

Value Analysis of a Laptop

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Abstract: This paper concentrates on value engineering and analysis of personal laptop. Principles of value engineering have been primarily applied for weight Optimization of laptop chassis for cost effectiveness as well as improvement in performance. The manufacturing industries are practicing to innovate and improve the design of product by weight optimization and elimination of redundant parts of product. Value Engineering defines a process in which the value of the product can be increased by significantly by decreasing its cost to achieve a long-term growth.

Keywords: value engineering, laptop

1. Introduction

In the modern world, one of the most important and necessary items of use is a computer or a laptop. It plays a vital role in his every day work and is of great help. A laptop is a more compatible and compact version of a computer. It's just like our notebook but it's an advanced one. Laptops have become necessary not only for working professionals but also for students. This increase in demand has led to requisite that the laptops be even more portable as well as cheap. The various parameters that can be optimized for cost effectiveness are important components in a laptop along with their weight. Reduction in weight can be achieved by redesigning the chassis and eliminating the components that are no longer used. Value Engineering methods are very important and useful in Cost Reduction and sustain their profitability. Value Engineering is one of the most effective techniques available to identify and eliminate unnecessary cost in manufacturing processes, design, test, construction, maintenance, data specifications and practices. Although its application to procedures, specifications and practices is less well known, its effectiveness in these areas has been proven. Value Engineering is a systematic approach to direct and analyzing the function of equipment, services, systems and supplies for the purpose of achieving their essential functions at the lowest cost with required reliability, performance, safety and quality.

2. Optimization of laptop: A case study analysis

In this paper we have discussed a product by very popular brand Dell XPS 15(9570). The major products by this company are computers, workstations, laptops and other computer hardware items. Value engineering is applied as per the following step to the XPS 15:

- Functional Analysis Worksheet is prepared for the different parts of the product.
- Cost evaluation is done for each part.
- Creativity Worksheet
- Selection of alternative is done
- Conclusion



Fig. 1. Various phases of value engineering

Table 1
Functional analysis worksheet

Part Name	Function		Part	
	Verb	Noun	Basic	Sec
Chassis (Carbon Fiber)	Hold	Assembly	X	
	Provide	Strength		X
	Provide	Aesthetics		X
4k-Display (Touchscreen)	Provide	Output	X	
	Provide	Input		X
Keyboard & Trackpad	Provide	Input	X	
Cpu/Gpu I9/1050ti	Provide	Processing Power	X	
Motherboard	Provide	Circuitry	X	
Software (Win10)	Provide	User Interface	X	

Table 2
Cost sheet initial

Part	Quantity	Cost (Rs.)
Chassis	1	7,000
4k-Display(Touchscreen)	1	40,000
Keyboard & Trackpad	1	5,000
Cpu/Gpu I9/1050ti	1	103,000
Motherboard	1	15,000
Software (Win10)	1	6,000
Total		176,000

3. Creative phase

In order to get the maximum efficiency from laptop without thermal throttling the group restored to the brainstorming technique. The following ideas were generated during this phase.

- Improve thermal performance
- Use less heating CPU
- Use cheaper alternative for chassis material
- Use lower resolution Display

4. Evaluation phase

From various benchmarks and reviews it has been evaluated that the i9 processor is two overpowered for this chassis of XPS 15. So the laptop gets over heated due to insufficient cooling. Also the 4k-display consumes too much power in terms of both processing power and electric power.

5. Recommendation phase

Following alternatives are recommended for reducing cost as well as performance improvements.

- Alternative-I- Change processor to i7.
- Alternative-II- Reduce display resolution to 2k.
- Alternative -III- Use aluminum for chassis

6. Implementation Phase

The following cost benefits were obtained after

implementation of above ideas:

Table 3
Cost sheet after recommended changes

Part	Quantity	Cost (Rs.)
Chassis	1	4,000
4k-Display(Touchscreen)	1	20,000
Keyboard & Trackpad	1	5,000
Cpu/Gpu I9/1050ti	1	63,000
Motherboard	1	15,000
Software (Win10)	1	6,000
Total		113,000

7. Conclusion and future scope

Table 4
Difference in Costs

Original Cost (Rs.)	Proposed Alternative Cost (Rs.)	Savings (Rs.)
176,000	113,000	63000

From this Case Study it is observed that how the value engineering is used for the cost reduction without the change in the product design & its value. The Value Engineering process and procedures are generally well defined and well-understood at all levels in the industry. VE is recognized as an effective way to improve the performance of a product with reduction in cost. The quality (qualifications and experience) of the team leader and specialists is a key ingredient to the success of the VE program. It is more effective and influential on the performance, quality, and cost of a product when done relatively early in the production schedule. In future, furniture product design can be modified so that the value of the product can be enhanced. Also other Industrial Engineering techniques can be used for further improvement in the product.

References

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