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Towards Corporate Sustainability: Cost-Benefit Considerations of Quantitative Methods (Multiple Regression Model) Versus Activity-Based Methods for Determining Indirect Costs – an Applied Study in KDD Industrial Company

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Abstract. The study aims in light of the goals of corporate sustainability to compare the costs and benefits of using different methods to determine costs; namely, the quantitative methods (multiple regression in particular) versus the activity-based costing (ABC) methods for assigning indirect costs on products in Iraqi companies as they still depend on traditional cost systems that face difficulties in computing accurate unit costs due to the failure to determine the appropriate amount of indirect costs. In order to achieve the study goal, the researchers reviewed the theoretical literature and previous studies to compare these methods and identify the advantages and disadvantages of each. The researchers also adopted the applied approach to compare these two methods based on the monthly costs data of the KDD production company to distribute costs according to both the activity-based method and the multiple regression. The study concluded that the design and implementation of the ABC method to determine costs requires lengthy and more expensive steps, especially in Iraqi companies that lack an integrated cost system, which requires additional costs to train employees and decision-makers to understand the steps of the system and its outputs and how to use them in the decision-making process in light of achieving Sustainability goals that require focusing on customer needs and product profitability rather than activities. On the other hand, the multiple regression method was easy to apply and inexpensive. Its results were more related to the products and the variables affecting them, thus it's more understanding for managers and helps in rationalizing decisions. Accordingly, the researchers recommended that Iraqi companies switch to the statistical method in distributing indirect costs instead of relying on a technique that increases the cost of products and makes them unable to compete and achieve growth and sustainability.

Keywords. Corporate Sustainability, Cost-Benefit Considerations, Indirect Costs, Activity-Based Costing, Multiple Regression

INTRODUCTION

Recently, the business community has focused on the concept of sustainability as a basic criterion added to its current and future goals for the survival of companies in light of the increasing competition as a result of changes in the economic environments (changes in prices), technological (development in assets) and social (diversity of products and customers). Therefore, companies must take into account when planning their goals the cost-benefit criterion, which is one of the essential factors for achieving a sustainable economy, foremost of which is the optimal use of economic resources, which depends on rationalizing consumption and reducing costs in order to obtain the

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maximum benefit possible and the required quality of the product or service, to be able to manage these resources and achieve its responsible use. Achieving sustainable development also requires companies to design, develop and use appropriate technology and methods to make good use of available resources and to provide goods and services at competitive prices. The primary goal of corporate sustainability is to achieve its first goal of continuing its ability to achieve profits and rationalize costs through the ability of its products to meet the needs of its customers on an ongoing basis. Corporate sustainability cannot be achieved without profit that enables companies to join sustainability strategies and implement their activities, such as governance, and social and environmental responsibility. One of the best known and widely used sustainability measures includes corporate sustainability reports.

The goal of achieving sustainability in light of all those changes and developments that the world has witnessed at the level of technology, economy, product diversity, and increasing competition, made companies find an alternative system to determine product costs after traditional systems failed to distribute costs accurately on products, so activities based methods emerged, most notably ABC and TDABC, but such methods require additional costs to make them workable. Hence, the study question arises whether the development, design and application of such methods pass cost-benefit considerations and whether the use of quantitative methods such as multiple regression as an alternative method for determining product costs will gives similar or close to accurate results with a lower cost in light of the corporate sustainability goals.

Therefore, this study came to provide an answer to this question from the reality of cost data for one of the industrial companies operating in Iraq, which adopts the traditional method in determining production costs and allocated indirect costs according to the applied rate based on volume of units produced. Where an applied study was conducted for each of the quantitative methods; (multiple regression) and ABC method in determining and distributing costs on products to compare the results from a cost-benefit perspective and to show the impact of each method on the profitability of company. It has been concluded that it is possible to adopt quantitative methods in determining the costs of products and to find the relationship between indirect costs and the variables that affect their behavior and to reach results close to those determined by activity-based methods that require additional costs for their design and implementation in addition to the difficulties that companies in Iraqi industrial sector may face in adopting such methods, as the radical change from the traditional methods of costing to more advanced methods such as activity-based costing requires the adoption of a strategy of re-engineering and quality management whose costs may outweigh its benefits in the short term. While on the contrary, the proposed multiple regression method exceeds the problems of traditional methods and the additional costs required by activity-based methods, in addition to being easy to implement and providing reliable information in rationalizing decisions and ultimately achieving the corporate sustainability goals.

STUDY METHODOLOGY

The Study Problem

As a result of technological developments and economic changes that intensified intense competition between companies to provide the best products with high quality and low cost for the purpose of achieving sustainability goals to ensure their survival in the market, companies are looking for a system to determine product costs instead of the traditional systems which failed to distribute costs accurately on products. But the Iraqi companies still adopts the traditional method in determining production costs and allocated indirect costs according to the applied rate based on volume of units produced, and it did not attempt to introduce a new method for costing system or adopt new methods that could be less costly and easier than adopting more advanced methods such as activity-based methods. One of the reasons for this is cost-benefit considerations in bringing about immediately change in the cost system, it will add costs that may exceed the benefits from those methods and thus adversely affect the company's goals in maintaining its competitive position and its goal in achieving growth and sustainability, as is the case in the research sample company, that is KDD Industrial Company.

The Study Importance

The importance of the study comes through the introduction of a statistical method for distributing costs instead of traditional systems, the activity-based costing system due to the inaccuracy of accounting systems in calculating

costs and the cost of application in light of cost-benefit considerations as a basic criterion for cost control, which provides accurate information on which the administration is based in taking Sustainability-oriented decisions.

The Study Objectives

The study aims to achieve the goals of corporate sustainability by controlling the cost distribution system by using the multiple regression model in comparison with the activity-based costing (ABC) methods for the purpose of determining indirect costs on products in light of cost-benefit considerations in that the activity-based methods may require Re-engineering and additional costs to be able to implement it, which adds burdens to the cost of the product, market conditions and competition may not allow it to be charged, which makes companies unsustainable, in return for using the multiple regression model, which may also require additional costs to collect data on the variables that affect the behavior of the cost of production.

The Study Hypothesis

In light of the companies' interest in sustainability goals under cost-benefit considerations, companies can use statistical methods such as the multiple regression model in calculating the costs of their products instead of the accounting systems represented by the activity-based costing system (ABC). For the purposes of analysis and testing, the above hypothesis can be formulated into the following statistical hypotheses:

The main statistical hypothesis: There is no statistically significant relationship between costs and cost drivers, and the hypothesis can be formulated into sub-hypotheses:

First: There is no statistically significant relationship between costs and units produced.

Second: There is no statistically significant relationship between costs and sales lists.

Third: There is no statistically significant relationship between costs and maintenance orders.

Fourth: There is no statistically significant relationship between costs and machine operating hours.

Fifth: There is no statistically significant relationship between costs and administrative orders.

The Study Approach

To achieve the goal of the study, the researchers relied on the descriptive approach in preparing the theoretical side of the study based on what was published of books, letters and research related to the topic of the study. Also, the study adopting the applied and analytical approach in KDD Industrial Company; the study sample based on the company's data for the year 2018.

THEORETICAL MATERIALS

What is Sustainable Corporate Development

Sustainable development, as stated in the United Nations report "Our Common Future," is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The report also included a clear statement of how our society and our companies need to develop in the future.

The Sustainable Development Goals identified by the United Nations report represent a useful framework for overcoming challenges related to sustainable development, although the SDGs target mainly national governments, more and more private organizations are referring to the SDGs in their own sustainability goals. [2]

Private companies have the potential to contribute to achieving the SDGs through their products and services, responsible processes and charitable engagement, but they can only achieve the goals through partnerships and the support of governments as well as educational and research institutions that provide comprehensive information on the SDGs as a valuable framework for action. [18]

Sustainable development consists of three basic dimensions that represent the first dimension of economic responsibility which are the common strategies and approaches to act responsibly in the market, for example, corporate social responsibility (CSR), corporate citizenship (CR) and corporate sustainability (CS). Taking a CSR

approach can help organizations stay competitive, meet stakeholder demands, and act responsibly at the same time. Another way to fulfill this responsibility while simultaneously contributing to the achievement of the Sustainable Development Goals is for companies to “promote sustainable economic growth.” and “ensure sustainable patterns of production and consumption”, which can lead to positive change in the organization as well as society, according to the Business and Sustainable Development Commission adapting and changing their products and services towards achieving the sustainable development goals, provides private organizations with significant economic opportunities in the market and future value [3]

The second dimension is "environmental responsibilities", which includes the protection of the natural resources necessary for society. This can include for example reducing waste, developing new and environmentally friendly solutions, using only renewable resources as well as creating better and greater importance to the topic [10]

While the third dimension was social responsibility, this dimension means going beyond the production of goods and services that are somehow related to a societal project. So that organizations must implement this dimension by providing comprehensive work environments in addition to development opportunities for employees. And continue to improve the quality of life of communities. [2]

What are Cost/Benefit Considerations (CBA)

Cost-benefit analysis is a method for assessing the projects from the investment point of view. This method is based on making investment decisions by comparing the estimated costs and benefits of the planned actions. This comparison is based on collected and analyzed data regarding technology and finance. This comparison helps the management to focus the available resources in the most useful way on such planned activities that have low costs and potentially high benefits.[16]

Cost/Benefit Analysis (CBA) is an analytical tool for judging the economic advantages or disadvantages of an investment decision by evaluating its costs and benefits in order to assess the welfare change attributed to it. [19]

Cost / benefit analysis is a method of evaluating projects from an investment point of view. This method is based on making investment decisions by comparing the estimated costs and benefits of planned actions. This comparison is based on data collected and analyzed regarding technology, finance and application. This comparison helps management to focus available resources in the most advantageous manner on such planned activities with low costs and potentially high benefits.

The cost-benefit analysis method consists of three steps, which are as follows: [16]

- Determining the financial value of the expected project cost and benefit variables.
- Analysis of the relationship between expected costs and benefits using simple or complex selection techniques.
- Make the final decision.

Cost in the context of cost-benefit analysis means the estimated or expected monetary or abstract cost of doing a particular job or starting a particular project. This cost can be tangible and, therefore, easily quantifiable and quantifiable, or abstract, and thus difficult to quantify or quantify in financial terms.

Whereas, the benefit is defined as the wealth achieved at a certain level of risk and for a specific period of time as a result of the efficiency of use, or it is a measurement function through which it is possible to judge the extent of the project’s success in achieving profits and benefits for the company. [21]

CBA is organized into seven steps: context description, goal setting, project identification, technical feasibility and environmental sustainability, financial analysis, economic analysis, and risk assessment. [19]

What is the Activity-Based Costing Approach (ABC)

In recent years, traditional models of information control and management have been severely criticized for failing to meet the needs of current organizations, resulting from the globalization of the economy, the development of markets, the increase in products and services offered, and technological development.

In this sense, the increase in organizational competitiveness has led to an increase in the demand for reliable and timely information in organizations, so it has become necessary to develop an appropriate approach to cost estimation that replaces traditional systems. [15]

The activity-based costing approach is designed to correct the shortcomings of traditional costing systems where the initial purpose of the ABC approach was to provide a fair and accurate allocation of cost, as well as to assess product profitability. [5]

This approach emerged in the 1980s as a costing method capable of overcoming the limitations of traditional costing systems in the face of economic and technological developments - that is, charging arbitrary and inaccurate costs of indirect costs resulting from their misallocation.

The ABC entry considers activities that consume resources, which cause costs, not just products that consume activities.

Martin (2007) noted that the logic of activity-based costing is based on the idea that the design, production and distribution of products and services require many activities to be performed and the implementation of these activities requires resources to be incurred and the use of these resources causes costs to be incurred. This is in contrast to the traditional accounting cost approach where the cost depends on the volume of production. [6]

Accountants and researchers differed among themselves on a specific definition of the cost-based approach to activity. The most important of these definitions are:

(Akyol, et al.) defined it as an economic model that identifies cost pools or centers of activity in companies and allocates costs to cost drivers based on the number of each activity used while the activity is an event, task, or business unit with a specific purpose. [12]

Whereas (kieso, et. al) defined the (ABC) approach as the costing approach that allocates indirect costs to several activity cost pools and then assigns activity cost pools to products and services through cost drivers. [23]

Also (Horngren, et al) defines the (ABC) approach as an approach to calculating costs for improving traditional costing systems by focusing on activities as a primary cost objective and then distributing the costs of activities to the final cost objectives of products and services and using cost vectors when distributing indirect costs to pools the cost. (ABC) uses causal relationships between cost vectors and activities and between activities and resources. [7]

Cost/Benefit Considerations in Applying the Activity-Based Costing Approach

The advantages of the Activity-Based Cost approach are: [11], [5]

- It enables management to know where the most significant costs occur as well as what saves them.
- It enables decisions on improving pricing, marketing, product design and product mix to be taken more efficiently by applying the ABC approach.
- It is the appropriate way to obtain correct and accurate information.
- Redistributes a resource from a non-value-added activity to a value-added activity, and also deletes the non-value-added activities.
- It helps in increasing organizational efficiency and profitability by identifying weak product lines and accurate costs.
- Provides fair and accurate cost distribution, as well as product profitability assessment
- The main attention is paid to the indirect costs allocated to the activities, rather than to the departments
- It provides information in the decision-making process and not only for cost measurement. Particularly in the decision regarding programmers, resource management and activities to be supported.
- Allocates cost through the most appropriate cost vectors that cause cost.

The disadvantages of the Activity-Based Cost approach are: [11], [4]

- More expensive than traditional cost entrance.
- The entrance implementation process is too complex for managers to understand and it produces many data, activity measures and requires collection and verification process etc.
- Because of the complexity of the process the decision-making process becomes lengthy.
- Management's resistance as managers become accustomed to using traditional costing systems to run their operations.
- The resulting data can easily be misinterpreted as there is a huge amount of irrelevant data.
- The cost and profitability information is disappointing for the project team if it is taken into consideration by the management in the performance appraisal.
- It lacks customer focus, is not process oriented, does not promote organizational learning and is incompatible with the theory of constraints.
- Can reliably measure the short-term impact of decisions on operating costs, inventory, and productivity.

Stages of Applying the Activity-Based Costing Approach (ABC)

The activity-based costing approach includes the following four basic steps:

- Defining activities: the basic step in implementing the (ABC) approach, and it is considered the basis of the application, and it is of great importance because it needs qualified individuals to understand all activities within the company. [9]
- Determining the cost drivers of activities: most of the cost vectors are quantitative measures that are easy to link to a specific product, production line, or a particular category of customers, which is considered the cause of direct costs, such as working hours and hours.
- Calculation of Cost Rate by Cost Engine: In general, the predetermined rates for allocating indirect costs to products are calculated as follows: [17]

$$\textbf{Cost Rate} = \textbf{Activity Costs} / \textbf{Cost Driver} \quad (1)$$

- Assigning costs from activities to products: It is done by multiplying the driving cost rate by the volume of cost driver units consumed by the product. [6]

What is the Multiple Regression Model

Regression is the study of variables that is used to answer questions such as does changing class size affect student success? Do changes in diet lead to changes in cholesterol level, and if so, do results depend on other characteristics such as age, gender, and amount of exercise? Do high-income countries per capita have lower birth rates than low-income countries? The goal of regression is to summarize the observed data as simply, useful, and more accurate. [22]

Regression means estimating the relationship between one of the dependent variables and one or more independent variables in algebraic form using the available data on the variables by formulating an equation or curve that explains this relationship.

Regression consists mainly of two types: the variable that researchers try to explain or predict is called the response variable, and it is sometimes also called the dependent variable because it depends on another variable, and the variable that is used to explain or predict the response variable is called the explanatory variable, and it is sometimes also called the independent variable because it is independent of The other variable .[1]

Multiple Regression Analysis Steps

The multiple regression approach includes the following steps: [8]

- Decide on purpose of model and appropriate dependent variable to meet that purpose.
- Decide on independent variables.
- Estimate parameters of regression equation.
- Interpret estimated parameters, goodness of fit and qualitative and quantitative assessment of parameters.
- Assess appropriateness of assumptions.
- If some assumptions are not satisfied, modify and revise estimated equation.
- Validate estimated regression equation.

Cost-Benefit Considerations from Multiple Regression Analysis

The advantages of the multiple regression are: [14]

- better prediction from multiple predictors
- can avoid picking depending on a single predictor
- can avoid non-optimal combinations of predictors (e.g., total scores)

- even when we know in our hearts that the design will not support causal interpretation of the results, we have thoughts and theories of the causal relationships between the predictors and the criterion -- and these thoughts are about Multiple relationships
- multiple regression models allow the examination of more sophisticated research hypotheses than is possible using simple correlations
- gives a link among the various correlation and ANOVA models.

The disadvantages of the multiple regression are: [24]

- prone to failure Inappropriate: The location that arises when a machine learning model fails to capture data properly, and this usually occurs when the hypothesis function does not fit well with the data. Since regression assumes a linear relationship between the input and output variables, it fails to properly fit complex data sets. In most real-life scenarios, the relationship between the data set variables is not linear and therefore the straight line does not fit the data correctly. In such cases, a more complex function can capture the data more effectively; Because most of the linear regression models are of low accuracy.
- sensitive to outliers: Outliers of a data set are outliers or outliers that deviate from other data points of the distribution, and outliers can greatly harm the performance of a machine learning model and can often lead to models with low accuracy.
- Linear regression assumes that the data are independent: The inputs are often not independent of each other, and therefore any multiple linear relationships must be removed before applying the regression.

APPLIED STUDY

Overview of the Study Sample

An innovation and design-driven company, KDD is the primary producer and distributor of food and beverages in the GCC countries. KDD is one of the oldest, most innovative and well-established dairy and diversified food companies in the region. For more than 50 years, the company has maintained the trust of its customers by providing quality products that are desirable to children, teens and adults alike.

KDD is the leading company in the Kuwaiti market, producing and distributing various dairy products and different types of ice cream, as well as many other culinary products. With innovation and hard work by the company's staff, the company aims to meet the needs of customers by continuously introducing innovative new products in the local and regional market.

The company distributes its products to neighboring countries: the Kingdom of Saudi Arabia, Iraq, Kingdom of Bahrain, UAE, Qatar, Sultanate of Oman, and Jordan. As its export markets continue to grow, this confirms the company's growing regional reputation, where the company is interested in competition and growth while maintaining the level of quality of its products. The company's commitment to quality is reflected in the huge investments in raw food sources, equipment, and production processes, in addition to quality control to ensure the excellence of all its products.

Reducing costs and determining the lowest costs for its products will certainly contribute to achieving the company's goal of competition and survival, in addition to the sustainability of its resources and operations. This applied study will contribute to comparing the costs and benefits of distributing costs to the company's products according to both the accounting method (ABC) and statistical method (Multiple Regression).

Distribution Costs According to the Accounting Method (ABC) in KDD Company

In this section, the cost system will be applied on the basis of activities in KDD, according to the data available in the company’s lists for the year 2018, according to the following steps:

First. Determining the activities as in table No. (1):

TABLE 1.KDD Company Production Activities and Supporting Activities

NO	Productive Activities	NO	Supporting Activities
1	Ice cream Activity	4	Sales Activity
2	Dairy Activity	5	Maintenance Activity
3	Food Activity	6	Machinery Activity
7	Management Activity		

Second. Assigning costs to activities as in tables No. (2) and No. (3):

TABLE 2. KDD Company Assigning cost to production activities

NO	Activity	Activity Details	Activity Costs
1	Ice Cream Activity	Raw Materials	254,625,000
		Work Wages	80,750,000
		Service Materials	43,630,000
	Total Costs		379,005,000
2	Dairy Activity	Raw Materials	540,000,000
		Work Wages	110,000,000
		Service Materials	68,205,299
	Total Costs		718,205,299
3	Food Activity	Raw Materials	133,000,000
		Work Wages	25,000,000
		Service Materials	19,000,000
	Total Costs		177,000,000

TABLE 3.KDD Company Assigning cost to supporting activities

NO	Activity	Activity Details	Activity Costs
1	Sales Activity	Raw Materials	33,500,000
		Work Wages	90,000,000
		Service Materials	19,200,000
	Total Costs		142,700,000
2	Maintenance Activity	Raw Materials	12,670,000
		Work Wages	6,450,000
		Service Materials	9,500,000
	Total Costs		28,620,000
3	Machinery Activity	Raw Materials	8,040,000
		Work Wages	4,500,000
		Service Materials	5,550,000
	Total Costs		18,090,000
4	Management Activity	Raw Materials	4,060,000
		Work Wages	7,350,000
		Service Materials	4,400,000

Third. Determining the cost drivers for the activities as in Table No. (4):

TABLE 4. KDD Company Determine activities cost drivers

NO	Activity	Cost Driver Basis	Cost Driver
1	Ice cream Activity	Number of units produced	150,000
2	Dairy Activity	Number of units produced	312,000
3	Food Activity	Number of units produced	122,000
4	Sales Activity	Sold units	348,000
5	Maintenance Activity	Number of maintenance orders	7,000
6	Machinery Activity	Operating hours	5,000
7	Management Activity	The number of administrative orders	4,500

Fourth. Calculate the rate cost as shown in Table (5):

TABLE 5. KDD Company Calculate activities cost rate

NO	Productive Activities	Cost Driver	Activities Costs	Cost Driver	Cost Rate
1	Ice cream activity	Number of units produced	379,005,000	150,000	2,526
2	Dairy Activity	Number of units produced	718,205,299	312,000	2,301
3	Food Activity	Number of units produced	177,000,000	122,000	1,450
4	Sales Activity	Sold units	142,700,000	567,000	251
5	Maintenance Activity	Number of maintenance orders	28,620,000	7,000	4,088
6	Machinery Activity	Operating hours	18,090,000	5,000	3,618
8	Management Activity	The number of administrative orders	15,810,000	4,500	3,513

It is noted from the results of Table 5 that the indirect activities in general, including the maintenance activity, consume the highest costs, as the average cost of maintenance activity reached (4,088 ID), which makes the products bear high indirect costs, so it requires the management to search for the reasons and develop alternative solutions, as the equipment may be old, or the rate of resource consumption is exaggerated in these activities, which requires determining other influencing factors or an unjustified increase in consumption such as idle energy or wastage and damage to determine consumption more accurately.

Fifth. Allocating costs from activities to products as shown in Tables from No. (6) to No. (12):

TABLE 6. KDD Company Cost of product, Ice Cream Gold

NO	Productive Activities	Cost Rate	Cost Driver	Product Cost
1	Ice Cream Activity	2,526	90,000	227,340,000
2	Sales Activity	251	88,500	22,213,500
3	Maintenance Activity	4,088	1,000	4,088,000
4	Machinery Activity	3,618	750	2,713,500
5	Management Activity	3,513	400	1,405,200
	Total			257,760,200

TABLE 7. KDD Company Cost of product, Silver Ice Cream

NO	Productive Activities	Cost Rate	Cost Driver	Product Cost
1	Ice Cream Activity	2,526	60,000	151,560,000
2	Sales Activity	251	56,000	14,056,000
3	Maintenance Activity	4,088	500	2,044,000
4	Machinery Activity	3,618	300	1,085,400
5	Management Activity	3,513	250	878,250
	Total			169,623,650

TABLE 8. KDD Company Cost of product, Milk

NO	Productive Activities	Cost Rate	Cost Driver	Product Cost
1	Dairy Activity	2,301	144,000	331,344,000
2	Sales Activity	251	142,000	35,642,000
3	Maintenance Activity	4,088	1,100	4,496,800
4	Machinery Activity	3,618	800	2,894,400
5	Management Activity	3,513	610	2,142,930
	Total			376,520,130

TABLE 9. KDD Company Cost of product, Nojoud Cream

NO	Productive Activities	Cost Rate	Cost Driver	Product Cost
1	Dairy Activity	2,301	102,000	234,702,000
2	Sales Activity	251	90,000	22,590,000
3	Maintenance Activity	4,088	701	2,865,688
4	Machinery Activity	3,618	570	2,062,260
5	Management Activity	3,513	300	1,053,900
	Total			263,273,848

TABLE 10. KDD Company Cost of product, Silver Ice Cream

NO	Productive Activities	Cost Rate	Cost Driver	Product Cost
1	Dairy Activity	2,301	70,000	161,070,000
2	Sales Activity	251	69,200	17,369,200
3	Maintenance Activity	4,088	1,099	4,492,712
4	Machinery Activity	3,618	1,080	3,907,440
5	Management Activity	3,513	1,040	3,653,520
	Total			190,492,872

TABLE 11. KDD Company Cost of product, Paste

NO	Productive Activities	Cost Rate	Cost Driver	Product Cost
1	Food Activity	1,450	99,000	143,550,000
2	Sales Activity	251	92,000	23,092,000
3	Maintenance Activity	4,088	1,600	6,540,800
4	Machinery Activity	3,618	800	2,894,400
5	Management Activity	3,513	1,000	3,513,000
	Total			179,590,200

TABLE 12. KDD Company Cost of product, Olive Oil

NO	Productive Activities	Cost Rate	Cost Driver	Product Cost
1	Ice Cream Activity	1,450	23,000	33,350,000
2	Sales Activity	251	22,900	5,747,900
3	Maintenance Activity	4,088	1,000	4,088,000
4	Machinery Activity	3,618	700	2,532,600
5	Management Activity	3,513	900	3,161,700
	Total			48,880,200

Sixth. Calculate cost per unit as shown in Tables from No. (13) to No. (15):

TABLE 13. KDD Company Cost ofunit, Ice Cream products

NO	Products	Costs	Cost Driver	Cost Per Unit
1	Gold Ice Cream	257,760,200	90,000	2,864
2	Silver Ice Cream	169,623,650	60,000	2,827
	Total			5,691

TABLE 14. KDD Company Cost ofunit, Dairy products

NO	Products	Costs	Cost Driver	Cost per Unit
1	Milk	376,520,130	144,000	2,615
2	Nojoud Cream	263,273,848	102,000	2,581
3	Khama cream	190,492,872	66,000	2,886
	Total			8,082

TABLE 15. KDD Company Cost ofunit, Food products

NO	Products	Costs	Cost Driver	Cost Per Unit
1	Paste	179,590,200	99,000	1,814
2	Olive Oil	48,880,200	23,000	2,125
	Total			3,939

The results of the distribution of costs using the accounting method (costs based on activity) show that calculating the cost of one unit needs cost drivers for each activity, where the highest activity cost rate is the dairy activity at a rate of (8,082), while the lowest rate is for the food activity (3,939). Also, note at the level of products that the highest cost rate is for a Khama cream product (2,886) with the lowest sold units amounting to (66,000) compared to dairy products. As for the least expensive products, it was for the paste product with a cost rate of (1,814) and the most sold products amounted to (99000) in comparison with the products of the foodstuff activity

Distribution of Costs According to the Multiple Regressio in KDD Company

The regression model for the distribution of costs is based on estimating the relationship between several factors, one of which is the dependent factor and the other represents independent factors. The dependent factor, as this model depends on the idea of the multiple regression coefficient (causality) that arises between the volume of costs and the change in the quantities produced from each product. Distribution The multiple regression model equation can be formulated as follows:

$$Y = \mathrm{B0} + \mathrm{B1\,X1} + \mathrm{B2\,X2} + \mathrm{B3\,X3} + \mathrm{B4\,X4} + \mathrm{B5\,X5} + \mathrm{e} \quad (2)$$

whereas:
Y = the value of the dependent variable, which is the amount of costs to be distributed.
X1 = the number of units produced from the dairy activity
X2 = the number of units sold from the dairy business
X3 = the number of maintenance orders from the dairy activity.
X4 = the number of hours of operating the machines from the dairy activity.
X5 = the number of administrative orders from the dairy activity.
B0 = the intersection of the straight line, i.e. costs when production is zero.
B1= Measures the change in total cost for each change of 1 unit in X1.
B2= Measures the change in total cost for each change of 1 unit in X2.
B3= Measures the change in total cost for each change of 1 unit in X3.
B4= Measures the change in total cost for each change of 1 unit in X4.
B5= Measures the change in total cost for each change of 1 unit in X5.
e = random errors in period (i), i.e. the difference between the observed and expected values in the period.

The above equation is applied to the KDD company, and after entering the monthly cost data in the (spss) program for the purpose of analyzing it using multiple regression, the outputs of the analysis were reached as in Table No. (16):

TABLE 16. Cost distribution results using SPSS regression analysis

Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
	B	Std. Error	Beta		
(Constant)	310,000	2,407.30		178	0.864
x1	1,115	1,292.40	0.865	1.704	0. 0109
x2	1,560	1,692.50	0.072	0.127	0.0203
x3	1,035	2,828.20	0.081	0.574	0.0487
x4	1,091	424.7	0.018	0.077	0.0391
x5	1,072	182.9	0.152	0.541	0.0417

It is noticed from Table (16) that there is a statistically significant relationship between costs and cost drivers, that is, there is a significant effect for all variables because the level of significance is less than the level of error (5%), as the variable with the most significant effect is (x1) for the units produced with a level of significance (0). 0109), and the least variable is (x3) related to the number of maintenance orders with a significant level (0.0487), and therefore it is possible to obtain the estimated regression equation for the distribution of costs, as shown below:

$$Y = 310{,}000 + 1{,}115\,X1 + 1{,}560\,X2 + 1{,}035\,X3 + 1{,}091\,X4 + 1{,}072\,X5 + e \qquad (3)$$

After reaching the regression model equation, the costs are distributed to the products by multiplying the coefficient of change for each activity in each product of the dairy activity, as (1,115) is the coefficient of change for the dairy activity and (1,560) is the coefficient of change for the sales activity and (1,035) is the coefficient The change for the maintenance activity and (1,091) is the change factor for the machinery activity and (1,072) is the change factor for the management activity, as shown in the Table (17):

TABLE 17. Distribution of cost using multiple regression

Activities	The Details	The Milk	Nojoud	Khama
	Number of units produced	144,000	102,000	70,000
Dairy Activity	unit cost		1,115	
	Total Costs	160,560,000	113,730,000	78,050,000
	Number of units sold	142,000	90,000	69,200
Sales Activity	unit cost		1,560	
	Total Costs	221,520,000	140,400,000	107,952,000
	Number of maintenance orders	1,100	701	1,099
Maintenance Activity	unit cost		1,035	
	Total Costs	1,138,500	725,535	1,137,465
	Machine operating hours	800	570	1,080
Machinery Activity	unit cost		1,091	
	Total Costs	872,800	621,870	1,178,280
	The number of administrative orders	610	300	1,040
Management Activity	unit cost		1,072	
	Total Costs	653,920	321,600	1,114,880

RESULTS AND DISCUSSION

It is noticed from Table (16) that there is a significant relationship between the costs of the products of each activity and the cost drivers, because all products achieved a level of significance less than the estimated error level (5%), and therefore the basic hypothesis is rejected and the alternative hypothesis accepted, and accordingly the statistical method represented by multiple regression can be applied to the distribution of Costs, as it is easy to apply and does not require additional costs, but depends on the transactions of variables to arrive at the cost of each variable instead of the accounting method, which usually costs companies the costs of its use, education and misapplication, which results in inaccurate information that makes the company's decisions irrational.

Table No. (17) showed results that prove the achievement of the study goal and its hypotheses by calculating the cost of one unit for each product using multiple regression that exceeded many of the burdens and costs that are achieved as a result of using the activity-based costing method, where the coefficient of change (unit cost) reached the dairy activity (1,115) and the sales activity change factor (1,560), which is the highest cost, while the maintenance activity change factor was (1,035), which is the least expensive, and the machinery activity (1,091), while the management activity achieved a change factor (1,072).

And if we return to the results of the accounting method (costs based on activities), we note that he achieved rates per unit cost of products were very high compared to the statistical method (multiple regression), where the highest cost rate according to the accounting method (4,088) for maintenance activity, while the unit cost was The one for this activity according to the statistical method (1,035), while the lowest cost was for the sales activity (251), but the multiple regression showed the cost of this activity (1,560).

In short, the distribution of costs on the basis of activities showed the cost of one unit for each activity at high rates compared to the multiple regression, which had accurate results and could be applied in companies for ease of application and not incurring any additional costs, which achieves one of the most important sustainability goals of control and cost control.

Table No. (18) shows the comparisons between the activities-based costing method and the regression method in terms of distributing costs on dairy products.

TABLE 18. Comparison of the distribution results between (ABC) and Multiple Regression

Accounting Method (ABC)			Statistical Method (regression)		
Milk Costs	**Nojoud Costs**	**Khama Costs**	**Milk Costs**	**Nojoud Costs**	**Khama Costs**
331,344,000	234,702,000	161,070,000	144,288,000	102,204,000	70,140,000
35,642,000	22,590,000	17,369,200	163,008,950	127,954,476	104,512,174
4,496,800	2,865,688	4,492,712	1,112,125	916,825	792,050
2,894,400	2,062,260	3,907,440	1,188,099	864,072	721,151
2,142,930	1,053,900	3,653,520	710,892	348,348	316,680
376,520,130	263,273,848	190,492,872	384,745,220	255,799,005	189,432,625

To know the effect of both the accounting and statistical method on the distribution of costs on operating profit, an income statement is prepared, as shown in the Table No. (19)

TABLE 19. KDD Company Comparative Income Statement between (ABC) and Multiple Regression

	Accounting method		Statistical method	
The Details	**The Amount**	**The Amount**	**The Amount**	**The Amount**
Sales:				
Milk Sales	649,650,000		649,650,000	
Khama Cream Sales	456,720,000		456,720,000	
Nojoud Cream Sales	400,410,000		400,410,000	
Total Sales		1,506,780,000		1,506,780,000
Cost Of Goods Sold:				
Milk Costs	376,520,130		384,745,220	
Khama Cream Costs	263,273,848		255,799,005	
Nojoud Cream Costs	190,492,872		189,432,625	
Total Costs		830,286,850		829,976,850
Profit Margin		676,493,150		676,803,150
Fixed Costs		0		310,000
Operating Profit		676,493,150		676,493,150

Table No. (20) presents the results of calculating the contribution margin amount and percentage for each dairy product according to the two methods:

TABLE 20. KDD Company Comparision Gross Margin and Net Income ratios between (ABC) and Multiple Regression

ABC Method				
Milk Sales	**Milk C.G.S**	**Gross Margin**	**%Gross Margin**	**Net Profit**
649,650,000	331,344,000	318,306,000	0.49	
khama Cream Sales	Khama Cream C.G.S	Gross Margin	%Gross Margin	
456,720,000	161,070,000	295,650,000	0.65	0.45
Nojoud Cream Sales	Nojoud Cream C.G.S	Gross Margin	%Gross Margin	
400,410,000	234,702,000	165,708,000	0.41	
Multiple Regression Method				
Milk Sales	Milk C.G.S	Gross Margin	%Gross Margin	Net Profit
649,650,000	160,560,000	489,090,000	0.75	
Khama Cream Sales	Khama Cream C.G.S	Gross Margin	%Gross Margin	
456,720,000	78,050,000	378,670,000	0.83	0.45
Nojoud Cream Sales	Nojoud Cream C.G.S	Gross Margin	%Gross Margin	
400,410,000	113,730,000	286,680,000	0.72	

As the table (20) shows the highest contribution margin according to the accounting method was for a Khama cream product, which amounted to (0.65), which means that it achieved the highest profit from sales while was less Contribution margin is cream Nojoud's product at a rate of (0.41), meaning that it was the least profitable due to the high costs calculated according to this method.

As for the multiple regression method, its results were that the highest contribution margin was for cream Khama, which amounted to (0.83), and the lowest contribution margin was achieved by cream Nojoud's product, with a ratio of (0.72). Accurate and stay away from the discretionary side of the calculation.

We note that the ratio of net profit to sales presented in Table No. (19) was equal between the two methods at a ratio of (0.45). This means that the multiple regression method can be used in companies for the purpose of distributing costs because it gives close results and we do not need to bear the additional costs of designing and implementing (ABC) Which is difficult to implement in light of cost-benefit considerations within the sustainable development goals.

Also, the income statement shows the presence of idle capacity according to the multiple regression in the amount of (310,000) classified as fixed costs, companies must reduce this energy for the purpose of achieving sustainable profits

CONCLUSION

It is possible to adopt quantitative methods in determining the costs of products and finding the relationship between indirect costs and the variables that affect their behavior and reaching results that are close to those determined by activity-based costs that require additional costs for their design and implementation, in addition to the difficulties that Iraqi industrial companies may face in adopting such these methods, since their cost systems are simple, require a radical change that increases the costs that may outweigh the benefits of applying these methods. Therefore, simple and less expensive methods must be adopted, and quantitative methods provide such results and save the additional costs required for the design and implementation of activity-based methods. Accordingly, it is necessary for Iraqi industrial companies to adopt the multiple regression method in distributing costs over products to reach more accurate costs than the traditional method currently adopted, and then the accurate identification and reducing the costs of products is in line with the company's goal to increase its competitiveness and achieve profit and thus achieve sustainability goals.

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