Case Study of Business Process Reengineering as a Value Engineering

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Abstract

Organisation has their own objective i.e. profit maximisation. Similarly organisation is going for their resource utilisation in optimised way. So we have new approach considered as a Value Analysis (VA), as opposed to a simple technique, because it is both an organized approach to improving the profitability of product applications and it utilizes many different techniques in order to achieve this objective. 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),. Now a day's VA approach is use for manufacturing & service industry. For new products, the Value Analysis (VA) approach, which applies the same principles and many of the VA techniques to pre-manufacturing stages such as concept development, design and prototyping?

KEYWORDS:- BPR, Value Engineering, Value Analysis, Cycle of a product, TQM.

I. INTRODUCTION

In 1940s Value Analysis approach was developed by General Electrical comp after II world war. Since this time the basic VA approach has evolved and been supplemented with new techniques that have become available and have been integrated with the formal VA process. Today, VA is enjoying a renewed popularity as competitive pressures are forcing companies to re-examine their product ranges in an attempt to offer higher levels of customization without incurring high cost penalties. In parallel, many major corporations are using the VA process with their suppliers to extend the benefits of the approach throughout the supply chain. Businesses, big and small, will therefore benefit from understanding and applying the VA process. It is likely that those companies that do not take the time to develop this capability will face an uncertain future as the lessons and problems of the past are redesigned into the products of the future.

Value analysis is an organized procedure for efficient identification of un-necessary cost.

Value analysis is a cost reduction technique in which our objective is to attack the cost themselves and eliminate them wherever possible. Value of product can be increased by -

1. By decreasing the cost for same functions.
2. By increasing the functions for same cost.

$$\text{VALUE} = \frac{\text{Function}}{\text{Cost}}$$

Following are the type of value engineering

A) COST VALUE - It is the cost of manufacturing a product or a component.

B) USE VALUE – It may also be called as functional value . It considers the work done, functions performed or services rendered by the product/ component.

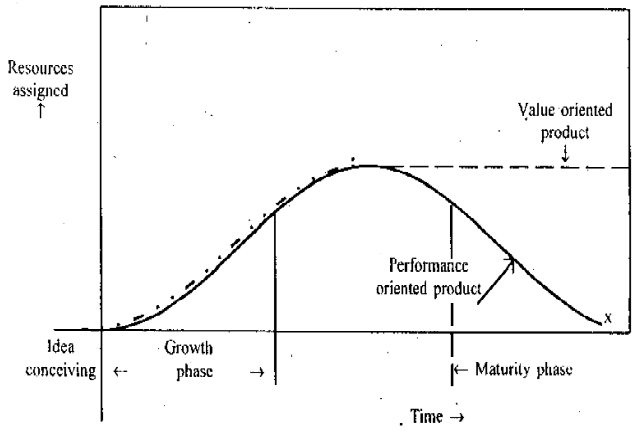
C) ESTEEM VALUE -It involves the qualities and appearance of the product, which attracts person and creates in them a desire to posses the product.

D) EXCHANGE VALUE –A product is said to posses exchange value if the same (because of its qualities) can be exchanged for something else.

2 REVIEW OF LITERATURE

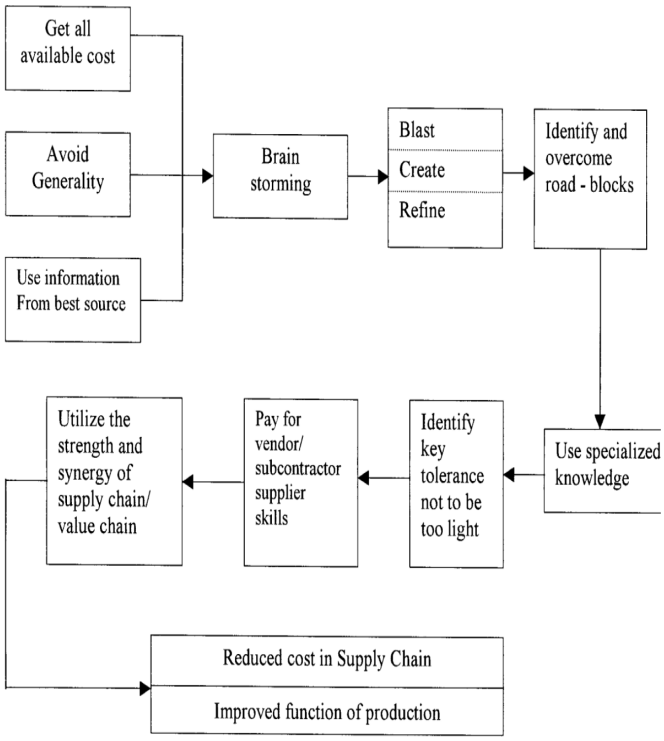
Cycle of a product & Value Engineering. Product life cycle involves various phases from idea conceiving to birth of product, growth phase and maturity phase. Up to growth phase, value engineering is not very relevant as compared to maturity phase. In the last phase, attempts are needed to reduce cost while retaining the functions. In such cases, product life cycle becomes flatter rather than declining in later phases. Value analysis is useful for products which are (i) imported, (ii) have long design to market time, (iii) high cost item, (iv) critical parts, etc. One may think of indigenous substitute for imported item. Shorter lead time and higher speed to market may be achieved through concurrent engineering. Pareto-analysis (or ABC analysis may be done to identify high value items. For these items, cost reduction efforts may be focused

Life cycle of a product and effect of value oriented product



3 Methodology in Value Engineering

Value engineering starts with the identification and classification of the items. Then functions of the items are identified. Each function is evaluated and compared. Alternative strategy for cost reduction or function improvement is adopted. The methodology is as follows:



Stage 1 - Orientation Phase

Orientation phase goes with
1.1 Forming the Value Analysis Team
1.2 An Extended Team Approach.
1.3 Selecting the Product.
1.4 Preparation.

Stage 2 - Functional Analysis

These are several steps within this stage:

Adopted from Bicheno, 1998

2.1 **Describe the Functions**
2.2 Rank the Functions by pair-wise Comparison

Stage 3 - Creative Brainstorming

This step requires a certain amount of creative thinking by the team. A technique that is useful for this type of analysis is brainstorming which allows all the members of the team to participate and for some strange yet ultimately commercial ideas to be promoted amongst the team.

Stage 4 - Analysis and Evaluation

Humour can foster this stage to a great extent. At this stage, the options available to the team are therefore to modify the design of the product to:

Completely eliminate the part from the design as it serves no useful purpose and has no customer value but only a cost.

Replace, substitute or modify the part and therefore lower the cost of the product by making an improvement to it.

The results of these team deliberations and evaluations of the different alternatives and potential changes can be recorded using a cost-benefit chart.

Stage 5 – Implementation

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.

Application of BPR tool as value engineering on Auto Feeder58 JUMBO DELUXE' AUTO FEEDER Mounting on Ginning Machine

5.2 Value Engineering–Of Auto Feeder

Study of Value Engineering is the main objective of this project work. This objective is achieved through a case study on Auto Feeder. A typical 58 JUMBO JADHAO DELUXE AUTO FEEDER is selected for applying & studying Value Engineering concept. This auto feeder is manufactured in Jadhao Industry Pvt Lmt. Amravati which is located nearby our institute. In the present case study, it is observed that the unnecessary increase in cost is due to the use of expensive material, increase in variety of hardware items and thereby increasing the inventory and so on. Therefore we have selected some components from AUTO FEEDER i.e. Tie Bar, Small Bracket for Idler Pulley, Nail Strip, Mounting Bracket for Upper Roll, Upper Roll, Glass Frame & Spacer Wooden Block and we have applied value engineering technique for the cost reduction & value improvement of these components of Auto Feeder.

With consistent efforts, they have gained a respectable position for manufacturing, supplying and exporting a wide array of qualitative Auto Feeder Ginning Machine. This machine is engineered by o skilled professionals using advanced technologies and superior quality of metals that is sourced from the certified vendors of the industry. Their offered Auto Feeder Ginning Machine is widely used for flawless feeding of raw cotton to gin machine. All these machines are acknowledged for their salient low maintenance & operational cost, reduced labour cost and improved productivity by 15-20%.

Features & Benefits:

- No Extra Electricity.
- No need to disassemble the Auto Feeder for machine maintenance.
- No need to disassemble the Auto Feeder for changing Auto Feeder cloth.

'58 JUMBO DELUXE' AUTO FEEDER

Component 1: Nail Strip

In this project we have considered a Jadhao Industry Pvt. Ltd. Manufacturing company located in Amravati. This firm is producing Ginning & Pressing Machinery and Cotton Handling System of which they export to various cities around the globe. All of the products manufactured here are conforming to the international standards. It is an ISO certified company. One of their models "Jadhao" 58 Jumbo Deluxe Auto Feeder have a component named 'Nail Strip' in.

Value Engineering is applied to the Nail Strip. The steps used for this purpose are as follows:-

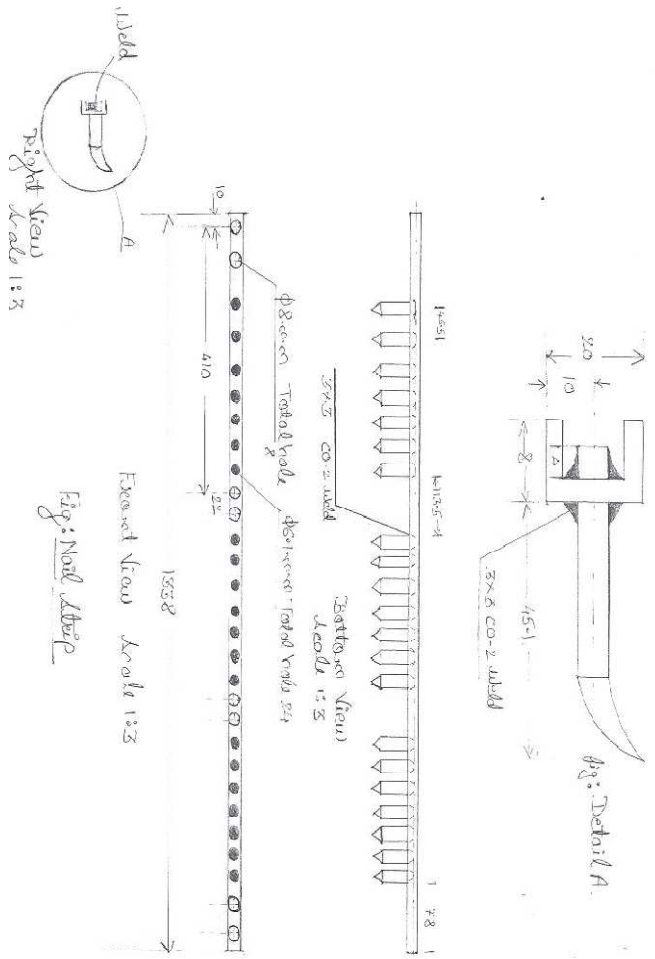
- Product selection plan
- Gather information of product
- Functional analysis
- Creativity
- Cost analysis
- Result

Steps followed during the analysis are given below:

1. **Plan For Product Selection**

Product selected is Nail Strip of auto feeder in ginning machine which is used to push cotton in the ginning machine. The present specifications of this part and its material used are costlier. Value of this product can be increased by maintaining its functions and

reducing its cost or keeping the cost constant and increasing the functionality of the product.



2. Obtain Product Information

Product specifications are:

- Material :– Mild Steel
- Pieces Produced annually :– 30000
- Process used :– Cutting, Grinding, Welding, Drilling & Painting
- Weight :– 1.2 kg
- Total Present cost :– Rs.240.4/piece

3. Functional Analysis of Present Functions:

Table 1.3: Functional Analysis

Name	Basic Function Verb	Basic Function Noun	Secondary Function Verb	Secondary Function Noun
Nail Strip	Push	Cotton inside ginning machine	Loose	Cotton

4. Develop Alternate Design Or Methods

During discussion these ideas were listed:-

- Change the arrangement of nail strip
- Keep material same
- Divide the nail strip into 3 parts

5. Function

- Cost
- Maintainability
- Quality
- Space

Each of these design criteria was given a weightage factor. These three categories were formed, viz. major, medium and minor. A score of 3, 2 and1respectively was assigned to each of the levels. The details are as given in the Table II

Table 1.2: Weight age Analysis

Weight age analysis	Points
Major difference	3
Medium difference	2
Minor difference	1

TABLE 1.3: PAIRED COMPARISON

Design Criteria	**Major difference**	**Medium difference**	**Minor difference**
Function		×	
Cost			×
Maintainability			×
Quality		×	
Space			

From the above paired comparison we get the following result:

Attribute	**Score**
Function	2
Cost	1
Maintainability	1
Quality	2
Space	0

Table 1.4: Attributes

The above ideas were discussed and the best feasible ideas were separated which were:-

- Change the arrangement of nail strip
- Use existing material
- Increase life
- Increase in functional performance

6. Cost Analysis

Table 1.6 : Cost Evaluation

Item	Material cost(Rs)	Machining cost(Rs)	Total cost Including overheads /Pc (Rs)
Nail Strip	120	68	240.4
Alternative	120	72	244.4
Difference /part	00	4	4

7. Result

The total savings after the implementation of value engineering are given below:

- Cost before analysis :– Rs. 240.4
- Cost after analysis :– Rs. 244.4
- Saving per product :– Rs. 00
- Percentage saving per product :– 00
- Annual Demand of the product :– 30000
- Total Annual Saving :– Rs. 00

In this component discussed above we have used the concept of Value Engineering to analyse the Nail Strip of Auto Feeder and with the critical evaluation of it we were able to increase the value of the product by substituting alternative in place of the one that is currently in use. The various advantages have been observed in terms of increase in production functional performance & value improvement. As we can see from result there is no cost reduction but there is improvement in the value of the component by increase in functional performance of auto feeder. So we can definitely use alternative of nail strip in place of existing nail strip.

Component 2 - Mounting Bracket for Upper Roll

In this project we have consider Jadhao Industry Pvt Ltd manufacturing company located in Amravati. This firm is producing Ginning & Pressing Machinery and Cotton Handling System of which they export to various cities around the globe. All of the products manufactured here are conforming to the international standards. It is an ISO certified

company. One of their models "JADHAO" 58 JUMBO DELUXE AUTO FEEDER have a component named 'Mounting Bracket for Upper Roll'.

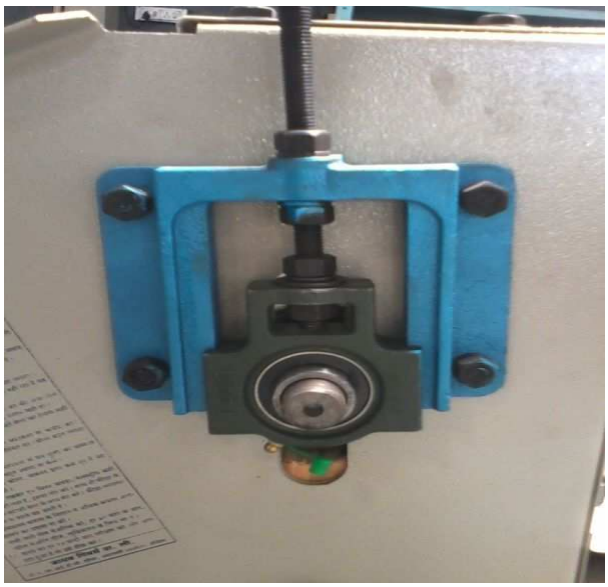
Value Engineering is applied to the Mounting Bracket for Upper Roll. The steps used for this purpose are as follows:-

- Product selection plan
- Gather information of product
- Functional analysis
- Creativity
- Cost analysis
- Result

Steps followed during the analysis are given below:

1. Plan For Product Selection

Product selected is Mounting Bracket for Upper Roll of auto feeder in ginning machine which is used to hold the upper roll. The present specifications of this part and its material used are costlier. Value of this product can be increased by maintaining its functions and reducing its cost or keeping the cost constant and increasing the functionality of the product.



Mounting Bracket for Upper Roll

2. Obtain Product Information

Product specifications are:

- Material :–Mild Steel
- Pieces Produced annually :– 16000
- Process used :– Drilling, Grinding & Painting
- Weight :– 1.33 kg
- Total Present cost :– Rs. 187.85/piece

3. Functional Analysis of Present Functions:

Table 2.1: Functional Analysis

Name	Basic Function Verb	Basic Function Noun	Secondary Function Verb	Secondary Function Noun
Mounting Bracket for Upper Roll	hold	Upper roll	adjust	Belt of pulley

4. Develop Alternate Design Or Methods

During discussion these ideas were listed:

i. Keep design same

ii. Manufacturing process change to fabrication

5. Evaluation Phase

For judging the ideas ,the following designs were considered:

- Function
- Maintainability

- Quality
- Space

Each of these design criteria was given a weightage factor. This was carried out as follows: each of the above criteria was compared with others, and depending on their relative importance, three categories were formed, viz. major , medium, and minor. A score of 3, 2 and 1 respectively was assigned to each of the levels .The detai**ls are as given in the Table.**

Table 2.2: Weight age Analysis

Weight age	**Points**
Major difference	3
Medium difference	2
Minor differences	1

Table 2.3: Paired Comparison

Design Criteria	**Major difference**	**Medium difference**	**Minor difference**
Function	×		
Cost			×
Maintain		×	
Quality	×		
Space			

From the above paired comparison we get the following result:

Table 5.6.4: Attributes

Attribute	**Score**
Function	3
Cost	1
Maintainability	2

Quality	3
Space	0

The above ideas were discussed and the best feasible ideas were separated which were:-

a. Use existing design

b. Difficult to assemble due to mismatch of holes

c. No cost reduction

6. Cost Analysis

Table 2.5: Cost Evaluation

Item	Material cost(Rs)	Machining cost (Rs	Total cost/ Pc including overh
Mounting Bracket for Upper Roll	109.5	35	187.85
Alternative	109.5	50	202.85
Difference /part	00	15	15

7. Result

The total savings after the implementation of value engineering are given below:

- Cost before analysis :– Rs. 187.85
- Cost after analysis :– Rs. 202.85
- Saving per product :– Rs. 00
- Percentage saving per product :– 00
- Annual Demand of the product :– 16000
- Total Annual Saving :– Rs. 00

In this component discussed above we have used the concept of Value Engineering to analyze the Mounting Bracket for Upper Roll of Auto feeder. As we can see from

above result there is no reduction in cost of the component & no value improvement so our proposed alternative component is not good as that of existing component and hence existing component i.e. mounting bracket for upper roll is better

CONCLUSION

In the present case study it is observed that the unnecessary increase in cost is due to use of expensive material, complicated design, increase in variety of hardware items and thereby increasing the inventory. Value Engineering is executed in this case study by implementing design modifications and change in materials of components.

The percentage cost saving per product of Upper Roll is 8.15%.

From this case study we can conclude that for Nail Strip the alternative can be used instead of existing components and as far as Upper Roll, are concerned the existing components are better than suggested alternatives.

REFERENCES

[1] Office of Management and Budget, “Value Engineering,” Circular No. A-131, May 21, 1993

[2] Society of Japanese Engineering,” GUIDEBOOK FOR VE ACTIVITIES = A BASIC VE MANUAL =”, http://www.sjve.org/download/914/stream/ 1981.

[3] Miles, L.D., Techniques of Value Analysis and Engineering, McGraw-Hill, 1972

[4] Value Engineering Manual, January 1, 2004

[5] Value Management: Surviving In The Millennium Via Diligence Rewarded. Management Accounting, McDowell, T. 1996.

[6] Cooper, R. and Slagmulder, R., Target Costing and Value Engineering Productivity Press, Portland , OR, USA (1997).

[7] Jay Mandelbaum & Danny L. read, 2006, “Value Engineering Handbook, IDA paper P-4114, pp. 37, 54, 73