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The role of product life cycle balancing in time and cost management as competitive priorities (Research extracted from a master's thesis)

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ABSTRACT: The current research aims to present a cognitive discussion of one of the modern strategic techniques in the field of cost and management accounting, represented by the technology of balancing the life cycle of the product, and to indicate the role it plays in terms of time and cost management as competitive priorities for the products of the laboratory research sample, especially if time is used as a cost guide in its application, as well as to help management in making various decisions through cost calculation and more accurately than traditional methods, To achieve this goal, the General Company for Electrical and Electronic Industries in Baghdad, through one of its laboratories represented by the production plant of the pneumatic refrigerant engine in WAZIRIYAH as a sample for research, was selected as a research sample, as the researchers relied when applying this technology on data and information obtained from the records of the laboratory research sample, as well as visits and field experience of researchers in the above laboratory, and meeting with officials and individuals working in it, With access to cost reports, accounting records, and time cards that belong to the laboratory, in order to apply the above technique.

The researchers have reached several conclusions, the most important of which confirms that the production laboratory of the pneumatic refrigerated engine in Waziriyah as a research sample suffers from the lack of any features of the application of modern strategic techniques that are concerned with reducing costs, the most important of which is the technology of the life cycle of the product and the preparation of the budget under it and using time as a cost directive through which the costs of the products of the laboratory can be reduced research sample, as well as the absence of a clear role in the laboratory research sample for the activity of the research department, To follow up the changes and developments witnessed by the contemporary business environment in which the laboratory becomes a research sample directed by the customer, as well as the use of modern technologies in the field of cost accounting and management would contribute to keeping pace with the progress, development and growth in the industrial, commercial and economic reality of the country, as these technologies provide appropriate information on cost and useful through which to identify the shortcomings, And work to address them.

Keywords: Product Lifecycle Balancing Technology, Time-Oriented Product Lifecycle Balancing Technology, Competitive Priority.

I. INTRODUCTION

The contemporary business environment is characterized by rapid developments and continuous changes highlighted by the globalization of markets, intense competition, technological development, and others, which has made developments cast a shadow on customers who have interacted greatly with it and in a way that may be unprecedented represented by the fluctuation of their tastes, the fluctuation of their desires, the growth of their needs, and the high

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ceiling of their requirements in terms of searching for products and services that meet those requirements.-So low price, high quality, diverse properties. On the other hand, economic units seeking success cannot achieve what they aspire to if they continue to apply traditional systems and approaches in the field of cost and administrative accounting, because those systems have become unable to provide appropriate information that enables economic units to achieve the desired success in light of the above developments. Revenues have become limited, which led them to focus on the hidden aspect of profitability, which is the cost and how to drive it, as well as there is a characteristic that distinguishes the competition market more than ever, which is the high demand by customers for products of high quality, while maintaining the level of prices in general, and this as a result led economic units to adopt strategies that are compatible with this change .On the other hand, time not only contributes to the process of pricing products but is considered a way to reduce the cost in the long term, and as a result leads to increased profits, and therefore the economic units when they want to carry out any activity should determine the amount of time required and necessary to carry it out, which is the optimal time to provide products and services to the lowest possible, With the preservation of quality, provided that this is done according to a strategic perspective, so it has become imperative to search for modern strategic techniques in the field of cost and administrative accounting that are in harmony and harmony with those developments and changes referred to and responsive, including these techniques (product life cycle balancing technique), especially if they are time-oriented. This technique is one of the most important technologies that are in the world. Aim to produce products that meet the desires and requirements of customers, after (the market) has become the strong and main guide to the process of making pricing decisions, for the multiplicity of types of products offered in the market by competitors with low prices that have led economic units to try to reach the cost of production to the level of planned cost, which in turn prefers to promise to apply the technology of balancing the life cycle of the product and as a result this is reflected on the management of time and cost as competitive precedence for products for economic units.

II. RESEARCH METHODOLOGY

First: The Problem of Research

Most economic units (especially the research sample laboratory) suffer from a rise in the cost related to their products, which affected the increase in their prices compared to the prices of imported goods, which led to a lack of demand for their products, which resulted from their inability to compete with imported products, or the threat of the laboratory research sample to exit the competitive market, especially after the opening witnessed by Iraq after the events of 2003, In addition, the traditional cost accounting systems in the economic units, especially the research sample laboratory, which focused on cost centers to determine the cost of production only, without completing the compilation of the cost of activities related to all stages of the life cycle of the product, from the beginning of the introduction of the idea of the product until its disposal and all this has affected the result in the areas of cost reduction for the laboratory research sample.

Therefore, the problem of research can be formulated in the following questions:

1- Does the application of product lifecycle budgeting help overcome the problems faced by traditional cost and administrative accounting systems?

2- Is it possible to apply product lifecycle balancing in the research sample laboratory?

3- Does the application of product lifecycle balancing lead to time and cost management as competitive priorities in the research sample laboratory?

Second: The importance of research.

The importance of this research is highlighted in the following:

A - The need of economic units in general, and in particular the laboratory of the research sample, to apply modern technologies in the field of cost and administrative accounting, the most prominent of which in this field is the technology of balancing the life cycle of the product and in a way that helps reduce the time and costs in the laboratory of the research sample, and the role they play in helping economic units to keep pace with developments and face the changes witnessed by the contemporary business environment, In a way that leads to the development of systems concerned with the preparation of budgets with the aim of providing appropriate information that contributes to success in terms of planning profits, costs and revenues with the optimal utilization of resources.

(b) Assisting economic units in reducing costs, and as a result enabling them to enter the competition market, and exploiting the opportunities available for investment to achieve continuity and superiority over competitors in the market.

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Third: Research Objectives

This research seeks to achieve the following objectives:

A. conceptual, debitive and cognitive presentation of one of the modern strategic accounting techniques, namely product lifecycle balancing, especially if it is directed on the basis of time as a cost guide.

B**.** Demonstrate the role played by this technology in time and cost management as competitive priorities.

c. Demonstrate how product lifecycle balancing technology helps provide (planned) information about sales, cost, profits, and along the life cycle of the product, thus contributing to reducing costs and time.

Fourth: Research Hypothesis

Based on the problem presented in this research, the hypothesis that the researchers are trying to prove or deny boils down to the following: "The use of product lifecycle balancing contributes to the management of time and cost as competitive priorities in the laboratory of the research sample."

III. THEORETICAL ASPECT

Balancing the Product Life Cycle

First: The concept and definition of product lifecycle balancing

The concept of product lifecycle balancing means planning the entire life cycle of a product that includes (design, manufacturing, service, and disposal). Product lifecycle balancing has been defined as the process of managers estimating revenue and costs across the entire product value chain from initial product research and development to customer service and support (Datar&Rajan, 2018:596)

(Dixon,2015:2) defines product lifecycle budgeting as a basic system for planning and monitoring performance, designed to integrate tightly with the management information system for the use of budgets, where many plans are evaluated that express the forecasts of the economic unit that span several years and can be compared with actual figures with the need to update budget figures according to economic conditions.

According to the Farlex Financial Dictionary, product lifecycle budgeting is defined as an estimate of all expenses and revenues incurred by the unit and derived from the product, as the life cycle budget includes all expenses from R&D, marketing, customer services, etc. as well as revenue from sales and other sources, and is calculated from the beginning of product research to the estimated date of withdrawal from the market (1): 2012, Farlex).

The researchers believe that the budget of the life cycle of the product can be defined as the process of estimating and predicting the revenues and costs of the product throughout the stages of its life starting from the presentation of its idea and planning for it until the time of its production, marketing and disposal, and comparing the actual investigator of these revenues and costs with what was planned in the budget in preparation for evaluating performance and correcting deviations if any or working to reduce and modify them in light of the circumstances occurring.

Second: Product Lifecycle Balancing Objectives

Product life cycle balancing aims to achieve the following objectives:

(Datar&Rajan, 2018:596-597), (Nune& Kozhikode, 2019:100).

1. Assist in providing useful information for the strategic evaluation of pricing decisions.

1- Helping to reduce the time to reach the market.

2- Helping to improve the quality of the product.

1. Assist in reducing prototyping costs.

3- Ability to quickly identify sales and their potential revenues.

4- Assist in highlighting costs throughout the life cycle of the product, thereby facilitating target pricing, target cost, and value engineering at the design stage before securing costs.

2. Help compare actual costs with lifecycle budgets to get feedback and to learn how to better estimate costs for subsequent products.

1- Assist in making or proposing changes to the product in the event that it is discovered that there are changes that require it in features, performance, design and at every stage of the product life cycle (Kamthe&Verma, 2013:2038).

Third: Elements of preparing a product life cycle budget

The application of any technology depends on a number of components for the completion and success of the application process, and for the technology of balancing the life cycle of the product, it is based on the following components: (Fernandes, 2021:7), (Talib and Ismail, 2018: 198) and (Mashkour& Abdul Attar, 2016: 70-71).

1- Understanding and cognitive awareness by responsible managers about the process of preparing for this technology to achieve the desired advantages and goals.

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2- Provide a system for receiving and evaluating ideas, features, or characteristics of new products, and evaluating them, and the evaluation of ideas usually involves a combination of market and field experience, customer vision, and a mechanism for evaluating the idea in the real world that will help the individuals involved in preparing this budget in the planning and design process of the product.
3 - The presence of specialists trained and with a sufficient degree of scientific and theoretical qualification to prepare this budget.
4- Control all stages of the life cycle of the product or service (Al-Jumaili , 2021: 31).
5. Systematic sequencing of procedures for the preparation of this technique.

Fourth: Steps to prepare a product lifecycle budget

The application of the product lifecycle cost balancing technology is based in the application of its steps on the basic concepts of the product lifecycle cost technology, within the framework of an integrative relationship between them, where the product lifecycle cost technology depends in its application on the identification of resource groups for each stage of the product life cycle and then the determination and allocation of the total cost of resource groups by means of resource routers, The practical energy and the set of activities that each stage is a prelude to calculating the cost of each stage and as a result calculate the total cost of the total stages of the life cycle of the product, and this process represents a flow of costs from the top and bottom, while the application of the product life cycle budget includes the following steps: (Tribulation , 2020: 48-49) , (Datar&Rajan , 2018:596-597) , (Al-Daami ,2021:63-64)
1- Predict (quantity and value) the expected demand for the coming period.
2- Determine the cost rates for the activities of each stage of the product life cycle.
3- Identify the needs and requirements of the activities of each stage of the product life cycle necessary to meet the expected demand.
4 - Determine the consumption rates for each resource.
5- Determine the amount of resources required to meet the expected demand.
6- Calculate the cost of the necessary resources.
7- Compilation of the total cost of resources in order to meet the expected demand.

Fifth: Difficulties of applying product lifecycle balancing

The application of any administrative technology, especially if it is a newly used technology at the practical level, faces many difficulties, and the following are the most prominent difficulties related to the application of product life cycle balancing :(Dwaikata&. Ali, 2018:1-2)
1 - Poor or weak awareness of the benefits of life cycle budgeting by those concerned in the economic units with the preparation of budgets and their sufficiency in the preparation of budgets by traditional methods.
2- Lack of reliable input data related to the costs of the product life cycle.
3- Lack of information regarding the actual cost variables required, and performance information necessary for cost planning and comparisons, especially if the analysis is carried out to develop life cycle budgets
4- Uncertainty and awareness associated with the assumptions of the concept of the life cycle of the product, which is the basis for the preparation of the budget of the life cycle of the product.
5- Incomplete understanding of the product lifecycle methodology, the associated costs and how to apply it to prepare budgets, this is a major barrier to the wide application of product lifecycle balancing technology.

Sixth: Balancing the life cycle of the product using (time prompt), its concept and steps of preparation

Based on the above, the researcher believes that the time-oriented product lifecycle cost technology is the basis on which to apply the product life cycle budget (TD – PLCB), and therefore the researcher can define the product lifecycle balancing that is based in the application process for the time router as "one of the modern techniques in strategic cost management that is used in the process of estimating the revenue and cost of the product and for all stages of its life and using time equations, This leads to the estimation of resources and the allocation of resource costs accurately for each stage of the life of the product, based on the amount of expected and predicted demand and in a manner that helps the management of the economic unit in working on comparisons and objective analysis of costs and revenues, as well as evaluating performance, detecting deviations if any, correcting them and working to avoid them in the future in order to achieve competitive advantages that enable the economic unit to achieve customer satisfaction and build its market share in the long term."

As for the steps of applying the product lifecycle balancing technology, they are summarized as follows if time is adopted as a

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primary cost directive in reference to product lifecycle balancing (time-oriented): (adversity, 2020: 48-49), ((Dejnega,2011:9 , Adigüzel , 2008: 51-73)), 2019: 358-363), et. al. Blocher) (Datar&Rajan , 2018:596-597)

1. Prepare forecasts and quantitative estimates of sales for the coming period, based on current sales levels and sales trends in past years, pricing policies, as well as the sale price, which is determined based on the profit margin that is added to the total cost of one product unit, as well as determining the estimated production quantities (planned) for the coming period, on the basis of which (the amount of sales and production) is predicted for the amounts of cost directives (time), Which belongs to products or services.
2. Identify the different groups of resources, (departments and divisions), related to the stages of the life cycle of the product, including those stages of activities that consume those resources.
3. Determine the forecasts and estimates of the total cost of resource groups for each stage of the life cycle of the product, represented by direct and indirect costs, which correspond to the performance of the activities carried out by all individuals who are involved in the production of the product, or the provision of the service.
4. Determine all the energy requirements of various resources (practical energy) for the coming period, where scientific and applied studies and research in this regard, indicate that the percentage adopted as practical energy of theoretical energy is what it is (80%) of the theoretical energy , so as to take into account the cases of stops and interruptions that are expected to occur as a result of (maintenance or repair) and others.
5. Determine the planned energy cost rates (unit cost of time) for each resource group (department or division) and for each stage of the life cycle, by dividing the total cost and for each of the resource groups calculated in (step 3), by the practical energy (resource energy) for each resource group calculated in (step 4).
6. Determine the expected amounts of time directives related to the activities performed and performed for each stage of the life cycle of the product and its events, which are adopted as the basis for the preparation of (time equations) in the light of each amount for each stage, and as a result calculate the operating cost (planned) for those stages, It should be noted here that the time equations for the budget period can be adjusted and changed if there are improvements in the different processes that would contribute to reducing the time required to perform those activities involved in the production stages, or if there are new and new activities being added to the processes.
7. Calculate the total operating cost (planned) for the resource groups required for each stage of the life cycle of the product, by multiplying the cost (planned) for the unit of time (by minute) and for each resource group calculated in (step 5) at the time of event for each activity and calculated in (step 6) and for each stage.
8. Calculate the total (planned) cost of products or services and for each stage of the life cycle of the product, by combining the cost of materials and direct wages with the indirect cost allocated to the stages, to extract the total planned cost of manufacture of the product.

Seventh: Benefits of implementing product lifecycle balancing (time-oriented):

Product lifecycle balancing if time is adopted when applied at a practical level brings a range of benefits, as follows:(Bragg, 2022:1), (Support,2021: 68), (Adigüzel, 2008: 73-75)

(a) Makes it easier to compare the costs or profits of products of different ranges and lengths using cost-benefit data for the full life of any project or product cycle.
(b) Allows a better understanding of total costs, where forecasting the costs of planning, production, expected use and future maintenance of economic units helps in determining the correct prices for them at the right time.
(c) It is a powerful tool that allows estimating costs for a relatively long period taking into account price changes.
(d) Assist in anticipating the resources required and their costs to meet job demands in the future period.

The Economic Unit shall assist in the abolition of many unnecessary budgeting procedures that are necessary to be carried out when preparing traditional budgets, such as negotiations.

H - Helps to prepare an inexpensive and fast budget.

Helps in making the budget of indirect costs clearer by allocating them and linking them with high efficiency to different cost objectives, and also facilitates large economic units through the use of scalable programs, applications and databases.

Third Section: Competitive Precedence, Concept and Dimensions

After addressing the knowledge framework of the technology of balancing the life cycle of the product and the importance of its application if time is adopted when applied and in a

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way that supports the management of the economic unit in terms of reducing costs, in this section will be presented or clarified the role of this technology in the management of time and cost as competitive priorities for economic units.

Competitive precedence is defined as the strategic preferences or dimensions under which economic units compete with other economic units in the target market (Al-Daami, 2021: 72).
As for the dimensions of competitive precedence, the literature mentioned many types, including four types, and five of them, but the most famous and traded competitive precedence's are almost limited to: cost, quality, flexibility, and time (delivery). Innovation has been added as a fifth competitive precedence. The following is an explanation of both the precedence of cost and time on which this research focuses:

1. Cost

Cost is the first competitive dimension on which the economic unit depends to maintain its market share and gain economic advantages that compensate for the reduction of the price by increasing the volume of sales (Zaidi, 2021: 113-114) and what is meant here by cost is not to provide a product at a low cost, but the reduction must have a relationship with quality that ensures obtaining an acceptable return on investment, and is, either by reducing marketing or administrative costs or reducing variable costs or the time required to complete the work and it affects the overall cost provided continuity and continuous improvement processes (Asadi& Muhammad,2021: 116-117).Reducing inventory to a minimum of all kinds, improving the quality of products and exercising tight control to get rid of defective units or reduce them while maintaining product design and developing the skills of working individuals by involving them in continuous training courses and reducing paperwork to reduce wasted time, this helps the economic unit to achieve the optimal utilization of human resources and reduce production time and this is reflected in the reduction of cost (Bayati, 2016:265) .

Malhotra &Krajewski believes that the process of reducing cost means providing a service or product at the lowest possible cost and to the satisfaction of customers, and to reduce costs here the processes must be designed and operated to make them effective, with a careful analysis of those processes and in a way that achieves efficiency in them (Krajewski& Malhotra,2022:32).

As well as through increasing experience, qualifications, education, successful investment and the development of appropriate policies for production and distribution which affects the price offered to the customer. (Diab,2014:140)

Slack sees that for economic units that compete directly for price, it is clear that cost will be the main goal of their operations. The lower the cost of producing their goods and services, the lower the price for their customers. Even those economic units that do not compete for price will be interested in reducing costs, in accordance with the levels of quality, speed, reliability and flexibility demanded by customers. (Slack. et.al,2013:55).

2. Time

It is the third competitive dimension and one of the important dimensions in the economic unit that is related to the desires of customers to pay the highest costs for the products and services they need and in a timely manner for them (Abdul Kadhim, 2022: 183), and the content of this dimension is determined by three directions, which are as follows:(Krajewski et.al , 2016: 15-16), (Krajewski&Malhotra , 2022: 32-33)

Fast delivery: i.e. filling the customer's orders quickly and product processes are designed to reduce the lead time (the time elapsed between receiving the customer's order and packing it) through backup storage and the use of excellent transportation options.

B. **On-time delivery**: i.e. fulfilling delivery time promises along with processes that reduce lead time, here planning processes (forecasting, appointments, promise of order, scheduling, capacity planning) are used to increase the percentage of customers' orders shipped.

C. Speed of development and development: Rapid introduction of the new service or product, the goal is to achieve multifunctional integration and involve important external suppliers in the service or product development process.

Therefore, the researchers believe that if the economic units want to achieve competitive priorities and maintain their market share, they must work to achieve customer satisfaction and satisfy his desires and changing requirements, and this helps to achieve competitive priorities represented by cost, time, and the application of strategic cost management techniques would help to optimize the exploitation of the resources and capabilities of the economic unit optimally. One of these techniques is balancing the life cycle of the product, which has a role in enhancing the competitive primacy of the economic unit, and

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clarifying this role will be the focus of the next topic.

Fourth Section: The Role of Product Lifecycle Balancing in Time and Cost Management as Competitive Priorities

After addressing the knowledge framework of the technology of balancing the life cycle of the product and the importance of its application if time is adopted when applied and in a way that supports the management of the economic unit in terms of achieving the dimensions of competitive advantage, in this section will be presented or clarified the role of this technology in achieving the precedence of competition for the economic unit represented by reducing cost, improving and reducing response time..

First: The role of product lifecycle budgeting in cost management

The goal of reducing cost is one of the strategic objectives of the management of the economic unit through which it maintains its market position while ensuring the continuity of the economic unit in the market in the event of strong competition (Al-Humeiri et al., 2017: 167). Both (Kaheet and Maaloul, 2020: 376-380) believe that the product lifecycle technology represents a modern method of reducing the cost of the product during its life cycle, considering that the cost is the most important thing that aims to reduce the economic unit and is one of the necessary requirements for the practice of its activities, so the economic unit can only do without it when full production stops and if the economic unit wants to support its competitive causing any of the negative effects related to the quality of the product, that is, the reduction should be away from the subject of avoiding loss, waste and damage in production (Khader, 2013: 190). position in the market, this requires it to strive to reach the lowest possible cost of its products. Khadr points out that the process of reducing cost should be without eliminating or avoiding a characteristic of the product as well as not.

Based on the foregoing, Rajkhan adds that in order to carry out the cost reduction process, the economic unit must observe the following principles and principles: (Rajkhan, 2002: 54).

1. You must first focus on the elements that can tolerate a greater reduction in melasma with minimal effort and compared to other elements.
2. The cost of analysis and study of the cost and application of proposals should not be greater than the reduction of the cost.
3. The reduction in cost should not be offset by a reduction in quality, which affects overall revenues.
4. The reduction in cost should not lead to inappropriate and wrong strategic decisions that affect the product in the near future.

Second: The role of product life cycle balancing in time management

The concept of time management is the third important competitive dimension adopted by the economic unit, especially in the industrial and service sectors, where time is defined according to (Darko) as the lead time between the submission of the order and the delivery of the required goods and the time here depends on the planning, management of the supply chain, logistics and the distance between customers and suppliers to ensure customer satisfaction through it (, 2018: 3 al. et Darko)) Customer satisfaction refers to the feeling of happiness or frustration of a person (the customer) resulting from the evaluation of the services provided by the economic unit to the individual (customer) in relation to expectations (Oliver, 1980:460-461)..

Christopher adds that reducing the expected time within the production and resource distribution chain is a time-based competition mechanism, time management can be a competitive advantage that promotes customer satisfaction, time management may be an inverse image of quality, cost, innovation and productivity management to reduce time and adopt a timely philosophy of economic unity in an era of time-based competition.

Therefore, the researchers believe that the importance of the role played by the technology of balancing the life cycle of the product in achieving the precedence of competition for the economic unit, especially if it adopts time as a cost guide in its application, but this role may be in the form of a theoretical assumption that is difficult to predict and predict its results without carrying out the applied study, and this will be addressed in the next section.

IV. THE APPLIED SIDE OF RESEARCH

Section

Time and cost management as competitive priorities **under the application of product lifecycle balancing technology** in the pneumatic refrigerant engine production plant

First: General Company for Electrical and Electronic Industries (Research Community)

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The General Company for Electrical and Electronic Industries is one of the subsidiaries of the Ministry of Industry and Minerals, which was established in (1965) following the joint cooperation agreement between the Soviet Union and Iraq, where it began its experimental work in (1967) as one of the economic institutions of the Iraqi Ministry of Industry and Minerals.

Second: Air Coolant Engine Lab ((Research Sample)) :

This laboratory represents the research sample, and is specialized in (production of single-phase engines): for evaporative air coolers, with a capacity of (1/2 hp, *1/3 hp, 1/4 hp, *and3/4 hp), and a speed of up to (1425)) Cycles per minute, as well as it is self-feeding, and this makes it one of the integrated and typical laboratories, while the sections of this laboratory, include preparation, assembly, mechanical handling, as well as qualitative tests, where experimental production began in this laboratory with the beginning of the year (1986) and the plant has continued to produce four types of engines according to the size of the surplus for export purposes, and currently it is The plant has electric motors, ranging in power between (180) watts and (370 watts), and with different horsepower capabilities.

					Ratio of the Verified to %		
year	Design Power	Available Power	Planned production	Actual production	Design Power	Available Power	Planned production
2014	105000	40000	5780	680	0.65%	1.70%	11.76%
2015	105000	40000	5950	590	0.56%	1.48%	9.92%
2016	105000	40000	5600	570	0.54%	1.43%	10.18%
2017	105000	40000	5481	545	0.52%	1.36%	9.94%
2018	105000	40000	5945	50	0.05%	0.13%	0.84%

Table (2)
Production capacities (for the products of the laboratory research sample represented by air coolant engines) for the period from 2014 **- 2018 (unit of measurement / number)**

Source: Prepared by the researchers and based on the annual reports (of the Planning Division) in the company.

Despite the continuous production processes in the laboratory (research sample), its products have witnessed a significant decrease in their production levels, so that they are well below the levels of design, available and planned power, which led to the cessation of the production of the plant The product of many products for varying periods, that is, their production has become irregular, and on demand, and this is due to the impact of the events (2003) that the country went through, which led to the opening of the country to the world, which led to a decrease in demand for products of the factory locally due to the entry of competing products> and others. Thus, all this caused a significant decline in the result of the activity of the laboratory (research sample), as well as the case of all the factories and factories of the other company, so there may come a time when production stops because of its economic feasibility from the point of view of the management of the General Company for Electrical and Electronic Industries.

From the previous table, it is noted that the volume of actual production of engines (for the research sample laboratory) decreased, significantly compared to the levels (design, available, and planned power, especially in 2018),) in which actual production declined significantly, and this is due to the continuous changes that have occurred and are happening so far in the competitive business environment.

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Third: The reality of the cost and pricing system (for the refrigerated engine (4/1 hp) in the research sample laboratory

After the researcher was briefed on the reality of the accounting system applied in the laboratory of the research sample, it was found that there is a cost system based on the unified accounting system, as for the pricing process for the product of the refrigerated engine, it goes through many stages, where in the first stage the Division of Cost Calculations receives the work order that clarifies the technological behavior of the product (refrigerated engine) in terms of quantities and types of materials necessary for the production process, And the working times, and then the determination of the total cost of the product, according to the cost elements related to the product, which is provided by the cost system, as the cost elements (for the refrigerated engine) include direct materials, and their prices are determined by the Division of Warehouse Accounts, depending on the method of the weighted rate, while the share (refrigerated engine) of the cost of work is determined by dividing the salaries of workers by the number of engines that are produced, and the percentage of indirect industrial cost is charged to the product (refrigerated engine) based on the basis (number of workers) In the laboratory the research sample, as for the marketing and administrative cost, it is distributed on the basis of, the ratio of each to the total cost of production.And in the second stage is determined the capacity of Table (3).

The cost and sale price of the refrigerated engine (4/1 hp) for the research sample laboratory for (2018)

Statement	Cost of one engine
Basic materials involved in the manufacture of the engine	34500.427
Chemicals	2502.697
Items purchased from local markets	861.000
Insulating materials and links	386.0428
Total Cost (for Raw Materials)	38250.167
Cost of work	12595
Disappearing	810
Other fixed cost	326
Total fixed cost	13731
Cost of manufacture	51981.167
Tech Marketing Roll % 8	4158.4934
5% administrative cost	2599.0584
Total cost	58738.7197
Profit margin) 10%))	5873.87
Sale price of refrigerated engine	64612.5897

Source: Prepared by the researchers and according to the reports of the Division of Cost Calculations for (2018).

Based on the above, it is clear to the researchers that there is a system of costs in the laboratory (research sample) in which some of the components of the cost system are available, but it isnot reliable in terms of achieving competitive precedence for the company's products represented in (reducing cost and time), as well as not providing information that helps in making various decisions, and that there are no features related to the application of the technology of balancing the life cycle of the product using the time wave in the laboratory research sample ,Therefore, it may be necessary to apply the above technology in this laboratory, in a way that leads to achieving competitive priorities represented by reducing the cost, and reducing the time required to respond to the customer's request, as the application of the above technology in the laboratory of the research sample, and in the light of the criticisms and observations mentioned above, represents from the point of view of the researchers a necessity to face the changes and developments, occurring in the contemporary business environment ,And this is what will be addressed in the next section .

Apply the technology of balancing the life cycle of the product in the laboratory of the research sample and its reflection in time and cost management as competitive priorities

In the aforementioned section, after identifying the cost system applied in the laboratory (research sample), and addressing the

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criticisms and observations recorded on it, as well as the absence of any features of the application of modern strategic techniques for management accounting and cost accounting, including the technology of balancing the life cycle of the product, and the role that this technology plays in the management of time and cost for the company in general and for the laboratory (research sample) in particular, Therefore, this section will highlight the steps related to the application of the above technology as described below with the use of time as a basic cost guide in its application to the product of a 1/4 hp air cooler engine. .

First: Estimating the amount of sales and production for the coming period

In this step, the amount of sales and production expected to be achieved for the product of the air cooled engine with a capacity of 1/4 hp for the next period (2019), as the results of the interviews conducted by the researchers with the officials in the laboratory (research sample) and for the departments of planning, follow-up, and sales, as well as reviewing the market research, conducted by the laboratory, indicate that what is expected to be produced for the next period if modern cost and administrative techniques are applied, Among them is the technology of balancing the life cycle of the product is about (7000 units of the product of the refrigerated engine with the aforementioned horsepower, which is equivalent to the amount of the planned amount that the laboratory aspires to produce the research sample, as the application of the above technology will help the laboratory research sample in achieving competitive precedence related to the product of the refrigerated engine in terms of reducing time and cost, and this will be reflected in the result on the decrease in the sale price, And increase sales, in a way that makes the laboratory occupy a good competitive position in terms of similar refrigerated engines in the market that are competitive with the product of the laboratory research sample.

Second: Identify groups, resources related to the life cycle stages of the product

In this step, the different resource groups related to the life cycle stages of the (1/4 hp pneumatic refrigerant engine), which are represented in all the sections and divisions concerned with the production of the above engine, are identified and have been addressed in the first section of this chapter.

Third: Determine the total planned cost of resource groups and for all stages of the product life cycle

The total cost for all different resource groups (divisions and divisions) and for each stage of the life cycle associated with the production process of the 1/4 power air cooler engine in the research sample laboratory is represented by both the direct cost elements and the indirect cost elements, which correspond to the performance of activities at each stage of engine production, which is carried out by all (individuals) who participate in the production process of (refrigerated engine) and in each resource group, The direct cost is represented by the salaries and wages of the individuals working in the laboratory of the research sample, and the indirect cost includes the elements of indirect industrial cost, which is reflected in the reality of the cost system applied in the laboratory of the research sample except for direct materials and direct work as shown in tables (4) and (5).

Fourth: Determine the practical capacity of all resource groups

In this step, all the energy requirements of the various resources are determined, for the coming period, which are the working hours, or the time required to complete and complete each stage of the life cycle in which the product passes, which will be relied upon to establish the planned energy cost rates (in the next fifth step). Scientific and applied research in this regard indicates that the percentage of energy adopted as practical energy, is (80%) of the theoretical energy, in terms of taking into account the cases of stops and interruptions that may occur as a result of (maintenance or repair) and others, taking into account and based on the results of the researcher's interviews with engineers in the laboratory research sample, that the laboratory did not reach this percentage in its activity, But this ratio represents part of the procedures of the laboratory research sample to shift from what is an object to what the laboratory should be, and thus represents a signal of the ability and possibility of the laboratory to reach the aforementioned ratio if the practical application of modern techniques of cost and administrative accounting that would contribute to achieving competitive precedence by relying on practical energy without the theory that this research deals with the most important of which is .

Fifth: Determine the planned energy cost rates (unit cost of time) for each resource group (department or division).

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In this step, the planned cost of the unit of time (power) is calculated, for each stage of the life cycle of the 1/4 hp air-cooled engine in the research sample laboratory, as shown in tables (4) and (5), This is by dividing the total direct, indirect and corresponding cost of carrying out and accomplishing the activities that are practiced by the persons who participate in the production processes of a product (4/1 hp refrigerated engine), by the practical power (calculated in the fourth step), represented by the working hours required, to accomplish and complete each stage of the life cycle of a product (refrigerated engine), which is accomplished by each (section, or division), whether related to production centers, service centers, and administrative, which are as follows: :

1- **Determine the planned energy cost rate for the stages related to the production of the refrigerated engine:**

Table (5) shows the results of the process of calculating the cost of the planned unit of time, i.e. (average energy cost) per minute for the stages associated with the production of the refrigerated engine, and folded under the production centers in the laboratory of the research sample.

Table (4)
Planned unit time cost (per minute) related to the life cycle phases of the 1/4 hp refrigerated engine for 2019

Stage	Annual direct cost of the stage administrator	Cost per minute	Annual direct cost of the worker	Cost per minute	Annual indirect cost	Cost per minute
Stage (Planning and Design)18 workers	15150000	170.793	9103000	102.622	101839628	63.782
Stage (production)						
Stator Division 40 workers	15950200	179.814	7813040	88.08	145131140	40.903
Rotary Division 17 workers	11480000	129.419	7510800	84.673	127274536	84.401
Front and Rear Covers Division 21 workers	15500440	174.743	7611400	85.807	110237931	59.179
Board Swig Division 6 Factor	14001000	157.84	7999400	90.181	84793024	159.318
Collection Division 14 workers	14634400	164.98	7225000	81.451	118700233	95.583
Marketing Phase13 workers	13570372	152.985	9440576	106.428	67836419	58.827
After-sales service phase 12 workers	14795200	199.793	8421428	94.939	93275326	87.628

Source: Prepared by the researchers based on cost records in the research sample laboratory.

of the cost per minute was made by dividing the annual direct cost of the stage or worker, which is carried out by the department or division, or indirect, by the practical energy, which in turn is calculated as follows:

v For the direct cost (for the stage administrator or for one worker):

= (22 working days per month and after excluding holidays × 7 hours a day in the factory × 60 minutes / hour) × 80% × 12 months per year = 88704 minutes

v As for the practical energy of the indirect cost, it is calculated as follows:

Practical energy = 22) days per month × 7 hours of work per day × the number of workers for the stage × 60 minutes / hour (× 12 months per year × 80 %

The following illustration shows the calculation of the cost (one minute) planned and shown in Table (5) for the planning and design phase. :

It is noted from the above table that the calculation

§ Planned cost (per minute) of the stage administrator = annual direct cost (planned) of the stage administrator ÷ annual process power

15150000 = KWD ÷88704 min = 170.793 d/min

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§ Planned cost per worker (per minute) = annual direct cost (planned) per worker ÷ annual practical energy
= 9103000 KWD ÷ 88704 min = 102.622 d/min
§ Indirect cost per unit of time (per minute) planned
= Annual (planned) indirect cost ÷ annual practical energy
= 101839628 JOD ÷ 1596672 min = 63.782 min

2- Determine the average cost of **the planned unit of time (energy) related to the service and administrative cost centers:**

Table (5) shows the results of the calculated cost of the unit of time (per minute) planned, related to the service and administrative cost centers.

Table (5)

The cost **of the unit time represented (in one minute) planned related to the service andadministrative cost centers of the laboratory Research sample for 2019**

Cost Centers	Total Cost	Working Hours (Annual)	Number of minutes (annual)	Practical Energy 80%	Cost per minute
	1	2	3	4	5
			(2) × 60 minutes	(3) ×(80%)	(1÷4)
Technical Affairs (34) Worker	273544205	65680	3940800	3152640	86.767
Maintenance (16) Worker	104600225	28721	1723260	1378608	75.874
Lab Management (19) Worker	131402860	35965	2157900	1726320	76.117
Quality Control (14) Worker	98312000	25022	1501320	1201056	81.855
Stores (13) Worker	90710920	21175	1270500	1016400	89.247
transportation (11) Worker	76926066	19480	1168800	935040	82.27

Source: Prepared by the researchers based on the cost records in the laboratory of the research sample.

Sixth: Identify and compile activities related to the life cycle stages of the 1/4 hp air cooled engine and the planned time of event of each activity

Based on the visits and field experience carried out by the researchers in the laboratory of the research sample, and through the study of the reality of the situation for the production of the refrigerated engine product, and the interviews conducted with some engineers working in the laboratory, the activities related to the stages of the life cycle of this product were identified, as well as determining the time of events of these activities, and also the entity responsible for each of the events required by the production processes for the purpose of reaching the

Planned time (minutes) for the planning and design phase = 1.1 (**production order issuance + preparation of work((((order) + 2.9 (receipt of work order, material request + planning and design** of the product **) + 0.5 (document signature) + 1.3 (Receipt of raw materials + initial inspection** and testing) 1.4 (**Transportation of raw materials + sending the execution order to the production ((stage) + 0.4** (Final **inspection and testing))**

level of production (planned) of refrigerated engines for the year (2019), Attempt to compile them into cost pools (), which show the activities of each stage of the life cycle of the air-

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cooled engine product, and the time of occurrence of each activity in each of them. It should be noted that, by determining the amount of time needed for the so-called "time directives", it is possible to prepare (time equations) in the light of each amount, and for all the activities involved in each stage of the life cycle of the refrigerated engine product, in preparation for calculating the operating cost (planned) for those stages, as explained in the theoretical aspect of the research, where the time equation can be formulated
for the activities of the planning and design phase of Mint
Time equation (planned) for the planning and design phase:In the same way, time equations are prepared for the rest of the stages of production of the pneumatic refrigerant engine**.**

Seventh: Calculating the operating cost (planned) for each stage (calculating the planned total cost of the required resource groups)

In this step, the cost of the planned unit of time (in minutes) and for each of the resource groups (calculated in paragraph V, point (**1**) and (2) at the time of the activity event, for each stage (calculated in paragraph VI by applying time equations) with the aim of determining the total cost (planned) of

Table (6)
Operating cost (planned) related to the planning and design phase **for 2019**

Pronounced like t	Activity (1))	Activity Event Time (min)(2)	Cost per unit time	Planned operating cost (4))
			(d/min) (3)	(2 ×3)
1	Production order issuance + work order setup	1.1	86.767	95.4437
2	Receiving the work order, ordering materials + planning and design of the product	2.9	234.575	680.2675
3	Document Signature	0.5	89.247	44.6235
4	Receiving raw materials + Initial Inspection and Testing	1.3	166.404	216.3252
5	Transportation of raw materials + sending the execution order to the production stage	1.4	82.27	115.178
6	Final Examination and Test	0.4	81.855	32.742
Total				1184.5799

the required resource groups representing the planned operating cost (labor + TGGM), and for each stage of the life cycle of an engine product Refrigerated. As a model of the calculation method, Table **(6**) shows the planned operating cost of the planning and design phase.

Source: Prepared by the researchers
In the same way, the planned operating cost of the rest of the life cycle stages of the refrigerated engine is calculated as shown in Table 7.

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Table (7)
Planned operating cost for the rest of the 2019 refrigerated engine lifecycle phases

Pronounced like t	Stage	Operating Cost (Planned)
	Production Phase:	
1	Stator Division	1558.4652
2	Rotary Division	2154.247
3	Front and Rear Covers Division	1564.0601
4	Board Swig Division	1110.6974
5	Collection Division	1407.9811
6	Marketing Phase	391.0662
7	After-sales service phase	944.2501

Source: Prepared by the researchers.

Eighth: Calculation of the planned total cost of the refrigerated engine product in the laboratory of the research sample

After calculating the planned operating cost of the stages related to the life cycle of the refrigerated engine product, the planned total cost of each stage of the life cycle of the refrigerated engine product is

Table (8)
Planned total cost related to the life cycle stages of the air-cooled engine product in the lab research sample for 2019

Stage	Cost of materials	Indirect planned operating cost	Planned cost of manufacture	Administrative cost	Total Cost Planned
	1	2	3	4	5
			1+2	(5 %× 3)	(3+4)
Stage (Planning and Design)	1941.196	1184.5799	3125.7759	156.2888	3282.0647
Stage (production)					
Stator Division	11647.1759	1558.4652	13205.6411	660.2821	13865.9232
Rotary Division	9317.743	2154.247	11471.99	573.5995	12045.5895
Front and Rear Covers Division	6988.3055	1564.0601	8552.3656	427.6183	8979.9839
Board Swig Division	388.2392	1110.6974	1498.9366	74.9468	1573.8834
Collection Division	4270.6311	1407.9811	5678.6122	283.9306	5962.5428
Stage Marketing	1552.9568	391.0662	1944.023	97.2011	2041.2241
Stage After-sales service	2717.672	944.2501	3661.9221	183.0961	3845.0182
Total	**38823.9195**	**10315.347**	**49139.2665**	**2456.9633**	**51596.2298**

Source: Prepared by the researchers based on tables (3), (6) and(7)

determined, by adding the planned cost of the material element entering each stage of the life cycle of the refrigerated engine to the planned operating cost to extract the planned manufacturing cost, with the addition of each stage share of the marketing and administrative cost, Let's get the planned cost of the refrigerated engine product

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It is clear from the above the role of the product life cycle balancing technology in achieving competitive precedence for the research sample laboratory with its different dimensions, in terms of cost it is noted that the total planned cost of the product of the pneumatic refrigerated engine of the laboratory research sample (51596.2298 dinars, based on the application of PLCB technology)) and by adopting time as a basic and fundamental cost guide in the application process, while the reality of the cost system applied in the laboratory shows the research sample, The cost of one refrigerated engine is (58738.7197) dinars, and therefore this has led to a reduction in the cost of one engine by (7142.4899) dinars, despite the expectation of engineers in the laboratory (research sample) to increase the prices of raw materials by 1.5%. And electronic when preparing a product life cycle budget with the exclusion of time that does not add value, notes the acquisition of the laboratory...

V. CONCLUSIONS

1. The weakness of traditional cost systems in meeting the requirements and objectives of management, due to their inability to provide accurate data that can help management in taking appropriate and appropriate decisions in light of the rapid developments and changes of the contemporary business environment, including the forces of intense competition, and this calls for the emergence of modern cost and administrative techniques that can keep pace with those Developments and changes, including the product life cycle balancing technique discussed in this research.
2. There is no clear role for the (Research and Development Department) in the laboratory, the research sample, to follow up on the rapid developments and changes taking place in the contemporary work environment, which necessitates that the customer is the (director) of the economic units as they seek to meet his needs and requirements, and respond to his desires.
3. The competition witnessed by the contemporary work environment, and the rapid technological progress, made the economic units practice their work in a customer-oriented work environment, and as a result it is imperative for them to achieve an added value on the part of the customer if they want to survive, and maintain their competitive position, in light of this environment.
4. The process of identifying, compiling and displaying the cost elements in the laboratory (the research sample) is not done according to the proper scientific method, when preparing cost lists, as well as not classifying the cost in a way that helps in the decision-making process, and the conditions of intense and intense competition that surround the laboratory (sample). Research) at the present time, and all of this is due to the inadequacy of the qualifications of individuals who work in the management of the cost system for the specialty of accounting.
5. The focus of the product life cycle balancing technique on the amount of resources that contribute to the production of a product (cooled engine) and at each stage of its life cycle, by adopting the basis of (time) as a basic cost camouflage in its application, making it one of the modern cost and management techniques in The field of accounting, which is characterized by accuracy in calculating the cost and managing it efficiently.
6. The product life cycle balancing technique helps to provide credible information, by determining the unused (idle) energy and its cost, and avoiding it being charged to the stages of the life cycle that the product is going through, to help management achieve the optimal use of energy, and contribute to determining and limiting the share of complexes resources from the cost.
7. Managers of industrial companies can rely on PLCB technology based on a (time) vector to achieve effective control and management of resources by adopting the principle of (cause and effect) in the loading and distribution of the cost of resource groups, on the productive departments and divisions.
8. The (time) is considered a cost vector by implementing the activities that include each stage with time rates, and by specifying the time required and required to complete each activity in each stage of the product life cycle, after which the cost of that time is determined and calculated. And here, the economic units, when they want to implement any activity at each stage, must determine the amount (the time needed) to implement it, as the optimal time for its implementation makes its cost minimal, while maintaining quality, and as a result reducing time and cost, and achieving a competitive precedence for the economic unit. .
9. The practical application of the product life cycle balancing technology has proven the possibility of reducing the cost to the stages that the product (cooled engine) goes through

for the laboratory sample of the research during its life cycle by (7142.4899) dinars.

10. In light of the use of PLCB technology, the most relied on in the process of application of this technology is (time), because time is one of the basic and intrinsic success factors for the economic unit, which is under pressure to speed up the performance of activities for the different stages, In order to be able to fulfill what is required of them and on time.

VI. RECOMMENDATIONS

1- The economic units in general, and the General Company for Electrical and Electronic Industries in particular, must rely on modern accounting techniques in the field of cost and management accounting, the most important of which is the product life cycle balancing technique that is based on the time vector, and is concerned with efficient and effective planning and allocation of the cost of resources and assistance to economic units To keep pace with the changes and developments in the contemporary work environment, as well as its reliance on practical energy instead of theoretical energy, and according to the steps in which the practical application of this technology passes, which contributes to supporting the competitive advantages of economic units.

2- The reality of the cost system applied in the laboratory (the research sample) in particular and the same in economic units in general, through the application of PLCB technology, which crystallized in concept and application in this research, to focus on the activities of the stages and events (time-oriented) necessary to perform those Activities and events to ensure that the cost of resource groups is charged to the final product in all fairness and credibility.

3- Paying attention to the resources and capabilities available to the economic units, with the aim of optimally exploiting them, and indicating the need for the economic units producing energy and for each of these resources, as well as benefiting from the information provided by PLCB technology in determining the capacity of these resources, with the development of plans for those Energy, and directing targeted and effective future plans to exploit idle (untapped) energy.

4- The human resources working in the laboratory (the research sample) and those working in the cost accounts in the company (the research community) should be developed and qualified, through preparing and holding training courses in the field of applying modern cost accounting and administrative techniques to help them keep pace with the recent changes and developments that the environment is witnessing. Current work in the accounting and administrative fields.

5- Seeing the features and characteristics of competing products, which are similar to the products of the economic unit, with the aim of comparing them with the local product, as an attempt to search for areas of cost reduction, as the economic units do not work within a closed and closed environment or cut off from the outside world, but rather work within a highly competitive environment, It requires them to develop a design for their products according to those requirements, taking into account the desires, needs and requirements of the target customers.

6- Reducing the cost of maintenance in the laboratory (the research sample), by updating the machines and equipment related to the product.

7- Spreading the culture and knowledge related to cost reduction among the individuals working in the laboratory (the research sample), informing them of their responsibility in that, and providing them with personal and personal motivation through encouraging and rewarding the creators among them, and as a result improving the professional and practical practice of their various works and reducing wastage rates.

8- Paying attention to the external design of the product, as well as improving the packaging and packaging processes in a way that arouses and attracts the attention of customers.

9- The need for economic units, especially the research sample laboratory, to activate the activity of the department (research and development and preparation of studies and reports), through which strengths are identified to support them, and to prepare proposals to address weaknesses or get rid of them, as well as rehabilitate the cadres of this department, scientifically and practically qualified to carry out the tasks Section well

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