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## USING THE GREEN TARGET COST TO BUILD A SUSTAINABLE COMPETITIVE ADVANTAGE IN AL-ZAWRAA STATE COMPANY FOR ELECTRICAL AND ELECTRONIC INDUSTRIES PRODUCTION AND ASSEMBLY OF SOLAR PANELS

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## ABSTRACT

The paper aims to study and analyze a framework that is theoretical and cognitive of the green target cost. Also, studying and analyzing the level of applications of Al-Zawraa State Company for Electrical and Electronic Industries for the techniques and methods of strategic management accounting, especially the green target cost. In addition to apply it in the company to build a sustainable competitive advantage by applying one of the products produced by the company, which is the solar panel's product model (450) watts. Problem statement was represented by the weakness of keeping pace with Al-Zawraa State Company for Electrical and Electronic Industries with technological developments, the high costs of its products and the low level of sustainability due to its poor awareness of contemporary strategic management accounting techniques with its various methods. The research reached a set of conclusions, the most important of which was the possibility of reducing production costs by applying the green target cost, as well as the absence of solutions to reduce the costs of the solar panel product (450 watts) model by applying green target costs to its sustainability or green properties. This makes it maintain the sustainable competitive advantages that distinguish it from other traditional products.

**Keywords:** *Target cost, Green target cost, Green product, Sustainability, Sustainable competitive advantage.*

## INTRODUCTION

In light of the current dynamic business environment and rapid fluctuations in levels of competition. Furthermore, in light of the global interest in Sustainability and the importance of integrating the social, environmental and economic aspects into the strategies of the economic unit. After Sustainability has become an integral part of business strategy and the driving force in the survival and growth of economic units, it has made them race to build and maintain a sustainable competitive advantage. In light of these developments, economic units are looking for more objective and creative accounting and

administrative techniques than before and with a strategic depth that leads to reducing the costs of the green product, which has four main dimensions: reducing energy, reducing resource consumption, preventing pollution, and using renewable energy without compromising quality and customers satisfaction. This is in order to enhance sustainable competitive advantage. Green target costing technology is one such technology which is based on the idea of integrating environmental requirements costs with traditional target costing, as it is the process of integrating the mechanisms of action of the target cost and its application

in the development of environmental sustainability strategy and in response to the increasing desire of customers to obtain environmentally friendly products, taking into account the environmental standards imposed by the legislative authorities at a reasonable price for them. Moreover, the desire of economic units to remain in a competitive position in the market by providing green products that meet environmental requirements and achieve the highest levels of quality at reasonable and competitive prices in a way that enhances the strength of practices and leads to a more comprehensive approach.

The research problem is the lack of keeping pace with technological developments with Al-Zawraa State Company for Electrical and Electronic Industries. The high costs of its products and the low level of its sustainability result from its poor awareness of contemporary strategic management accounting techniques with its various methods, including the green target cost. Which is the supporting pillar for the management of economic units in improving their competitive position and building sustainable competitive advantage.

Based on the above problem statement, this paper aims to:

1- Study and analysis of the theoretical and cognitive foundations of the green target cost.

2- Study and analysis of the application of Al-Zawraa State Company for Electrical and Electronic Industries for the techniques and methods of strategic management accounting, especially the green target cost.

3- Applying the green target cost technology to build a sustainable competitive advantage in Al-Zawraa State Company for Electrical and Electronic Industries by applying to one of the company's sustainable products represented by a solar panel product that produces (450) watts.

The research is also based on the fundamental hypothesis of the possibility of applying the green target cost technology in Al-Zawraa State Company for Electrical and Electronic Industries and achieving sustainable competitive advantage.

## LITERATURE REVIEW

The topic was utilized in a study by Frehe, (2015) entitled “Can Target Costing Be Applied In Green Logistics – Evidence of a Conjoint Analysis”, It has reached the possibility of using the target cost to provide the right product or service at the right price.

As for the tagged study (Melo et al., 2016) tagged “ZEMCH And Green Target Costing Approaches: Inferences From A Design Workshop”, It has concluded that green target cost technology (GTC) is a vital technique to secure the target profit margin while maintaining the product's value. Integrating GTC and value engineering also provides a significant opportunity to reduce costs, ensure tight profit margins and enhance collaboration with the supply chain to evaluate the value delivery process. An alignment between a green target cost and an environmental design approach is desirable.

As for the study (Srivastava et al., 2013), it lost the purpose of the study aid “Building a Sustainable Competitive Advantage”, to identify the best comprehensive industrial practices and future trends in the context of the economic unit's contemporary resource-based competitive advantage model.

Therefore, this study came to complement what the previous researchers concluded by using the green target cost to build a sustainable competitive advantage for the production and assembly of solar panels model (450) watts in Al-Zawra State Company for Electrical and Electronic Industries.

## **FIRST: AN ANALYTICAL STUDY OF THE USE OF GREEN TARGET COSTING IN BUILDING A SUSTAINABLE COMPETITIVE ADVANTAGE**

In the last century, the world witnessed significant economic and technological developments. These developments had a direct impact on the environment of the economic units. This prompted her to take the lead in making changes to maintain her competitive position. It has made every effort to implement cost management techniques. The most critical problem for economic units is the production of goods of high quality and low prices, taking into account all the variables that affect their profits. As well as responding to environmental challenges. Hence, many techniques for cost reduction, including the green target cost, have emerged, reflected in achieving a sustainable competitive advantage.

### **1- The concept of target cost and its definition:**

The concept of target cost has received much attention in the literature on cost management when developing new products (Stadtherr & Wouters, 2021:1). As under the target cost technique, the activities are controlled in the light of the goals or light of the cost allowed in the market list, which should be achieved if

the economic unit is in a profitable position. Under this, the required profit margin is subtracted from the estimated selling price to determine the target cost of the new product. All members of the economic unit work to design and manufacture the product at the target cost (Gagne & Discenza, 1995: 16). Also (Toosi & Chamikarpour, 2021:32) indicates that the target costing technique helps economic units to estimate cost accurately, reduce the risk of insufficient profits, and develop better and faster products. It also aims to estimate costs based on the objective that the economic unit seeks in a competitive environment. Hence, target costing has been defined as a cost management technique to reduce the total cost of a product over its entire life cycle with the help of production, engineering, research and development, marketing and accounting departments (Krstevski & Mancheski, 2018:22). It is also defined (Itik, 2020:389) as a method that reviews all ideas in order to reduce costs during the process of planning, research and development of the product and shape production according to customer requirements by prioritizing elements such as speed and quality in the production line. As (Ferreira & Oliveira 2020:33), it was defined as a cost management tool to reduce cost during the product life cycle, which can also be used

to reduce investments with the design in the production and distribution of the product.

From the above, the researchers clearly did not agree on defining a comprehensive definition of the target cost. Some have focused on it as a tool, technique, or method for managing costs. Despite this, they did not go far from the essence of the target cost, which aims to reduce the product cost. Through the above definitions, researchers can define it as the technique by which the needs and desires of customers are known. The strategies of competitors in the market are understood and worked accordingly to determine the competitive price of the product, which leads to determining the cost of the product from the point of view of the market and customers and working to manage and reduce the actual cost of the product by studying the product throughout all stages of its life cycle to achieve the lowest possible cost compared to competitors, which leads to a reduction in the price of the product and competitive advantage.

From the above, the researchers clearly did not agree on defining a comprehensive definition of the target cost. Some have focused on it as a tool, technique, or method for managing costs. However, they did not go far from the core cost target,

which aims to reduce the product cost. Through the above definitions, researchers can define it as the technique by which the needs and desires of customers are known, the strategies of competitors in the market are understood, and accordingly, work to determine the competitive price of the product, which leads to determining the cost of the product from the point of view of the market and customers and working to manage and reduce the actual cost of the product by studying the product throughout all stages of its life cycle in order to achieve the lowest possible cost compared to competitors, which leads to a reduction in the price of the product and the achievement of competitive advantage.

## **2- Basic Principles of Target Costing Technology:**

Itik (2020:391) believes that six basic principles will form the basis of the conceptual basis for the target cost method, which is as follows:

- 1- Cost estimation.
- 2- Focus on customers.
- 3- Determine design priorities.
- 4- Enhancing participation.
- 5- Product life cycle concept.
- 6- Commitment to the value chain.

## **3- Techniques supporting the target costing technique:**

According to (Dury, 2018:892), there are several methods that the economic unit can use to achieve the targeted reduction, and they are as follows:

1- Continuous improvement (Kaizen Costing): It is a Japanese technique consisting of two Japanese words, Kai, which means change, and Zen, which means better, which translates to continuous improvement (De Carvalho, 2016:12).

2- Value Engineering: Value engineering is defined as a technique for evaluating all aspects of the value chain to reduce and eliminate costs that do not add value to the product, making improvements in product design, changes in material specifications, and modifications in process methods, which achieve a quality level that satisfies customers (Horngren, 2012:441).

3- Reverse-Engineering: Reverse engineering arose initially as an essential tool in the product design process that highlights the reverse methods in deducing and exploring designs. This tool evolved from collecting product data to the manual redesign process to developing a new product (Anwer & Mathier, 2016:1).

#### 4- Green product concept:

Green products have been used in many fields in the past few years. Customers prefer to use these products, especially if their prices are close to regular products. Those customers are not willing to pay more for those green products. As these products remain within small outlets, most have a market share of less than 5% for various reasons. Here two problems arise. The first is that greening products increases costs. Additional requirements (the green price premium) must be met at each product's life cycle stage. The second problem is that cost management is not used in the design and manufacture of the product (Seuring, 2001:1). He defined it (Chen, 2010: 29) as a product whose impact on the earth is non-existent, does not waste the exploitation of natural resources, can be recycled, and is safer in terms of safety. In other words, green product refers to product that includes the possibility of recycling or using less toxic materials to affect the environmental nature.

From the above, researchers can define a green product as one that meets customers' needs and desires following environmental standards, which is designed and produced using environmentally friendly raw materials or using toxic raw materials most narrowly in

order to preserve the environment from pollution and optimal use of natural resources and to provide environmentally safe products to the customer.

#### 5- The concept of green target cost, its definition and reasons for resorting to it:

Many economic units search for effective ways and methods to reduce the costs of green products, which have main dimensions are reducing energy consumption, reducing the depletion of natural resources, reducing pollution and using renewable (alternative) energy while maintaining the quality of the product and satisfying customers in order to achieve a competitive advantage. Green target cost technology is one of the technologies that help provide environmentally friendly products and achieve a competitive advantage.

Kersten (et al.) defined it as a technology that represents an evolution of the traditional target cost technology that takes into account the environmental aspects by reducing harmful waste and toxic emissions such as carbon dioxide gas and striving to achieve the target cost of the product and taking into account the environmental impacts and according to a comprehensive view. Kersten et al., 2011: 57. As defined by (Nishimura) the green target cost technology is a comprehensive

approach to product design in which costs and environmental impacts are determined and help meet the needs and desires of customers, achieve environmental requirements and take into account cost constraints side by side to create a green design for the product (Nishimura, 2014: 56)

Through the preceding, researchers can define the green target cost technology as a technique that works to determine costs and reallocate them according to the green value provided to customers in a way that leads to reducing production costs and achieving Sustainability.

Attention to environmental issues, environmental legislation and laws, and pressures to meet the green needs of customers, and taking into account the pressures of stakeholders and shareholders in need to pay attention to green issues are all reasons that prompted economic units to pay attention to their production operations and design and develop their products according to environmental standards. This prompted her to search for modern cost management techniques that help her reduce emissions and achieve a competitive advantage. One of the most important of these techniques is the green target cost technology (Malone, 2015:6).

## **6- Benefits and objectives of applying green target costing technology:**

By applying the green target cost technology, the economic units seek to achieve several benefits and objectives. The green target cost links customers' desires and needs with sustainable development initiatives, which makes it the economic dimension in the long-term vision towards establishing economic unity in achieving Sustainability (عبد العباس 2022 والموسوي; Winter & Knemyer, 2012: 35).

As for (Albino et al., 2009: 84), one of the strategic objectives of economic units is to develop products (goods and services) that reduce their impact on the environment at every stage of the product or service life cycle. It also aims to increase the provision and use of renewable energy sources to develop a comprehensive approach to improving the environment and business performance.

## **7- Green Target Cost Technology Requirements and Steps:**

To apply the green target cost technology, several main requirements must be met, the most important of which are the following: (IPRI & LOGU, 2012:21-22):

1- Adding the features that make the product greener and environmentally

friendly to the product features and specifications package.

2- Consider the green standards and indicators when determining the profit margin.

3- That decision is taken to green the product in line with the economic and environmental objectives of the economic units.

4- Knowing the customer's willingness to pay for green and environmentally friendly logistics services when determining the price of the entire product.

The process of applying the green target costing technology goes through several steps, as indicated by (Horvath & Berlin) and as follows:

**Step One: identifying and evaluating the green needs and desires of customers:**

In this step, customers' green needs and desires are determined, which are translated in the form of specifications enjoyed by the green product and the functions performed by this product in a way that leads to the realization of the value perceived by the customer for each of these characteristics.

**Step Two: Determine the target selling price and the green price premium:**

In this step, the selling price is determined after analyzing the market's competitive conditions and considering the customers' reactions. Several studies highlight the possibility of adding a price premium to green products after the green product gains the customer's trust and the customer realizes the environmental benefits involved in purchasing the green product.

**Step Three: Determine the green target profit margin and calculate the allowable costs:**

This step calculates the allowable costs by subtracting the target profit margin from the target price.

**Step Four: Allocate Costs to Green Cost Drivers:**

In this step, the economic unit determines the allowable costs for each product component and works to determine the perceived value of the characteristics provided by the components.

**Step Five: Implementing green cost management procedures:**

In this step, the standard costs of the product components are determined. Moreover, compare the standard and allowable costs for each of these components. It then analyzes deviations to

improve the component design and reduce overall cost without affecting product functionality and quality.

## **SECOND: THE NATURE OF THE RELATIONSHIP BETWEEN GREEN TARGET COST AND SUSTAINABLE COMPETITIVE ADVANTAGE:**

### **1- The concept of sustainable competitive advantage and its definition:**

The sustainable competitive advantage is nothing but a tool for the economic unit that enhances its ability to implement strategies that make it superior to competitors and in a better and more vital position. It works on developing a strategic vision for managing the economic unit to anticipate events because they are in a state of competition with each other (Al Zweeni & Al-Musawi, 2021; Ali et al., 2021:66). (Bharadwaj et al., 1993:84) has made it clear that competitive advantage comes through two paths: either by implementing a value creation strategy that is not implemented at the same time by any of the current or potential competitors or through the particular implementation of the same strategy, and Sustainability is achieved. When the advantage is more resistant to the behaviour of the competitor. Competitive advantage is how an economic unit provides value to its customers and

outperforms its competitors (Sweis et al., 2018: 165). The sustainable competitive advantage of economic units has three features: economic Sustainability, Environmental Sustainability and Social Sustainability. Which comes from the intellectual capital accumulated by economic units through knowledge management (Pan et al., 2021:4). He defined it (Pratono et al., 2019:3) as the ability of the economic unit to achieve more excellent performance than its competitors and to achieve the value in which the economic unit seeks high Innovation by leading competition in the market. As for (Ali et al., 2021:66), an economic unit can sustainably implement competitive strategies and confront environmental challenges in the long term. From the above, it is clear that the views on sustainable competitive advantage are many, some of them focus on the ability of the economic unit to achieve economic value from its practical and scarce resources so that it is difficult to reproduce and imitate by competitors, and some of them pointed out that the economic unit can increase its market share through By keeping costs lower than competitors. Thus, researchers can define it as the advantage obtained by providing more value to customers compared to what other competitors offer, as well as by distinguishing between what one economic

unit owns and no other economic units that can be sustainably maintained.

## **2- The importance of sustainable competitive advantage:**

The competitive advantage of the economic unit is an essential tool in competition and appropriate for the development of the economic unit. The analysis of sustainable competitive advantages helps business managers improve the level of their business and promote the sustainable development of the national economy (Feng et al., 2020:2). The sustainable competitive advantage depends on the resources and capabilities considered valuable, scarce, imitable and not replaceable. It is thus considered a powerful resource-based strategy for the competitive market (Hossain et al., 2021:3). These economical units have strengths represented by valuable resources that keep gaining a sustainable competitive advantage (Ginting et al., 2020: 189). The researchers believe that sustainable competitive advantage is of great importance, as it has strong trends towards a set of values to satisfy its internal and external customers in the current and future period and enhances the position of the economic unit and its strategic positions in the market to achieve profitability to distinguish it from other competitors.

## **3- Dimensions and strategies of sustainable competitive advantage:**

The researchers pointed out several dimensions of sustainable competitive advantage. According to (Nurcholis, 2021:8), the uniqueness of the product, the quality of the product and the competitive price are among the leading indicators for measuring sustainable competitive advantage. He pointed out that the primary competence of the economic unit is a set of unique capabilities that the economic unit possesses and its development, such as product quality, customer service, Innovation, flexibility and responsiveness to customers. All this is so they can beat competitors and gain a sustainable advantage in the long run. Because they can serve customers better than competitors, and the key to continued competitive advantage is the ability to quickly and decisively manage and regroup complex relationships and resources. In another context, (Battour et al., 2021:2) indicated that sustainable competitive advantage depends on four dimensions: effectiveness, superior quality and creativity, as follows:

1- Effectiveness: Effectiveness is a well-known word used in research and organizational practice. This term dates back to the era of industrialization and the era of scientific management. Efficiency

has been recognized as a tool for measuring productivity or profits. It is a diverse and complex concept. Scholars have indicated that efficiency strongly emphasizes achieving the goal of economic unity. It also emphasizes the degree of achieving the goal by applying organizational resources and the difference between actual and expected production. And then focus on whether the goal of economic unity has been achieved. Thus, it refers to the ratio of inputs to outputs, the ability to use the least amount of effort or costs to generate the desired result (Tang, 2017: 1834).

The researchers found that effectiveness refers to a brief evaluation of the overall organizational results and that its criterion is one of the vital and critical indicators in measuring the extent to which the economic unit achieves the set goals, which are referred to as the strategic goals.

2- Superior quality: Quality is a process of removing defects and striving to achieve a consistent result free from defects, as everyone can achieve quality by focusing on continuous improvement and removing all defects (Matei & Iwinska, 2016: 14). The quality of products and services and the competitive price are among the leading indicators to measure the competitive advantage that gives the

economic unit a sustainable advantage (Nurcholis, 2021:8).

From here, it becomes clear to researchers that high quality is one of the indicators used to measure the competitive advantage through which economic units contribute to developing critical competencies and capabilities to serve their target customers better than their competitors. Hence, quality is considered a source of sustainable competitive advantage simultaneously.

3- Superior creativity: In general, creativity is defined as the direction of the economic unit to try ideas or implement creative processes that can lead to the development of new products (Na et al., 2019:3). Innovation is seen as any product process, policy or planned change. It is something new in economic units as the introduction of new products, services, policies and processes to implement the activities of the economic unit to achieve a sustainable competitive advantage (Julius & Maru, 2020: 119).

#### **4- The relationship between green target cost and sustainable competitive advantage:**

The current stage is characterized by the devastating waste of natural resources, uneven economic development, and climate change. This case shows changes

in the behavior of customers and changes in the responses of business entities. Some economic units have adopted the environmental management system and started applying an environmentally friendly approach to all the activities of the economic units. It has also started taking sustainable initiatives to take a win-win approach that saves unit economic costs while showing awareness among customers increasingly looking for promises from responsible economic units. This is because they realize that environmental themes influence all activities related to human existence. Thus, green target costing is a modern way to gain a competitive advantage. A sustainable competitive advantage can be obtained by incorporating environmental thinking into all practical aspects of product design (Moravcikova et al., 2017:2). Despite the obstacles that prevent the transition to a green environment, as being environmentally friendly has become a practical strategic approach to distinguish and locate the products and services of economic units, environmental competencies become a source of value and uniqueness for the economic unit itself, and then these economic units may have a sustainable competitive advantage compared to economic units that do not follow the green cost approach (Monteiro, 2020:11). From here it is clear that the

most successful economic units are those that see non-compliance with the environment as a problem that must be dealt with by isolated specialists within the economic unit and thus these economic units integrate the green target costing technique as a means of gaining a competitive advantage (Winsemius & Guntram, 2013:15).

The researchers believe that the green target cost plays a significant role in achieving a sustainable competitive advantage. Its application addresses many environmental problems, increases profits and sales, improves the image and reputation of the economic unit, and expands its market shares. It also leads to improving the quality of the product and contributes to the strategic management of future profits by planning the target profit by offering environmentally friendly products and then leads to the provision of products or services desired by the customer at an affordable price and at the same time those products and services are profitable and environmentally acceptable and reflected. These factors achieve sustainable competitive advantage.

### **THIRD: INTRODUCING AL-ZAWRAA STATE COMPANY FOR ELECTRICAL AND ELECTRONIC INDUSTRIES:**

Al-Zawraa State Company was established in (1988) with a total area of (82,000) square meters in the Baghdad / Al-Zafaraniya / Industrial Area. Al-Zawraa State Company includes three companies merged under the name Al-Zawraa State Company based on major decisions from the state in (2015), which increased the company's manufacturing and development capabilities to serve the industrial sector within the Ministry of Industry and Minerals. As a pioneering step in keeping pace with the development of production methods and technology and improving the quality of the product, the company was keen to conclude a joint technical cooperation agreement with international companies to exchange experiences. Al-Zawraa State Company consists of Al-Zawraa General Company, which was established in (1988), Al-Tahadi Company, which was established in (1991) and Al-Mansour Factory, which was established in (1975), which was disengaged from the company and attached to the General Company for Food Products by Ministerial Order No. (411/20) /33350) dated 08/18/2021. Al-Zawraa State Company also owns several marketing outlets for the company's

products, including the company's headquarters (Baghdad, Al-Zafaraniya, the industrial zone near the Electronic Industries Company, Basra, and the Middle Euphrates). As well as from the company's website and the media.

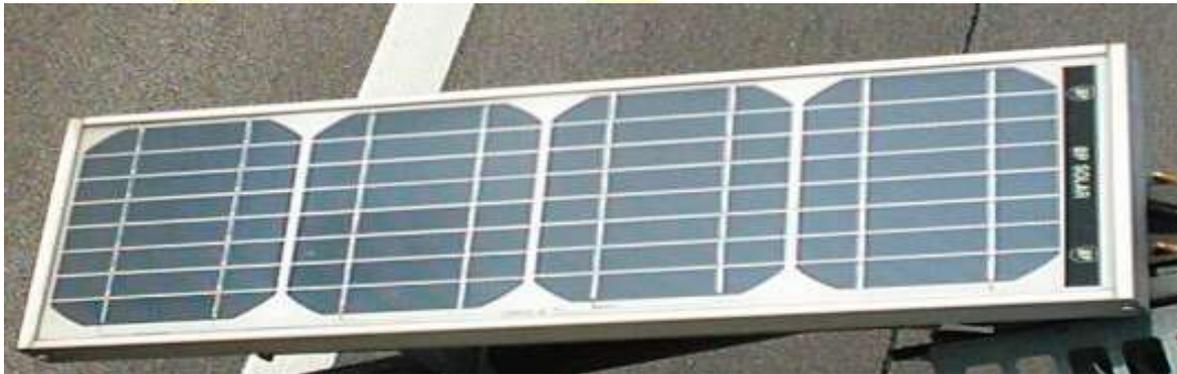
1- The nature and importance of the green product that Al-Zawraa State Company for Electrical and Electronic Industries seeks to manufacture and assemble:

One of the company's products that it manufactures and assembles has been selected as a green product. In line with environmental requirements and contemporary economic and technological developments, Sustainability is one of its most important priorities: the product (solar panels). This product suffers from high manufacturing and assembly costs. As well as the intense competition it faces from similar imported products. Al-Zawraa State Company for Electrical and Electronic Industries planned a project to manufacture and assemble (solar panels) with different capacities and modern technologies. It relies on the latest technologies of buss bar 12-5 solar energy, with a production capacity of (3000) kilowatts/year and over the next ten years, bringing the total production to (30000) kilowatts, which is equivalent to (30) megawatts, to be added To produce the national energy in the country and reduce

the obstetric load on it, which is considered as non-green and unsustainable traditional production methods. This proposal was presented based on the directions and vision of the senior management to increase its production

capacities and maximize its resources, which will constitute support for rationalizing national electricity consumption, which will positively reflect on the national economy, and Figure (1) illustrates a solar panel model.

**Figure 1. Design of Solar panels produced by the company**



*Source: Engineering Design Division, Electronic and Laboratory Units.*

The importance of solar energy comes from the fact that it is enormous energy that can be exploited anywhere. It is a free and inexhaustible fuel source as well as clean energy. It can be used in many fields, including agricultural activity, water heating and cooling, water desalination, sewage treatment and electricity generation. Therefore, in light of the importance of preserving the right of future generations to oil wealth and making the period of benefiting from this wealth long-term and sufficient, as well as the increase in electricity consumption in our country significantly and the increasing costs resulting from the use of

fuel to generate electricity and the importance of reducing gas emissions, the interest in developing renewable energy sources In Iraq, the most important of which is solar energy, it has become a necessary matter. Note that efforts to benefit from solar energy in Iraq face some challenges, including the availability of oil and its lower cost compared to generating solar energy, as well as the impact of the dust that characterizes the atmosphere of the region, so the researchers considered that this product should be the subject of the study.

2- The role of solar panels in achieving Sustainability:

Given the great interest that the countries of the world attach to renewable or sustainable energy (clean energy) and its applications that are considered environmentally friendly, the trend for solar energy that can be exploited and achieve significant benefit from it in several aspects is present and in the future. Solar cells have been chosen to take advantage of the sun's rays to produce electrical energy because the cost of this type is much lower than the cost of producing conventional electrical energy. Using electric energy through solar panels contributes to reducing the use of fossil fuels by providing homes with clean and renewable energy from the sun, saving much energy for long periods. Solar panels are the best choice to reduce your carbon footprint and maintain a comfortable lifestyle. The solar panel is made of pure silicon, glass and aluminium, and the use of toxic materials is avoided. Manufacturers strive to improve operations continually and lead the industry in sustainable manufacturing practices.

3- Al-Zawraa State Company for Electrical and Electronic Industries aims to produce and assemble solar panels:

Al-Zawraa State Company for Electrical and Electronic Industries, through the implementation of the project of a plant for the production and assembly of solar panels with different capacities and modern technologies, with a production capacity of (30,000,000) watts over the next ten years, aims to:

1- Filling the country's needs for solar energy panels and systems in various fields of use within renewable energies and promoting national electric energy.

2- Building and consolidating a sophisticated industrial base for electric power production that keeps pace with the rapid development in this field.

4- The actual costs of producing and assembling a model (450) watt solar panel:

After studying and analyzing the parts and materials used in the production of an integrated system of solar cell systems, the researchers will measure the actual cost of each component of the costs, each part, and each of the materials used in production, and the total actual cost of all materials. To calculate the total actual costs, the cost of actual materials, wages and indirect industrial costs associated with each job should be calculated. Table (1) shows the total costs of producing and assembling a model (450) watt solar panel.

**Table 1. Total cost to produce and assemble solar panel model of (450) watt**

Cost details	Cost amounts (I.D.)
Raw materials	146,026
Human force	318,000
Indirect costs	43,141.5
Managerial and marketing costs	13,500
Total	520,667.5

Source: made by authors based on the company's records

As for calculating the cost of producing and accumulating one watt of the total cost, it will be as follows:

Cost per watt of total costs = total costs/model size

The cost of one watt = 520,667.5 dinars / 450 watts = 1157.039 dinars / watt

From the preceding, it appears that the policy of Al-Zawraa State Company for Electrical and Electronic Industries in calculating costs is through determining the cost of materials involved in the production process, labor component costs, indirect industrial costs, marketing and administrative costs. In addition to adding a profit margin (10-20%) of the total cost to pricing its products according to the nature of market demand and competition. That is, the company follows the traditional method of calculating production costs and pricing and does not realize modern strategic accounting techniques in calculating costs and modern pricing methods. This will be discussed in the next paragraph of this research.

#### **FOURTH: STEPS TO APPLY THE GREEN TARGET COSTING TECHNOLOGY:**

The implementation of the green target costing technique consists of several steps as follows:

##### **1- Determining the target selling price and the green price premium:**

One of the most critical steps of the green target cost technique is setting the target selling price and the green price premium. The prices of the panels vary according to the quantities and are divided into three parts for the customers. Smalls of all types and sizes, up to a few kilowatts, the second medium, up to (10) megawatts and higher, and large ones can be purchased at discounted prices. With time the prices of solar panels began to decline significantly. As prices vary according to the geographical difference of the countries of the world according to the country's climate, it rises in cloudy countries such as Finland and Sweden. It decreases in sunny countries such as Arab countries. To calculate the target price, the

prices of competing products for the same model (a 450-watt solar panel) must be

calculated, and this is shown in Table (2) below.

**Table 2. Prices of competitors producing (450) watt models**

Product name	Country of production	Watt Price (\$)	Watt Price (I.D.)	Total (I.D.)
First Solar	US	0.70\$	1036	466,200
MTS	UK	0.65\$	962	432,900
Sonar Energy	Turkish	0.60\$	888	399,600
Q CELL Hanway	Korean	0.50\$	740	333,000
J.A Solar	China	0.40\$	592	266,400
Trina Solar	China	0.35\$	518	233,100

Source: made by authors based on local prices

Since the company's local product has a high quality comparable to the imported products, the researchers decided to exclude competitors 5 and 6 in Table 2 because they do not match the required standard specifications.

The average price of the competing product = the sum of the prices of the competing products / the number of competing products

Average target price for the competing product =  $1,631,700 / 4 = 407,925$  dinars / solar panel

Al-Zawraa State Company for Electrical and Electronic Industries is concerned with protecting the environment. This is through the Industrial Safety Department, which includes the Environmental Protection and Improvement Division in its formations. This department carries out environmental sanitation procedures and

tests for environmental influences. It is noted that there are no adverse effects on the environment from the company because the level of environmental pollutants falls within the applicable standard parameters. In the same context, the company has now obtained a quality certificate (ISO - 9001-2015) after completing all the requirements, contexts, manuals and procedures necessary to apply them practically. This is because it applies appropriate methods to ensure the quality of results and prevention for the company's products and activities, which shows the extent of the operations' possibility to reach the planned results. Therefore, Al-Zawraa Company, in consultation with the engineers and financial affairs staff, decided to add a price premium estimated by the company at an amount of 25,000 dinars as a simple price premium to avoid the risks of customers not accepting the

company's products because their prices are high compared to the competing product.

So, the green target price after adding the price premium is according to the following equation:

Green target selling price = target price + premium

Green target selling price = 407,925 + 25,000 = 432,925 dinars / unit

## 2- Determine the green target profit margin and allowable costs:

After the target sales price and green price premium were determined in the previous step, the target profit margin and allowable costs must be determined in the third step of applying the green target cost technique. The company set the product profit margin at a rate of (15% - 20%). As a result of the intense competition that the company faces from competitors, the company decided to reduce the profit margin to be (10%). It is considered a reasonable percentage to face the risks of that competition for its products, as well as to increase and encourage the awareness of Iraqi society to switch to environmental products. Therefore, the profit margin will be calculated according to the following equation:

Green Target Profit Margin = Green Target Price \* Profit Margin Percentage

Green target profit margin = 432,925 \* 10% = 43,292.5 dinars / unit

## 3- Determine the green target cost:

After determining the green target profit margin, the next step of applying the green target cost is to determine the green target cost for the 450-watt solar panel model produced by the company according to the green target price that was determined according to the prices of competing products for the same product. It can be calculated according to the following equation:

Green Target cost = Green Target Selling Price – Green Target Profit Margin

Green target cost = 432,925 - 43,292.5 = 389,632.5 dinars / unit

## 4- Determine the target reduction to achieve the green target cost:

After determining the green target cost needed to compete with foreign products that compete with the company's product in the local market, this cost is compared with the traditional Cost in Table (1), amounting to (520,667.5) dinars/unit to determine the amount of the target reduction to achieve the green target cost as follows:

Target Reduction = Actual Cost of Producing a Model (450) Watt Solar Panel – Green Target Cost

From the preceding, it is noted that Al-Zawraa State Company for Electrical and Electronic Industries needs measures to reduce actual costs to achieve the green target cost. This is done using techniques and procedures that support the product's green trends, comply with sustainability requirements, and meet customers' green demands. This is the main goal that the company seeks. Therefore, the researchers will use one of the techniques supporting the green target cost technique, which is the value engineering technique, to support it in determining the value index for the components of the product at the design stage in order to reduce and improve their value by making changes in the design and then submitting proposals. It will, in the subsequent paragraph, apply value engineering.

#### **FIFTH: VALUE ENGINEERING APPLICATION:**

Value engineering is applied through several stages, which are as follows:

Information stage: after defining the product, value engineering technology procedures will be applied. As well as the formation of a multi-tasking working group. Including the collection of

information on the financial and non-financial products, whether inside or outside the company.

Functional analysis stage: This stage is the cornerstone in the procedures for applying value engineering technology. Suppose the value index of the product components is determined to diagnose the product components subject to the procedures of applying value engineering technology.

Creativity stage: This stage represents the most critical stage in the value engineering application procedures, which is the process of creating new ideas that aim to reduce the cost of the job at the lowest possible cost, whether by replacing it, redesigning it or getting rid of it. To meet customers' desires with high quality and Sustainability. After personal interviews with engineers and technicians, they put forward several practical ideas and solutions, and some are not applicable due to external factors. In order to achieve this goal and within this stage, the focus will be on the cost elements of the solar panel components as follows:

1- Areas of direct material cost reduction:

After listening to the opinions of engineers, salespeople and specialized technicians, it was determined to reduce the components that are being spent more than their value to customers. Reducing

the cost of direct raw materials involved in the production of the solar panel can be achieved by recycling the components of the cells after the end of their useful life and returning them to the company again and not throwing them as waste after the end of their useful life. This happens by selling them to the company at a price (10%) of their price as new materials. According to the opinions of engineers and technicians, the company bears the cost of the necessary treatments and modifications that are made to the cells to be ready for use again as new cells, estimated at (50%) of their price as new materials. Thus, the company reduces the cost of purchasing cells by (40%). This leads to a reduction in the cost of direct materials by (23.8%).

2- Areas of reducing the cost of work: After repeated personal interviews conducted by the researchers with engineers and technicians, the possibility of reducing the cost of work was found through the use of green machines and equipment characterized by technological development, simplicity of use and uncomplicatedness. In addition, it reduces the number of emissions generated during the use of machinery and equipment. As most of the current equipment and machines are characterized by obsolescence, complexity, increased fuel consumption, and lack of technological progress, in the case of using

technologically advanced green machines and equipment will reduce the number of technicians by 30%, which leads to a reduction in the cost of work by 14%.

3- Areas of reducing indirect industrial costs: The use of green materials and technologically advanced green machines in production and assembly does not result in reducing emissions generated during their use and reducing the number of workers needed to operate them only as indicated in the first and second paragraphs above, as the engineers and technicians specialized in The company stated that this measure will result in a significant reduction in the company's indirect industrial costs, with a reduction of no less than (50%).

4- Areas of reducing administrative and marketing costs: After continuous work to identify areas for reducing administrative and marketing costs through personal interviews that were conducted by the researchers with the marketing manager, production manager and specialists in the company in question, the possibility of reducing the cost of packaging materials was reached through Importing it instead of buying it from the local market, and its environmental friendliness also characterizes it. In the case of importing packaging materials, it will reduce the cost of packaging materials by (13.8%)

compared to local purchase prices, which leads to a reduction in administrative and marketing costs by 12%.

After the proposed alternatives to the components produced by the value engineering technology have been presented to be used in place of the previous components, a table will be

prepared with the results of the proposed alternatives. The reductions that can be achieved are the target reduction as Table (3) shows the amount of the target reduction that Al-Zawraa General Company can achieve when applying the proposal Value engineering technique and the amount of cost after reduction.

**Table 3. The costs of a model solar panel (450) watts according to the proposals for the reduction of value engineering technology**

Targeted Reduced Factor	Cost before reduction	Reduction rate	Reduction amount	cost after reduction
Raw materials	146,026	23.8 %	34,754.188	111,271.8
Human capital	318,000	14 %	44,520	273,480
Indirect costs	43,141.5	50 %	21,570.75	21,570.75
Managerial and marketing costs	13,500	12 %	1,620	11,880
Total cost before reduction	520,667.5	Total cost after reduction		418,202.55

Source: made by authors

It is noted from Table (3) above that the total costs of the product unit after the reduction amounted to 418,202.55 dinars after it was (520,667.5) dinars/unit. A total reduction of (102,464.95) dinars/unit was achieved. It constitutes (19.68%) of the total costs and (78.2%) of the total amount of the targeted reduction per unit, amounting to (131,035) dinars/unit, which is a very high amount and percentage. It also lies in achieving all the targeted

reductions through the future expansion in the volume of production in order to reduce the share per unit of fixed costs. Especially since the company suffers from high fixed costs due to the cost of work that is paid on a fixed basis (monthly salary), in addition to the fact that the process of producing green, environmentally friendly and sustainable products represents a continuous process for many years and is a necessity of the

times and transformations towards the production of clean energy and green products.

As for the other aspects of Sustainability and the sustainable competitive advantage other than the lowest sustainable cost that the company in question achieves, it can be identified as follows:

- 1- Technological Innovation by using green materials that are environmentally friendly and have few harmful effects and emissions.
- 2- Sustainability of economic resources through the rational use of resources (energy, materials, and water).
- 3- Preserve the environment by minimizing waste over the product's life cycle.
- 4- Social Sustainability by avoiding the use of hazardous or toxic materials that are prohibited or prohibited by health or internationally.
- 5- Sustainable excellence by designing the product so that it can be disassembled or recycled after the end of its useful life.
- 6- The long productive life of the product (energy panels) compared to traditional products (generators and conventional power stations), as its life ranges between (20-25) years, which can be extended

through technological Innovation, development and recycling.

7- Obtaining a zero noise pollution product, as the process of generating solar energy through solar panels does not emit any noise or noise at all.

8- The ability of the product price to cover environmental and social costs, encourage Innovation by anticipating market needs, and achieve social responsibility for economic units by providing sustainable products.

Accordingly, it turns out that the use of green target cost and the support of value engineering technology achieves compatibility between the needs and desires of customers in obtaining a green product (environmentally friendly). As well as bearing its costs while achieving the objective of the economic unit in question in maintaining its competitive position and achieving sustainable competitive advantage. This proves the validity of the central hypothesis of the research, which states the possibility of applying the green target cost technology in Al-Zawraa State Company for Electrical and Electronic Industries and achieving sustainable competitive advantage.

#### **SIXTH: CONCLUSIONS:**

- 1- The green target cost has a significant role in achieving a sustainable competitive

advantage. Its application addresses many environmental problems, increases the percentage of profits and sales and improves the reputation of economic units.

2- Many benefits result from integrating environmental sustainability issues into product development and business operations, such as increasing efficiency in the use of resources, increasing sales, developing new markets, improving the image of the economic unit, differentiating its products, and enhancing its sustainable competitive advantage.

3- The sustainable competitive advantage is crucial as it has strong trends towards a set of values to satisfy its internal and external customers in the current and future period and enhances the status of economic units and their strategic locations.

4- Using solar panels reduces energy consumption and electricity from fossil fuels by providing homes with renewable energy from the sun. This is the best option to reduce the carbon footprint and maintain a comfortable lifestyle.

5- Green target costing is one of the essential techniques that consider the product's Sustainability because the process of determining the cost of the product takes place at the product design stage.

6- The reduction achieved from the application of the green target cost in the costs of the 450-watt solar panel product amounted to a total amount of (102,464.95) dinars and a reduced rate of (78.2%) of the target reduction, which represents a high percentage that continuous reductions can strengthen over the coming years.

7- The proposals to reduce the costs of the 450-watt solar panel product by applying the green target costs did not affect its Sustainability or green characteristics, which makes it maintain the sustainable competitive advantages that distinguish it from other traditional products.

#### **SEVENTH: RECOMMENDATIONS:**

1- Encouraging economic units, especially industrial ones, to apply the green target cost because of their role in achieving Sustainability and reducing the environmental and social impacts of products, as well as achieving sustainable competitive advantages.

2- Increasing investment in green production technology and developing new green products to be put on the market, as increasing the volume of investment in green production technology positively impacts the trend towards Sustainability.

3- The use of supportive modern administrative accounting techniques (such

as value engineering) contributes to reducing costs, defining product functions and improving its quality during the design phase.

4- Benefiting from the products after the end of their useful life by retrieving them from customers and using them again by recycling them as new materials and using them in the production of new products, which contributes to reducing costs and reducing waste.

5- Urging Al-Zawraa State Company for Electrical and Electronic Industries to adopt the green target cost technology proposed in this research to sustain its products, reduce costs and achieve sustainable competitive advantages.

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