(IJTBM) 2020, Vol. No.10, Issue No. III, Jul-Sep e-**ISSN: 2231-6868, p-ISSN: 2454-468X**

THE EFFECT OF USING VALUE ENGINEERING TO RESTRUCTURE PRODUCT LIFE CYCLE COSTS TO GAIN COMPETITIVE ADVANTAGE AND MARKET SHARE

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ABSTRACT

The main goal of companies is to achieve a competitive advantage as well "to reach the maximum profit possible while maintaining the basic principles of quality and brand name in a strong competition environment and the different desires of customers, which caused a challenge" among companies in adopting modern trends of management and orientation towards modern manufacturing methods and accounting techniques Administrative, value engineering is an effective means that relies on creative solutions to solve the evaluation of what exists and find alternatives without affecting the quality or functionality of the product characteristics as it works to introduce modernization and addition to product design and exclude unnecessary ideas, and it can be said that it works to restructure costs In the product life cycle by focusing work on research and development and design activities, studying product functions and evaluating the goal of adding value, research has concluded that the application of management techniques in the field of industrial companies work, especially in research and development and design activities, contributes to driving the business environment and gaining a competitive advantage

THE FIRST REQUIREMENT - RESEARCH METHODOLOGY

Research problem

Companies suffer in the modern business environment in light of the industrial openness and the development of production and manufacturing methods from increased competition and the difficulty of maintaining the desired competitive site and the continuous increase in resource costs with multiple customer desires in addition to entering counterfeiting companies that aim to provide products similar to those offered by the leading companies in the field of business At low costs by relying on external ideas and designs, and therefore they provide high costs that you can use in competition.

Research hypothesis

The research adopts the idea that restructuring the product life cycle costs using value engineering technology will lead to maintaining the market share and not allowing competing and imitation companies to influence sales percentages as well as "providing valuable products to the customer."

Research objective

The research aims to focus on the product life cycle and its costs as well as studying research, development and design activities to find products that ensure the company's ability to compete in the business environment. The research comes as an attempt to study the cost structure of products through the use of value engineering.

Research sources

- Theoretical study through relying on many books, studies and research available from scientific journals and the Internet to enrich the current study with a detailed detailed description of the information
- Field study through a questionnaire for the opinions of specialists in the administrative and accounting field.

THE SECOND REQUIREMENT- PRODUCT LIFE CYCLE AND COSTS

1- The concept of the product life cycle

Every product has a life cycle that varies according to the market, product and customer perspectives. From the market point of view, the product life cycle is a succession of the product's life in the market from the product offering and growth in sales and maturity and then deterioration and decay, and the product's survival period in the market varies according to the nature of the product as In some cases, the product will remain in the market for a long time until it reaches the stage of deterioration (Al-Hadidi, 2006: 19).The product life cycle can be represented from the market point of view, as shown in the condemnation of it in Figure (1).

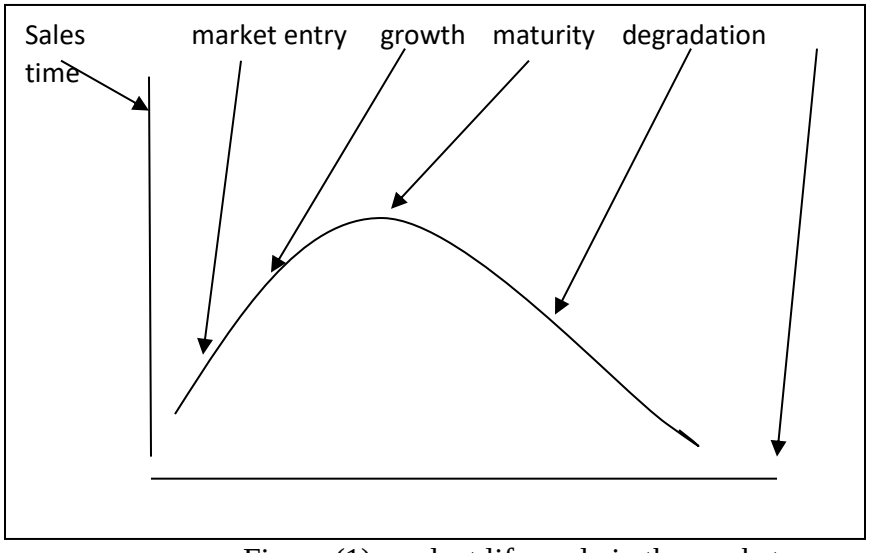


Figure (1) product life cycle in the market

(IJTBM) 2020, Vol. No.10, Issue No. III, Jul-Sep e-**ISSN: 2231-6868, p-ISSN: 2454-468X**

Source : Hussein**,** Ahmed Y. , 2008, Development of product life cost Analysis Tool ,Master , Faculty of Mechanical Engineering ,P6

The life cycle of a product from a market point of view consists of the following stages: (Blocher, et al, 2005: 398)

• The stage of providing the product is characterized by this stage of lack of competition, low percentage of sales and high cost, the reason for this is the increase in research and development expenses and the capital and marketing costs as a result of creating productive and marketing factors as the price is high as a result of the distinction of the product from the rest of the products, and at this stage the focus of the company's management is towards The design, excellence and marketing that leads to the development of new products and the adoption of pricing strategies in light of the competitive position in the growth stage.

• Growth stage In this stage, the product spreads on the market and sales are characterized by a gradual rise because the product is still distinguished and in return the intensity of competition increases and the price begins to decrease.

• Maturity and stability stage In this stage, the form of competition is largely determined and the product becomes a fixed share in the market and sales continue to rise, but at decreasing rates and the exclusivity of the product is no longer an advantage and competition for quality, cost and brand name.

• The stage of deterioration and decay begins the decline in the market share of the product as it is characterized by a decrease in the selling and sales price due to the increase in the number of competitors.

As for the product life cycle from the point of view of production and industry, some have emphasized that this cycle is limited to activities that are in direct contact with adding value to the product or service in the company based on the principle of the value chain. Source (Horngren, et al. 2012: 6) Figure No(2)it shows the value chain activitie

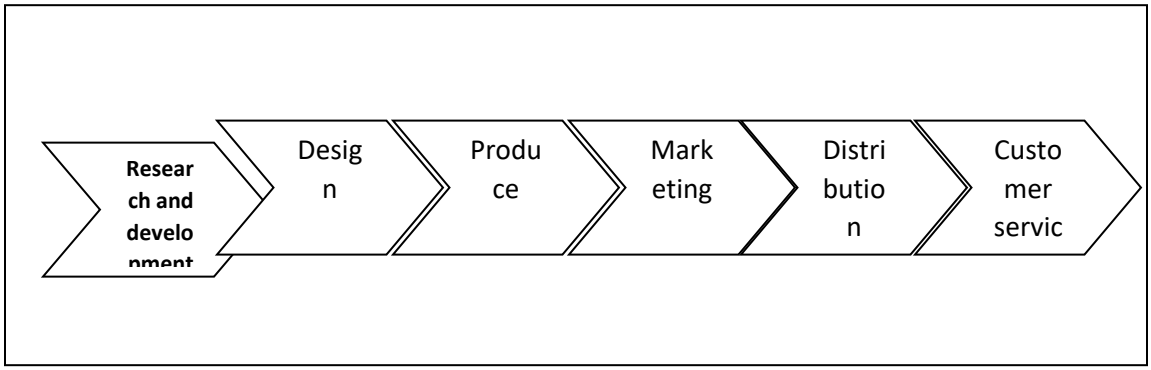


Figure (2) the value chain activity

Source: Charles T. Horngren. Srikant M. Datar. Madhav V. Rajan,(2012), **Cost accounting**

managerial emphasis Library of Congress Cataloging-in-Publication Data ,14 edition.p:6

The value chain activities are divided into a set of activities as shown below:

- **Research and development** :This activity is concerned with generating relevant ideas and trying out new products and services (Horngren, et al., 2012: 6). Note that the function of research and development activity is not limited to trying new products only, but extends to increasing product functions, which makes it more attractive to customers and thus adding value. Likewise, the activity of research and development leads to increased efficiency and thus reduces production costs and helps the company in both cases by reducing costs and raising the benefit of the product (Hill & Jones, 2010: 82).
- **Product design and operations**: The activity is concerned with product design, detailed process planning, engineering, and product and process testing (Horngren, et al., 2012: 6).
- **Production**:The company's production process helps reduce costs by coordinating the work, arranging it, and accomplishing work in a way that ensures the exit of high-quality products, which leads to differentiation and higher value addition (Hill & Jones, 2010: 83).
- **Marketing**: There are many ways to perform the marketing and sales activity in the company that helps to create value by placing brands and advertisements. The marketing function can increase the value of customers who are waiting for products of interest attributed to the product by giving a positive impression of the company's products and what are the specifications and benefits of the product (Hill & Jones, 2010: 8).
- **Distribution**: The mission of this activity is to distribute processing orders and ship products to customers (Horngren, et al., 2012: 6).
- **Customer Service**:The role of the customer services activity is to provide after-sales service and support, as this task can create superior performance by solving customer problems and support after they have purchased the product. For example, Caterpillar, the heavy equipment manufacturer, can get spare parts for their products to any point in the world in Within twenty-four hours, thus reducing the amount of downtime for customers who have malfunctions in their equipment. (Hill & Jones, 2010: 8).The customer service activity is not limited to this only, but also to other operations such as installation and guarantee, and it is by calling the phone or through the company's website. Horngren, et al. , 2012: 6).

2- The costs of the product life cycle

The product life cycle method focuses on tracking and collecting costs associated with the stages of the product life cycle from the beginning of research and development activities to the end of after-sales service activities and providing appropriate information that helps decision-makers understand and manage these costs and trying to reduce them using appropriate methods and technologies for each stage of the product life cycle with Maintaining the customer's requirements, and the main goal of studying these costs is to determine these costs and measure them with the expected returns after production or not (Salman, 2003: 58), and the product life cycle costs include all costs associated with

the product starting with "from the first idea and perception of the product to what services After sales (Morse, 2003: 378). There are those who divide the costs of the product life cycle according to the degree of commitment and verification as shown below: (Al-Shaabani and Al-Yamour, 2012: 206)

Initial costs: These are pre-production costs and include research and development costs, design and testing of models and engineering costs, that is to say, all costs before the production process and these costs are not recoverable and these costs are considered as deferred revenue costs that are amortized over a number of years

Regular costs: This includes the scientific manufacturing costs of the product, labor materials and other requirements, and also includes marketing costs, in other words, all the direct and indirect costs of production, marketing, and after-sales services, also called dimensional costs.

Costs incurred by the customer: that is, costs after the purchase, such as installation, operating, and use of the product.

Environmental costs: These include the costs required to dispose of the product, as well as environmental fines and violations, from the application of environmental laws.

THE THIRD REQUIREMENT: VALUE ENGINEERING

1- The concept and definition of value engineering: Products or services are considered good value if their cost and job performance are appropriate. On the contrary, products or services are considered not good value if they lack the appropriate job performance or the appropriate cost, and accordingly the value increases with increasing performance. Career or cost reduction as follows (Miles, 1989: 4-5):

• The value always increases by reducing costs while maintaining the required level of job performance.

• The value increases by increasing the job performance if the product meets the customer's desires and needs and is ready to pay for the job performance.

It can be said that the value consists of three main components, which are as follows (Al-Yousefi, 2010: 3): -

(Function): means the specific work for which the project or the product was found.

(Quality): Conformity with customers' requirements, desires and expectations.

(Total Cycle Cost): means the initial cost as well as all indirect costs.

Some approaches deal with the terms value engineering and value analysis as two methods used to achieve the target cost by focusing on product functions, but by reference to the literature issued by the International Society of American Value Engineers it became clear that value engineering is

synonymous with value analysis, in addition to applying value under value SAVE International, 2007: 2).

Value engineering has been defined as "a technique for analyzing program, project, systems, product, building, and supply function functions directly to improve performance, reliability, quality, safety, and overall cost" (Nelson, 2006: 22). It is defined as "activities concerned with improving design and specifications in the stages of research, development and production for product development" (Heizer and Render, 2011: 194).

Objectives of Value Engineering

Value Engineering seeks to achieve the following goals:

- Reducing costs that do not add value to products by reducing the amount of cost vectors for activities that add value on the one hand and reducing costs that add value to achieve greater efficiencies in the activities in which the activities are added.(Horngren et al., 2003, 416).
- Achieve improvements in product design by making changes to material specifications or making modifications to manufacturing methods (Hussain, 2003: 98).
- Achieve the best balance between the cost of the product and its reliability (reliability) and performance (Gongbo 2009: 18).
- Reducing the cost of the process, material or product.
- Achieve customer satisfaction with the process, material, or product. (Aziz and Al-Bakri, 2011: 240).
- Consolidating the profits of economic units as well as reducing costs by identifying the product functions that the customer wants to pay a lot for and this leads to maximizing profits (Yoshikawa et al., 2002: 11).

3-Stages of Value Engineering

The value engineering technique is characterized by the presence of a number of sequential steps or stages that should be followed when conducting a specific study to analyze the value of products in order to ensure the effectiveness of the application. They point to more than that (Kandouri, 2006: 58).

The first stage - studies prior to the value

According to this stage, the value study is prepared according to the following (Al-Yousifi, 2000: 39-40):

1- Choosing a multi-functional team A multidisciplinary working team is selected in order to obtain the largest possible number and the team often consists of five to nine individuals, but if the project is large then the work team can be divided into two or three teams and it is not necessary that a team have Working in knowledge of value engineering, as it is not required that all team members be specialists in value engineering, but that the team must be led by a certified value specialist.

2- A detailed review of the project and the field of study by the multifunctional team.
3- Determine the detailed cost of the project to be studied and, through it, the team determines the amount of savings required to achieve it.
4- Setting a timetable specifying the beginning and end of each stage of the study.

Second stage - business plan or value study

This stage is divided into six basic stages, as follows:

1- Information

According to this stage, the internal and external data related to the study are obtained, as well as the choice of data sources as well as identifying the requirements of customers and costs related to the product, the goal of this stage is to collect information for the specific project or product in addition to the information gathered in the previous stage of the study. Information is collected from vendors, competitors, and customers, for example, what does the customer want and what desirable characteristics are in terms of weight, size, and appearance, as well as information from company departments such as the Systems Engineering Department, the Engineering Department, and the Engineering Department (Aziz and Al Bakri , 2011: 242) .

2- Job Analysis

This stage is the essence of value engineering, as functional analysis is defined as the activity by which performance and cost of each job or product specifications are examined, that the primary goal of this stage is to define the primary and secondary functions of the product for the purpose of meeting customer requirements (Alshaya, 2009: 28).

3- Creativity

This stage is sometimes called the meditation stage. This stage represents the release of talents and stimulating creativity through the use of brainstorming method or other methods, as the members of the specialized team study the value by offering creative ideas freely and without restrictions to find proposals and alternatives that achieve jobs either in a better way or at a cost Less or both, after that all ideas and proposals are recorded, this stage enables the team members to present their ideas and perceptions about finding solutions and proposals for the issues and problems raised and it also creates an appropriate environment to show scientific capabilities based on experiences and expertise, that this step determines the alternatives That performs the same function without compromising quality (Dell'Isola, 1997: 221).

4- The evaluation

The aim of this stage is to uncover the ideas and concepts that were raised in the previous stage (the creativity stage) in order to improve the value, that the ideas that are obtained are ideas examined accordin- Development

5-Development

This stage is sometimes called the reporting and planning stage for implementation, and it is the penultimate stage of the value study stages. When the most acceptable alternative is identified, the value engineering team develops it through charts, cost estimates and other technical analyzes to ensure the validity of the alternatives that have been generated, and it can be divided Alternatives are three types: (Gongbo, 2009: 25).

- Alternatives that can be implemented directly because they do not require additional work.
- Alternatives that require additional work, such as testing or marketing validation, and no major constraints are expected from them.
- Alternatives that represent new concepts, so they require additional work before implementation, significant capital, and possibly changes in economic unit policy.

6- The show

The main goal of the presentation phase is to achieve harmony and commitment between the designers and the project financiers, as well as the relevant stakeholders in order to move forward in implementing the directives. The directives are summarized by presenting the final proposals to the decision makers and the project owners in order to obtain their approval, and through the presentation and discussions among them The team will either agree to for the purpose of implementation or go to obtain additional information if the project needs, as written documents, proposed alternatives and supporting data are presented and confirmation that the implementation plan is accepted by the administration. (Gongbo, 2009: 25).

The third stage - the post studies stage of the value

The goal of this stage is to finalize the value engineering report, as it is ensured that all value engineering proposals are included and developed during the work plan, then after that it is confirmed that the designer responded to these proposals and included them in the project design or rejected these proposals (Al-Yousefi, 2010 : 12). At this stage, emphasis is placed on presenting the ideas reached by the study results, then preparing a summary of the reports on the proposed alternatives, discussing them, studying how to apply them, discussing the factors that affect the process of implementing alternatives or proposals, as well as monitoring the work plan on an ongoing basis (Farrell, 2010: 27).

THE FOURTH REQUIREMENT: THE ROLE OF VALUE ENGINEERING IN STRUCTURING PRODUCT LIFE-CYCLE COSTS

The increase in global competition, technological innovation and the diversity of customer demands have caused a significant decrease in the product life cycle, as the product has become no more than three years old and this change has contributed to a great need to know the costs of the product life cycle for the following reasons: (Blocher et al, 2002: 162).

• The companies found in many industries that the largest part of the costs of the product life cycle is committed at the planning and design stage, whereas at the manufacturing stage the costs have been achieved, so companies have found that cost management is accomplished more effectively at the design, research and development stage and not in the manufacturing phase This new trend in cost management has made management accounting focus more on providing information related to costs that are adhered to at the planning and design stage of the product life cycle.

• Administrative accounting systems previously focused "on the manufacturing stage only, and dealt with the costs of pre-manufacturing (research, development and design) as period costs, not product costs, and given" the magnitude of research and development costs in a modern business environment, companies need to define all costs of the product life cycle To determine whether the profits gained during the manufacturing phase will cover the costs achieved in the pre and post production stages (Ernst & Youong, 2000: 23).

• Most accounting systems prepare their reports related to the profits gained on the basis of a period after a period and because of the short life cycle of the products and their overlap between the stages or accounting periods, After a product and for several periods during the product's life cycle. (Drury, 2000: 890)

In the past decades, efforts have focused on reducing costs through process management methods such as JIT and others that help reduce production or manufacturing costs, and recently, management accounting in companies has used other technologies such as ABC and value engineering for the purpose of identifying and studying activities and reducing costs that do not add value. (Al-Shaabani & Al-Yamour, 2012: 209), through the above it has become necessary to study the stages of the product life cycle and its costs and analyze the costs using appropriate techniques and value engineering is one of the targeted cost techniques that reduce costs and raise performance and increase the functional characteristics of products through The analysis of the components of the product and its functions in a scientific way enables the company to know the parts that the product must contain and what parts should be deleted and replaced with better ones that give higher performance, and the work of value engineering is to analyze the product functions and identify the components that constitute it and then reconfigure those functions that It is likely to cause increased costs without introducing a new addition to the product. (Al-Jabali, 1998: 25)

From the above, it can be said that the value engineering technique focuses on research and development costs and design as one of the activities that determines the total cost of the product and is responsible for the extent of proportionality between the cost and the outstanding job performance of the product and figure (3) shows the role of value engineering in analyzing the product and focuses it on the research and development and design stages.

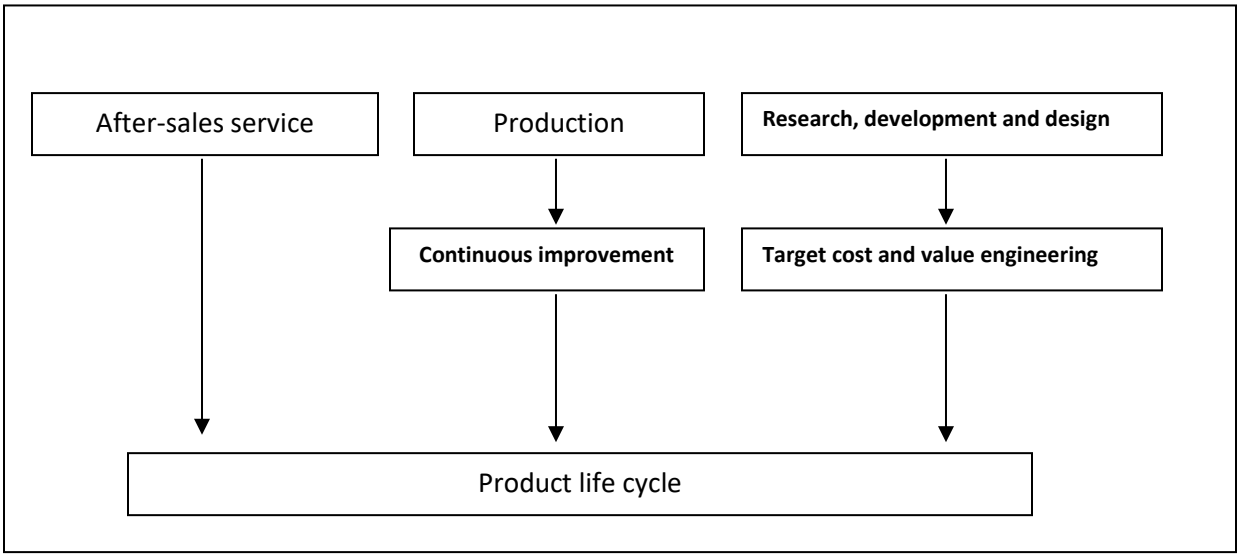


Figure (3) cost Product life cycle

Source: Kaplan, et,al (2007), Management Accounting ,5th ed, Person International Edition, Person Prentice Hall, New Jersey,USA.317

Responding to and adapting to the requirements of the engineering design of the product simultaneously with the technological developments that take place in the field of design is considered a support that corresponds to the constantly changing requirements and desires of the customer.

- Increase market share
- Maximize profits

As for the long-term, it is targeting

- Maintaining existing customers and earning new ones
- Gain a new competitive advantage with an impact that achieves unique advantage over competitors' advantages

Where value engineering technology can be applied to design work in all stages or on any part of the product, it may be the results of a value study to cancel the original design and find another design, in other words, a redesign that achieves the required job performance at the lowest possible cost, and it should be noted that The cost of applying value engineering increases with the advance of the design stage, and this increase is caused by the additional time needed to redesign, as the study of value engineering must begin at an early stage to avoid time and the previous cost before the study. (yasuhiro & others, 2013; 16-34)

Accordingly, when achieving the final design of the product, it must match the desires and needs of the customer with the functions and characteristics of the product by using the following cost analysis steps: (Horngren , 2006: 426)

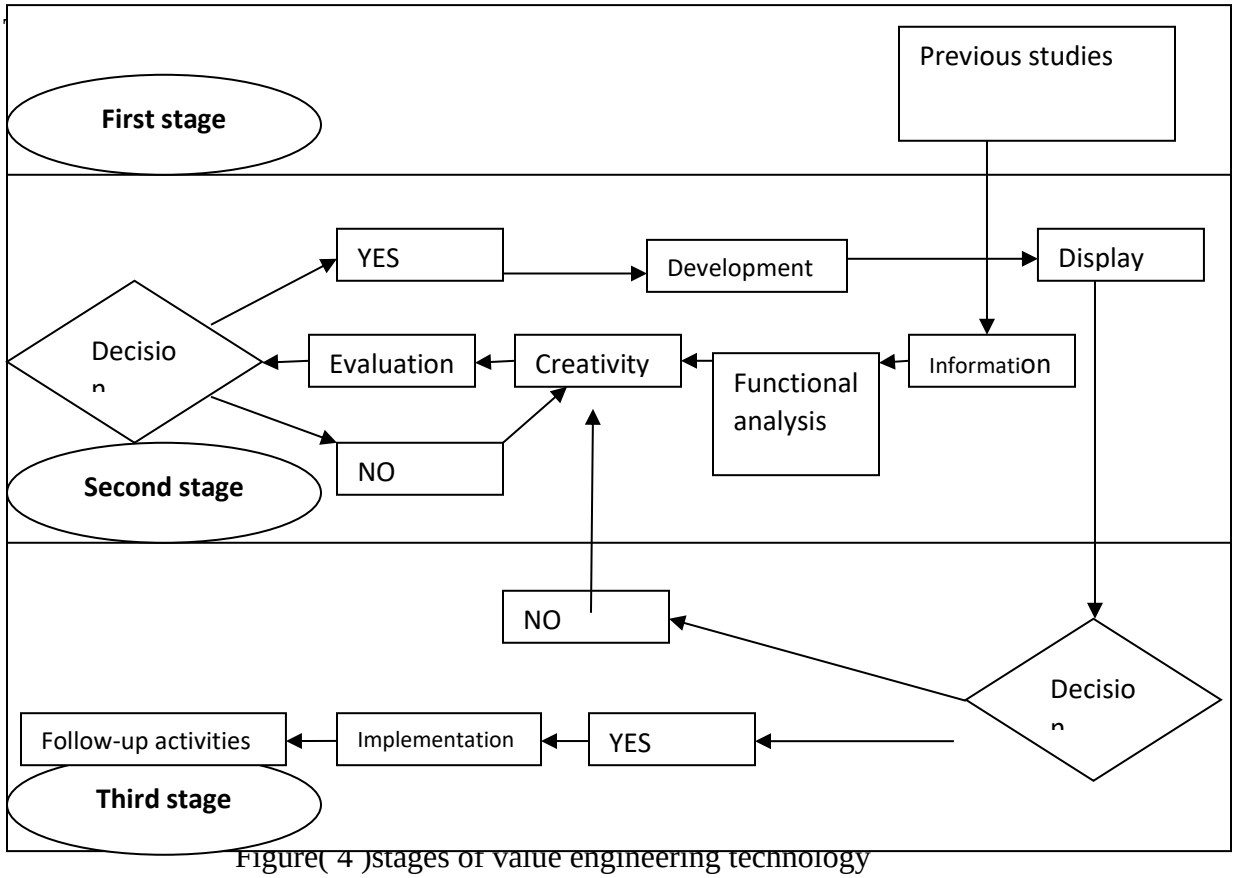
• Analyzing product functions for the purpose of achieving cost reductions

• Determine the job accomplished by the parts of each main component of the product

• Determine the costs due for the basic product parts

• Determine the relative importance that the customer places on the different product functions

Practical reality has proven that value engineering studies are an effective means with a positive role in the qualitative upgrading of engineering work through application at the design stage and have been applied widely in Japan in many industries. Figure 4 shows the stages of value engineering technology and how to analyze and evaluate product functions.



Figure(4)stages of value engineering technology

SOURCE- SAVE International (2007): "Value Standard and Body of Knowledge":12

The researchers believe that the application of value engineering technology leads to obtaining a good market share and reducing costs, because it focuses in its work on research and development and design activities, and therefore it is responsible for finding products with unique features, in other words that companies that apply value engineering technology start thinking about the product The new or the renewal of the current product at the time of its reaching the maturity stage, at this stage

the product has taken adequate time in the markets and it is possible that competing or imitated companies can provide products that carry the same functions and technical characteristics of the product, as well as reducing the costs of the product and as a result the company that applies Value engineering technology can drive to the market many and varied products that are uniquely distinguished by the rest of the companies, only after a certain period of time and thus these companies remain a leader in competition and it is difficult for competitors to reduce their market share and the form below shows the competition market before and after the application of value engineering technology.

FIFTH REQUIREMENT: STATISTICAL ANALYSIS-THE EFFECT OF VALUE ENGINEERING ON THE PRODUCT LIFE CYCLE

Value engineering is considered one of the most important factors affecting the costs of the product life cycle, as a questionnaire was formulated to know and measure this effect through the SPSS V.21 program to find out the results and analyze it and use the multiple linear regression model to measure the impact. The questionnaire was divided into two axes:

The first axis: value engineering

The second axis: the costs of the product life cycle

Multiple regression analysis method

The multiple regression analysis model is one of the most used statistical analysis tools, and the multiple regression model is concerned with estimating the relationship between a quantitative variable which is the dependent variable and several other quantitative variables which are independent variables. Assuming there is a dependent variable and independent variables, the model can be formulated as follows:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \varepsilon_i$$

Where (y_i) is the dependent variable and (x_1i, x_2i) are the independent variables and (ε_i) is the random error and (β_0) is a constant value that expresses the value of y when the values of (x_1, x_2) are zero. (B_0, β_1) expresses the regression coefficients of the independent variables. The independent variables represent the first axis paragraphs (value engineering), which number (5) variables (x_5, x_4, x_3, x_2, x_1), and the dependent variables represent the second axis paragraphs (product life cycle costs) and the number (5) variables (y_5) , Y_4, y_3, y_2, y_1), after measuring the effect of the first axis paragraphs on paragraph (1) of the second axis (y_1) and choosing the best model for the data, the value of (0.986 = R ^ 2) which means (coefficient of determining the best model) That is, the independent variables explain (98%) affect the dependent variable (y1), meaning that the remainder are considered random errors in choosing the specific answer or are due to unknown errors, as their value reached (2%), as shown in the table below:

Table No. (1) Criteria for the best regression model

Model Summary

Model	R	R Square[b]	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df 1	df2	Sig. F Change
1	.993[a]	.986	.985	.372	.986	1331.374	5	95	.000

a. Predictors: X5, X3, X2, X1, X4

b. For regression through the origin (the no-intercept model), R Square measures the proportion of the variability in the dependent variable about the origin explained by regression. This CANNOT be compared to R Square for models which include an intercept.

The effect of each variable of value engineering can be measured on the first variable of the product life cycle axis, as the table below shows the effects for each of the variables.

Table No. (2) Model's transactions and their impact

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	X1	.243	.082	.272	2.973	.004
	X2	.246	.099	.199	2.485	.015
	X3	.479	.093	.371	5.143	.000
	X4	.059	.120	.046	.493	.003
	X5	.103	.083	.113	1.246	.016

a. Dependent Variable: Y1

b. Linear Regression through the Origin

As for measuring the impact of value engineering on paragraph (2) on the product life cycle costs axis (y_2) and choosing the best model for the data, it is shown that the value of (0.923 = R ^ 2) which means (the coefficient of determining the best model), meaning that the independent variables explain (92) %) Affects the dependent variable (y2), i.e. what is left is considered a random error in choosing the specific answer or is due to unknown errors as its value (8%), as shown in the table below:

Table No. (3) The criteria for the best regression model

Model Summary

Model	R	R Square[b]	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.996[a]	.923	.993	.285	.993	755.279	5	95	.000

a. Predictors: X5, X3, X2, X1, X4

b. For regression through the origin (the no-intercept model), R Square measures the proportion of the variability in the dependent variable about the origin explained by regression. This CANNOT be compared to R Square for models which include an intercept.

Measuring the effect of the value engineering paragraphs on paragraph (3) of the product life cycle costs axis (y_3) and choosing the best model for the data shows that the value of (0.887 = R ^ 2) which means (the coefficient of determining the best model), meaning that the independent variables explain (88%)) Affects the dependent variable (y3), meaning that what remains is considered a random error in choosing the specific answer, or it is due to unknown errors, as its value reached (12%), as shown in the table below:

Table No. (4) The criteria for the best regression model

Model Summary

Model	R	R Square[b]	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.893[a]	.887	.886	.366	.887	1408.020	5	95	.000

a. Predictors: X5, X3, X2, X1, X4

b. For regression through the origin (the no-intercept model), R Square measures the proportion of the variability in the dependent variable about the origin explained by regression. This CANNOT be compared to R Square for models which include an intercept.

Measuring the effect of value engineering on the product life cycle cost axis (y_4) and choosing the best model for the data shows that the value of (= 0.787 = R ^ 2), which means (parameter determining the best model), meaning that the independent variables explain (78%) affect the dependent variable (y4) In other words, what is left is considered a random error in choosing the specific answer, or is due to unknown errors, as its value reached (22%), as shown in the table below:

Table No. (5) The criteria for the best regression

Model Summary

Model	R	R Square [b]	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.994[a]	.787	.986	.263	.987	1447.430	5	95	.000

a. Predictors: X5, X3, X2, X1, X4

b. For regression through the origin (the no-intercept model), R Square measures the proportion of the variability in the dependent variable about the origin explained by regression. This CANNOT be compared to R Square for models which include an intercept.

Measuring the effect of value engineering paragraphs on paragraph (5) of the product life cycle costs axis (y_5) and choosing the best model for the data shows that the value of (0.986 = R ^ 2), which means (coefficient of determining the best model), meaning that the independent variables explain (98%)) Affects the dependent variable (y5), meaning that what is left is considered a random error in choosing the specific answer, or is due to unknown errors, as its value reached (2%), as shown in the table below:

Table No. (6)The criteria for the best regression model

Model Summary

Model	R	R Square[b]	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.993[a]	.986	.986	.371	.986	1369.464	5	95	.000

a. Predictors: X5, X3, X2, X1, X4

b. For regression through the origin (the no-intercept model), R Square measures the proportion of the variability in the dependent variable about the origin explained by regression. This CANNOT be compared to R Square for models which include an intercept.

CONCLUSIONS

• Value engineering is a modern management accounting technique and an important imperative in managing strategic cost to ensure a fair distribution of valuable production resources

• That counterfeiting companies adopt manufacturing products similar to current products in the market environment at low costs by adding some minor changes that gave them a competitive advantage to gain a market share and add another type of industry in the field of business

• Because of the development of the manufacturing environment and the multiplicity of customers 'tastes, the advantage of competitiveness at cost has not become the main advantage compared to" past decades, as the importance of other competitive advantages that can be represented by the value of products at the customer has increased

• The use of management accounting techniques helps in controlling cost elements because the costs that are planned in the initial stages are those that occur during the production stage

• The results of the statistical analysis showed that the value engineering affects an average of (95%) on the product life cycle costs

• The results of the statistical analysis showed that the value engineering directly affects the activities of research, development and design, due to the fact that random errors were the average percentage (5%).

RECOMMENDATIONS

• Adoption of value engineering because it helps define standard production costs as well as direct costs on jobs that add value to the product

• Intellectual capital in the modern business environment is one of the most important assets of companies and therefore must be developed and developed because it is the main reason for the sustainability of business

• Focusing on research and development and design activities, as it is the weapon of companies in the face of counterfeiting and competition companies that work to gain a market share in the market environment through low cost.

• To ensure market leadership and competition leadership, companies must continuously provide innovative products with competitive advantages and functions

• Focusing on the customer and building ideas depends on his views, and therefore must use modern technologies that translate these views into products that generate value to the customer

• The modern business environment is competitive and fast changing, and the average life of the product has become short, and accordingly, companies must keep abreast and draw a new product plan on the business table before the current product is prepared.

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