

Using the Value Analysis Technique to Reduce Product Costs and Improve the Competitive Ability of Economic Units (An Applied Study in Iraqi Industrial Companies)

Hayfaa Kadim Ismael Alobaidi^a, Alaa Awad Kadhim Albdiri^b, Aqeel Shamkhi Jebur Al-Bdairi^c, ^aUniveraity of Thi-Qar, College of Engineering my life, ^bDepartment of Finance and Banking College of Management and Economics University of Al-Qadisiyah, Iraq, ^cMinistry of Education, The General Directorate of Diwaniya Education Iraq, Email: ^aHaifaakahdim78@gmail.com, ^balaa.albadiry@qu.edu.iq, ^caqeel.shmke39@gmail.com

The research aims to study the cognitive pillars of the value analysis technique and explain the importance of this technique in achieving a competitive advantage under recent changes and developments associated with the modern business environment. The research used a questionnaire to collect its data. The research sample was chosen from employees who work in Iraqi industrial companies, including administrators, accountants, engineers and technicians. The research reached a number of conclusions, the most important of which is that the value analysis technique is a product design activity. It includes manufacturing products whose functional performance meets the expectations of customers at the lowest cost. Moreover, the value analysis technique helps to identify, analyse functions and exclude functions that do not add value in order to reduce cost and increase value without affecting quality. It does so through the use of creative thinking to help managers to distinguish between activities that add value and those that do not add value.

Key words: *Value Analysis Technique, Competitive Advantage, Cost Management, Product Functions, Value added, Iraq.*

Introduction

The business environment in general and the manufacturing environment in particular face many changes that have become challenges for and put pressure on economic units operating in this environment. The most notable of these are scientific technological development, the informational and communication revolution and the increasing intensity of competition among these units as well as changing tastes, the needs and behaviours of customers, etc. In order for economic units to meet these challenges and pressures and adapt to them, they have to pay attention and focus on the strategic approach to cost management through their contemporary cost and managerial techniques. The most important of these techniques is the value analysis technique based on a distinctive method of job analysis to improve product value.

These developments have resulted in the transformation of the business world from an industrial community to a global information and knowledge society, which requires the application of a high degree of flexibility in the development of products. Consequently, it is necessary to focus on product development operations in the Iraqi industry that enable companies to penetrate markets, permeate them and launch high quality products reaching consumers in a timely manner. The value analysis technique helps achieve a competitive advantage and strengthen the status of Iraqi manufacturing companies in the market. This was focused on in this research.

General Framework of the Research

This framework discusses the problem, objectives, importance, hypothesis and methods of the research.

Problem of the Research

Due to rapid and successive changes and developments that accompany the modern business environment, economic units have faced many challenges and difficulties. The most important of these challenges and difficulties is the increasing intensity of competition among these units. As a result, Iraqi industrial economic units have been suffering from many problems, the most important of which are high costs and low quality of their products. Despite these problems, there are many cost and managerial techniques that help solve these problems. The most important of these techniques is the value analysis technique. Thus, problem of the research can be expressed by the following two questions: To what extent are managers in Iraqi industrial economic units interested in the value analysis technique as a contemporary management cost technique? Does this technique help to achieve a competitive advantage in its four dimensions of cost, quality, time and flexibility?

Objectives of the Research

The research aims to study the pillars of the value analysis technique and competitive advantages and show the importance of this technique in light of the modern changes and developments associated with the modern business environment. It aims to do this by demonstrating its role in achieving a competitive advantage in order to improve cost, quality, time and flexibility.

Importance of the Research

The research draws its significance from the importance of the variables addressed. The value analysis technique focuses on improving the performance of a project or product and analyses it in its components and its functions in order to exclude the functions that do not add value from the perspective of the customer. As for a competitive advantage, it refers to the distinction of an economic unit of any element that is unique in comparison to competitors. This can be achieved if the economic unit follows any strategy aiming to achieve a certain competitive advantage.

Hypothesis of the Research

The research is based on a basic hypothesis that states ‘The application of the value analysis technique can help economic units to achieve a competitive advantage’.

Methods of the Research

In order to achieve the objectives of the research, a descriptive analytical approach was adopted. It depended on books, periodicals, theses and the Internet. In addition, a questionnaire was used to collect the data of the research. A sample of employees who work in Iraqi industrial companies, including administrators, accountants, engineers and technicians, was chosen to show the role of the value analysis technique in achieving a competitive advantage. Finally, a set of statistical tools to analyse the data collected by the questionnaire was used along with interviews with the employees who participated in the research sample.

Theoretical Aspect of the Research

Value Analysis Technique

The origin of value analysis goes back to the days of World War II, when there was a shortage of materials involved in the production of products due to increased consumption of these materials for war purposes. Lawrence D. Miles was an electrical engineer working in the General Electric Company to search for ways to alleviate the shortage in materials by focusing on the functions performed by products rather than the products themselves. This worked to improve their value and reduce costs (Mostafa Eipour, et. al., 2011, p. 205). In 1954, the American Department of Defence adopted this concept to reduce costs during

the design phase. Tazegu & Kaygin (2014, p. 89) define value analysis as a product design activity that involves manufacturing products whose performance meets the expectations of customers but at the lowest cost and highest degree of quality. The Society of American Value Engineering (SAVE) defines value analysis as an organised application of recognised techniques that work to determine the functions of a product or service and evaluate them in order to provide the functions with a level of quality and reliability at the lowest possible cost (Jariri & Zegordi, 2008, p. 406).

Consequently, it is clear that value analysis is organised efforts to improve the value of products or services by identifying and analysing their functions in order to accomplish specific functions with high quality and reliability at the lowest possible cost.

The application of the value analysis technique seeks to achieve a set of goals in an economic unit. These are as follows:

- 1- Providing functional performance regarding the product or service with the lowest possible cost through the use of a creative thinking approach and the exclusion of narrow thinking (Rains, 2015, p. 6).
- 2- Identifying, analysing and excluding functions that do not add value. This will be reflected in cost reduction and increased value (Wang & Li, 2013, p. 714).
- 3- Achieving a balance between the cost, quality and functional performance of a product or service (Elkeley, 2006, p. 411).
- 4- Reducing cost without affecting quality (Tazegu & Kaygin, 2014, p. 89).
- 5- Assisting managers in the differentiation between activities that add value and their costs and those that do not add value and their costs in order to assist in the decision-making process (Horngren, 2012, p. 464).

It is noted from the points above that the objectives of value analysis are consistent with the requirements of the of modern competitive business environment through which these objectives can grow and develop. In addition, the application of value analysis passes through several stages (Karimi & Jafari, 2014, p. 234). These stages are as follows:

- 1- Previous study:** This includes selecting the product that suffers from the problem of high cost or other problems related to a competitive advantage with the formation of a value engineering team and determination of the scope of the study.
- 2- Value or action plan study:** This stage includes the following:
 - a- **Information phase:** This focuses on collection of the information related to the field of study, such as information about the cost of the product, its components, specifications, functions and other information (SAVE, 2007, p. 12).

b- Functional analysis phase: This phase is focused on functions and their analysis in order to exclude functions that do not add value to the customer with their cost without affecting quality. Rains (2015, p. 6) indicates that this phase is the heart and spirit of value analysis and its success depends on this analysis.

- 3- Creativity stage:** In this stage, the value analysis team adopts a constructive thinking approach to identify alternative methods to perform a function that customers desire, as well as searching for areas by which an economic unit can achieve a reduction in these functions' costs. Stevenson indicates, in this regard, that in order to achieve this objective, several tools are usually used. Perhaps the most important of these is unassembled analysis. This is because it focuses on cost reduction, if information is collected on the best tools applied by competing economic units. Hence, disaggregated analysis is only a process of evaluating competitors' products in order to identify development and cost reduction opportunities regarding an economic unit's products (Stevenson, 2005, p. 155).
- 4- Calendar stage:** At this stage, the results obtained from the application of the innovation stage are evaluated and the alternatives proposed are reconsidered with the confirmation of a chosen alternative that costs less cost compared to the current design. In addition, the proposed design reflects a functional performance consistent with customers' needs. In this regard, the Value Engineering Manual (2014, p. 17) presents a model that assists in the evaluation of proposed ideas or alternatives with value analysis procedures related to the functions of a particular product in the economic unit that applies the procedures of this technique.

5- Development and implementation stage:

At this stage, it is ascertained that the ideas or alternatives put forward in the previous stage are reasonable and cost savings are incurred by studying each idea with a brief and focused description and introducing any development processes that could improve them.

- 6- Feedback stage:** All the stages of value analysis are reviewed by the value analysis team in order to ensure the safety of the implementation of these stages. Mistakes are avoided and solutions are developed to address expected errors (Value Engineer Manual, 2014, p. 19).
- 7- Subsequent study:** The application of a value study is assured in this stage in accordance with the latest developments proposed by the value analysis team in order to ensure the completion of the achievement of desired results. This includes obtaining implementation orders and assisting the value analysis team in the distribution of information to the departments that will benefit. This is done through the establishment of a common database among team members, evaluation of results and preparation of a final report.

Consequently, the researchers believe that the essence of value analysis work is in studying and analysing functions in order to concentrate on the functions that add value for customers

and exclude the functions that do not add value for them. Therefore, this matter requires knowledge of the nature and types of functions and how to determine their cost and time requirements.

Competitive Advantage

Many definitions have been expressed for a competitive advantage. All these definitions emphasise the importance of the distinction of an economic unit regarding any element by which it is distinguished from its competitors. These distinctions can be achieved if the economic unit follows any public competitive strategies, such as cost leadership, differentiation and focus. These aim to achieve a competitive advantage in a certain field. Harry defined a competitive advantage as a source to enhance the position of an economic unit in a market and make profits through its distinction and excellence in the areas of product quality, price, cost and concentration in production (Harry, 1986, p. 59).

A competitive advantage arises once an economic unit discovers new ways that are more effective than those methods used by the competitors. These methods embody a discovery in the market. This occurs when a creative process, in its broadest sense, takes place. Thus, it is the uniqueness of the economic unit in comparison its competitors with one or more of the critical competitive success factors (lower cost, quality, time, flexibility and innovation). Flamholts described it as the lifeblood of economic unit to survive and grow in a competitive market and a function (indicator) of its ability to achieve differentiation over competitors (Flamholts, 2003, p. 223). In light of these previous definitions, the researchers define a competitive advantage as all of the possessed characteristics of an economic unit that distinguish it from its competitors. It leads to satisfy the desires of existing or potential customers and reflects in its effect in increasing market share and profitability. Thus, all these lead to the distinction and superiority of an economic unit over other competitors. In this context, Barfield suggests that in order for the economic unit to be able to compete in a market, they should do the following (Barfield, et. al., 2003, p. 315):

- 1- Determine customers' expectations regarding the characteristics and performance of products offered by the economic unit.
- 2- Analyse competitors' capabilities and products' costs and components by which they are characterised using benchmarking comparison.
- 3- Determine product specifications that conform to product features and international quality standards.
- 4- Focus on the quality of product or service design because of their importance when measuring the overall quality of products. Evans and Dean believe that six characteristics enhance the retention of a competitive advantage. These are as follows (Evans & Dean, 2003, p. 319):

- a- The orientation to the customer aims to satisfy the needs of the customer individually.
- b- Success factors are embodied in the achievement and improvement of the competitive advantage continuously.
- c- Organisational consistency should be achieved among the potentials, capabilities and investment opportunities available to achieve competitive and superior strategy in comparison to competitors with high efficiency and effectiveness.
- d- The activities of the core value chain supporting an economic unit should be motivated to make continuous improvements and develop programs to analyse value in order to meet the requirements of achieving high quality, lower costs to achieve customers' satisfaction and loyalty to the economic unit.
- e- The re-designing and reviewing of target cost operations should be provided by using benchmarking comparisons and a balanced performance scorecard.
- f- The advantage should be fixed and permanent. It should be difficult for competitors to imitate easily. The components of that advantage should be revealed only after a long time.

The researchers believe that economic units operating in the modern business environment should strive to achieve a competitive advantage by focusing on the customers and working to meet their requirements. These involve products and services with respect to high quality and acceptable prices that are better than those provided by competitors in order to achieve satisfaction and loyalty.

Economic units use financial and non-financial measures for the purpose of identifying the success or failure of their competitive advantage in a market. These measures are as follows:

1- Profitability measure

Low profitability forms one financial indicator of the weak competitive advantage of an economic unit or reflects its increase due to current high competitiveness that aims to increase market share in a declining market. The weakness of the indicators of this measure is that they do not show the level of future profitability (Kotler & Armstrong, 1999, p. 38).

2- Market share: This represents the share of an economic unit in all sales obtained from the market it serves. It is an appropriate measure of the extent of an economic unit's competitiveness and profitability in the short term. When an economic unit acquires an important part of the local market, its competitiveness is determined in two cases discussed by (Pirde & Ferrell, 2000, p. 33). These two cases can be clarified through the following:

The first case: When the production of an economic unit is homogeneous and the variable cost rate of the unit is less than the rate of competitors (with the assumption that the other

factors are equal), the market share and profitability of the economic unit will increase and vice versa if the production is not homogeneous.

The second case: When the production of an economic unit is heterogeneous and less attractive than competitors' products (namely when the competitiveness of the economic unit is weak) its effects will be reflected in a decline in its market share and profitability.

3- Manufacturing cost: An economic unit is not competitive if its average manufacturing costs exceed the price of its products in the market. This is considered a suicide for this unit in a highly competitive environment. A high average manufacturing cost rate may be caused by low productivity or high heterogeneous input costs of production. But if the average homogeneous cost of production is less than the average cost of the industry, this will be an indicator to the existence of a unique competitive advantage provided that the decrease of the average manufacturing cost (Atkinson & Kaplan, 2007, p. 232).

4- Productivity: Overall productivity measures the efficiency and effectiveness of value chain activities in converting inputs of production to finished products. However, this measure does not explain the advantages and disadvantages of the cost of inputs. Furthermore, output is measured in physical units (tons, numbers and meters). Therefore, this measure of productivity does not explain the attractiveness (features) of products offered by an economic unit (Harrison, et. al., 1998, p. 93).

It should be noted that the financial measures of the competitiveness of economic units alone cannot give objective results unless they are integrated with non-financial measures and in an associative manner to measure non-financial variables associated with the market. These include quality, time, flexibility and innovation from different points of views. Thus, economic units should use a combination of financial and non-financial measures to determine their levels of performance and the extent to which they achieve their objectives in terms of creativity and excellence compared to other competitors.

There are four dimensions of a competitive advantage: cost, quality, time and flexibility. These dimensions can be explained by the following:

1- The least cost: The least cost advantage can be achieved with a rigid system that works to minimise or reduce all types of loss and waste of resources and time by directing materials, wages and indirect manufacturing costs. This achieves a noticeable reduction in the unit cost of a product or service as well as reducing the costs of additional investment in technology. Accordingly, economic units seek to control their costs and make them less than the industry average in order to achieve a competitive advantage and thus help to achieve customers' satisfaction and loyalty (Harrison, et. al., 1998, p. 93).

2- High quality: The availability of advanced technology has enabled most industrial economic units to improve the quality of their products during a short life cycle. Quality means matching the standard of design specifications and the characteristics of a product to the expectations and desires of customers. The quality factor represents a competitive advantage that can achieve the fulfillment of the desires and expectations of customers if the characteristics and functions of the product meet its uses. An economic unit may achieve the least cost advantage, but the level of quality of their products may not suit customers' needs.

There are conditions that need to be met by economic units using quality as a competitive advantage. These determine quality from the customer's perspective and embody the basic features desired in a product (Evans & Dean, 2003, p. 324):

3- Response time to the customer: Time represents a competitive advantage. Economic units race to get the biggest investment opportunities and speed in the development and delivery of their products to market before other competitors. Accordingly, time is considered an important element for increasing the revenue of an economic unit before others in terms of exploiting the opportunities available in the market. Response time to the customer is determined by the time that adds value. It is called the cycle time of manufacturing and delivery to the customer. This includes the time taken in receiving a request from a customer, the time of manufacturing processes and the time of the final product's delivery to the customer. Excluding time that does not add a value shrinks the cycle time and improves the efficiency of the manufacturing cycle (Garrison & Noreen, 2008, p. 447).

4- Flexibility: It is considered one of the success factors of an economic unit's competitiveness. It refers to the ability of a unit to adapt its production system to changes in the competitive environment. This can involve processing orders according to the changing desires and needs of customers in terms of diversity, size and speed of innovation in the production and delivery of new products. Davis identifies three dimensions of flexibility: the first dimension is related to the response speed to specific customers' requests. The second dimension is associated with diversification and flexibility in the mix of products or services desired by customers. The third dimension is related to size flexibility, i.e., the ability of the economic unit to rearrange its operations according to the size of seasonal, age or geographical specifications or according to the purchasing power level of customers (Davis, 2003, p. 35).

The researchers believe that in the modern business environment, economic units must characterise and work to gain competitive advantages and reduce competitive gaps. These are represented by differences that can be identified by comparing the products or processes of

a certain economic unit with distinct similar products or operations of another unit in the same industrial sector. This can be done in terms of performance, quality, price, time and profitability. In addition, the responsibility of an economic unit in a competitive environment is not only to provide products to the customers but more importantly to retain existing customers and work to gain new customers and establish their satisfaction and loyalty.

Practical Aspect of the Research

This part describes the practical aspect of the research:

Definition of the Population and Sample of the Research and the Interpretation of Dependent Variables in the Statistical Analysis

The research population consists of the employees in Iraqi industrial companies such as administrators, accountants, engineers and technicians. The sample of the research was chosen from these employees. A questionnaire was designed to collect the. Fifty-four questionnaires were distributed to the sample members and (50) of them were retrieved (these were appropriate for analysis). Questions in the questionnaire were expressed so that the replies could be converted to quantitative values on the Five-Point Likert scale. The researchers used a set of statistical methods, including an arithmetical mean relative to the maximum value of the Likert scale as well as the use of percentages and standard deviation. In addition to these, a (*t*) test was used to show that the relationships between research variables were real relationships and not due to chance. Table (1) clarifies the results of the distribution of questionnaires to research sample members.

Table 1

Results of the distribution of questionnaires to the members of the research sample

Explanation	Number	Percentage
Distributed questionnaires	54	100%
Questionnaires retrieved and analysable	50	92.6%
Non-returned questionnaires	4	7.4%

It is noted in Table (1) that (54) questionnaires were distributed. (50) questionnaires were returned and subjected to statistical analysis, a returned percentage of (92.6%). (4) questionnaires were not returned, a percentage of (7.4%). The demographic characteristics of the members of the research sample are shown in Table (2).

Table 2

Demographic characteristics analysis of the research sample members

No.	Variable	Category	Number	Percentage
1	Age	Less than 30 years	6	%12
		From 30-40 years	10	%20
		From 41-50 years	23	%46
		More than 50 years	11	%22
2	Gender	Male	36	%72
		Female	14	%28
3	Scientific Qualification	Diploma	12	%24
		Bachelor's	35	%70
		Master's	3	%6
4	Years of Experience	Less than 10 years	5	%10
		From 10-20 years	15	%30
		From 21-30 years	20	%40
		More than 30 years	10	%20

It is clear in Table (2) that (12%) of the respondents were less than 30 years old, (20%) were between the ages of 31-40 years and (46%) of them were aged between 41-50 years. The rest of the respondents were more than (50) years old. The percentage of males in the research sample was (72%), while the percentage of females was (28%). In addition, the percentage of respondents who held a diploma in the research sample was (24%), Bachelor's Degree was (70%) and Master's Degree was (6%). This means that these respondents were qualified to understand the idea of subject. Finally, the years of experience of the members of the research sample were most for respondents ages 21-30 with a percentage of (40%).

The present research consists of two main variables: the value analysis technique (the independent or explanatory variable) and a competitive advantage in its four dimensions: cost, quality, time and flexibility (the dependent or responsive variable). For the statistical analysis, the explanatory and responsive study variables are expressed by giving symbols for these variables in the following table:

Table 3

Interpretation of the variables adopted in the statistical analysis

Types of variables	Interpretation of variables	Variable code
Independent variables (explanatory)	Strategic cost management techniques	X
	Value analysis technique	X1
Dependent variables (responsive)	Dimensions of a competitive advantage	Y
	Cost	Y1
	Quality	Y2
	Time	Y3
	Flexibility	Y4

Effect analysis of (X1) in (Y1, Y2, Y3 and Y4)

This section aims to analyse and test the effect of the value analysis technique (X1) on the four dimensions of a competitive advantage (Y1, Y2, Y3 and Y4). Table (4) shows the arithmetic mean, percentage and standard deviation between (X1) and (Y1, Y2, Y3 and Y4).

Table 4

The arithmetic mean, percentage and standard deviation between (X1) and (Y1, Y2, Y3 and Y4)

Value Analysis (X1) Competitive Advantage (Y)	Arithmetic Mean	Percentage	Standard Deviation
Cost (Y1)	4.200	84.0%	0.592
Quality (Y2)	3.940	78.8%	0.542
Time (Y3)	4.088	81.8%	0.569
Flexibility (Y4)	3.816	76.3%	0.522

It is clear from the table above that there is a correlation between the value analysis technique and each of the four dimensions of a competitive advantage. The arithmetic mean of the cost dimension amounted to (4.20) with a standard deviation of (0.592), which indicates the ability of the value analysis technique to reduce the cost. As for the quality dimension, the arithmetic mean amounted to (3.94) with a standard deviation of (0.542), which means that the value analysis technique will help to improve the quality. The arithmetic mean of the time dimension amounted to (4.08) with a standard deviation of (0.569), which confirms the ability of the value analysis technique to reduce the time of operations. Finally, the arithmetic mean of the flexibility dimension amounted to (3.81) with a standard deviation of (0.522),

which means that the value analysis technique will help provide flexibility in responding to changes in the needs and desires of customers.

Accordingly, it can be said that the value analysis technique plays an important role in achieving a competitive advantage in the four dimensions of cost, quality, time and flexibility. As a result of using the Likert scale and the arithmetic means of the value analysis technique and the four dimensions of a competitive advantage, the arithmetic mean attributed to the maximum value of the Likert scale exceeded a percentage of 60%. More than three levels of the scale were achieved. It can also be noted that the percentages ranged between (76.3%) and (84%), which indicates to the acceptance of the hypothesis of the research that the application of the value analysis technique can help economic units to achieve a competitive advantage. The Statistical inference can be used to validate this by using the (*t*) test to prove that the relationship between the value analysis technique and the four dimensions of a competitive advantage is real and not coincidental. Thus, the (*t*) value must be calculated for each dimension of a competitive advantage and compared with the tabulated (*t*) value. This is true if the calculated (*t*) value is greater than the tabulated (*t*) value with a certain significance and degree of freedom. This result leads to the acceptance of the hypothesis of the research that the application of the value analysis technique can help economic units to achieve a competitive advantage. It can also be said that the relationship between the exploratory and responsive variables of the research is a real relationship and not due to pure chance. The calculated (*t*) values and the tabulated (*t*) value of the value analysis technique (X1) and the four dimensions of a competitive advantage (Y1, Y2, Y3 and Y4) are expressed in the following table:

Table 5

Calculated (t) values and tabulated (t) of (X1) and (Y1, Y2, Y3 and Y4)

Value Analysis (X1) and Competitive Advantage (Y)	Calculated (<i>t</i>)	Tabulated (<i>t</i>)	Significance Level
Cost (Y1)	14.333	2.704	0.05
Quality (Y2)	12.263	2.704	0.05
Time (Y3)	13.521	2.704	0.05
Flexibility (Y4)	11.054	2.704	0.05

Based on the above table, the relationships between the value analysis technique and each of the four dimensions of a competitive advantage can be established. These analyses are as follows:

First: Effect analysis of the value analysis technique (X1) versus the cost dimension (Y1)

The calculated (t) value of the value analysis technique and cost dimension amounted to (14.333). This is more than the tabulated (t) value of (2,704) at a significance level of (0.05) and a degree of freedom of (49). This result indicates the fundamental fact that the relationship between the value analysis technique and cost dimension is a real relationship and did not arise by chance. The application of the value analysis technique can help the economic unit to reduce costs. This was due to the method of analysis of the distinctive functions in which this technique is characterised. This technique can reduce unjustified costs associated with components and functions that do not add value from the perspective of both the company and the customer.

Second: Effect analysis of the value analysis technique (X1) in the quality dimension (Y2)

It is noted that the calculated (t) value of the value analysis technique and the quality dimension amounted to (12.263). This was greater than its tabulated (t) value of (2,704) at a significance level of (0.05) and a degree of freedom of (49). This result indicates that there is a possibility to improve the quality of both a product and process through the application of the value analysis technique. The relationship between these two variables is a real relationship rather than an accidental occurrence. The reason for this is that this technique addresses quality problems and seeks to do the right thing the first time, in addition to reducing internal and external defects. This results in reduced scrap re-work and analysis and other procedures.

Third: Effect analysis of the value analysis technique (X1) on the time dimension (Y3)

The calculated (t) value of the value analysis technique and time dimension amounted to (13.521). This was greater than its tabulated (t) value of (2.704) at a significance level of (0.05) and a degree of freedom of (49). This result indicates that the relationship between the value analysis technique and the time dimension is a real relationship. There is a possibility of achieving a competitive advantage through the achievement of savings in the time of design, manufacturing and assembly. The reason for this result is due to the value analysis technique being effective in helping to provide the best design for the product and the process.

Fourth: Effect analysis of the value analysis technique (X1) on the flexibility dimension (Y4)

The calculated (t) value of the value analysis technique and the flexibility dimension amounted to (11.054). This was greater than its tabulated (t) value of (2,704) at significance level of (0.05) and a degree of freedom of (49). This result indicates the fundamental fact that the value analysis technique helps in providing sufficient flexibility to respond to changes in the needs and desires of customers. The relationship between these two variables is a real relationship. The reason for this is due to the focus of the value analysis technique on the customer as well as the possibility of introducing appropriate and fast solutions for problems that economic units can face. This is especially true regarding problems related to rapid responses to changes in the needs and desires of customers.

Consequently, the researchers can indicate the following:

- a- There are statistically significant differences between the value analysis technique and the four dimensions of a competitive advantage. Thus, the relationship between these variables is real and not due to pure chance.
- b- The value analysis technique has affected the four dimensions of a competitive advantage in different proportions. The greatest effect was on the cost dimension, which indicates the effectiveness of this technique in reducing costs.
- c- It can be said with 95% degree of confidence the value analysis technique helps to reduce costs, improve quality, reduce time, provide flexibility and thus achieve a competitive advantage.
- d- The findings reached in the research can be generalised for Iraqi industrial companies operating in a single industrial environment subject to the same conditions, whether they are economic or social.

Conclusions and Recommendations

The research reached a number of conclusions and suggested recommendations.

Conclusions

The research reached a number of conclusions, which are as follows:

- 1- The value analysis technique is a product design activity that includes the production of products whose functional performance match the expectations of customers at the lowest cost. Thus, it is a tool that analyses the function of a product as a core objective seeking to improve its value while reducing its cost of life cycle required for performing necessary functions.
- 2- The value analysis technique aims to identify, analyse functions and exclude functions that do not add value. This is reflected in the reduction of costs and increases in value without

affecting quality through the use of a creative thinking approach to help managers to distinguish between activities that add value and those that do not.

3- There are three stages in the application of the value analysis technique: previous study, the study of a value or work plan and subsequent study, given that the second stage includes a set of steps. These steps involve information, functional analysis, creativity, evaluation, development, implementation and feedback.

4- A competitive advantage indicates the distinction of an economic unit in any element by which it excels in comparison to its competitors. Hence, an economic unit can achieve a competitive advantage if it follows any common competitive strategy. There are four key dimensions to a competitive advantage: cost, quality, time and flexibility.

5- The success of an economic unit in the competitive market depends on the extent of continuous improvement achieved by performance levels. These are related to the fundamental success factors regarding cost, quality, time and flexibility in responding to the needs and desires of customers and through which superiority over competitors can be achieved.

6- Through the field study and the results of statistical analysis, the following was found:

a. The value analysis technique helps to reduce costs. Cost analysis, with the help of the value analysis technique, can help to identify areas in which cost reduction operations can be carried out in order to develop procedures that lead to lower costs.

b. The value analysis technique helps to improve quality through the standardisation of procedures. Thus, it improves the quality of both processes and products, in addition to achieving quality from the point of view of both the customer (appropriateness for use) and the economic unit (correspondence to specifications and standards).

c. The value analysis technique helps to reduce the time of design, manufacturing and assembly since the improvement of process quality leads to the elimination of factory defects. In addition, it does not hinder the production process (which could cause significant waste in manufacturing and assembly time).

d. The value analysis technique helps to provide sufficient flexibility by eliminating unnecessary functions that hinder rapid response to changes in customer needs.

Recommendations

In light of the conclusions reached, the researchers recommended the following:

1- There is a need to pay attention to modern cost and management techniques because they are more appropriate for the requirements of the modern business environment. The latter is characterised by intense competition and focus on customers. Economic units can reduce the costs of their products and operations through these techniques, which establishes competitive advantages.

2- Economic units should have qualified personnel to apply these techniques, especially the value analysis technique with. This can involve the formation of a multifunctional task team and the development of an appropriate action plan in accordance with the circumstances with



the need to establish a common database for the exchange of information among team members.

3- In the implementation of the value analysis technique, the basic stages and steps of applying this technique should be adhered to regarding previous studies and subsequent studies.

4- There is a need to analyse the internal and external environment of an economic unit in order to identify the most important opportunities and exploit them. There is also a need to identify the threats faced by these units and to work on addressing them, to strive to gain a competitive advantage and to strive to have excellence in comparison to other competitors in a market.

5- For the purpose of achieving a competitive advantage through the value analysis technique, the following aspects should be adhered to:

a. Commitment to the analysis method of the distinctive functions of the value analysis technique. All components and functions that do not add value from the perspective of the customer should be discarded.

b. Commitment to the principles of total quality management by doing the right thing the first time and by getting rid of defects, whether they are inside or outside an economic unit.

c. Working to reduce the time of product design and development as well as reducing manufacturing and assembly time in order to shorten the product life cycle and to ensure ideas quickly reach the market.

d. The need for standardisation and simplification of procedures so that there is sufficient flexibility to respond to any emerging changes to provide for the needs and desires of customers.



REFERENCES

- Atkinson, A. A., Kaplan, R. M., Suture, L. & Young, S. M. S., (2007). "Management Accounting", 5th ed., Pearson Prentice Hall, USA.
- Barfield, J., Bern, C., & Kinney, M., (2003). "Cost Accounting: Traditions and Innovations", 5th ed., South Western, Inc..
- Davis, M., Aquiline, N. & Chase, R., (2003) "Fundamentals of Operations Management", 4th ed., McGraw-Hill, Irwin.
- ElKeley, I. A.. (2006). "Towards a Conceptual Framework for Strategic Cost Management ", unpublished doctorate thesis, Chemnitz University.
- Evans, J. R., & Dean, J., (2003). "Total Quality Management Organization & Strategy", 5th ed., Thomson South-Western.
- Flamholts, E. & Hua, W., (2003). "Searching for Competitive Advantage in the Black Box", European Management Journal, Vol.12 No.2.
- Garrison, R. & Noreen, H., & Eric, W., (2008). "Managerial Accounting", 11th ed., McGraw-Hill, Singapore.
- Harrison, J. S., & John, G. H., (1998). "Foundation in Strategic Management", South Western Collage Publishing, US A.
- Harry, D., (1986). "Strategic Management", Merrill Publishing Co., USA.
- Horngren, C.; Rajan, G. & Dater, S., (2012). "Cost Management: A Managerial Emphasis". 14th., ed., Prentice-Hall, Inc., New Jersey, USA.
- Jariri, F. & Zegordi, H., (2008). "The Quality Function Deployment, Value Engineering and Target Costing: An Integrated Framework in Cost Management", Research Programs", WWW.SID.ir .
- Karimi, Z. & Jafari, D., (2014). "Quality Function Deployment and Value Engineering", Research Journal of Environmental, 6 (4): 233-240 .
- Kotler, P. & Armstrong, G., (1999). "Marketing", 8th ed., Prentice-Hall, Inc.
- Pride, W. & Ferrell, O., (2000). "Marketing", Houghton Co., USA.



Rains, J., (2015). "Function Analysis", [http:// value foundation.org](http://value.foundation.org).

SAVE-International, (2007). "Vision Statement", [http // www.value-eng.org](http://www.value-eng.org).

Stevenson, W., (2005). "Operations Management", McGraw-Hill, Irwin.

Tazegu, A., (2014). "Benchmarking Approaches: As Strategically Cost Management Tools", *Journal of Academic Research*, 5 (14), pp: (84-91).

Value Engineering Manual (2014), "West Virginia Department of Transportation Division of Highways", Engineering Division.

Wang, H. & Li, X., (2013). "The application of value engineering", *Journal of Chemical and Pharmaceutical Research*, 6 (10), pp: (714-720).



Appendix 1

Questionnaire form

Gentlemen,

Peace, mercy and blessings of God are upon you:

We put in your hands the questionnaire of the research entitled "Using the value analysis technique to reduce product costs and improve the competitive ability of economic units (an applied study in Iraqi industrial companies)". We seek, in this research, to explore your opinions about its paragraphs. Your accurate answer to the questionnaire will contribute to its objectives, represented in showing the role of the value analysis technique in reducing costs and achieving a competitive advantage. Therefore, could you please choose the answer that you see is more consistent with the actual reality, because your interest to give the accurate answer will help to reach the credibility and right opinion through which accurate results can be achieved in the analysis in order to serve the scientific research in the industrial sector in the Iraqi environment. Our hope is great for cooperation with us by reading the paragraphs of the questionnaire and answering them in the light of your experience and vision. Note that all information contained in the questionnaire will be used for the purposes of scientific research only. The researchers are also fully prepared to clarify and answer any inquiry regarding the paragraphs of the questionnaire.

With appreciation

The researchers

Questionnaire

First: Personal information:

Please tick (✓) in the appropriate box:

- Age:

Less than 30 years From 30 to 40 years From 41 to 50 years More than 50 years

- Gender:

Male Female

- Qualification:

Diploma Bachelor's Master's Ph.D.

- Years of Experience:

Less than 10 years From 10-20 years From 21-30 years More than 30 years

Second: Questions Related to Variables of the Research

Please tick (✓) in front of the alternative you deem appropriate .

Questionnaire form

No.	Paragraphs	Complete ly Agreed	Agree	Neutr al	Not agree	Complete ly not agree
	The role of the value analysis technique in reducing costs:					
1	The method of analysing the distinctive functions adopted by the value analysis technique will help to identify unnecessary components and functions to be eliminated and thus reduce the associated costs.					
2	Cost analysis through the value analysis technique can help to identify areas where cost reductions can be conducted.					
3	Reducing the number of product components or using cheaper materials while maintaining product quality will result in significant cost savings.					
4	The value analysis technique helps to simplify procedures and improve product manufacturing and assembly processes, which will reduce the cost of both processes and products.					
5	Through the value analysis technique, materials and components can be used that serve more than one function, and thus this process will standardise processes and simplify procedures, which in turn will reduce costs.					
	The role of the value analysis technique in quality improvement:					

6	Deleting unnecessary components and functions makes the product more suitable for the customer's use, thus achieving quality from their point of view.					
7	The standardisation of processes and simplification of procedures will improve the quality of both processes and products as well as achieving quality from the point of view of the economic unit, which conforms to the specifications and standards set.					
8	The value analysis technique addresses quality problems, and the pursuit of the right thing from the first time.					
9	The value analysis technique helps reduce internal and external defects, thereby reducing scrap, re-working, re-checking and failure analysis.					
10	The value analysis technique eliminates non-value-added quality activities, especially those related to evaluation and failure.					
	The role of the value analysis technique in reducing time:					
11	The information provided by the value analysis technique to the design team will help them to reduce design time, especially with regard to the time of designing components and processes that were deleted after functional analysis.					
12	The value analysis technique, by standardising processes and simplifying procedures, will help reduce product manufacturing and assembly time.					
13	Improving the quality of the process					

	will result in the elimination of factory defects and not hinder the production process, which is the cause of the waste of a lot of manufacturing and assembly time.					
14	The reduction in the time of design, manufacturing and assembly will shorten the product life cycle, and thus the idea arrives in the market quickly.					
15	The use of modern technology in design, manufacturing and assembly will reduce the time of the product life cycle and achieve speed in the delivery of products to customers.					
	The role of the value analysis technique in achieving flexibility:					
16	Value analysis technology helps to find quick solutions to the problems facing the company, especially those related to rapid response to changes in the needs, desires and requirements of customers.					
17	The value analysis technique eliminates unnecessary components and functions that hinder rapid response to changes in customer's needs and desires.					
18	Continuous improvement of products and processes through the value analysis technique help to provide sufficient flexibility to respond to any changes in customers' needs, desires and requirements.					
19	The precise identification of the current needs, desires and requirements of customers, and the scientific prediction of changes in					



	them make the economic unit ready to respond to any changes in these needs and desires quickly.					
20	The value analysis technique prepares the appropriate grounds to provide sufficient flexibility to respond rapidly to changes in the needs, desires and requirements of customers by working to disseminate this culture in the economic unit.					