



Activity-Based Costing (ABC) System and Its Role in Improving Performance in the Economic Enterprise: A Case Study

Benoubiza dahou*

University of mascara , (algeria)

daho.benabiza@univ-mascara.dz

Sadouki ghrissi

University of mascara , (algeria)

ghrissi.sadouki@univ-mascara.dz

Abstract ;

The application of cost accounting concepts initially relied on traditional approaches; however, with time, these methods revealed significant limitations. The financial accounting systems were unable to provide sufficient information through their financial statements to adequately understand cost behavior and its trends within organizations, particularly those with an industrial nature. Consequently, modern approaches have emerged, characterized by greater accuracy, clarity, and rationality in determining and directing costs toward the financial objectives desired by the organization.

These modern techniques facilitate the ultimate goal of enabling firms to control and optimize costs efficiently. Among the various approaches developed are Activity-Based Costing (ABC), fuzzy logic-based costing models, Material Flow Cost Accounting (MFCA), and Resource Consumption Accounting (RCA). The fundamental objective of these methods is to offer a clear representation of cost patterns, measurement, and behavior to enhance their understanding, improve their allocation, and support timely and well-informed decision-making.

Article info

Received
22/08/2025

Accepted
24/09/2025

Keyword:

- ✓ Activity-Based Costing
- ✓ Costs, Performance
- ✓ Target Costing ABC

* Corresponding author

1. Introduction

characteristic of a good business model is working to reduce operating costs, enabling an economic institution to achieve cost leadership. This is achieved in a business environment characterized by intense competition, with each party attempting to position itself correctly in the market to create a competitive advantage for the longest possible period. This is necessary to confront the rapid changes in all aspects and trends. Focusing on increasing the quality of the institution's products at the lowest costs is one of the ways to achieve this. The activity-based costing (ABC) system is an alternative system for analyzing costs, providing a sound reading of financial information, and allocating various costs on a sound, undistorted basis, as occurs with traditional methods and analytical accounting, especially in industrial institutions that seek to achieve outstanding performance and maintain this high level for a longer period. Institutions with outstanding performance are characterized by clear objectives and continuous efforts to achieve them by providing appropriate means for better operation. Activity-based costing (ABC) is one of the methods that can be adopted to achieve better results and a clearer understanding of the institution's financial position.

Based on the above, the following problem can be raised:

To what extent does the implementation of the costing system contribute? Based on activities to improve performance in economic institutions?

How can this system address the shortcomings of traditional cost accounting methods?

2. conceptual framework of activity-based costing

The first and actual appearance of activity-based costing (ABC) can be traced back to William Vatter's 1954 study, which attempted to establish a comprehensive cost accounting framework consistent with an organization's activity structure. Staubus then presented a preliminary analysis of a cost accounting system that took into account the activities involved in the process in 1971. Johnson and Kaplan then studied the suitability of traditional cost accounting methods and techniques in 1987, with the most prominent conclusion being the need to adopt new methods for allocating indirect costs to products and various other cost objects. (Ismail Hijazi, Maalem Suad, 2013, p. 96)

2.1 Activity-Based Costing (ABC):

This system allocates additional costs more accurately by dividing activities into multiple levels and then allocating the cost of these activities to cost elements using appropriate cost drivers.

2.1.1 The Concept of Activity-Based Costing:

The International Confederation of Advanced Manufacturing (CAM-1) defines the ABC system as: "A methodology that measures the cost of performance of activities, resources, and cost objectives; allocates the cost of resources to activities; allocates the cost of activities to cost objectives based on their use; and identifies the causal relationship between cost drivers and activities." (Ismail Yahya Al-Takriti,, 2016, p. 27)

An activity-based costing system is a set of interconnected and integrated accounting procedures that aim to measure the structure and profitability of the products and services provided by an organization by dividing performance into a group of activities, determining the cost of each activity, and then assigning the cost of these activities to the products or services based on appropriate cost drivers. (Ibrahim Mida, Atallah, and Rad Khalil, 2010-2011, p. 452)

From these definitions, we conclude that an activity-based costing system is a system that first allocates resources to the activities that benefit from them, then allocates the cost of these activities according to the rate of benefit from these activities. (Mohamed Hanafi Zaki and others, , 2000, p. 420)

2.1.2 Shortcomings of Traditional Systems and the Difference Between Them and Activity-Based Costing:

2.1.2.1. Shortcomings of Traditional Costing Systems:

The processes and methods of traditional accounting practices have become inappropriate. Criticisms of these systems include: (Habi Ahmed, 2011, p. 14)

- Traditional accounting systems focus on routine and structural decisions at the expense of other decisions, which has affected their effectiveness as a decision-support system in general.
- They do not meet management's information needs due to their focus on the operational level, their failure to allocate costs to cost-inducing activities, and their provision of inaccurate information about cost behavior.
- Traditional accounting systems involve many complex processes that require non-value-adding activities.

2.1.2.2 Difference between methods of calculation of traditional clothes and systems computed by activities (CPA) : (Kamal Khalifa Abu Zaid and Atiya Abdel-Hay Marai, 2004, p. 14)

Table 1: Comparison of methods of calculation of traditional books and CPA

Traditional costing system	ABC system	differences
Traditional costing uses a single cost driver, such as direct labor or machine hours, to allocate indirect costs to products.	Activity-based costing uses multiple cost drivers, such as multiple setups, inspections, or orders, to allocate indirect costs to products.	Cost driver
A traditional costing system can allocate indirect costs inaccurately, as it assumes that all products consume indirect costs in the same way.	Activity-based costing provides a more accurate view of cost behavior by determining cost allocation based on the activities that produce it. .	accuracy
. Traditional costing is a simple method of allocation that is easy to understand and implement	. Activity-based costing is a more complex method that requires more time and effort to implement, but it provides a more detailed and accurate view of cost behavior.	complexity
The cost of implementing a traditional costing system is less than activity-based costing.	It requires more resources and time. Activity-based costing may be more expensive to implement due to its complexity..	Cost-effectiveness
. The traditional costing system is suitable for companies with simple production processes or those with a limited range of activities.	Activity-based costing is suitable for companies with complex operations that require more detailed and accurate cost allocation methods.	Ease of implementation
The traditional costing system focuses on direct costs, such as direct labor and direct materials.	. Cost estimation focuses on indirect costs, such as general administration expenses and support costs	the focus

Source: Ashraf Azmi Masoud Abu Mughli, The Impact of Applying Activity-Based Costing Accounting System on Maximizing Profitability, Master's Thesis in Accounting, Faculty of Administrative and Financial Sciences, Middle East University for Graduate Studies, Amman, Jordan, 2008, p. 26

2. Steps to Implementing the ABC System in an Organization

In order to implement an activity-based costing system, the following steps must be taken to design this system:

2.1 Identifying Activities

This stage marks the beginning of implementing the ABC system. The organization is studied, identifying the nature of work in each department and how the production process is managed. Through this process, the activities necessary to produce a specific product are identified. However, scientific studies have shown that the greater the number of activities, the greater the complexity and difficulty of the relationship between the activity and the product unit, which increases the cost of implementing this method. Activities are classified into: (Yasmina Salem et al., p. 450)

2.1.1 Value-adding Activities: These are activities whose existence is essential for completing the production, marketing, and selling of the product to customers. Examples include purchasing raw materials to manufacture the product, which is a valuable activity because without them, the organization would be unable to manufacture the product. Similarly, painting a car to a certain quality is a valuable activity because customers expect and desire it, among other things.

2.1.2 Non-Value-adding Activities: These are activities whose implementation does not add value to the product, meaning that eliminating or eliminating these activities does not affect the value of the products provided to customers. Examples include storing raw materials or finished products, which is considered a non-value-adding activity from the customer's perspective. Therefore, pursuing just-in-time production, as well as remanufacturing defective units, is a value-free activity for customers and can and should be eliminated.

2.2 Determining Activity-Based Costing:

Cost management measures the cost of each activity performed by the organization, whether primary or secondary, by allocating a cost pool* that accommodates the cost items consumed in implementing that activity, including material costs, labor costs, and service costs. For this process to be successful, cost management must ensure proper accounting guidance for cost items across various activities. (Abdel Nour Zaya, 2017, p. 57)

Cost accounting for activity-based costs is the expression of these activities using a quantitative measure that establishes a correlation between the volume of that activity, expressed in units of measurement, and the amount of the cost. This measure is called the cost driver. (Bilal Bounab, 2013, p. 55)

3. Determining Cost Drivers

After completing the study and identification of activities and their costs, the next stage is to identify cost drivers. These are the factors that led to the emergence of the activity or affect the volume of work, thus affecting the cost of the activity. A cost driver is the event that led to the emergence of the cost. Knowing the relationships between activities and their explanatory factors serves as the foundation for system operation and unit costing. Cost drivers can be translated into units of work (Unité D'œuvre), such as:

Direct labor hours, machine hours. It should be noted that there may be a common cost driver among a group of homogeneous activities. In this case, when there are multiple cost drivers for the same activity, differentiation is achieved using the correlation coefficient. (Rania Ghadab, 2013, p. 25)

Fourth: Determine Activity Centers

Activity centers refer to the sector of the production process that performs a specific task that serves to achieve one of the organization's functions. This step aims to determine how cost reports are prepared at the center level. An activity center is a section of the production process where management wants to record all activities separately. For example, the receiving department might be treated as an activity center (receiving). Choosing this system design does not affect the final product cost; the effect lies in how this cost is recorded. The system might record the total product cost, for example, as 50 dinars, or it might be broken down into 30 dinars for the manufacturing activity and 20 dinars for the receiving activity. The ability to record costs through an activity center gives managers the ability to better monitor activities. (Khaled Hadeifi,, 2012, p. 71)

4. Benefits of Implementing Activity-Based Costing (ABC) and Performance in a Dairy Production Company

Activity-based costing systems were often more accurate than traditional costing methods. Using an activity-based costing (ABC) system reduces estimates because actual costs cannot be traced back. Strapleton et al. (2004) noted the costs of finding true costs. Gering (1999) stated that an activity-based costing (ABC) system was best used with minimal detail and estimated cost figures. Among the advantages of implementing this system are the following: (Raziah Deveinaga, 2011, p. 83)

- The activity-based costing approach is based on an in-depth analysis of all activities within the organization, attempting to link them to their causes. This leads to a better management understanding of all processes and interrelationships within the organization, enabling better cost control and the adoption of a systematic and continuous cost reduction strategy to achieve a significant competitive advantage in a highly competitive environment.
- Activity analysis (also called the process analysis approach) in the ABC system allows activities to be divided into those that add indispensable value and those that do not add value and can be dispensed with or minimized. This is a new and fundamental development that helps management improve performance and integrates with the cost reduction plan.
- The ABC system offers new possibilities for linking costs to the cost theme and allows activity costs to be linked to different customer categories, as they are the ones who request certain activities and cause costs. This helps management gain a better understanding of how profits are generated at the product and customer levels, and thus rethink the product and customer mix.
- The ABC system is compatible with and complements other modern management systems in achieving organizational goals, such as just-in-time (JIT) production, continuous improvement, production-oriented strategies, and a focus entirely on meeting customer needs. The ABC system is also a key factor in implementing the modern management strategy of Total Quality Management (TQM).

. About the company: It is a small production company of the SARL type located in Taghnif, Mascara province. The decision to exploit it was made in 2006, while the dairy started producing pasteurized milk and yogurt in 2007 with a production capacity of between 7140 and 8100 bags of milk per day and 1539 bags of yogurt per week.

Table 2: Milk Production Development

year	Milk consumption in liters	year	Milk consumption in liters
2008	570500	2017	573700
2009	571000	2018	574000
2010	572000	2019	574200
2011	572300	2020	574600
2012	572600	2021	575000
2013	572900	2022	575300
2014	573100	2023	576000
2015	573300	2024	580100
2016	573500		

Source: Prepared by the researcher based on information from the institution

Table 3: Development of the company's turnover

year	Business number	year	Business number
2008	60120523.00	2016	64453214.00
2009	60210421.00	2017	65152462.00
2010	60321231.00	2018	65234762.00
2011	61745362.00	2019	68314862.00
2012	62352513.00	2020	69245468.00
2013	62925253.00	2021	70125532.00
2014	63432295.00	2022	74228697.00
2015	63852432.00	2023	74429999.00

Source: Prepared by the researcher based on the Analytical Accounting Service.

2. Costing Mechanisms and Product Cost Price in the Establishment

2.1: Determining the Direct Costs of the Product (Raw Material Cost): Determining this type of cost is of paramount importance in determining the cost price of a specific product in the establishment. To determine the cost of these materials, the accountant initially relies on the raw materials card, which shows the quantity and type of materials necessary to produce a specific unit. The purchasing department is then contacted to obtain the unit cost of each material.

2.2: Determining Indirect Costs: This is the determination of the value of indirect costs, which are all costs that cannot be directly allocated to production.

3. Determining the Product Cost Price: After determining the indirect costs assigned to the product, the cost and final cost of the product are determined.

3.1: Determining the Direct Costs of the Product: This cost is determined based on the raw materials card, which shows the quantity of materials required to produce 1 liter of milk, as shown in the following table:

Table. 4: Cost of raw materials used to produce 1 liter of milk for the month of December 2023

Name of the material used	Total cost	Cost of material used per	Quantity used in kg
0% Milk powder	6.63	149.48	0.04434
26% Milk powder	0.28	149.51	0.00187
MGLA powder	0.95	150.03	0.00634
Local milk	6.14	26.00	0.23605
Reclaimed butter	0.21	219.91	0.00095
Plastic	1.49	224.98	0.00663
Total	15.7	/	0.31609

Source: Prepared by the researcher based on the Analytical Accounting Service.

This table shows the value of raw materials per liter of milk at 15.7 DZD.

Table No. 5: Direct costs of producing 1 liter of milk

Statement	amounts
cost of raw materials	15.7

Source: Prepared by the researcher based on the Analytical Accounting Service.

This table shows the direct costs of 1 liter of milk at DZD 15.7.

4: Determining Indirect Costs

Table 6: Indirect Costs for December 2023

tatement	Amounts
H/60 Consumable Purchases	1928560.75
Depreciation	1327843.88
H/61 and 62 External Services and Other External Services	1062273.64
H/63 User Charges	7202262.27
H/64 Taxes, Fees, and Similar Payments	381958.66
H/65 Other Operating Charges	155605.38
Total Indirect Costs	12060478.8
Number of Units Produced	2481580
Indirect Cost per Liter	4.86

This table shows the indirect costs for 1 liter of milk at 4.86 DZD.

5: Determine the final cost of the product: After determining both the direct and indirect costs of the product, we determine the final cost.

Table 7: Cost price tag for 1 liter of milk

Name of the ingredient used:	Cost Unit	price in kg	Quantity in kg
0% milk powder	0.04434	149.48	6.63
26% milk powder	0.00187	149.51	0.28
MGLA powder	0.00634	150.03	0.95
Local milk	0.23605	26.00	6.14
Reclaimed butter	0.00095	219.91	0.21
Plastic	0.00663	224.98	1.49
Direct costs (raw material costs)			15.7
Indirect costs			4.86
Cost price			20.56

Source: Prepared by the researcher based on analytical accounting information.

The table shows that the final cost of 1 liter of milk is 20.56 DZD.

Table 8 shows the total cost of the product.

Statement	Total cost	Quantity produced Unit	cost per liter
Raw Material Cost	15.7	576000	9043200
Indirect Costs	4.86	576000	2799360
Cost Price	20.56	576000	11842560

Source: Prepared by the researcher based on the Analytical Accounting Service.

6: Attempt to apply the activity-based costing method and compare it with the enterprise method.

: Identifying the enterprise activities specific to the milk production workshop.

Given the multiplicity of activities in practice, as well as their complexity, we will attempt to select a few activities to apply the activity-based costing method. We will then identify the factors used to allocate the costs of these activities to the products.:

7. Determining Activity-Based Costing

Activity costs are all the production factors employed to carry out these activities. In order to determine these costs and the requirements for each activity, the cost driver for each activity must be identified. These costs are represented by indirect costs.

7.: Determining the Value of Indirect Costs

7.1 Determining the Percentage of Indirect Costs to Direct Costs -

Total direct costs = 11,842,560 DZD.

Total indirect costs = 2,799,360 DZD.

Indirect cost ratio = Indirect costs / Direct costs x 100%.

Indirect cost ratio = 2,799,360 / 11,842,560 x 100%.

Indirect cost ratio = 23.64%.

7..2 Determining the indirect costs related to the product:

The indirect costs related to the product are determined by multiplying the direct costs by the indirect cost ratio. Before determining these costs, the direct costs must be determined, which we will determine using the following table:

Table 9: Determining the direct costs related to the product

Statement	Amounts
Cost of raw materials	9043200

Source: Prepared by the researcher based on the previous information.

After determining the direct costs, the indirect costs can be determined, as explained previously:

Indirect costs = $9,043,200 \times 0.2364 = 2,137,812.48$ DZD.

Second: Distribution of indirect costs across activities

Table 10: Distribution of the number of workers across activities

activities	Number of workers
Management	02
Maintenance	02
Mixing	02
Pasteurization	01
Cooling	01
Packaging	03
Total	11

Source: Prepared by the researcher based on user information.

Allocation of Supporting Activities to Primary Activities: In this step, we will allocate supporting activities to primary activities.

Table 11: Allocation of Management Activity Costs to Primary Activities

Core			Management Activities	
Activity Name	Cost	Percentage %	The cause	the cost
Mixing	183230.8	36%	Using percentages due to the complexity of the work and the difficulty of extracting the cost driver. These percentages were estimated in cooperation with the head of the analytical accounting department.	508974.54
Pasteurization	157782.1	31%		
Cooling	96705.2	19%		
Packaging	71256.4	14%		
508974.54		100	totals	

Source: Prepared by the researcher based on the Analytical Accounting Service.

Table No. 12: Determining the costs of basic activities after allocating indirect costs and auxiliary activities

Activities	Download the costs of management	activity indirect costs	Maintenance Activity Costs Load	Total
Mixing	508974.54	183230.8	254487	946692.34
Pasteurization	254487.27	157782.1	84829	497098.37
Cooling	254487.27	96705.2	42414.5	393606.97
Packaging	763461.81	71256.4	127243.5	961961.71
Total	2799360	508974.54	508974.54	3817309.08

Third: Allocating activity costs to the product, determining the cost price, and comparing the method applied by the organization with the activity-based costing method.

1: Allocating activity costs to the product

Table 13: Allocating activity costs to the product

Activity	cost of activity	Ultimate	Number of causes	Unit cost
Mixing	946692.34	Number of workers	03	315564.11
Pasteurization	497098.37		01	497098.37
Cooling	393606.97		01	393606.97
Packaging	961961.71		03	320653.9
3817309.08		the total		1526923.35

Source: Prepared by the researcher based on previous information.

Fourth: Determining the final cost of the product

Table 14: Determining the final cost

Statement	The amount
Direct Costs	9043200
Indirect Costs	1526923.35
Final Cost	10570123.35
Quantity Produced	576000
Cost Price of 1 Liter of Milk	18.35

Source: Prepared by the researcher based on previous information.

The table shows that the cost price for 1 liter of milk is 18.35 DZD.

Fifth: Comparison between the method applied in the institution and the activity-based costing method

Table 15: Comparison between the method applied in the institution and the activity-based costing method for the product

Statement	The method applied in the institution	activity-based costing method
Direct Costs	9043200	9043200
Indirect Costs	2799360	1526923.35
Final Cost	11842560	10570123.35
Quantity Produced	576000	576000
Unit Cost Price	20.56	18.35

Source: Prepared by the researcher based on previous information.

Note: It is noticeable from the table that the cost price is lower using the activity-based costing method compared to the method used by the organization. This is due to lower indirect costs, which is reflected in lower profits generated from the product.

Conclusion

Through our theoretical and applied study, we attempted to clarify the most important advantages that enable outstanding performance using modern costing systems, represented here in this study by the activity-based costing (ABC) method, and to compare it with the traditional analytical accounting method. This is of course based on information provided by the organization's officials. Researchers of this type of study often encounter obstacles regarding obtaining financial information, through which comparisons can be made between the methods used and those proposed for use in controlling costs in the organization compared to traditional systems. Given the demands of a business environment characterized by rapid and unstable developments, technological advancements, and short product life cycles, especially electronic ones, and customers' desire for lower-cost products in exchange for high quality, achieving superior performance through the results obtained and the sound decisions resulting from these results, the results of this paper are as follows:

- Most organizations use traditional methods for calculating costs.
- Despite the widespread prevalence of traditional methods for calculating costs, they have come to face considerable criticism, especially from managers, regarding their inability to provide sufficient information. Accurately assessing the final costs of products and making strategic decisions regarding them.
- Indirect costs are the primary concern in product cost accounting due to the difficulty of tracking and accurately identifying them, a task traditional systems have failed to accomplish.
- Product prices are now determined in the market in the modern environment in response to customer desires for low-priced, high-quality products. In other words, price dictates cost, not the other way around.

These results highlight the paramount importance of such modern costing methods, most notably activity-based costing, and the significant role its implementation plays in enabling an organization to achieve outstanding performance and a strong position in a highly competitive and rapidly changing environment.

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