

AREAS OF CONTRIBUTION OF THE DISASSEMBLED ANALYSIS IN ACTIVATING THE COMPETITIVENESS OF THE INDUSTRIAL ENTITIES-APPLIED RESEARCH IN KARBALA CEMENT FACTORY

Mohammed Abed Kadhim(1)

yshsgy@gmail.com

Ali Mohammed Thijeel AL-Mamouri(2)

asst.prof.ali@pgiafs.uobaghdad.edu.iq

The Post Graduate Institute of Accounting and Financial Studies
Accounting Studies Department- University of Baghdad- Iraq(1,2)

Abstract

There is a group of economic factors that affect the rationalization of costs, including intense competition between economic entities, which made them face to face with the danger of non-continuity and the deterioration of their competitive position if they did not reconsider in terms of applying the disassembled analysis approach as a modern strategic technology in the field of cost and administrative accounting, which can be Its role is for the economic entities to achieve rationalization of their costs in a way that helps achieve optimal utilization of resources, improve product processes, eliminate waste and loss, and as a result enhance competitive advantage by providing high quality products that meet customer requirements, in a timely manner, and at low prices. The research concluded a set of conclusions, the most important of which is that the Karbala Cement Factory, as the research sample, suffers from a waste of materials in addition to the lack of optimal use of resources. By applying these two techniques, the goal of rationalizing costs can be achieved, as well as providing useful information that helps the administration in making various decisions.

Keywords: disassembled analysis, activating the competitiveness, industrial entities

Introduction

The method of disassembled analysis of products and materials into its multiple parts with the aim of obtaining technology or information that is used to obtain a competitive advantage by acquiring innovative experience or creative ideas (acquired knowledge), and shortening the time and cost needed by the research and development process by studying the product starting from the result The final manufacturing processes (outputs) and go back to the beginning of the production process represented by the inputs in order to rationalize costs, quality and solve the problems that plague the manufacturing processes, defects or product shortcomings to meet the desires of customers.

The first axis: research methodology and previous studies

First: research methodology

Research problem:

That the administration directs in the economic entities that operate in the Iraqi environment that their products or industries suffer from a decline in product quality and high manufacturing costs, which makes them in a position of weak competition compared to other similar products, especially foreign ones, due to the adoption of traditional and old production systems that do not keep pace with technological and technical development. In light of this, it is necessary to search for production alternatives that lead to interest in the technologies and methods necessary to develop and improve the design of the product, and the disassembled analysis that is concerned with rationalizing costs in order to achieve customer satisfaction and achieve an advanced competitive position that enables Iraqi economic entities to enter the market and compete with global entities.

Research objectives :

This research aims at a number of objectives that can be summarized in the following points:

- Identify the reality of adopting the disassembled analysis method and the extent to which it can be applied in the Iraqi environment.
- Contributing to activating the disassembled analysis method by setting standards and mechanisms and providing the necessary information for its application, taking into account the requirements of competitive advantage, and keeping pace with modern technology and the special conditions of the Iraqi environment.
- Shedding light on the theoretical concepts related to disassembled analysis, and identifying their role in achieving sustainable competitive advantage.
- Measuring the appropriateness of the outputs of the cement industry for discreet competing companies and analyzing its parts using the disassembled analysis of quality control and conformity factors under the Iraqi environment.

Research Hypothesis:

The research is based on a main hypothesis:

The use of the disassembled analysis method leads to obtaining appropriate information that would activate the competitiveness of the economic entities in Iraq).

The importance of research

The importance of the research is evident in the following points:

- 1- Contribute with the help of economic entities (the research sample) to use modern technologies for management, and give a clear idea about the disassembled method and analysis.
- 2- It contributes to increasing the level of senior management's awareness of the importance of adopting the disassembled analysis in order to improve the performance of Iraqi economic entities that lead to customer satisfaction and thus achieve a competitive advantage over its competitors.

4- This research, through its practical application, can provide solutions to the problems that cement industry factories suffer from, especially in how to develop and design their products, as well as provide indicators that help adopt the disassembled analysis approach by specialists to be able to achieve change and raise the quality of their products. and rationalizing its costs.

4- The need of senior management for the integrity of the information provided by the method of disassembled analysis, which contributes to identifying the actual reality of the economic entity and the level of performance of a distinguished innovative product of other competitors, analyzing it and benefiting from it in improving and developing its products to reach positive results, and using it as a basic support in order to rationalize the costs of quality.

Search method

- **Inductive method:** By relying on studying and analyzing previous theoretical and applied studies related to the subject of research, as well as research and articles published on the World Wide Web (Internet), with the aim of forming the theoretical framework.

- **The analytical descriptive approach:** by applying the disassembled analysis approach to rationalize costs and achieve a sustainable competitive advantage on a cement manufacturing plant by analyzing the results from this application.

Second: previous studies

(Rains ; sato , 2008)

"The Integration of the Japanese Tear-down Method with Design for Assembly and Value Analysis"

Integration of the Japanese disassembled analysis method with design for collection and value analysis.

The research seeks to introduce the disassembled analysis method to the United States of America and the improvements that have been achieved as a result, including the integration of the disassembled analysis method with design for collection and value analysis.

The most important conclusions The research concluded that the application of the method of disassembled analysis has proven, as confirmed, that it is important in increasing the profitability of the economic entity.

Most Important Recommendations The use of disassembled analysis will give positive results if value analysis technology is applied as it is an important tool to improve the design process for grouping in the economic entity.

(Saleh, 2013) 2-

"Applying Target Costing Technology Using Reverse Engineering"

Objectives of the study

-Adopting the planning cost management approach and some of its technologies and demonstrating its importance in facing price competition by means of designing products with the lowest cost and appropriate quality.

-The use of cost management techniques in detecting and diagnosing the causes of high costs of the company's products through the application of the target costing technology and the method of reverse engineering.

-Directing and urging the administrative and technical leaders (with engineering specializations) to adopt contemporary design methods such as the reverse engineering method and the design method according to the customer's requirements.

The most important conclusions

- The changes that occurred in the contemporary business environment represented by global competition, technological progress, diversity and many customer needs, and the transfer of business entities from an environment that enjoys manifestations of stability where competition is limited, simple technology, and customer loyalty to the product to an environment characterized by intense competition and rapid change in customer tastes.

- Global competition and technological progress have caused a shortening of the product life cycle, and thus created an urgent need to provide products in a variety of forms in order to satisfy the expectations or preferences of customers.

-In order to survive in the contemporary business environment, it is necessary to include the product with the critical factors of success: the lowest cost, quality, speed of delivery, innovation, and the flexibility that is required from the customer.

The most important recommendations

-Stop using the traditional method in product pricing (cost plus profit margin) and use the planning cost management approach represented by the target cost technology and the reverse engineering method, and with the support of the reference budget in pricing products that face intense competition.

- The need to modify or develop the costing system within the unified accounting system, taking into account modern systems in allocating and distributing costs, especially technology costs based on activities, and management on the basis of activities.

The second axis: the theoretical side

Competition pressures have reached their limit in terms of speed in product design and achieving a disciplined model. It is very necessary to adopt the product development cycle (reducing product development time), as development is required strongly for customer satisfaction, the needs resulting from the globalization of manufacturing, and changes in market requirements. In engineering, many fields such as aerospace, shipbuilding, and others, it is difficult to find or create a computer-aided design model that has multiple facets. A computer-mediated model to show the approach, and then the model that was made can be reused, or improved, that is, the disassembled analysis is an organized method for evaluating the product for the purpose of making a replica or making improvements to the current design of the product (Ismail, 2009:139).

disassembled analysis is called reverse engineering and back engineering. (Wikipedia, 2022: 9), and that disassembled analysis is the discovery of technical principles through the processes of technical analysis, performance analysis, and function, and it is a technology

process that begins with analyzing the original product completely to know its engineering specifications in order to produce an alternative to it, or to improve the product, and increase its capabilities and ability to avoid existing defects. In the original product, this technology requires the presence of an advanced scientific and technological base on which to base it, and this technology may be applied to produce an entire system, one of its components, or even a spare part. (Al-Sawy, 2021: 386).

disassembled analysis is a process that involves examining a competing product in order to identify opportunities for product improvement and/or cost reduction. The competing product is disassembled to determine its functionality, design, and information about the processes used and the cost of making the product. The aim of this process is to benchmark the product's provisional designs with competitors' designs to incorporate any advantages noted in the competitors' approach. (Drury, 2018: 545), and it is also known as the process of dismantling and analyzing competitors' products to determine the mechanism of product design, the materials used and to understand the technologies used by competitors.

And that the economic entities obtain the products of competitors, and disassemble them to verify the design, materials, manufacturing processes and quality of the product by means of this process, and to identify and realize those units of the products of their competitors, and what differs from their products, and the cost of their production and the disposal of untapped resources (Al-Maamouri; Al Dhaheri, 29: 2020), customers benefit from high quality products at low prices. (Zengin; Ada, 2010: 596), and the scale expresses the high degree of practice, mastery, and balance with competitors in all jobs to determine the necessary production capacities, which are necessary for production according to the conditions of the competing product (Al-Kawaz, 2016: 87), as it qualifies them to gain an advantage, or competitive advantages.

It can be said that the importance of disassembled analysis lies in the fact that it is more than just a means of measurement and reporting on the costs of products and services provided by competitors, but rather (philosophy, attitude, technology).

1- It is a philosophy: The disassembled analysis is a philosophy of continuous improvement, because it is tantamount to developing the idea of continuous search for methods that help the economic entity to take appropriate decisions to rationalize costs and that contribute to determining prices for products that achieve benefit and satisfaction for the economic entity and its customers. and raising the level of efficiency, economic and effectiveness for individuals and institutions concerned with the implementation of procedures and development programs, the increase in Growth rates in the various fields of production through which the individual income rate increases and the relationship and feedback between inputs and outputs are stimulated ,(Ali, Abd , & Kareem , 2022).

2- It is a position: The disassembled analysis is a prior and proactive position, and its role is not limited to dismantling and analyzing cost elements and materials, but rather it has become an active partner in administrative decisions in order to improve and develop products and services and rationalize their costs.

3- It is a technology: the disassembled analysis means the design of reliable methods and methods to be used in supporting administrative decisions related to reducing costs on the one hand, and improving quality on the other hand.

The disassembled analysis is an effective tool in transferring technology and then reducing the technology gap between the leading economic entities and the promising emerging economic entities, as these entities realize the difficulty of reducing it through radical innovation, and in a secret way to seize opportunities for technological take-off, instead of waiting for innovations. Costly radical, which may be far-fetched, and depends on understanding the working principle of new products, or competition mediated by disassembled and analysis of products (Khalili, 2022:445).

Cost rationalization in light of the disassembled analysis 1.2

The rationalization of costs depends on the optimal use of unit resources from control, good guidance for the purpose of providing products and commodities at the lowest costs. (Saad; Jawad, 2020: 177), and by following modern costly and administrative methods to obtain a competitive advantage and achieve a competitive position. (Zarour, 2015: 90), and rationalization means economy in performance that helps the planning process to achieve rationalization by focusing on adequacy of work, and consistency in effort, as it replaces planned, uncooperative joint efforts, equal flow of work instead of uneven, and considered decisions instead of Wise decisions dictated by necessity. (Ibrahim, 2012: 54).

The disassembled analysis plays an important role in rationalizing costs at a very early stage, as the budget process is adopted in the design or development of the product on the basis of the availability of customer requirements that are not available in the current product, and looking at the customer as an essential and influential part in the development stage to determine the advantages of the product (cost, quality, function) and this requires compatibility between the parts and components, which can be easily changed thanks to this method, and then the bulk of the product costs will be determined in the design and development phase before manufacturing, and this contributes to reducing the gap between the actual cost and the standard cost, i.e. the disassembled analysis method Managing costs to satisfy customers by defining the product, defining customer requirements, budgeting, and detailed description of the components, and processes for control or control from developing alternative solutions, whether it is to cause a change in the components or the process, which makes it more sufficient than others in providing a product that is superior to others, so the disassembled analysis is The fastest way to reach the market or penetrate the future (Buonamici, 2018: 447), and after selecting the product to be produced based on market studies, and others, competitors' prices are known for that product, and then the profit margin is subtracted (Al- Mamouri; Al-Sad, 2022: 8), which determines the (industrial) product based on a specific plan, and the remaining amount is the target or allowable cost. The problem lies when production costs are more than the target cost, and here value engineering technology is used to redesign the product based on its functions That is, identifying the required functions, identifying the components that perform this function, and re-designing according to the disassembled analysis based on dismantling the best similar product, and offering design alternatives by means of components that are able to achieve the target cost, and the required characteristics of the target elite.

Reducing costs by using the disassembled analysis technique 1.2

At this point, the role of disassembled analysis technology is clarified in reducing costs by following the product life cycle. The main product life cycle includes three main stages of cost reduction. The first stage is research, development, and design. The second stage is production or manufacturing. The third stage is: : After-sales service.

In the first stage represented by the stage of research and development, it includes the following: (Atkinson, 1998: 611)

1- Using the information obtained through the disassembled analysis technique that leads to generating ideas for new products.

2- Product design by developing the technical aspects of the products by specialists, engineers, and experts.

3- Developing the product through the economic entity developing distinctive characteristics, the task of satisfying the customer, designing models, production processes, and any special tool required.

At this stage, senior management takes the most critical decisions at this stage, because any extra amount spent on activities at this stage leads to a large availability of costs in the production (manufacture) and after-sales services stages. (Kazem, 2008: 126).

As for the second stage (the manufacturing or production stage), it takes place after the previous stage, as the economic entity carries out the industrial (production) cycle represented by the costs realized in the production or manufacture of the product, and usually at this stage there is no flexibility in the analysis process, and the design of the product to influence In product costs due to it developed in the previous stage.

Finally, the third stage, after-sales services, begins its role when the product becomes accessible to the customer. Thus, this cycle bypasses the manufacturing cycle (production).

The disassembled analysis also follows the methodology of thinking to identify alternative methods of performing the job that meet the customer's requirements and desires, and to identify opportunities for developing the products of the economic entity and reducing the cost. (Drury, 2008: 892), without prejudice to the target quality level specifically, and an analysis of all cost elements. (Al-Lami, 2008: 21).

The third axis: the theoretical aspect

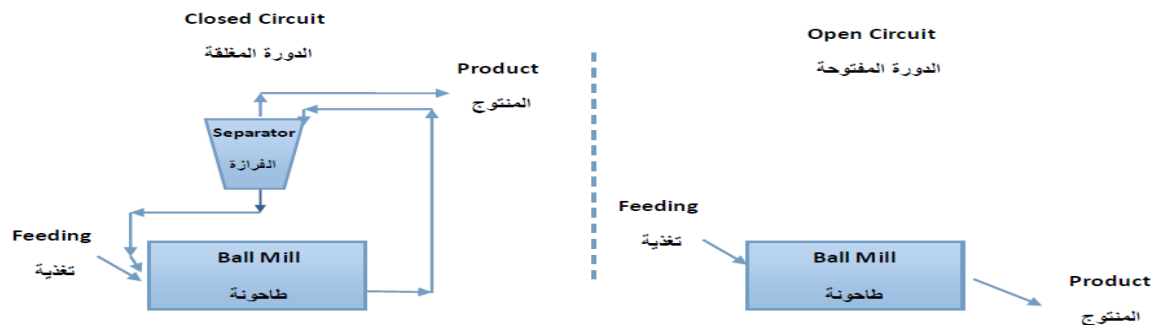
Applying the disassembled analysis approach to identify the competitive reality

Before delving into the details of the activities of production costs and other activities, we review a comprehensive overview of the most important indicators of the factory's performance and its capabilities as follows:

1.3 sufficiency of the production process

The laboratory raises the adequacy and effectiveness of the mills by following the closed circuit by increasing the separator or classifier to separate the outside of the mill into fine and coarse, as the fine comes out as a product, and the coarse is returned to the mill with the materials The entrance was to be grinded again, and the mill followed the open circuit that was used in the past in the work of the mill, and to control the quality of the fineness, it was by reducing the feed, and the materials were entered into the mill, and in the event of non-

conformity with the specifications, the meal was returned in its entirety, which leads to a loss of time, Effort, cost, and as shown in the figure below:

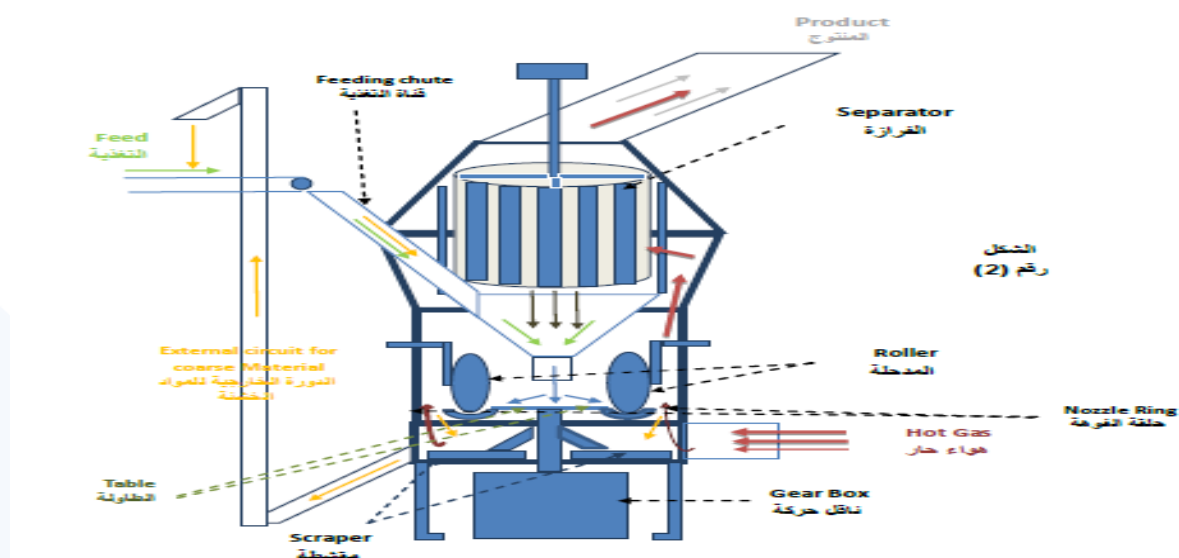


Figure(1)

The mill works in closed cycle and open cycle

As for the clinker mills, the problem that the factory faced was represented by using the horizontal ball mill to grind the clinker with gypsum (gypsum) and smooth them to produce cement, which is characterized by energy consumption and poor grinding efficiency. On the center table and as a result of the rotation of the table, the materials move by centrifugal force towards the rollers, and are confined between the roller and the table, and as a result of the hydraulic force that controls the rollers, the grinding process takes place, and the ground materials are lifted by the force of the air generated by the mill fan to pass them to the separator, where the required soft materials are separated as a result. Returning the large materials (non-conforming) to the center of the table for re-grinding. As for the coarse materials that cannot be lifted by the force of air, they slip from the nozzle ring and are pushed out by the scraper. The mill fan is also used to control the amount of gases inside the mill by returning part of the air. Or the gases that you draw from the mill to the mill again.

The heat generated from the furnace stage is used to heat the mill by using fans to transfer hot air to it, thus reducing the thermal energy consumed, as shown in the figure below:



Figure(2)

The mill works in closed cycle and open cycle

Modifying the stages of mill operations by increasing the roller press in terms of its energy expenditure within the range of (4-9%), as the arrangement of the sizes of the balls inside the mill is changed by replacing the large sizes with small ones, and returning the materials to the grinding process, and reducing the number of rooms, as shown in the figure below:

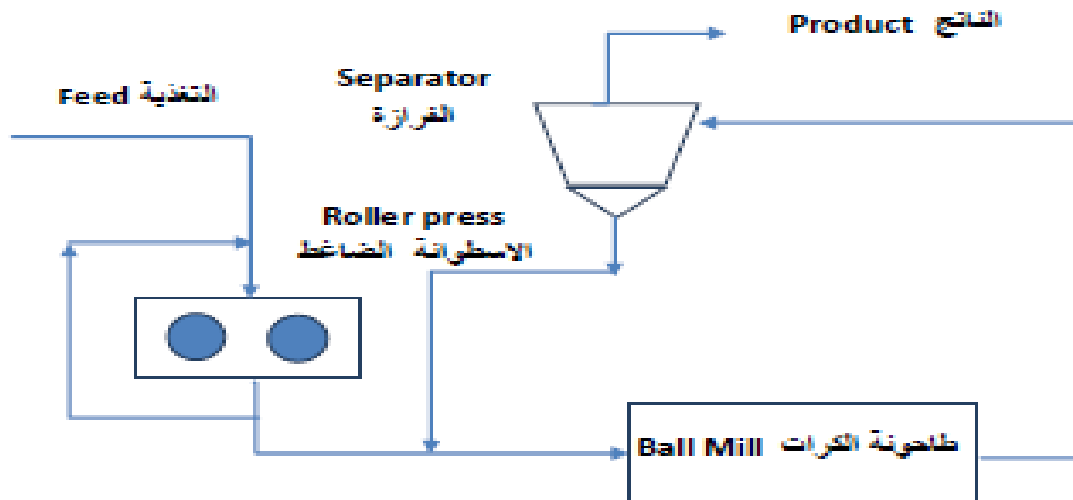


Figure (3)

Increased pressure roller in grinding stage

Figure (3)

Increased pressure roller in grinding stage

3.2 Production capacity of laboratory equipment

The design production capacity, estimated at two million tons annually, requires the presence of equipment and supplies capable of achieving this, and the table below shows the production capacity of Karbala Cement Plant equipment

Schedule (1) Production capacity of laboratory equipment Table (1) Definitions of Activity-Based Costing (ABC) Technology

productive stage	Available number of production equipment	Production capacity per unit (ton/h)	Total production capacity (ton/h)
Extraction and breaking of raw materials	Breaker number / 1	100	100
Breaking auxiliaries or additives	Breaker number/1	100	100
Rough (preliminary) grinding	Mill number / 2	140	280
the oven	Oven number / 2	150	300
mill (clinker)	Mill number / 2	100	200

Source: Research and Development Department

The factory owns (two crushers, four mills, and two furnaces), and the nature of the furnace cannot raise its capacity to more than (3000) tons / day, which is equivalent to (1095) thousand

tons per year, and this production capacity does not conflict with the production purpose of the factory represented in the production of (Two million tons) of cement annually.

The relative production share of the factory 3.3

The table below shows the relative shares of the Karbala Cement Factory in the market on the one hand, and on the other hand the percentage of its contribution to the achieved production of the produced resistant cement.

schedule (2) The relative production share for the year / 2019

	The amount of cement produced / thousand tons	The quantity of cement produced of the salt-resistant type / thousand tons	Relative share of the factory of all types of cement %	Relative share of the plant of salt resistant cement %
Karbala Cement Factory	1,6	1,6	13	38
Competitive laboratories inside Iraq	10,7	2,6	87	62
domestic production	12,3	4,2		

Source: Research and Development

The Karbala Cement Plant produced for the year 2019 about (1.6) thousand tons annually, and thus it contributed by (13%) of the cement production produced inside Iraq, and it also contributed by (38%) of the cement production of the salt-resistant cement type (CRS).

Analysis of energy utilization 4.3

This ratio represents the capacity range of a coefficient using its energies. The table below shows the energy utilization ratios for cement-producing activities and events in the years (2008-2009) .

Table No (3) Energy utilization ratios for cement

	before re-engineering		After re-engineering	
the years	2008	2009	2018	2019
Design capacity (1) thousand tons	2000	2000	2000	2000
The planned capacity is (2) thousand tons	400	520	1800	1800
Actual production (3) thousand tons	244,7	215,9	1607	1648
Operating ratio (2/1)	20	26	90	90
Execution rate (3/2)	61.1	41,5	89,3	91,5
Utilization ratio (3/1)	12,2	10,8	80,4	82,4

Source: It was calculated by the researcher based on the reports of the Research and Development Department

From the above table, the following is clear:

1- A significant increase in the utilization of the design capacity of the plant was noted, as it reached (82.4%) for the year 2019 (after re-engineering), parallel to the year 2009, which reached the utilization rate (10.8%), which indicates the achievement of the desired purpose. Among them, the realization of a remarkable increase in the production capacity, which also led to an increase in the employment rate from (26%) to (90%).

2- Exploiting the plant's resources effectively and efficiently, as the planned percentage reached (90%) of the design capacity for the years (2018, 2019), which is the highest planned capacity for production from the designed capacity, parallel to the years before re-engineering, which reached the highest percentage in the year 2009, as It amounted to (26%) of the design capacity, while the implementation rate amounted to (91%), which indicates an improvement in the production capacities of the factory, and the exploitation of its energy with the highest possible efficiency, and regular industrial production without obstacles or difficulties in all stages of production.

3- The presence of idle capacity (unutilized) amounting to (1784.1) thousand tons, at a rate of (89.2%) for the year / 2009 of the designed capacity for the production of the factory, which indicates the poor performance of the factory, and the lack of efficient and effective use of its resources to produce and develop its products to meet the needs Consumers, and this was a motive for the higher management to re-engineer by giving an investment opportunity to operate the plant and to conduct an in-depth study to develop production lines, meet the desires of customers, and then increase energy utilization rates.

The fourth axis: conclusions and recommendations

First: conclusions

1- The technique of disassembled analysis is one of the important tools of re-engineering, as it is based on the proper identification of the activities of the economic entity by identifying the activities that increase the value, deleting the activities that do not increase the value, or reducing their cost.

2- The use of disassembled analysis technology is directly related to the desires and preferences of the customer and the provision of the product or service that suits his needs, and this would lead to improving the value of the product or service, and as a result rationalizing its costs.

3- The disassembled analysis (reverse engineering) is one of the most important tools used in achieving the targeted rationalization of costs, because it is based on the basis of evaluating the competing product in order to identify opportunities for developing the product of the economic entity, and as a result, modifying the second according to the specifications of the first.

4- The results of employing disassembled analysis technology, and changing manufacturing methods from the wet method to the dry method used in the cement industry, as well as improving the quality of cement by producing salt-resistant cement instead of ordinary

cement, have proven to lead to rationalization of the production cost, as it reached the cost of a single ton before recycling Engineering ranged from (162-165) thousand dinars, and its cost after re-engineering ranged from (78-80) thousand dinars, i.e. cost rationalization, which is represented in idle energy costs, which should not be charged on the cost of products.

Second: Recommendations

- 1- The necessity for the economic entities of the research sample to apply the method of disassembled analysis due to the development taking place in the industrial environment, dynamics, and manufacturing techniques, which required those entities to develop their manufacturing and productivity methods in order to achieve their planning purposes.
- 2- Creating a division specialized in disassembled analysis in the factory. Its work will be within the research and development department, and its main interest will be to study the market, see the advantages of competing products and compare them with the factory products, find out what suits the tastes of customers, and try to develop and update products, especially the resistant cement product. According to the market study, and an attempt to benefit from re-engineering technology and its tools in improving and developing production processes, and raising the level of the product in a way that enhances the competitive advantage and makes it a strong competitor in the market.
- 3- Replacing the old machines and equipment for cement production with modern ones, developed with high specifications and more adequate, and this procedure leads to rationalization of maintenance costs, spare tools costs, and of course it will lead to rationalization of the cost of the plant.

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