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The role of value analysis technique in improving product quality (Applied study in Al-Diwaniyah tire factory)

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Abstract

The research aims to apply the value analysis technique in one of the factories of the General Company for Rubber Industries / which is Al-Diwaniyah Tire Factory, as it is one of the most important strategic cost management techniques in the field of cost and management accounting, and to achieve the objectives of the research, the researcher relied on the data of the Al-Diwaniyah tire factory through personal interviews with the factory employees. For the purpose of applying the value analysis technique, the research concluded that eliminating waste and loss in all production processes, as well as processes that do not add value for the purpose of improving the quality of products. After analyzing the research results, the most important results reached by the researcher were that the technique of Value analysis can help economic units achieve competitive advantage through their ability to reduce Costs, improve quality, reduce time, and provide sufficient flexibility in responding to customer needs. The most important recommendations were Emphasis on the importance of the factory's adoption of the value analysis technique through the formation of a multi-tasking team that has the ability to develop the appropriate plan to perform the activities of the laboratory research sample through the assistance of experts and consultants in the field of design and manufacturing for the purpose of preparing the readiness to work with this technology in the laboratory and contribute to finding solutions to recurring problems related to higher production costs.

Keywords: *value analysis technique, product quality improvement*

Introduction : Global markets have recently witnessed intense competition between economic units and continuous attempts to improve the quality of production of their products and provide products that meet the needs of customers and achieve their satisfaction, because traditional accounting and traditional production systems based on a large production system have become unable to provide information that helps in making technical decisions that contribute In improving production quality, there was a need to adopt several techniques used by economic units to achieve their goals, including the value analysis technique.

The research contains four paragraphs:

The first represents the research methodology of previous studies. The second represents the cognitive foundations of the value analysis technique as well as quality improvement. The third represents the practical side of the research, where the value analysis technique was applied in the Diwaniyah tire factory. The fourth represents the conclusions and recommendations.

1 - research methodology

In this topic, it deals with a number of paragraphs represented by the research problem, its importance, objectives, hypothesis, society, scientific method, sources of information collection and its limits, which are as follows:-

1-1 The research problem

The problem of the research is that the Iraqi economic units suffer from the problem of high costs compared to the foreign products offered in the market, and these units also suffer from problems related to quality, as the foreign products offered in the market are more quality than the local products. Despite that, the economic units Al-Iraqiya does not apply modern administrative techniques despite the development of these techniques in a distinct way, and among the most important of these techniques are the technique of value analysis, and the research problem can be expressed through the following intellectual question :-

(Does the use of value analysis technique help in improving product quality ?)

1-2:The research importance:

The importance of the research stems from the importance of the main variable represented by the value analysis technique. The value analysis technique comes its importance from the possibility of this technique from analyzing the components and functions of the product in order to reach the unnecessary components and functions that are not value-added from the point of view of the economic unit and the customer and work to exclude them in order to reduce the cost without compromising the quality or improve it.

1-3:The research objectives :

In light of the research problem and the question posed, the research mainly aims to achieve a set of goals, which are as follows:-

1-Addressing the knowledge bases of one of the strategic cost management techniques, which is the value analysis technique.

2-Knowledge bases to improve product quality.

3-Explaining the role of value analysis technique in improving product quality.

1-4:The Research Hypothesis **:**

The research is based on a basic hypothesis, which is as follows (the use of value analysis technique can help in improving product quality).

1-5:The research community and its application :

The research community is represented by the factories belonging to the General Company for Rubber Industries, which is one of the formations of the Iraqi Ministry of Industry and Minerals. As for the research sample, it is the Diwaniyah tire factory, in order to conduct the applied aspect of the research.

1-6:Scientific Research Methodology and Data Collection Sources :

The researcher relied on two main approaches, which are as follows:

First: The deductive approach: It was used in the theoretical aspect of research, and data and information related to this aspect were collected through theses, letters, books, periodicals and articles, as well as the opinions of local, Arab and foreign researchers, and they were reached through visits to public and private libraries, as well as through the network. Internet.

Second: The inductive approach: It was used in the practical aspect of the research, through the use of the value analysis technique and its application in the economic unit under study. As for the data and information of the practical side, it was reached through the following :

A- Interviews with those in charge of the work, including engineers, technicians, accountants, auditors,
B - Examine the records and cost reports in the economic unit, the experts and designers
sample of the research .
C - reviewing production reports for all production stages through field visits
d- View performance reports.

1.7 The research sample

First: The spatial boundaries of the research: The General Company for Rubber and Tire Industries / Al-Diwaniyah Tire Factory was chosen as a research sample for the purpose of conducting the practical side of the research, which is located in Al-Qadisiyah Governorate / Al-Iskan neighborhood, because local products suffer from high costs, low quality and the inability to compete with foreign products. The laboratory needs to apply modern and contemporary technologies in order to contribute to supporting the national economy .

Second: Temporal limits: The temporal limits of this study were limited to the year (2016) because it is closer to reality and contains data, noting that the laboratory has stopped working from 2017 until now .

1-8:The research variables:

The research included two variables:

A - The independent variable: It is represented by the value analysis technique

B - The dependent variable: It is represented in improving the quality of the product.

2- Previous studies:-

1- study Abdullah(2015)" Implementation Value Analysis \Value Engineering (VA\VE) : during New Product Development".

A- This study aimed to demonstrate the role played by the two value analysis techniques for the development of the new product, by analyzing the product's functionality and excluding unnecessary and non-value-adding functions.

B- The study aims to improve the components of the product and its primary and secondary functions.

2- study Henriques (2015)" Value Analysis- An Sustainability ".

The study aims to demonstrate the role played by the value analysis technique in the three basic and main aspects of economic, social and environmental sustainability.

3- study Erekat (2015)"The effect of quality control on reducing costs".

A- This study aims to identify the effect of quality control in reducing cost.

B- The study aims to identify the concept of quality control, its methods and means.

3- the cognitive foundations of the value analysis technique

3-1 Origin of the concept of value analysis

The first appearance of this technology was in 1974 by the electrical engineer (Lawrence Miles), who was working in the American company (General Electric) and was based on American research, ideas and efforts made earlier in the year 1930 in the field of research in order to find components for products that are less expensive. And better functional performance and high quality, as well as the shortage that occurred in the basic materials and components of the products after World War II, a major and main reason for the emergence of this technology due to the great need to find alternatives to the components and functions of the products to do the same job at the lowest cost and highest quality (Gheorghe, et.al., 2013: 162). Value analysis is viewed as an organized methodology that aims to achieve a balance between the efficiency and effectiveness of the function performed by the product and between cost and general performance, depending on scientific methods, and the greatest focus is on the needs and desires of customers, as well as solving the problems that the product is going through with regard to its value (Alazemi, 2011:49-50), as this technique is an organized methodology to determine the functions and costs of the product in order to reach a way to reduce the costs associated with the product through the components and functions that are It does not add value from the customer's point of view, so it performs a functional analysis that is based on an organized work map that improves performance and quality and deletes unnecessary and non-value adding functions (Suhaimi, 2014:9). Also, this technology is an organized methodology that analyzes functions and components of products and services projects and programs in order to improve performance and quality and reduce product costs in all stages of its production as well as provide safety and security requirements. Thus, this technology needs a working team with experience and know-how in order to analyze these functions and components and conform to the requirements of customers (Patii, 2010:3-4).

The researcher sees that the best opinions to describe the concept of value analysis technology as a scientific technique directed at functional analysis and that it came in response to the developments and changes that have occurred in the business environment and is considered one of the requirements for success and excellence in economic units, by improving the value of the product through reducing costs and raising the level of performance and quality.

3 .2- Technical Objectives of Value Analysis

The value analysis technique is a sophisticated methodology for solving many problems, and it is one of the techniques of strategic cost management that seeks to achieve a set of goals, including:

1-The collective effort and the spirit of one multi-functional and multidisciplinary team that works through coordination and communication to solve all the obstacles and problems experienced by the economic units when applying this technology made it aim to remove all the professional or functional barriers from them in the economic units (Suhaimi, 2014:47-48).

2-The goal of this technique is to achieve customer satisfaction with the product in the economic unit, and consequently, the increase in sales, the reduction of costs and the improvement of quality. In addition, the percentage of profits of products in the economic units will increase and profitability will improve (Mahdi-a, et.al., 2015:2746).

3-This technology is an important tool for cost management in an efficient and effective manner, and thus this tool is one of the important tools to achieve the target cost.

4-Economic units go through several stages and processes for the production of products and services, the application of this technology leads to a reduction in the costs of all these activiti (Zanjanchi, 2014: 85-86).

5-It is considered an important tool in conveying an idea to all workers in economic units about the importance of improving the value of products and the general benefit it brings to the economic unit as a whole through improving performance, reducing costs and offering a product that competes and distinguishes others from them (Mahdi-b, et.al., 2015 :200) . It works to improve the functionality of the product while maintaining or improving quality, and thus we reach the desired goal, which is to satisfy customers and provide a product of high value.(Abdullah,etal.2015:10053).

Through the above, The researcher sees that the main objective of applying this technology in economic units is to achieve customer satisfaction by improving the value of products, reducing costs and improving quality by studying the desires and aspirations of customers through a specialized team. Necessary and not adding value, which does not reflect the desire of the most general of customers, and maintaining the necessary costs that add value to the maximum extent possible to reach.

3-3:Requirements for applying the value analysis technique

This paragraph includes the following:

First: - A multi-functional value analysis team:-

this technology requires a specialized work team in various specializations such as accountants, administrators and engineers. The number of team members varies from one task to another and according to the size and importance of the task on which the technology is to be applied. There are important and basic matters that must be taken into account when forming the work team, including that the team members have experience Sufficient in his field of work, both according to his specialization, and there must be consistency and rapprochement between the competencies of the team and what the project requires, as well as an accurate identification of the project and an adequate and required understanding of its objectives and the desires and requirements of customers, and there should be preference for individuals who distinguished their work over others (Tenkorang, 2011:1).

Second:- Value Analysis Action Plan:

After identifying the problems facing the economic units and their products with regard to value, the multi-functional value analysis team prepares a work plan to be applied in economic units that is characterized by flexibility and ease of implementation. And jobs that do not add value. Therefore, a work plan for value analysis must be developed. This plan includes the following:-(Abdullah, et al., 2015:10052).

1- After conducting a comprehensive review of the activities, the extent of the study must be determined.

2-Choosing the product that requires improving the value from the point of view of the customer and the economic unit.

3-Determine the location of the study and the activities that should be carried out by the team.

4-The size of the current costs of the product before the process of improving its value.
5-Determining the stages of the study and the sufficient time to implement these stages.

6-Distribution of work according to the diversity of competencies among team members and the necessity of coordination and disparity between them.
7-Determining the time for the end of the study, as well as the date for submitting the final report on the plan.

3-4 Stages of applying the value analysis technique:

The application of the value analysis technique requires going through five successive stages (information gathering, job analysis, searching for ideas and solutions, testing and (evaluation, development and implementation).

1-The stage of collecting information:

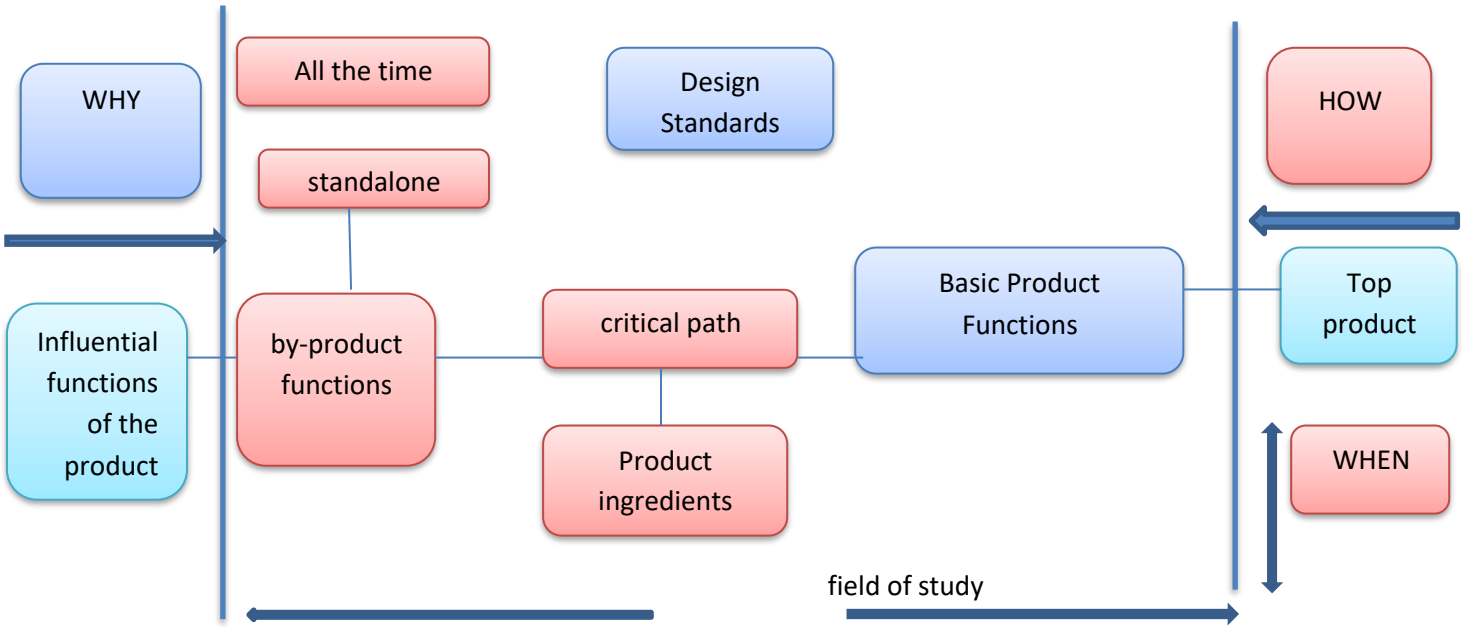
This stage is the first launch for the application of the value analysis technique, as what they see as appropriate and necessary information is collected by the value analysis team of various functions and specialization, in order to implement the action plan in a timely manner. This process is one of the basic elements that must be available for the purpose of analyzing the problems associated with the product Regarding the performance, quality, and high costs of the components and functions of the product (Mohsen and Al-Najjar, 2006: 493).

2-Job Analysis Phase

It is the stage in which the components and functions of the product are analyzed in addition to the cost analysis for each of them. Therefore, we consider it one of the most important stages of the value analysis technique, as it represents the basic foundation for all value techniques in general, and for the value analysis technique in particular, because it is unique in solving problems in a distinctive way (Mahdi-b, et. al., 2015: 203).

(Figure No. (1)

Job Analysis Chart (FAST)



Source :- Shiimi, Mary. (2017)." Identifying design alternatives for the Windhoek municipality by applying the FAST diagram" (Doctoral dissertation, University of Cape Town). p.p .18 .

3-The stage of searching for ideas and ways to solve

After the information stage, the value analysis team works to collect a larger number of ideas and solutions in order to review the problems presented, relying on several sources, the most important of which are customers by listening to their opinions, as well as reviewing the work of competing companies and their products, as well as from external sources, which is to identify cases under treatment and there as well. “Internal sources, including the employees of the institution and its scientific centers, and thus we get a set of ideas that the value analysis team arranges, where each job is according to the number of a set of alternatives and options that can perform a function in all parts of the goal and thus obtain a set of solutions, in addition to the analysis team The valuer and the value analyst participate in this stage, other people from specialists and experts who are used to carry out this task (Najat, 2016: 358).

4-Testing and evaluation stage

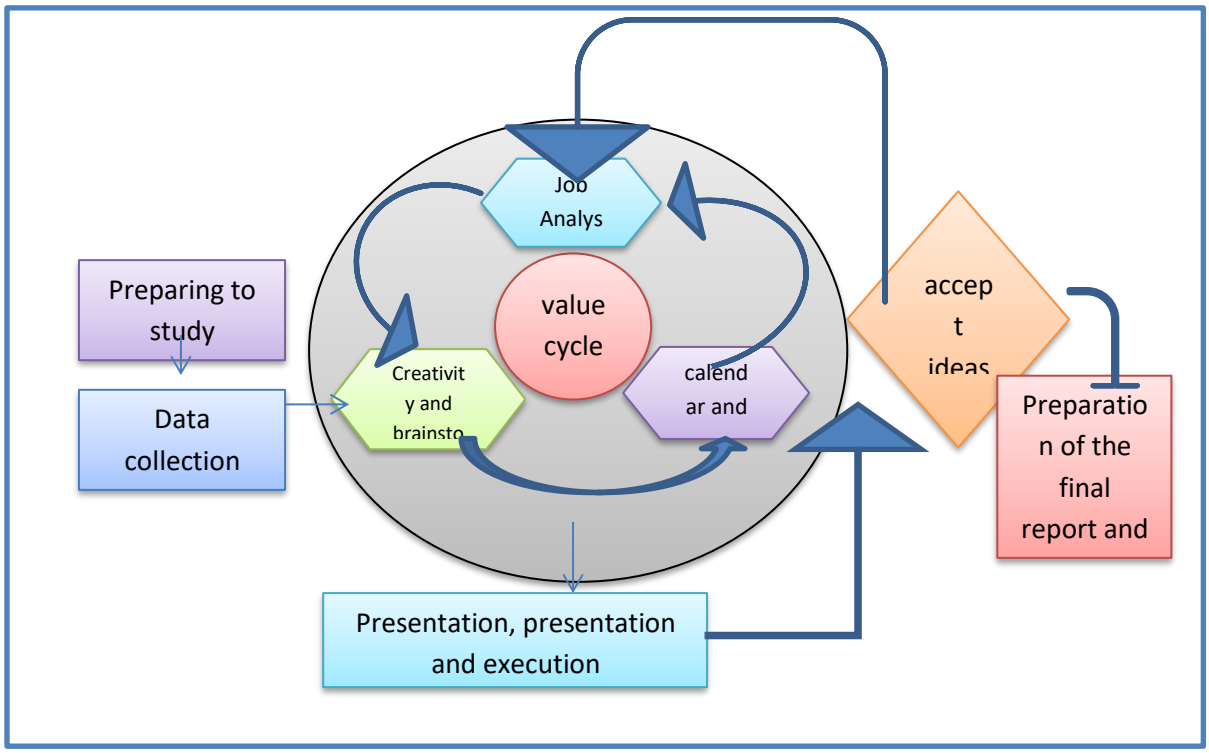
At this stage, the work team is working on evaluating the ideas and solutions that were proposed and giving priority to the ideas The task that can meet the needs and desires of customers, which adds to the value of the product, refuses and does not accept ideas that do not meet the needs of customers and that do not add to the value of the product. (Mahmoud, 32:2021).

5-Development and implementation phase

At this stage, it is ensured that the alternatives and ideas that were proposed were within the reasonable and within the aspirations of the customers. Cost savings are made by describing each idea or alternative through a simplified explanation of it and the possibility of a development process that can work to improve it, as the focus on cost is not enough alone. It should be next to maintaining or improving the quality and performance of the products, especially with regard to the engineering and technical specifications of the product. The most important thing at this stage is that the cost of the proposed alternative is within the target cost ceiling of the economic units (Al-Samarrai and Al-Zamili, 201: 2018).

shape(2)

Stages of applying the value analysis technique



Source:(Rashti,S.&Zanjanchi,P.2014,"The Role of Value Engineering\ Value Analysis in Reducing the cost and Time of the Construction Project ,"Journal of Civil Engineering and Environment, Vol.1,No.2,p:86) .

4- knowledge bases for quality improvement

4-1 The concept of quality improvement

The process of quality improvement is growing as a competitive strategy that the economic unit resorts to in order to adapt to the modern business environment, as well as help in achieving the aspirations and satisfaction of customers and avoiding them from entering into a spiral of price problems. 1999:78) The process of quality improvement is also one of the important tools for product improvement processes by solving the problems they face and working to understand the requirements of customers to meet them (Schroeder, 2000:132) and also the importance of quality improvement comes from the fact that it refers to doing the right thing the first time To produce products that fit the needs of customers and meet them

and meet their expectations, and thus it is considered an important way to achieve customer satisfaction with economic units and their loyalty to them (Atem, 2007: 14).

The researcher believes that quality improvement is an approach that is used to get rid of deficiencies and works to improve the production process or change for the better and for the better. It is considered one of the important parts of the distinguished management aspects.

Quality and through some contributions from the point of view of economic units are of great importance, and some of them can be clarified through the following: (Heizer & Render) ,2011:223).

1-Reputation of the economic unit

All economic units see that they will get a good or bad reputation as a result of quality and working to improve it will earn the economic unit a good reputation among other units and this is what helps it to continue, expand and achieve profits.

2-The legal responsibility of the producer

Governments in most countries hold economic units legally responsible as a result of producing and designing products that alter use or the environment, meaning that economic units, whether industrial or service, are responsible before the law for damage to the environment or society. Working to improve the quality of the product avoids legal responsibility in some cases.

3-International results

Quality has become a site of international interest for economic units as a result of technological development, and in order for the economic unit to be able with effective competition, it is necessary to improve its products and services to match quality requirements and international specifications with the aim of entering international markets

4-economic unit Reducing costs and increasing the market share

The process of improving product quality will lead to a reduction in costs by eliminating some of the deficiencies facing the products before reducing costs, defective and debris and reducing warranty costs and this leads to increased profits and at the same time that the quality of products will lead to retaining existing customers and obtaining new customers Which leads to an increase in sales and thus an increase in the market share of the economic unit.

4-2 Factors that help improve quality**:-**

There are some factors that help to improve products or services, and they are as follows: - (Al-Dradakah and Al-Shibli, 63:2002).

1- Production on time through production according to the quantities required of customers in the market, and this gives the opportunity for officials and workers in economic units to identify the problems facing the product or service provided and to overcome them during the production process.

2-Standardization of products by setting a specific pattern that is easy to assimilate and understand from workers working in production lines.

3-Using some devices and machines such as (robot) that help to reach a high level of product quality.

4-Continuous maintenance and maintenance in the economic units of the mechanisms and machines in the production lines to avoid downtime and reduce the times of disruption and operation according to the level required to produce a product with a distinctive quality

The researcher sees the administration's support and encouragement for workers to improve the production process through the establishment of training and educational courses, as well as providing rewards, will be the basis for achieving continuous improvement in the production process in the economic unit with the factors mentioned above.

4-3 The role of value analysis technique in improving product quality

The value analysis technique aims to improve the quality of the product and this goal is achieved by defining the components of the product and determining its primary and secondary functions while working to determine which of these components and functions are related to non-value adding activities from the point of view of customers (Damlin, 2010:3-4) as well as The value analysis technique focuses on customers, as it works to find high quality products at a reasonable price to meet their desires and needs. Quality is also considered one of the main elements of the functional benefits of the product, and when it is improved, the customer's view of the value of the product will change positively (Tam, 2013;3) and there are several issues related to quality It was determined by (Patil) when applying the value analysis technique, which are as follows: - (Patil, 2010:3-4).

1-The basic functions of the product correspond to the performance characteristics and improve them as much as possible.

2-Replacing the components and functions with others of better quality, without excessive costs

3-Logical compatibility between components and functions and achieving integration between them

4-Making any necessary modification to improve the quality of the product and the production process from the beginning.

5-Providing designs for products that conform to the wishes of customers in order to achieve their satisfaction.

The value analysis technique aims to find a relationship between cost and quality in order to reach a high quality product at the lowest cost. Therefore, it is necessary to reach customers between cost and quality in a way that makes the value of the product as high as possible, and (Dell Isola) that there are special limits for both cost and quality. Its way is to make the cost at its lowest level and the quality at its highest level (Dell Isola, 2003:3).

5- the practical side

5-1(The research sample (Al-Diwaniyah Tire Factory)

Al-Diwaniyah Tire Factory is one of the companies that was affiliated to the Ministry of Industry and Minerals when it was established in 1974, and then it was associated with the General Company for Rubber and Tire Industries. It is distinguished among the company's factories, but it has suffered a lot in recent years, especially after 2003, due to the changes that have occurred in the Iraqi market and the entry of competing products in large quantities, lower prices and good quality, as well as the weak interest and government funding for such important projects that supply the national economy with great resources, Where the factory produces two types of tires 24-1200 and 20-1200, and the production is in small quantities because it is not put in the market and was allocated to meet the needs of the departments only, in 2016 when it was returned to work, but it did not continue and work stopped in 2017 due to poor demand Government departments are attentive to import, which led to the closure of the factory again, and the following tables show the volume of production for the year 2016, and the actual cost of the frame size is 24-1200, which are as follows:

table(1)

production for 2016

the month	tire size 24-1200
March	305
April	285
May	134
June	254
July	75
August	122
September	169
October	130
November	130
December	198
the total	1802

Source: Plant Planning Department

Table (2)

Actual cost of tire size 24/1200

sequence	cost elements	The actual cost of the tire size 24/1200 (D)
1	SPR rubber 1500	13,059
2	natural rubber	111,676
3	Carbon FEF	844
4	Carbon SRF	8,885
5	lSAF carbon	7,417
6	GPF . Carbon	858

7	Deuterox Oil	1,215
8	virox oil	956
9	zinc oxide	2,749
10	stearic acid	1,170
11	Anox	2,762
12	Lppd	2,649
13	Retarder	414
14	Rinaset	506
15	CBS	1,560
16	IT MBTS	40
17	OBTS	1,414
18	IT MBT	1,586
19	Malikan	1,399
20	Banoub	1,487
21	iron wire	4,778
22	Scores	67
23	NY 1420(75)	16,136
24	NY 1420(100)	48,866
25	Resocinol	682
26	Ricklim rubber	64
27	paraffin wax	453
28	Sulfur	439
29	Calcium carbonate	24
30	Hexacoated	169
	Total direct material cost	234,324
31	direct wage cost	41470
32	industrial expenses	5354
33	Marketing and administrative expenses	19648
	Total cost of the product	300796

Source: Prepared by the researcher based on the data of the Costing Division from the Finance Department in the factory

5-2:Stages of applying the value analysis technique

1- Information collection

After the product that suffers from high costs has been identified, which is the frame size 24/1200, then information will be collected about this product from inside the factory related to work procedures, the machines used in its production, the number of working hours, the number of workers who participate in the production process for each department and their wages As well as collecting information on the specifications of the frame on which the manufacturing is based, in addition to collecting information on the costs of each component of the frame.

2-Functional Analysis

This stage is the mainstay of the value analysis technique because it focuses on the jobs that customers need, as it works on analyzing the components and functions of the product and determining its cost, as well as determining the job entitlement, and knowing the value index for the jobs to be improved, and in order to carry out the functional analysis of the product frame size 24/1200, it should Do the following steps.

A-Determining the components and functions of the frame size 24/1200 and determining أ-
their cost:

The tire size 24/1200 consists of five parts (the tread, the side line, the coated wires, under the tread, the inner layer) and these parts include a group of components or raw materials that enter into the production process of the tire size 24/1200, and these components and their functions can be clarified primary and secondary through the following table.

Table (3)

Frame components and functions size 24/1200

Sequence	**the components**		**Functions**		
	Component name	Component Code	job description	Job Code	**Category (primary or secondary)**
1	SPR 1500 rubber	C1	Stabilizes the wheel, increases friction with the ground, prevents slipping, reduces vibration and raises the vehicle body off the ground	F1	Basic
2	natural rubber	C2	It increases the frictional cohesion between the wheels of the car and the ground, and resists the tendency of the car to slip	F2	Basic
3	Carbon FE	C3	Reinforced filler material	F3	Basic
4	Carbon SRF	C4	Reinforced filler material	F4	Basic
5	Carbon Lsaf	C5	Reinforced filler material	F5	Basic
6	GPF . Carbon	C6	Reinforced filler material	F6	Basic
7	Deuterox Oil	C7	Increases flexibility	F7	Basic
8	virox oil	C8	Liquid plasticizer increases flexibility	F8	Basic
9	zinc oxide	C9	Works as vulcanized materials and activator to make tires	F9	Basic

10	stearic acid	C10	Bounding, antioxidant and vulcanizing materials	F10	Basic
11	Anox	C11	It works as a stainless steel	F11	Basic
12	lPPD	C12	An anti-ozone substance	F12	Basic
13	Retarder	C13	A damper to slow down the speed of movement	F13	Basic
14	Rinaset	C14	It acts as a digestive	F14	Basic
15	CBS	C15	It acts as a precipitate for the reaction	F15	Basic
16	IT MBTS	C16	It acts as a precipitate for the reaction	F16	Basic
17	OBTS	C17	It acts as a precipitate for the reaction	F17	Basic
18	IT MBT	C18	It acts as a precipitate for the reaction	F18	Basic
19	Malikan	C19	Measure the amount of charge of an electron	F19	Basic
20	Banoub	C20	Bidrink reinforced material	F20	Basic
21	iron wire	C21	Connecting and strengthening the strength of the frame parts	F21	Basic
22	Scores	C22	It acts as an adhesive	F22	
23	NY 1420(75)	C23	Reinforced fabric for frame structure	F23	Basic
24	NY 1420(100)	C24	Reinforced fabric for frame frame	F24	Basic
25	Resocinol	C25	Rubber permeable adhesive	F25	Basic
26	Ricklim rubbe	C26	Extended tire life.	F26	Basic
27	paraffin wax	C27	It acts as an antioxidant	F27	Basic
28	sulfur	C28	It works as a vulcanized material	F28	Basic
29	Calcium carbonate	C29	It gives hardness and strength, enhanced heat resistance and bending strength	F29	Secondary
30	hexacoated	C30	Prevent tire cracks	F30	Basic

Source: Prepared by the researcher, according to the data of the commercial department in the laboratory

Note: The use of C), which is an abbreviation for the word “Component,” and (F) which is an abbreviation for the word “Function.” These abbreviations will also be used later. It was determined that all the functions of the above components are basic, except for the component calcium carbonate, whose function is secondary.

Table (4)

Actual cost and functional cost ratio for tire size 24/1200

sequence	cost elements	The actual cost of the (tire size 24/1200 (JD	Functional cost ratio for tire size 24/1200
1	F1	13,059	%4.34
2	F2	111676	37.1
3	F3	844	0.28
4	F4	8,885	2.95
5	F5	7,417	2.46
6	F6	858	0.28
7	F7	1,215	0.4
8	F8	956	0.31
9	F9	2,749	0.91
10	F10	1,170	0.38
11	F11	2,762	0.91
12	F12	2,649	0.88
13	F13	414	0.13
14	F14	506	0.16
15	F15	1,560	0.51
16	F16	40	0.01
17	F17	1,414	0.47
18	F18	1,586	0.52
19	F19	1,399	0.46
20	F20	1,487	0.49
21	F21	4,778	1.58
22	F22	67	0.02
23	F23	16,136	5.36
24	F24	48,866	16.2
25	F25	682	0.22
26	F26	64	0.02
27	F27	453	0.15
28	F28	439	0.14
29	F29	24	0.01
30	F30	169	0.05
	Total direct raw materials cost	234,324	
31	direct wage cost	41470	13.8
	Indirect expenses		
32	Industrial	5354	1.81

33	Marketing and administration	19648	6.83
	Total indirect expenses	25002	
	Total cost of the product	300796	%100

Source: Prepared by the researcher, according to the data of the Costing Division, from the Finance Department in the laboratory

Note: The job cost ratio represents the ratio of the actual cost of each job to the total actual cost .

We note from Table (4) that the actual cost of jobs for the frame size 24/1200 amounted to (300796 dinars), which includes the cost of direct raw materials (234,324 dinars) and is divided into five sections, where the share of each of the preparation department (199238 dinars) and the formation department (35086 dinars) As for the construction, installation and inspection departments, their share was zero of the raw materials. With regard to the cost of direct wages, it amounted to (41470 dinars), the share of the preparation department was (7055 dinars), the formation department (4821 dinars), the construction department (9590 dinars), the installation department (11214 dinars), then the quality and inspection department was its share (8790). dinars), as for the cost of industrial indirect expenses amounted to (5354 dinars), the share of the preparation department was (2349 dinars), the formation department (774 dinars), the construction department (1652 dinars), the installation department (144 dinars), then the quality and inspection department His share was (435 dinars). The cost of indirect industrial, administrative and marketing expenses of the frame, in which the factory follows a special charge policy, is (7.5%) of the direct raw materials cost and (5%) of the cost of direct wages, respectively, that is, the administrative costs were calculated, which amounted to (17,574) through (234324 * 0.075) and the marketing costs were calculated, which amounted to (2074) through (41470 * 0.05).

B- Determining the job entitlement

We can determine the job eligibility ratio for each job within the framework size 24/1200, as well as determine the job eligibility percentage for both direct wages and indirect expenses through the following table.

Table (5)

Determination of job entitlement (%) for jobs and cost components for the frame size 24/1200

Sequence	**cost elements**	**degree of relative importance**					**Arithmetic mean (1)**	**Relative importance (%) (2)**	**conversion (%) rate (3)**	**Job Merit (%) (4)=(3*2)**
		1	2	3	4	5				
1	F1	0	0	8	10	12	8.26	3.78	1.30	4.91

2	F2	0	4	6	20	0	7.06	3.23	0.82	2.64
3	F3	0	0	0	9	21	9.41	4.31	0.34	1.46
4	F4	0	3	24	3	0	6.01	2.75	0.16	0.44
5	F5	1	2	17	4	6	6.81	3.12	1.55	4.83
6	F6	0	6	4	18	2	7.06	3.23	2.13	6.87
7	F7	1	1	4	24	0	7.41	3.39	0.83	2.81
8	F8	2	0	2	26	0	7.46	3.41	1.11	3.78
9	F9	0	6	2	22	0	7.06	3.23	0.85	2.74
10	F10	7	12	6	4	1	4.66	2.13	1.00	2.13
11	F11	0	1	2	27	0	7.73	3.66	1.00	3.66
12	F12	2	1	2	25	0	7.33	3.36	1.00	3.36
13	F13	0	0	5	24	1	7.73	3.6	0.93	3.34
14	F14	1	2	5	22	0	7.21	3.3	1.00	3.30
15	F15	0	0	9	21	0	7.41	3.4	1.02	3.46
16	F16	0	3	19	8	0	6.33	3	1.02	3.06
17	F17	1	1	4	24	0	7.41	3.4	1.00	3.40
18	F18	2	1	26	1	0	5.73	2.62	1.07	2.80
19	F19	1	8	18	1	2	5.66	2.32	1.07	2.48
20	F20	0	0	27	3	0	6.21	2.9	0.89	2.58
21	F21	1	2	23	4	0	6.01	2.75	1.03	2.83
22	F22	3	3	29	4	1	5.81	2.7	0.90	2.43
23	F23	0	4	18	8	0	6.26	2.86	0.83	2.37
24	F24	0	7	23	0	0	5.53	2.53	0.91	2.30
25	F25	2	2	18	8	0	6.13	2.85	1.14	3.24
26	F26	0	3	20	4	3	6.46	2.98	1.07	3.18
27	F27	0	5	16	8	1	6.33	2.9	1.06	3.07
28	F28	2	10	7	11	0	5.81	2.66	1.04	2.76
29	F29	0	2	21	4	3	6.53	2.99	1.00	2.99
30	F30	0	1	24	5	0	6.26	2.86	1.03	2.94

	Total direct raw materials cost						201.08	92.22		92.16
31	direct wage cost	0	1	10	17	2	7.33	3.36	1.00	3.36
	Indirect expenses									
32	Industrial	1	2	8	9	0	4.00	1.80	1.00	1.80
33	Marketing and administration	1	3	25	1	0	5.73	2.62	1.00	2.62
	Total indirect expenses						9.73	4.42		**4.42**
	total summation						218.14	%100		**%99.94**

Source: Prepared by the researcher based on the opinions of technicians and engineers in the tire factory

C- Determining the value index and the functions to be improved

After we have calculated the job cost percentage in Table (4) and the job entitlement percentage in Table (5) for each job in the framework size 24/1200 in addition to determining it for direct wages and indirect expenses, the value index is calculated according to the following equation.

(%) Value Indicator = Job Entitlement (%) / Job Cost

If the value index is greater than the correct one, this means that the job entitlement has exceeded its cost, but if the value index is less than the correct one, this means that the cost has exceeded the job entitlement, and this indicates that there are jobs that need improvements through improving the functional performance of the product and its quality or reducing its cost or both, but in the event that the job benefit is equal to the cost, that is, the value index is equal to the correct one, this means that the optimal value for the job has been reached, and the value index is calculated for the elements and functions of the cost frame size 24/1200 through the following table.

Table (6)

Calculation of the value index for the functions and cost elements of the frame size 24/1200

sequence	cost elements	Functional cost ratio for tire size 24/1200	Job Merit (%)	Indicator value for tire size 24	Elements that need improvement for framework 24

1	F1	%4.34	4.91	1.13	
2	F2	37.1	2.64	0.07	need improvement
3	F3	0.28	1.46	5.21	
4	F4	2.95	0.44	0.140	need improvement
5	F5	2.46	4.83	1.960	
6	F6	0.28	6.87	24.53	
7	F7	0.4	2.81	7.02	
8	F8	0.31	3.78	12.19	
9	F9	0.91	2.74	3.01	
10	F10	0.38	2.13	5.60	
11	F11	0.91	3.66	4.02	
12	F12	0.88	3.36	3.81	
13	F13	0.13	3.34	25.69	
14	F14	0.16	3.30	20.62	
15	F15	0.51	3.46	6.78	
16	F16	0.01	3.06	30.60	
17	F17	0.47	3.40	7.23	
18	F18	0.52	2.80	5.38	
19	F19	0.46	2.48	5.39	
20	F20	0.49	2.58	5.26	
21	F21	1.58	2.83	1.79	
22	F22	0.02	2.43	12.50	
23	F23	5.36	2.37	0.44	need improvement
24	F24	16.2	2.30	0.14	need improvement
25	F25	0.22	3.24	14.72	
26	F26	0.02	3.18	15.90	
27	F27	0.15	3.07	20.46	
28	F28	0.14	2.76	19.71	
29	F29	0.01	2.99	29.90	
30	F30	0.05	2.94	58.80	
	Total direct raw materials cost	77.56	92.16	1.188	
31	direct wage cost	13.8	3.36	0.243	need improvement
	Indirect expenses				
32	Industrial	1.81	1.80	0.99	need improvement
33	Marketing and	6.83	2.62	0.38	need improvement

	administration				
	Total indirect expenses	8.64	4.42	0.511	need improvement
	total summation	%100	%99.94	0.999	need improvement

Source: Prepared by the researcher based on tables (4), (5).

It is clear from Table (6) that there is a group of jobs for the frame size 24/1200 that do not need to be improved because the value index has exceeded the correct one, which means that the job entitlement has higher than the cost of the product and therefore these jobs are considered adding value and do not need improvement, and there is another group of jobs For the framework, in which the value index has fallen below the correct one, and these jobs are: F2, F4, F23, F24, they are considered not adding value and need improvement, in addition to these jobs, direct wages need to be improved through the number of workers, especially there are those who are surplus to Need and unproductive. Indirect industrial expenses and administrative and marketing expenses also need to be improved, since most of the costs associated with these elements are unjustified and not adding value.

3-Creativity and brainstorming:

In this step, creativity and ideas are presented in order to find proposals and solutions to achieve good performance and the required jobs, by following organized methodologies for work that will improve product quality including the following:

A- Adding new tire specifications:

One of these specifications is what makes the tire the ability to withstand heat, harsh weather and bad road paving, and this represents the biggest problems that we face in Iraq in particular. To choose some raw materials, including rubber, that help the tire to withstand and disperse high temperatures, as well as withstand strong bumps, that is, work on the manufacture of tires of Class A) that operate with these specifications and thus obtain a high quality that can compete with foreign goods.

B- Using modern technology in all parts of the factory :

The machines and mechanisms that are used in the factory are very old and do not keep pace with the rapid changes and developments that occurred in the industrial environment, and modern types of machines are available in foreign markets that produce a high-quality product and require a small number of workers, so it saves from the cost of direct wages.

4-Evaluation of ideas:-

During this step, the ideas that were previously proposed to reduce costs for jobs or items in which the value index has fallen below the correct one are evaluated and worked to be modified to keep pace with

developments and conditions that have arisen in the business environment with an estimate of the costs incurred by the product for its cost elements, according to what the plant management deems appropriate and which It can add value to the product and contribute to increasing its functional merit.

5-Development and implementation

During this step, proposals and solutions are developed that include choosing the best that helps in solving problems that are represented in the high costs of product elements, as well as solving problems that increase costs and lower product quality, and prepare a final report that includes information on costs and improvement on products, This report is sent to the senior management to implement the best alternative that was chosen in order to increase the functional merit of the product and reduce its cost.

As for the role of the value analysis technique in improving the quality of the product, we have new technical specifications after the application of the proposed ideas and proposals that helped improve the quality of the product and make it more suitable for the use of customers and conforms to the specifications and standards set for quality, thus meeting the needs and desires of customers and improving the actual performance and value of the product Based on the foregoing, it can be said that the application of the value analysis technique in the factory, the research sample, has helped to improve the quality of the product, and accordingly, the research hypothesi has been proven.

6 - conclusions and recommendations

6 - 1Conclusions:

1- The value analysis technique is among the important modern techniques for strategic cost management, as it contributes to the analysis of the functions and components of the product for the purpose of identifying and consolidating the activities that contribute to adding value to the product and excluding the activities that do not contribute to adding value and seeking to find successful solutions for them for the purpose of increasing the functional entitlement of the product (quality performance) to meet the needs of customers.

2-We can use the value analysis technique on new and existing products, so its effectiveness increases when used on existing products for the purpose of helping economic units find a solution to their problems related to their products.

3-The application of the value analysis technique needs successive stages, including (the stage of information gathering, the stage of job analysis, the stage of creativity, the stage of development and the evaluation stage).

4-It became clear that the factory is unable to sell its products in the Iraqi market at prices that cover the costs and the profit margin, and all of this is due to reasons that we summarize as follows.

The absence of protection over the national product, the increase in the supply of foreign tires imported from poor global origins.

6-2Recommendations

1-Emphasis on the importance of the factory's adoption of the value analysis technique through the formation of a multi-tasking team that has the ability to develop the appropriate plan to perform the activities of the laboratory research sample through the assistance of experts and consultants in the field of design and manufacturing for the purpose of preparing the readiness to work with this technology in the laboratory and contribute to finding solutions to recurring problems related to higher production costs

2-It is recommended that the management of the Diwaniyah tire factory exclude redundant workers who do not contribute to adding value and transfer them to the waste tire recycling project, in addition to the necessity of preparing training courses to improve the experiences and skills of value-adding workers.

3-The management of Al-Diwaniyah factory must use the newly discovered administrative and cost-effective methods and techniques, at the forefront of which is the value analysis to analyze and manage the cost.

4-It is necessary for the factory's management to offer products that meet the customer's desire in terms of acceptable quality and low price for the purpose of being able to continue and compete with imported products, and work should be done to study and analyze the market on an ongoing basis to know the customer's needs and proceed to meet them.

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