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THE IMPORTANCE OF GREEN TARGET COSTING AND CONCURRENT ENGINEERING TECHNIQUES IN ACHIEVING SUSTAINABLE COMPETITIVE ADVANTAGES-APPLIED RESEARCH IN THE IRAQI GENERAL CEMENT COMPANY

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Abstract
The research aims at the importance of the Concurrent engineering techniques and the green target cost in providing an environmentally friendly product, because these two technologies are among the most important tools that emerged as a result of following business strategies that change rapidly with market requirements and the essence of the advanced production process, by manufacturing products that meet the desires of customers in the shortest possible time and lowest costs. To this end, the Babylon laboratory was chosen. The research reached several conclusions represented in the shift from product development from succession to synchronization, which enables it to respond quickly by reducing the time required for products to enter the market and adapting to changing work environments. Following the two techniques of concurrent engineering and green target cost in product development is a shortcut to the product design and development process. The most important recommendations are directing modern technologies to serve the environment due to the trend of global interest in the environment due to environmental pollution and the lack of natural resources, especially scarce resources.

Keywords: Concurrent Engineering, Green Target Cost, Sustainable Competitive Advantage.

Introduction

The business environment has been accompanied by many rapid and continuous changes and developments that pose challenges, pressures and threats to the future of economic entities.

This environment is characterized by economic, social, cultural, political, legal and technological changes, the use of modern design and production systems, as well as market globalization and competition between economic entities , in addition to focusing on changes in customers' tastes and behaviors, in order for economic entities to adapt to these changes and developments, they must follow a strategic approach to cost management, relying on a set of cost and management techniques and fulfilling customers' desires, and among these technologies are the Concurrent engineering and green target costing techniques to achieve a sustainable competitive advantage.

THE FIRST TOPIC
RESEARCH METHODOLOGY

Research Problem

The competition between the economic entities has increased, the focus on the customer and the adoption of the strategic approach to cost management, and the Iraqi economic entities face many problems related to cost, quality, time and flexibility. Despite that, these units rely on the traditional approach to cost analysis and management, where the traditional approach and cost and administrative techniques play an important role in achieving accurate cost measurement and providing cost information commensurate with different environment changes. And modern costing techniques Which seeks to provide an environmentally friendly product capable of competing with foreign products in terms of quality and price, which contributes to achieving a sustainable competitive advantage. This is because traditional cost systems cannot keep up with modern challenges and increasing environmental requirements. The research problem can be summarized by presenting the following questions:

- Can the concurrent engineering and green target costing techniques be applied in the Iraqi economic entities?
- Does the use of concurrent engineering techniques and green target costing contribute to the production of environmentally friendly products that achieve a sustainable competitive advantage?
- Does the green target costing technology help avoid the disadvantages of traditional target costing in the field of providing environmentally friendly products?

Research Importance

The importance of the research stems from the importance of the Concurrent engineering techniques and the green target cost and their suitability for the Concurrent engineering and environmental changes that constitute a pressure and challenge on the future of the economic entities operating in this environment, and the reasons for the emergence of these two techniques were established, so the importance of the research can be explained through the following:

a. State the importance of applying green target costing technology to analyze product components and functions in order to identify unnecessary components and functions that do not add value to the product, with the aim of getting rid of them in order to reduce costs and time without compromising product quality.

b. Statement of the role of applying Concurrent engineering technology to achieve savings in each of the cost, design time, and manufacturing and assembly time by conducting these operations Concurrently, and focusing on the quality of products in a way that helps provide sufficient flexibility to respond to any changes in customers' needs and desires.

c. Statement of the role of concurrent engineering and green target cost technologies in helping the Iraqi economic entities to reduce costs and gain a sustainable competitive advantage in terms of cost, quality, time, flexibility, and in line with the requirements of the business environment.

Research Aims

In light of defining the problem, the research aims to:

a. Statement of the knowledge foundations of the concurrent engineering and green target costing techniques.

b. Statement of the knowledge bases for the concept of sustainable competitive advantage.

c. Applying Concurrent engineering techniques and green target costing in the Iraqi business environment, by developing a methodology for applying the proposal, in a manner commensurate with the economic entities operating in this environment, in order to help these units achieve cost and achieve a sustainable competitive advantage.

Research Hypothesis

The research is based on the hypothesis that:

"The use of Concurrent engineering and green target costing technologies achieves customers' desires and reduces costs, thus contributing to enhancing the sustainable competitiveness of economic entities."

THE SECOND TOPIC
THE THEORETICAL FRAMEWORK OF THE STUDY

1- Concurrent Engineering Technology

There are several ways to develop the product, the first of which is the traditional method or what is called (sequential engineering), which was prepared at the beginning of its use as a method for developing the design of the product because it uses feedback in re-designing the product, however, this method has some defects and cannot be continued, and among these defects The defects of each stage of production will be discovered after its completion and the outputs will be transferred to the next stage, and thus the product will bear the costs of redesign and the costs of additional time, in addition to that the delay in the arrival of the product to the market and thus it will be satiated by competing industrial companies as a result, the advantage is weakened Competitiveness and the company loses its market value, which urges the company to move towards solving failures in sequential engineering and to use the Concurrent engineering method.

2- Historical Development Of Concurrent Engineering

Most of the studies and research referred to the history of the emergence of the concurrent engineering technology during the eighties of the last century when it was used in the development of weapons in the American transport arsenals (Makinen, 2011:20), and in the early nineties of the last century the concurrent engineering technology began to spread widely because it covered multiple industries in different countries around the world. American, Japanese and German companies have applied it to various industries such as aircraft, automobiles, machinery and electrical appliances. Therefore, it is considered an important tool to reduce costs and improve quality (Daoud and Mazen, 2016: 186.).

3-The Concept Of Concurrent Engineering

The term concurrent engineering was adopted in the late 1980s to describe the systematic approach to concurrent product design, scheduling and support for production processes, and concurrent engineering as a concept means reducing product development time in response to changes in production techniques, managing quality and market installation, increasing product complexity, and rapid delivery to obtain the lowest cost (Kamara, 2007:1). (Mani, et.al.,) referred to concurrent engineering as a multi-functional team, aiming to find specific solutions to many problems that may arise when designing, manufacturing, and assembling products through the Concurrent development of products and production processes, and this development represents an essential element for radical solutions through which products can enter the market and through excellent performance in the dimensions of cost and time can compete with global markets, accordingly, (Mani) and others emphasize that concurrent engineering is a way to find radical solutions to problems that can arise when Carry out product design, manufacturing, and assembly processes with the help of a cross-functional team by performing these processes Concurrently to reduce costs—and generate time savings (Mani, et.al., 2015:128-129).

4- The Entrance To The Concurrent Four-Dimensional Geometry:

After many writers and researchers agreed on the three-dimensional Concurrent Engineering stage, which is considered the most common stage used to this day in many economic entities that adopt concurrent engineering, represented by (after designing a product's sustainability), this dimension includes the study of the aspects of sustainability, the importance of the large issue of sustainability in the world, the size of its large positive return on the Iraqi society on the Iraqi industrial environment.

(Dongre, al., 2017:2766) confirms that the basic idea of concurrent geometry revolves around two concepts:

The first concept is that all elements of the product life cycle, from a functional point of view, throughput, assembly, interview, testing, and maintenance issues, should be taken into account very carefully in the early design stages.

As for the second concept: which is the previous design activities, they should all happen at the same time. The idea is that the concurrent nature of these elements greatly increases productivity and product quality (Dongre, al., 2017: 2766), (Kim, et al., 2014:44) states that one of the motives behind the issue of sustainability is that customers demand more products that are not harmful to their health and safety, as well as environmentally friendly products related to reuse, recycling, and recycling of old products, as seen by (Ishioka & Yasuda.,2009:1699).

Green Target Cost

1-Establishing The Green Target Cost

Target cost technology arose from the idea of fixed costs at the beginning of production and product development, which gives management the opportunity to reduce them, as Japanese industry experts began to develop a simple American idea called value engineering, which Americans used in industry during World War II as an engineering method to rationalize and transform production costs into a dynamic system to reduce costs. With production costs reduced to the lowest level (Garrison, et.al., 2016:623).

2-The Concept Of Green Target Cost

It is considered a market-oriented cost management technique, because it is used to improve profitability and total productivity at the beginning of the product life cycle, which confirms

that it is the early stage of the product life cycle (Hansen & Mowen, 2006 :8). Green target costing is defined as the process of integrating and implementing target costing mechanisms into the development of an environmental sustainability strategy, where the target costing strategy enhances the strength of practices and leads to a more comprehensive approach. It can be a useful tool to help determine the allowable cost of a product, because although an environmental protection plan indicates the importance of green products, customers are often unwilling to bear the additional cost of purchasing the product (Hendricks, 2015:11).

3-Creating Sustainable Green Products

Innovation has become an essential factor for business survival and a weapon for maintaining competitive advantage (Chiou, et.al., 2011: 822-836) and the increasing interest in environmental issues prompted companies to develop green products and green manufacturing processes, to satisfy the strict environmental systems scattered over competitors, using differentiation strategies (Lin, et.al,2013: 1-14). Green innovation is defined as the process of developing and implementing new products and processes, to achieve social goals and reduce environmental damage, through a process Manufacturing for the entire product life cycle, in addition to responding to environmental issues in the influencing factors, (Huang & Li) indicated that it uses green innovation to express the performance of green products or processes to compete in the market, which is achieved by reducing the environmental impacts of companies. Companies can reduce production costs and increase economic efficiency by implementing environmental innovation such as reducing energy consumption, reusing materials, and redefining the production process (Li & Huang, 2018:316-324).

4-Dimensions Of Green Innovation

A- Green Product Innovation

(green product innovation) means the introduction of new or significantly improved products that meet the inter-requirements in terms of (non-toxic raw products, green design, energy saving, pollution control, recyclable, and low waste volume), green product innovation is also seen It is an effective way for producers and consumers to reduce costs to meet environmental and business requirements. Companies can also implement green product innovation decision through product design and packaging to maximize and increase product distribution benefits (Chen, 2008: 531-543).

B- Green Process Innovation

The term refers to modifications made in the manufacturing process and systems to produce environmentally friendly products that meet environmental requirements and needs, such as energy saving, pollution prevention, and waste recycling. Companies can implement green innovation processes in the manufacturing process to reduce the time of the production process and thus reduce costs (Guoyou, et.al., 2013:1-14)), and the innovative green process is a process or activity characterized by meeting environmental standards determined by the social environment in which it operates Industry, company, markets and customers, fully taking into account the use of energy, resources and environmental impact in designing and implementing sustainability issues, as well as incorporating ongoing impact and evaluation mechanisms into this iterative process.

C-The Concept Of A Green Product

Although the trend towards green product innovation has become popular among economic entities in recent times, there is a lot of confusion about the concept of green or sustainable products. There are many opinions and views on how to define a green product accurately:

a. Some people think that a product that has no negative impact on the environment is called a "green product" or "environmental product" (GP) in the business world. However, the term can also apply to products that aim to protect, preserve, and enhance the environment, by reducing energy and resource consumption, and eliminating or eliminating toxic substances, pollution, and waste. This definition of a green product reflects the wide variety of product types that focus on multiple, interconnected issues such as energy, resources, pollution, and toxic substances. (Dangelico & Pujari 2011:273).

b. Others believe that a green product is one that is designed to reduce environmental impacts over its entire life cycle, by using renewable resources, reducing reliance on non-renewable resources, and avoiding the use of toxic and non-recyclable materials. (Durif, et.al., 27).

c. A green product is defined as any product that is designed and manufactured according to a set of standards that aim to protect the environment and reduce the depletion of natural resources, while maintaining the basic functions that meet customer needs without causing harm to the environment or providing an environmental benefit. A green product has several characteristics, including: not using preservatives, consuming minimal energy, preserving raw materials and reducing their consumption, and avoiding the use of toxic materials in its manufacture. (Abdul Razzaq, 2009: 283).

d. The term "green product" refers to products that do not contribute to land pollution or depletion of natural resources, by incorporating sustainable strategies into the production process, such as using recyclable materials and reducing reliance on toxic materials, with the aim of reducing their negative impact on the environment. (Chen, 2010: 29).

Steps To Implement Green Target Costing:

The First Step: Identifying And Evaluating Green Attributes And Functions:

The first step is to define the attributes of the product (service), and from the consumer's point of view in terms of quality and functionality. Based on the characteristics of the product, the customer verifies the perceived value of each characteristic. As for green products, customers are usually unaware of the environmental requirements. In addition, they are not Many industries have standards and indicators, and the meaning of the word "green" or "environmentally friendly" is often ambiguous. Green product requirements are governed by environmental laws. These requirements are often considered mandatory and their implementation does not affect the value of the product from the customer's point of view. On the other hand, economic entities use the principle of pulling or pushing the characteristics and functions of green products. "Pull" means implementation at the request of the consumer, and "push" means that the economic unit realizes the innovative nature of the green product.

"The Second Step: Estimate the Target Selling Price and The Green Price Premium":

The second step involves determining the target selling price by analyzing the competitive market situation and observing customer opinions. Initial estimates of the selling prices of green products show a wide variation. Many studies indicate that customers are willing to pay a higher price for green products. However, other studies show that this price premium is only achievable under certain conditions. One factor that may explain the variation in consumer desires is the level of confidence in the environmental benefits of the product. When

environmental issues such as global warming are perceived, customers tend to show higher confidence and are more willing to pay a premium. In this case, the price premium is used to support the environmental attributes of the product. However, as green products become more popular in various industries, customers' willingness to pay a price premium may decline in the future, which may lead to the selling prices of green products becoming equal to those of conventional products. (28:2012, Horvath & Berlin). When product alternatives are presented to customers for testing, the products differ in their price and features and can be determined by their willingness to pay for the different features of the product, and by the choices they make (Berlin, et.al., 2011:62).

"The Third Step: Adjusting the Green Profit Margin and Calculating The Allowable Costs":

In this step, allowable costs are determined by subtracting the target profit margin from the target price. The target profit margin is often based on long-term profit analysis, which is measured by return on sales (net income divided by sales). Return on sales is a popular metric because it is easy to calculate and can be linked to the profitability of each product.

The target profits behind the design of green products must be determined, as the design of environmental products is associated with high market risks and high design efforts, and the experience of green products is rare in many industries. Product designers are often asked to integrate environmental information systems into early design projects, as green products face greater challenges to success than conventional products. The selling price must cover all costs incurred during the product life cycle, with direct product costs forming only a portion of the target cost. Indirect costs, such as management costs, are total costs that are identified as relative cost targets regardless of the perceived value by customers. In many cases, environmental costs are associated with product characteristics as indirect costs; for example, the cost of clean production is an indirect cost. The allocation of environmental costs is based on the principle of cause and effect, and economic entities must develop an accounting for environmental costs. (Horvath & Berlin, 28:2012).

"The Four Step: Distribute costs among green cost drivers":

When allocating allowable costs to a unit of product, designers assign costs to each component. To realize the customer's value of product specifications, the QFD method is usually used within a matrix. Determining the customer's perceived value depends on the knowledge of engineers, which makes this stage very important in a target costing system, especially since allocations are subjective. Allocations gain even more importance in the context of environmental requirements, where designers need to understand the environmental impacts of each component. This requires a comprehensive life cycle analysis, which is expensive and time-consuming, and requires accurate environmental information from suppliers and distributors. Therefore, it is essential to integrate the value chain of all partners in the target costing process and involve environmental experts from the environmental management body. (Horvath & Berlin, 28:2012).

"The Five Step: Implement Green Target Cost Management Measures":

This Step Includes Three Consecutive Steps:
(Berlin, et.al., 2011:86), (Horvath & Berlin, et.al., 2012:30):

a. **"Determining the standard cost of the product":** Determining the standard cost of a green product requires collecting information about the costs of the least expensive product and assessing the environmental impact at each stage of the life cycle. If this

is not done, the high costs will remain as indirect costs that can be dealt with at the next stage.

b. **"Comparing the standard cost and the allowable cost for each component":** A comparison is made between the standard costs and the allowable costs, in order to adjust or adjust the value, as each value indicator for each component indicates whether the cost of the component is too high or too low to Give perceived value to the customer.
c. **"Analyze deviations to improve the design of components and reduce total costs without compromising performance and quality":** The environmental index of each component is calculated based on the allowable environmental impact and the standard environmental impact. This index indicates which components should be added or reduced according to a specific environmental issue. The standard environmental impact estimates are based on raw material and energy flow data, and this requires real data models that show the actual deviation in value for the new or modified product design.

The Six Step: Implement Green Kaizen Costs:
Regardless of whether acceptable costs have been achieved or not, continuous improvement efforts are under way. Green Kaizen costing is an extension of traditional kaizen costing towards environmental issues, allowing for cost reduction and monitoring of environmental improvement measures that are often quite ambitious.

The Role Of Concurrent Engineering Technology In Reducing Costs And Achieving Sustainable Competitive Advantage:-
In this paragraph, the role of concurrent engineering technology in reducing costs and achieving sustainable competitive advantage in terms of cost, quality, time and flexibility will be clarified, as shown in the following:

1- The Role Of Concurrent Engineering Technology In Reducing Costs
Cost is the most influential factor in achieving sustainable competitive advantage in light of the business environment and the changes accompanying it, and the cost reduction process according to the strategic approach will help the economic unit to achieve other competitive advantages such as quality, timing and flexibility in response to changing customer needs and desires. It is usually appreciated Costs are in the early stages of the product life cycle, especially in the design stage, and this estimate must be based on a scientific basis and not a random estimate, because decisions that affect the competitive position of economic entities will be taken. Therefore, in addition to estimating the cost of the product and process during the design phase, the target cost must also be determined, provided that a comparison is made between them in order to make the appropriate decision regarding the acceptance or rejection of the proposed design. (Moges, 2007:40-49), where most economic entities lack these specialists. In addition to determining the target cost of the product in order to accept or reject the proposed design, it is necessary to estimate the cost when applying concurrent engineering technology, as well as to ensure that the technology is used to reduce costs. When the estimated cost is less than or equal to the target cost, which indicates that the technology will achieve the desired goal (Moges, 2007:40), this can be clarified when determining the target cost and the estimated cost and when comparing them and their impact on design acceptance.

2- The Role Of Concurrent Engineering Technology In Quality Improvement

The meeting point of Concurrent Engineering and total quality management together is to focus on the customer and improve quality by reducing internal and external defects and doing the work right the first time, as well as using total quality management techniques such as brainstorming techniques (Teare, et.al., 1997 :110). Accordingly, the concurrent engineering team must take into account the basic principles (total quality management), to improve the quality of processes and products, and thus achieve customer satisfaction. Therefore, it is necessary for the members of the work team to pay attention and focus on quality costs, which consist of four types (Horngren, et.al., 2012:673), which are prevention costs, evaluation costs, costs of internal failure and external failure, and what is meant by prevention costs is the cost achieved to maintain the cost of evaluation and failure at the lowest possible level and to prevent the defective from occurring, while the cost of evaluation is The cost of examination and testing to ensure that the product is acceptable and conforms to the specified quality standards.

It can be said that the application of concurrent engineering technology in the design, manufacturing and assembly stages of products has a set of things that will help economic entities improve quality, as follows: (Al-Zamili, 2017: 112)

- **a.** Understand the principles of each of the Concurrent Engineering techniques and total quality management, and identify points of integration in the design, manufacture and assembly of products.
- **b.** Emphasis is placed on prevention activities and their improvement at an early stage of the design process, as value-adding activities, as well as their use to improve process and product quality.
- **c.** Determine the activities of each of the two types of evaluation and failure, and focus efforts on getting rid of them by eliminating the causes of their occurrence, because they cause a decrease in quality, in addition to that they are activities that do not add value, and therefore scrap, rework, examination and failure analysis must be reduced.

Early involvement of the concurrent engineering team can help reduce redevelopment time throughout the design process, depending on the quality of design required.

Accordingly, Concurrent Engineering technology can provide the best suggestions for choosing the desired combination of cost, quality and time, as it takes this into account in the early stages of designing and developing both the product and the process, and thus helps the economic unit to achieve a sustainable competitive advantage.

3- The Role Of Concurrent Engineering In Reducing Time

Concurrent engineering technology is one of the important and critical elements of time-based management, and therefore time is considered an essential element of competition in light of the competitive business environment in addition to the accompanying changes and developments (Lewandowski, 2014 :6), and the role of concurrent engineering technology in reducing time can be explained by what Come:

- **a.** Concurrent Engineering technology allows saving design time by implementing the design process concurrently and reviewing and modifying the design at the same time, and the time saved reaches 40% of the total design process time (Belay, 2013:108), due to this Kodak company was able Which manufactures digital cameras, to achieve savings of up to 50% of the design time, because it has designed all of (body, film engines, and lenses) concurrently and accurately (Hammer and Champy, 2011: 32).

b. Concurrent Engineering technology helps in creating a suitable ground for the implementation of the synchronous manufacturing process, and thus a saving in manufacturing time (Sapuan, et.al., 2006:144) is achieved. The basic requirements that urge the economic unit to carry out manufacturing operations is to identify homogeneous activities that can be implemented at the same time, and as it is required to correct errors at the time of their occurrence, through the assistance of the concurrent engineering team, as there are no barriers between the different stages of the design, manufacturing and assembly departments (Fonche, 2010: 6).

c. When the economic unit performs the assembly operations concurrently, this leads to realizing at the same time savings in the actual time for the assembly, where the company (Northtrop) achieved the largest possible amount of savings achieved in the assembly time, which reached 60% of the total time (Mohamad,1999: 79), and therefore it can be said that the application of Concurrent Engineering in the activities (design, manufacturing, and assembly) helps to increase its effectiveness, which leads to achieving the greatest possible savings from the total time of the product life cycle significantly (Brown, et. al., 2001:87).

d. Reducing the time of design, manufacturing and assembly reduces the total time of the product life cycle, and thus reduces the time, which helps in delivering products to customers at the agreed upon time, which helps the economic unit to achieve customer satisfaction (Basu, et.al., 2013:17).

e. Concurrent Engineering works to shorten the product life cycle by reducing the time of the production process, thus bringing ideas to the market quickly (Ebrahimi, 2011:48), confirms (Tenkorang), that shortening the product life cycle is a basic requirement to confront competitors in the market through Making rapid changes, in each of the processes and products, through which customer satisfaction can be achieved, and thus achieve a sustainable competitive advantage (Tenkorang, 2011:2).

4-The Role Of Concurrent Engineering Technology In Achieving Flexibility

Flexibility refers to the ability to respond to potential changes and developments in the design, manufacturing, and marketing processes in a way that meets customers' needs, desires, and requirements. Through the element of flexibility, the economic unit can meet the needs, desires and requirements of customers by offering better products than competitors in the market, and thus gaining a sustainable competitive advantage that depends on the degree of economic development. This is done by employing the capabilities and resources of the economic unit in order to provide new products to customers (Krajewski, et.al., 2007:208).

The question that arises here is: How can concurrent engineering technology help provide sufficient flexibility to respond to changes in customer needs and desires? To answer this question, it should be noted that the design process can speed up or slow down the product development process. In light of the intense competition, the economic unit needs to accelerate or change the development of the product as soon as possible before the competitors do so, and the role of concurrent engineering technology in achieving this goal is highlighted, through the following: (Bogus, et.al., 2005:1181)

a. Presenting various designs and solutions, and choosing the best design to solve problems in the product, taking into account various environmental changes and developments.

b. The flexibility of design elements in response to any changes in the needs and desires of customers, as well as the speed of presenting the product design in the shortest time, which helps to ensure customer satisfaction with the products of the economic unit that it provides to them.

c. Establishing a common database, to facilitate the process of exchanging internal and external information, to help identify any changes and developments that may occur in the needs and desires of customers, and to respond quickly to those changes.

5-The Role Of Green Target Cost Technology In Reducing Costs And Achieving Sustainable Competitive Advantage:

Through this paragraph, we will review the role that green target costing technology can play in reducing costs and achieving a sustainable competitive advantage in terms of cost, quality, time and flexibility, as shown in the following paragraphs.

1- The Role Of Green Target Costing Technology In Reducing Costs

Green Target Costing focuses on product design to achieve cost reduction, and the processes used to produce and market the product are also potential sources of cost reduction. Therefore, it is important that cost reduction processes be carried out through an in-depth study to increase efficiency, in response to the urgent need to reduce costs (Drury, 2012: 548), that the target costing technique is a set of disciplined procedures designed to achieve the best value at an early stage through analysis, which helps to gain a competitive advantage, as there are two types of analyzes as follows:- (Ibid., 2012: 546).

a. Analysis Of Components, Functional Characteristics And Resources:
In this analysis, the components of the product are unnecessary or can be replaced with cheaper components, provided that they perform the same previous functions and have the required quality. As for the analysis of functional characteristics, the functions with indicators with a low value and in which the value indicator is less than the correct one, with respect to By analyzing the resources, the human resources that must be redundant in the production process are determined.

b. Analysis of technical characteristics of cost:
This analysis takes into account costs related to areas where actual reductions can be made in terms of components, functions, activities, processes and resources that are not necessary and do not add value from the point of view of economic entities and the customer. Green target costing technology is not only concerned with reducing the cost of physical components related to materials, but it exceeds This refers to both direct wages and indirect expenses. Therefore, this technique takes a comprehensive view of all unjustified additional costs associated with components, functions, or activities that do not add value, as reducing these costs has no impact on product performance and quality. (Hansen & Mowen, 2006 : 780).

Based on the foregoing, we note that the green target costing technology is concerned with reducing costs, which in turn leads to improving the value of the product from the point of view of each economic unit. Thus, through this technology, it is possible to help achieve the lowest cost dimension, which in turn will help In achieving the competitive advantage of this unit.

2- The Role Of Green Target Costing Technology In Quality Improvement

The technology of value analysis focuses on the customer, so it seeks to provide products that meet the needs and desires of customers with high quality and an acceptable price. Maintaining the profitability of products is essential, especially when economic entities face increasing competitive pressures or when it is planned to reduce the price of the product in

the future (Musa, 2008: 13). Quality is one of the main elements in the functional benefits of the product and its improvement will increase the value of the product from the customer's point of view. Thus, it can be said that quality is an important element that is taken into account while performing the functional analysis.

A group of quality-related issues has been identified when applying the green target costing technique, which are as follows: (Walke, et,al, 2010:2).

- **a.** Match the basic functions and performance characteristics of the product and improve it as much as possible.
- **b.** Replacing components and functions with better quality components and functions, keeping in mind that the cost will not be too high.
- **c.** Compatibility and integration between components and functions.
- **d.** Make the necessary adjustments from the first time to improve the quality of products and processes.
- **e.** Providing products and processes with designs that meet the customer's needs and achieve his satisfaction.

3- The Role Of Green Target Costing Technology In Reducing Time

Green target cost technology works by deleting or modifying product components and functions that do not add value, from the point of view of the economic unit and customers, to simplify and standardize operations and procedures, which leads to savings in the time of making products and reaching customers on time, and these savings also help To create a sustainable competitive advantage that allows the economic unit to take advantage of the investment opportunities available to it, as well as the speed of delivery of the product to the market and thus achieve customer satisfaction (Ketola, 2002:35), which confirms that the product is designed in accordance with the requirements of the competitive market, which It entails improving its value, which in turn will help achieve sustainable competitive advantage (Christensen, 2014:9). In addition to reducing the cost of non-value components and functions, focus should be placed on improving the performance and quality of the product, and the information provided by the green target costing technology to the design team is accurate, which helps the members of this team to provide a design for the product as quickly as possible, so from It is necessary to estimate the cost and time and compare it with the current situation experienced by the economic unit, without using this technique to determine the amount of savings (Galipogullari,& Atabay 2013 :41). The economic unit is always working hard to develop its products to obtain a strong competitive advantage, and this is not limited to improving the value of the product, but rather through the availability of the speed factor in order to reduce the response time for customers, as the green target cost technology helps to enhance the speed factor by accelerating the process of manufacturing products , and thus marketed to customers at the specified time, as well as the environmental factor that helps the economic unit to improve the schedule of the economic project, as there is a direct relationship between the green product and the sustainable competitive advantage (Sharma, 2017:3).

4- The Role Of Green Target Costing Technology In Achieving Flexibility

The business environment is characterized by the increasing competition between the economic entities , in addition to the rapid and frequent changes in the tastes and behavior of customers. Therefore, the green target costing technique tries to find appropriate and quick solutions to the problems faced by the economic entities in response to changes in these needs and desires, by taking corrective measures to provide the necessary proposal. To simplify and standardize operations, which can be achieved by reducing or eliminating unnecessary

components and functions that do not add value to both the economic unit and customers. This technology is an efficient and effective tool to solve the problems that the product suffers from, especially its value in terms of benefits Low functionality for both performance and quality, as well as the high cost of product components and functionality (Al-Jadri, 2018: 86). In order to achieve a competitive advantage through flexibility in responding to changes in customers' needs and desires, it requires taking a group of things, as follows: (Swenso & others, 2003:13.).

a. Getting rid of components and functions that hinder the process of rapid response to changes in customer needs and the associated unjustified costs, and striving to provide information that helps shorten the life cycle of the product, starting from the design stage, until it is marketed to the customer, through the manufacturing and assembly processes.

b. Working on diversifying products and providing safety and security requirements to suit all tastes, taking into account continuous improvement processes at every stage of the product life cycle.

c. Working on arranging and improving operations according to current customer requirements, taking into account future changes, and making the product practical and responsive to maintenance and repair operations.

THE THIRD TOPIC
APPLIED SIDE

After addressing the theoretical aspect of the research variables, this topic deals with the application of Concurrent Engineering technology and the green target cost to achieve a sustainable competitive advantage in the Southern General Cement Company and focus on one of its factories (Babylon Cement Factory) as a sample for research.

1- A Brief Summary Of The Research Sample

The Babylon Cement Factory (Al-Seddah) is one of the factories of the Iraqi General Cement Company affiliated to the Ministry of Industry and Minerals. It was established in 1957 to produce Portland cement by the wet method and is considered one of the oldest producing factories in Iraq. The factory stopped production in 1985 due to its inability to meet the local need and its useless production cost, and in 1999 its management was linked to the General Company for Southern Cement, but in 2009 production was converted from Portland cement to resistant cement, and in 2017 some types of cement were produced Oil well cement for oil wells, due to the urgent need for it in drilling wells, where the plant operates according to a design capacity of 198,000 tons annually.

1-APPLICATION OF CONCURRENT ENGINEERING TECHNOLOGY

After Designing The Product:

The First Step: Product Design Specifications

The Babylon Cement Factory produces two models of the cement product, as there are some differences between these two models in terms of components and mixing ratios, as the first model (resistant cement) consists of (clinker + gypsum mix) and the ratio of the coefficient of lime saturation is approximately equal to 0.87), while The second model (well cement) is made from (clinker + heat gypsum), and the ratio of the coefficient of lime saturation is approximately equal to (0.95), in addition to that, the heat gypsum is of high purity, as the percentage of sulfate purity reaches 40%, and the total costs spent for the production of (32,000) tons of the two models, with (19,000) of resistant cement and (13,000) of oil well cement, so that the total costs of the two models reach (6,762,662,000) dinars during the month of June. The details will be fully clarified in Table (1) and (2), where both From the

two tables, the cost of one unit for the product of resistant cement and well cement for the year 2021 is as follows:

Table (1) The Cost of The Resistant Cement Product During The Fiscal Year 2021

Cost Components	**Total Costs To Produce (13000 Tons)**	**Industrial Cost Per Ton / Dinar**
The First Element: Direct Costs		
Limestone	7,350	
Ordinary Dirt	3,650	
Iron Dust	120,000	
Gypsum Mix	5,970	
High Silica Sand	4,000	
Fuel And Oils	704	
The Total		141,674
Secondly, Direct Action		
Direct Wages	589,373,845	45,336
Total Direct Costs		187,010
The Second Element: Indirect manufacturing costs		
Water And Electricity	54,740,000	4,210
Maintenance	8,000,000	615
Renting Fixed Assets	120,110,000	9,239
Spare Tools	4,038,123	310
Extinctions	30,430,437	2,340
Total Industrial Indirect Costs		16,714
Total Industrial Costs Per Ton Of Resistant Cement.		203,724
The Third Element: Marketing Costs		
Packaging	7,812,324	600
Advertising, Printing And Hospitality	3000,000	230
Miscellaneous	1,243,846	95
Total Marketing Costs		925
Fourth Element: Administrative Costs		
Research And Consulting	2,910,000	223
Transfer, Dispatch And Communication	9,538,000	733
Miscellaneous Service Expenses	1,730,000	133
Training And Rehabilitation	325,000	25
Maintenance Of Office Furniture And Equipment	3,235,000	248
Expenses Of Previous Years	2,275,000	175
Total Administrative Costs		1,537
Total Cost Per Ton Of Resistant Cement		206,186

The table below shows the actual costs of the second model of well cement for the year 2021.

Table (2) The actual cost of the well cement product during the fiscal year 2021

Cost Components	Total Costs To Produce (13000 Tons)	Industrial Cost Per Ton / Dinar
The First Element: Direct Costs		
First: Raw Materials And Direct Materials:		
Limestone	7,350	
ordinary dirt	3,650	
Iron dust	120,000	
High silica sand	4,000	
Gypsum Heat	18,640	
Fuel and oils	704	
The Total		153,704
Secondly, Direct Action		
Direct Wages	589,373,845	45,336
Total Direct Costs		199,040
The Second Element: Indirect manufacturing costs		
Water And Electricity	54,740,000	4,210
Maintenance	8,000,000	615
Renting Fixed Assets	120,110,000	9,239
Spare Tools	4,038,123	310
Extinctions	30,430,437	2,340
Total Industrial Indirect Costs		16,714
Total Industrial Costs Per Ton Of Resistant Cement.		215,754
The Third Element: Marketing Costs		
Packaging	7,812,324	600
Advertising, Printing And Hospitality	3000,000	230
Miscellaneous	1,243,846	95
Total Marketing Costs		925
Fourth Element: Administrative Costs		
Research And Consulting	2,910,000	223
Transfer, Dispatch And Communication	9,538,000	733
Miscellaneous Service Expenses	1,730,000	133
Training And Rehabilitation	325,000	25
Maintenance Of Office Furniture And Equipment	3,235,000	248
Expenses Of Previous Years	2,275,000	175
Total Administrative Costs		1,537
Total Cost Per Ton Of Resistant Cement		218,856

The Second Step: Theoretical Design

In This Step, The Theoretical Model Will Be Designed As Follows:

- (The Survival Of All Components Of The Resistant Cement Product And The Addition Of Glass Powder In Order To Produce Oil Well Cement At The Lowest Cost And The Least Time).

In order to develop the product of the economic unit, as well as to reduce the costs represented in the cost of obtaining the functional characteristics required by the customer, in addition to reducing the time to obtain these characteristics mentioned in the first step, the resistant cement product will be used as a model to be developed, to obtain well cement, This is because it contains low-cost raw materials that can meet the requirements of customers, by adding glass powder taken from the waste, in an amount of (0.02), from the weight of the resistant cement, and then repeating the chemical tests, in order to compare the results obtained. After adding glass powder with the oil well cement product, and knowing the extent of the change in the properties of the product, as well as comparing the elements of components and compounds in the composition of the developed cement product with the components and compounds of international cement. Table (3) shows the cost of raw materials for oil well cement after adding glass powder.

Table (3) Cost of Raw Materials For Oil Well Cement After Addition

Cost Components	The Cost Of One Ton Is In Dinars	Total Industrial Costs Per Ton
Limestone	7,350	
Ordinary Dirt	3,650	
Iron Dust	120,000	
Gypsum Mix	5,970	
High Silica Sand	4000	
Glass Powder	10,000	
Fuel And Oils	704	
The Total		151,674

We note from the table above that the costs of raw materials for oil well cement have been reduced by (2,670) per ton, and from this step it can be said that the most important requirement of the customers mentioned in the questionnaire has been achieved.

The Second Dimension: Design Of The Production Process

The production process is planned after considering the appropriate design to meet the customer's needs, taking into account the specific cost, as well as knowing whether the design is suitable for the economic unit (Babylon Factory), in terms of production capability, and knowing the steps that the model goes through during manufacturing, given that manufacturing experience plays a role An important role at this stage is that all criteria, including downtime, must be taken into account when formulating the production process work plan, because the product production time plays an essential role, as it directly reflects the cost of the product. Therefore, when applying the proposed model, which is adding glass powder to resistant cement in order to produce cement for oil wells, it is suitable for the customer in terms of cost, but in terms of its ability to be produced in the economic unit, which must be taken into account in terms of the devices used in production, represented in machinery and equipment. In addition to the laboratories in which the physical and chemical analyzes are conducted, in addition to knowing the mixing ratios of the materials used in

production, Table (4) shows the results of the chemical analysis of the used cement samples, which were conducted in the laboratory of the Babylon Cement Factory (Al-Seddah).

Table (4) Chemical Analysis Of The Used Cement Samples

Chemical Compounds	Quality Improvement By	Oil Well Cement	Resistant Cement After Adding Glass Powder	Resistant Cement Without Additives
SiO_2	0.5	21.40	21.90	20.30
Al_2O_3	2.52	4.16	6.68	5.86
Fe_2O3	- 1.52	4.84	3.32	3.56
CaO	- 4.99	62.62	57.63	60.21
MgO	1.55	2.83	4.38	4.34
SO_3	0.76	1.21	1.97	2.02
L.O.I	2.9	1.02	3.92	2.75
Total	1.72	98.08	99.80	99.04
F.CaO	- 0.52	1.23	0.8	0.67
Ins.res.	0.01	0.18	0.19	0.23
SM	- 0.11	2.38	2.27	2.15
AM	0.04	0.86	0.90	1.65
L.S.F	1.83	90.77	92.60	88.83
C_3S	- 11.97	48.89	36.92	39.82
C_2S	2.45	24.55	27	29.74
C_3A	9.72	2.84	12.56	9.51
C_4AF	- 4.71	14.71	10	10.82

Based on the data in the table above, we will extract the compounds and elements from the table, which are considered the basis for determining the chemical properties of the cement used in naming oil wells, and then include them in the following table:

Table (5): Chemical Proportions (Compounds And Elements) Of All Cement Samples Used In The Study

Chemical Compounds	World Standard Ratio(API)	Oil Well Cement Ratio	Percentage Of Resistant Cement	Proportion Of Cured Cement
Mg_O max %	6.0	2.83	4.34	4.38
SO3 max %	3.0	1.21	2.02	1.97
Loss on Ing. Max %	3.0	1.02	2.75	3.92
Insoluble Res. Max %	075	0.18	0.23	0.19
C3S max %	85-48	40	39.82	57.57
C3A max %	1	0.08	9.51	12.65
Total Alkali as Na2O%	0.75	0.52	0.57	0.71

As for the physical tests that were conducted in the Babylon laboratory, where table (12) shows the results of the physical properties tests that were obtained, as the period for testing the compressive strength was (3) days, while the temperature of the solidification time was (28) degrees Celsius and the percentage of Adding the amount of water to the cement is 30%, and the degree of fineness of the developed cement was less than or equal to (Mμ75), and the percentage of adding glass powder used to the used cement is (2%) to (100) grams of the weight of the cement.

Table (6) The Results Of The Physical Tests For The Properties Of The Resistor Cement After Addition

Examination Type	The Result After Adding
Primary Solidification Time	91degrees at temperature (F) 125) and pressure (psi) 5160)
Compressive Strength	(760 psi) at a temperature of (100 f), and (1685 psi) at a temperature (140 f)
Free Water Content	2.2cc “per 250 cc”

Table (7) Represents the Comparison Between The Results Obtained After The Addition And The Standard Results According To International Specifications (API)

Examination Type	Result After Addition	Results (API)	Compression	Temperature
Hardening Time	91 minute	120-90 minute	5160 psi	125f
Compressive Strength	760psi	350psi as a minimum level	-	100f
	1685 psi	1500 psi	-	140f
Free Water Content	2.2cc Per 250	3.5cc Per 250cc as a maximum	-	-

Through the results shown in the tables obtained, it is clear that this type of (developed) cement falls within the expected limits stipulated by the American Petroleum Institute.

The Third Dimension: Supply Chain Design

The importance of the supply chain lies in the great interest of a number of parties, whether they are internal parties such as (suppliers of raw materials, or semi-manufactured parts), which the economic unit needs in the manufacturing process, while the external parties are represented by (agents and customers), meaning agents (The wholesalers who will get the finished goods from the economic unit), the presence of the suppliers within the synchronized engineering team, which facilitates the work of the design engineers and the work of the members responsible for the production process, which makes it easier for the management to take many decisions.

Comparison is made between the component (glass powder) used in the product, in case of purchase or recycling of solid waste, as follows:

Table (8) The Cost Of The Glass Used In The Product

The Details	Quantity	In The Case Of Purchase	In Case Of Using Glass Waste	The Difference
Quantity Of Glass	tons	13000	13000	-
Price Of A Ton Of Glass	Iraqi Dinar	50,000	10,000	40,000
Total Cost	-	650,000,000	130,000,000	520,000,000

The Fourth Dimension: Product Sustainability Design

An environmentally friendly green product is any product that is designed and manufactured to standards designed to protect the environment and reduce depletion of natural resources, while maintaining functionality. In addition, the environmentally friendly product is not required to be completely new, but there are many additions to the regular product to get closer to achieving the desired goal of reducing the materials used and the level of the product's negative effects on the environment.

Which requires adjustments at the level of production stages, as cement companies are currently working on this point, using engineering techniques to re-engineer the cement industry, in addition to adding (solid waste) to cement, which leads to a reduction of approximately 900 kg of carbon dioxide gas. (Co_2) because it contains a high percentage of magnesium oxide (Mg_o), and thus the environmental design after addition is called (green cement), where these percentages will be calculated as shown in the table below.

Table (9) Quantities and Costs of Flying Dust And Dust Deposited At Babylon Cement Factory For The Year 2021

N	Details	Quantity Of Ton	Percentage Of Flying Dust %	Amount Of Flying Dust And Precipitated Soil/Ton	Cost Of Flying Dust/ID	Cost Per Ton Of Flying Dust/ID
1	The First Stage: Raw Material Grinding:					
	limestone	11,388	4%	624	135,566,144	10,505
	Clay dust	3,276				
	Iron dust	437				
	High silica sand	499				
	the total	15,600				
2	The Second Phase: Burning Putty					
	The amount of putty	14,976	9%	1,348	295,017,888	22,693
3	Third Level: Cement Grinding					
	Clinker	13,219	4.6%	627	137,222,712	10,555
	gypsum	409				
	the total	13,628				
4	Total Flying Dust			2,599	568,806,744	43,754
5	Deposited soil			1,680	367,678,080	28,282
	Total Flying Dust And Deposited Dirt			4,279	936,484,824	72,036

After completing the determination of the quantities of volatile dust and sedimentation for the Babylon Cement Factory (Al-Seddah), here comes the role of the Concurrent Engineering technique through the fourth dimension (after the sustainability of the product), which one of its pillars is that the product is friendly, which indicates a reduction in the amount of these pollutants (flying dust, sediment) and through the following equations:

Reducing the amount of flying dust after applying the Concurrent Engineering technique = the amount of dust residue / the amount of production:

$$=2{,}599 \div 13{,}000 = 20\%$$

Reducing the amount of deposits after applying the concurrent engineering technique = amount of deposits / amount of production:

$$1{,}680 \div 13{,}000 = 12\%$$

It is clear from the above equations that the amount of volatile dust will decrease by (20%) for the cement product, while the amount of sediment will decrease by (12%).

Table (10) The Amount of Flying Dust And Sediments In The Babel Laboratory Before And After Implementing The Concurrent Engineering Technique For The Year 2021

Statement	Details
The amount of flying dust before applying the Concurrent Engineering technique	2,599
The amount of flying dust after applying the Concurrent Engineering technique	(2,599-20%× 2,599) 2,079
Precipitation quantity prior to applying the concurrent engineering technique	1,680
The amount of precipitation after applying the concurrent engineering technique	(1,680-12%×1,680) 1,478
The amount of flying dust and sediment before applying the concurrent engineering technique.	4,279
The amount of volatile dust and sedimentation after the application of the Concurrent Engineering technique.	3,557
The rate of reduction of both the amount of volatile dust and sediment after applying the Concurrent Engineering technique.	12%(3,557÷4,279)

At the end of reviewing the application of engineering technology in the economic unit, the research sample (Babylon Cement Factory), as this can be summarized in a unified report that discloses the competitive advantages achieved for the economic unit, as follows:

Table (11) A Consolidated Report On The Competitive Advantages Achieved From The Application Of Concurrent Engineering Technology

Dimensions Of Concurrent Engineering	Competitive Advantages	Financial Data					The Details
		Number	Time	Percent	Quantity	Amount/ID	
The First Dimension (Product Design)	Knowing customers' desires	-	-	-	-	-	By conducting a field survey
	Reducing costs for the product	-	-	-	-	34,710,000	through the use of solid waste
	Add glass powder material			%2	-	-	This percentage is added to the weight of the cement (100%).
The Second Dimension (Production Process Design)	Increased cohesive strength	-	95-76.5	-	-	-	Achieving initial hardening with a time of 6.57 minutes and a final hardening of 95 minutes
	Improve product quality	-	-	-	-	-	By comparing the product before and after adding
Third Dimension (Supply Chain Design)	Increase the number of means of transportation	6					From 15 - 21 means of transportation
	Increasing the number of factory customers	4	-	-	-	-	There is a high demand for oil well cement from the Ministry of Oil and oil companies in Iraq
	Reducing the cost of purchasing gypsum	-	-	-	-	77,610,000	By using mix gypsum instead of heat gypsum
The Fourth Dimension (Product Sustainability Design)	Reducing the risk of environmental pollution	-	-	-	-	-	By adding (solid waste) to cement, it reduces approximately 900 kg of carbon dioxide (Co2) because it contains a high percentage of magnesium oxide (Mg_o).
	Reduce the amount and cost of dust	-	-	-	-	455,220,480	By adopting the reduction ratio after applying concurrent engineering
	Reducing the amount and cost of deposits					323,469,168	By adopting the reduction ratio after applying concurrent engineering
The Total		-	-	-	-	891,009,648	

2- APPLICATION OF GREEN TARGET COSTING TECHNOLOGY

After having previously identified the concurrent engineering technology from this chapter and what are the necessary steps to apply it in the economic unit (subject of research), and in addition to that, the green target cost technology will be applied according to the steps that were previously explained in the theoretical aspect related to this technology, in order to increase the capacity of The factory managed to manage the cost of (oil well cement) as a sustainable competitive precedent, and to reach the maximum possible reduction in the cost of the product (the research sample), as it requires the implementation of the following steps:

A-Determine The Target Selling Price.

Since the oil well cement product is unique in its kind and is rare in the Iraqi market, as it is demanded by private oil companies to name oil wells in varying periods and according to need, which led to calculating the price of the product according to the years in which production took place and knowing the reasons for the high prices in relation to current price. The table (below) shows the selling prices of oil well cement, according to the dates listed in Table (12), as follows:

Table (12) Selling prices of oil well cement

Dates Of Selling Oil Well Cement	Selling Price
7/6/2018	240,000
15/5/2019	200,000
14/1/2020	225,000
22/4/2021	200,000
the total	865,000
÷ Number of prices	÷4
Average selling prices of oil well cement	216,250

The above table shows the years in which oil well cement was sold starting from 2018, and according to the plant's policy, the target selling price will be determined based on the average selling price of the product, as the average price for cement will be 216,250 dinars, and it will be approved as a target selling price during the year 2021 .

B- Determine The Green Price Premium

The factory constantly seeks to provide an environmentally friendly product (oil well cement) that achieves a sustainable competitive advantage, by enhancing the product with environmental properties that are in harmony and in line with the international environmental quality standards ISO 9001:2015.and according to the standard specifications of the American Petroleum Institute API, and thus in order to obtain a rare and unique product of its kind requires It is required of customers to pay a price premium called the green price premium, which is added to the target price of the traditional product and is used to achieve environmental protection properties, as this depends on the desire of customers and the extent of their confidence towards the use of green products, given that green products are uncommon products in the Iraqi environment, This does not allow the factory to add a high price premium as it seeks to strengthen its position in the market, by adding a price close to the price of traditional products, i.e. adding a green price premium that does not affect

customers. In order to calculate the green price premium, the environmental costs of pollution (air, water, waste) will be calculated, because the factory during the production process throws out a lot of pollutants, causing damage to the internal and external environment alike, and for this reason the factory spends a lot of money To prevent or reduce the effects of these pollutants. Where these amounts spent by the factory on pollutants emitted from the production stages of the cement industry are divided into the amounts spent due to air, water and waste pollution, which can be classified according to the environmental costs report as follows:

Table (13) Report Of Environmental Costs Of Air Pollution, Water And Waste

	Types Of Environmental Costs	Cost / Dinars	Ratio To Production Costs	Its Ratio To Revenues
1	Costs Of Air Pollution			
	- Employee salary costs	12,917,000	0.0045	0.0049
	- Costs of commodity supplies	9,200,949	0.0032	0.0035
	- Costs of service supplies	37,935,000	0.0133	0.0145
	- depreciation costs	16,388,000	0.0057	0.0811
	Total Costs Of Air Pollution	76,440,949	0.0269	0.104
2	Water Pollution Costs			
	- Employee salary costs	12,417,000	0.0043	0.0047
	- Costs of commodity supplies	-	-	-
	- Costs of service supplies	29,971,621	0.0105	0.0115
	Extinction costs	10,051,750	0.0035	0.0176
	Total Costs Of Water Pollution	52,440,371	0.0184	0.0338
3	Waste Pollution Costs			
	- Employee salary costs	4,500,000	0.0015	0.0017
	- Costs of commodity supplies	3,913,000	0.0013	0.0015
	- Costs of service supplies	15,428,520	0.0054	0.0059
	Extinction costs	7,598,160	0.0026	0.0098
	Total Costs Of Waste Pollution	31,439,680	0.0110	0.0189
	Total Environmental Costs	160,321,000	0.1422	0.4609
	Total Production Costs	2,836,808,000	%100	1.091
	Total Revenue	2,600,000,000	0.3123	%100
	Environmental Costs Per Ton	160,321,000	= 13,000 ÷	1,233

Accordingly, based on the opinions of the engineers specialized in the manufacture of the product and the employees of the Costs Division, (1,233) dinars were added as a green price premium, which is a symbolic price to avoid the risks of customers not accepting the product due to the high price compared to the traditional product. Therefore, the green target price is (217,483) dinars.

C-Determine The Green Profit Target

The management of the factory (study sample) wants to achieve a target profit margin for oil well cement, and the profit margin percentage has been determined, ranging between (10% - 30%). As a result of the strong competition between local products and products of

international origins, researchers chose the minimum profit margin ratio to determine the green target profit:

Green Target Profit = Green Target Price x Target Profit Margin Ratio
=217,483 × 10% = 21,748 dinars

D- Determine The Green Target Cost
The green target cost is determined by the difference between the green target selling price and the green target profit. The green target cost for oil well cement will be calculated through the following:

Green Target Cost = Green Target Selling Price – Green Target Profit
=217,483 – 21,748 = 195,735 dinars

It is clear from the above that the green target cost for the oil well cement product is (195,735) dinars, while the actual cost of the product was (218,856) dinars, and therefore the gap between the actual cost and the green target cost is (23,121) dinars, which is a negative gap, as the study aims To close this gap and make a positive difference, as well as setting a green target profit margin of 19,573.5 (195,735 x 10%) for each unit produced and sold of the oil well cement product. In order to apply the green target costing technique to the study sample, this stage includes three main steps, which are as follows:

First: Collect Information
After identifying the high-cost product, we collect information about this product from within the factory, including work procedures, machines and machines used for production, the number of workers involved in the production process, in addition to the wages of workers and administrative staff, as well as collecting information related to product development and modifications made affecting the product, as well as reviewing purchase lists, to determine the cost of each component of the product, and information collected from outside the factory regarding suppliers and their ability to provide the necessary raw materials that require quality and time availability, and information must be collected about the needs and requirements of current and potential customers Finally, it is necessary to collect information about the products offered by competitors and changes in their prices, and to determine the extent of customer satisfaction and acceptance of factory products and competitors' products.

Second: Functional Analysis of The Product
Information related to each product function is analyzed to find out the details associated with each function, in terms of requirements and characteristics. The functional analysis of the product is as follows:
First: job characteristics analysis (qualitative approach)

A- Analysis of the costs of functional characteristics: - To clarify the quantity and cost of mixing before and after adding glass powder, in order to obtain 15,600 tons of putty material, as shown in the following table:

Table (14) The Cost Of Raw Materials During The Functional Characteristics Analysis

Material Quantity / Mixing Proportions	Limestone/ Ton	Clay Soil / Ton	Iron Dust /Ton	High Silica Soil / Ton	Glass Powder / Ton	Putty /Tons
73+21% +% 2.80%+%3.20	11,388	3,276	437	499	_	**15,600**
Actual Costs Before Addition	83,701,800 (11,388×7350)	11,957,400 (3,276 × 3,650)	52,440,000 (120,000× 437)	1,996,000 (4,000× 499)	_	**150,095,200**
73% + 20% +2%+3%+ 2%	11,388	3,120	312	468	312	**15,600**
Costs According To The New Rates	83,701,800	11,388,000 (3,120× 3650)	37,440,000 (120,000× 312)	1,872,000 (4000× 468)	3,120,000 (10000×312)	**137,521,800**
Excluded Costs Of Raw Materials						**(12,537,400)**
Cost Per Ton	**12,537,400**	**÷15,600**				**(804)**

B- Analysis Of The Cost Of Functional Technical Components:

This analysis is based on identifying the most important components in terms of cost, focusing on the cost relationships between the various components and verifying that unnecessary components are not used, for the purpose of cost management and control, and to achieve the targeted reduction without affecting the quality of the product and the benefits that accrue to the customer. It has also been shown that clinker It represents 90% of the product cost as shown in the previous section, meaning it is more important to the product cost than gypsum, which represents 10% of the product cost. Which means that increasing the percentage of clinker added and reducing the percentage of gypsum added to one ton of cement, to achieve the shortest setting time (hardening) and the lowest cost of the product while maintaining the quality of the product within the limits of standard specifications.

Based on the equation for mixing clinker with gypsum stone to obtain final cement, and according to the limits of standard specifications, the percentage of carbon trioxide (So3) should not exceed 3% in the cement product, and the chemical equation is as follows:

$$0.03 <) So_3 = (1 <) So_3 (X - 48 <) X\text{-}1($$

Through the researchers' meetings with the engineers and laboratories of the Quality Division, it was found that the percentage of sulfates in the clinker material reached 8%, and this percentage is within the limits of the standard specifications, which should not exceed 1%, in addition to the purity of the gypsum material that should not exceed 48%.

And when we apply the chemical equation and according to the new mixing ratios, they are as follows:

$$1.97 =0.08\ X\ \ 40 -) 1 - X($$

$$1.97 =0.08\ X - 40 - 40\ X$$

$$41.97 =39.92\ X$$

X=1%

That is, the cost of one ton of oil well cement can be reduced by (2,188) dinars/ton, as shown in Table (15).

Table (15) Shows The Amount Of Reduction In The Cost Of One Ton Of Cement Product

Statement	Final Cement	Clinker	Gypsum
Mixing Ratio/Kg	1000(100%)	(97%)970	(3%) 30
Quantities / Tons	13,000	12,610	390
Current Cost	2,836,808 (13,000 × 218,216)	2,759,774,160 (218,856×12,610)	85,353,840 (218,856× 390)
(So_3) Ratio According To Standard Specifications	3%	-	-
Standard Chemical Equation For Mixing Proportions	(So_3)< 0.03	(So_3)< 1	-
The chemical equation under the new proportions	So_3 1.97	(So_3)< 0.08	-
Mixing Ratios Based On The New Equation	1000(100%)	(98%)980	(2%) 20
Quantities / Tons	13,000	12,740	260
New Cost	-	2,788,225,440	56,902,560
Excluded Quantities	-	130	(130)
Costs To Be Excluded	-	28,451,280	(28,451,280)
Cost Per Ton	**28,451,280 ÷ 13,000= 2,188**		

3- REDUCING DIRECT WAGES

A cement plant suffers from a major problem, which is the problem of disguised unemployment, which indicates the presence of a large number of unnecessary and redundant workers, which makes the cost of the product very expensive. For example, we find that three workers are required to operate a specific machine or production line, but the actual reality indicates that there are ten or more workers on this machine or production line, and therefore, there is a negative impact on both cost, time and quality in the production process, so We will focus on three important points to reduce direct wages, which are as follows:

i. Reducing the number of redundant workers in the factory
ii. Reducing the time of the production process by defining the characteristics of the production process
iii. The use of modern technologies in operations (manufacturing, assembly, and examination).

These points will be clarified as follows:

A- Reducing the number of redundant workers:

Through the following table, the production departments in the Babylon Cement Factory will be known, in addition to the number of production workers and their costs, in addition to knowing the worker's wages from the total cost, as shown in the table below:

Table (16) The Wages Of Workers At Babel Factory For The Year 2021

N	Industrial Divisions	Number Of Employees	Total Wages Of Employees/Dinars
1	packing	22	18,536,229
2	jacks	16	11,138,252
3	maintenance	9	6,883,310
4	electricity	36	30,048576
5	workshops	19	15,812,961
6	Maintenance of cement mills	10	7,051,385
7	Cement mills	36	26,127,119
8	Raw material mills	10	8,956,712
9	water station	14	10,353,427
10	compactors	14	11,103,543
11	ovens	27	22,657,803
12	modes to transfer	7	4,630,239
	Total	220	173,481,556
	The Average Worker's Wage	**173,481,556 ÷220 =788,552**	**18,536,229**

The number of workers in production lines for cement production reached 220 workers in the Babylon factory for the year 2021, and the direct wages for these workers were estimated at (173,481,556), and accordingly the share of a ton of production from direct wages amounted to (13,345) *[1] dinars.

According to the opinions of the design and manufacturing engineers in the factory, the production lines for manufacturing this product require 100-150 workers, and any increase in the number of workers that exceeds the permissible limit represents the number of workers redundant, so the number of these workers in the factory can be reduced by 50 %, which means that the share of the cement producer in the direct wages will decrease by 50% if the number of workers is reduced, and therefore the direct wages will be (6,673)*[2] dinars per ton produced and sold, thus achieving cost savings of (6,673)**[3] dinars per ton produced and sold Here the question arises: How is the surplus of workers dealt with, and that there are a set of solutions to deal with the surplus in the number of workers, as follows: -

B- Reducing the time of the production process by defining the characteristics of the production process.

The total time required for manufacturing and assembling one ton of product is up to 420 hours, as the manufacturing and assembling processes are carried out continuously, which

[1]* Direct wages for each unit produced and sold after the 50% reduction, my agencies: 13,345 – (13,345 x 50%) = 6,673
** Savings achieved in the cost of the unit produced, my agency (13,345 x 50%) = 6.67

[2] *Direct wages for each unit produced and sold after the 50% reduction, my agencies: 13,345 – (13,345 x 50%) = 6,673.

[3] ** Savings achieved in the cost of the unit produced, my agencies (13,345 x 50%) = 6,673

requires an additional number of workers in addition to a great waste of time. The solution to this problem was addressed when applying the concurrent engineering technique.

C - Using modern technologies in manufacturing, assembly and examination processes
There are old machines in the Babylon Cement Factory. These machines were purchased in the eighties and nineties of the last century. Modern production machines are also available in foreign markets, which require less than 100 workers for the purpose of manufacturing and assembling this product.

4- REDUCING INDIRECT EXPENSES
This reduction can be explained through the following:

A- Reducing indirect industrial expenses.
The actual indirect industrial costs amounted to 16,714, which is equivalent to 10% of the direct cost of 167,140. Indirect industrial expenses can be reduced to 5%, and thus the new cost of expenses will become 8,357 [(167,140 × 5%) or (16,714 × 50%)] , which means that the amount of reduction for indirect industrial expenses will be 8,357 dinars

B- Reducing marketing and administrative expenses:
The actual marketing and administrative expenses for the product amounted to 2,462 dinars, which is equivalent to 50% of the indirect industrial expenses (16,714 × 50%). The reduction in these expenses will be in the amount of 1,231 dinars.

It is possible to clarify the amount of the reduction in the cost of the product as a result of the application of the green target costing technology for the year 2021, and based on the previous paragraphs, through the following:

Table (17) The Amount Of Reduction In The Cost Of The Oil Well Cement Product

N	reduction areas	Actual Cost (ID) (1)	The Amount Of The Discount Per Item/ID (2)	The Cost After The Discount For The Item (1-2=3)
1	Reducing the cost of putty after addition	9,621	804	8,817
2	Reducing the cost of gypsum	4,488	2,188	2,300
3	Reducing the number of employees	13,345	6,673	6,673
4	Reducing indirect expenses	16,714	8,357	8,357
5	Reducing administrative and marketing expenses	2,462	1,231	1,231
	The Total	29,916	19,253	10,708

We note from Table (17) that the actual cost of the cost elements amounted to 29,916 dinars, and the amount of reduction for these elements amounted to 19,253 dinars, which means that the cost of these elements after the reduction became 10,708 dinars, as the cost was reduced by 64%. (19,253 ÷ 29,916), which indicates that there are many unjustified sources of spending, and the percentage of reduction in the actual cost of the total cost of the product amounted to 9% (19,253 ÷ 218,856). Therefore, it can be said that the green target cost

technique helps in reducing the cost The product in terms of resources, wages, and direct and indirect expenses without negatively affecting the performance and quality of the product.
As for the extent of closing the cost gap of 23,121 dinars, it was closed by the amount of the reduction in cost elements, which means that the gap was not completely closed and a positive gap was achieved, but it remained negative, but by a very low amount (3,838) dinars.

Table (18): Cost Gap and Amount of Reduction For The Cost Of Oil Well Cement

Cost Gap/ID	The Expected Reduction In Cost/ID	The Difference Between The Cost Gap And The Expected Reduction / ID
23,121	19,253	(3,868)

We note from Table (18) that the green target cost technique has helped reduce costs and close the cost gap by approximately 83% (19,253 ÷ 23,121). This gives the factory management an opportunity to achieve the profit margin goal or achieve an additional profit margin for the product with further improvements to its functions by focusing on improving both the performance and quality of the product as well as reducing its costs and thus improving the value of the product from both the factory and customers' point of view.

The Fourth Topic
CONCLUSIONS AND RECOMMENDATIONS
Conclusions:

1. The business environment is accompanied by many rapid and continuous changes and developments, and this was the basic and logical justification for shifting from the traditional approach to the strategic approach to cost analysis and management, as the traditional approach has become inappropriate for the economic entities operating in this environment.
2. Concurrent engineering is a technology that seeks to implement design and development processes concurrently and concurrently by taking advantage of all available information, in addition to the possibility of applying it in manufacturing, assembly and marketing processes, by forming a multifunctional team and formulating an appropriate action plan, it aims to improve Quality and savings in costs and time, as well as providing sufficient flexibility to respond to any changes that may occur in the needs, desires and requirements of customers.
3. There are many economic entities that use concurrent three-dimensional engineering technology and have achieved success in this regard, but it is a relative success, that is, it is not the success required to survive in the world of business, and in order to achieve greater success that guarantees sustainability in a competitive market environment, which requires expansion The base of competitive advantages in the economic unit and the addition of a fourth dimension to the concurrent three-dimensional engineering, which is complementary to the concurrent engineering technology represented by (after designing the sustainability of the product), and this dimension participates to a large extent in gaining a sustainable competitive advantage, as it is not possible to achieve a clean environment without producing friendly products For the environment, in addition to the contribution of this dimension to the preservation of limited natural resources, as well as the possibility of benefiting from old products and converting them into new usable products, which is called (the recycling process).

4. Green target costing technology helps support the basic success factors for business organizations, which means that the use of green target costing technology helps in setting the target price with the addition of a green price premium, taking into account competition, market share, product quality, and customers' desires and needs, rather than focusing on cost.
5. Concurrent engineering was applied first to the oil well cement product, and it was found that there are some functional characteristics desired by customers, which were reached after making a determination of the most important desirable characteristics, and the product was developed and the desired characteristics were added, as for the cost of the product before Its development was (218,856), and after conducting the product development process when applying the concurrent engineering techniques and the green target cost, the cost of the product became (196,933), which is less than the cost of the product before its development, and thus achieving profits for the unit, as the selling price was (200,000) dinars and at a cost of (218,856), which This indicates a loss of (21,923).
6. The green target costing technology has helped reduce costs and close the cost gap by approximately 83% (19,253÷23,121). This gives the factory management an opportunity to achieve the profit margin goal or achieve an additional profit margin for the product with further improvements to its functions by focusing on improving both the performance and quality of the product as well as reducing its costs and thus improving the value of the product from both the factory and customers' point of view.

Recommendations:

1. The objective of the economic entities is to achieve revenues and enhance their market share, through the production of products that meet the requirements and desires of customers, which leads to the success of these units in the competitive work environment. Therefore, the economic unit (the research sample) to achieve its goal must follow costal and administrative techniques, and the most prominent of these techniques are the concurrent engineering techniques and the green target cost, through which products that meet the desires of customers are produced at a low cost that achieves the objectives of the economic entities .
2. Including in the concurrent engineering technology work plan information about the cost and time of the production process before its implementation and determining the target costs, in addition to distributing tasks among the team members according to the required specialization, and this is done after determining the date of implementation of the plan and the work site.
3. In view of the importance of addressing environmental issues, the economic unit (the research sample) must turn to recycling, because it has a role in benefiting from it to reduce the cost of purchasing raw materials used for production, in order to reduce environmental pollution.
4. Applying green target costing technology to help improve product design, get rid of unnecessary costs, and harness untapped energy to reach a competitive cost of the product at the target price required in the market and increase the market share.
5. The green target costing technology contributes because it promotes innovation and innovation through the use of concurrent engineering in product design and development, taking into account the desires of customers, and thus achieving customer satisfaction, which is one of the priorities of the company's strategic management method.

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