

The Necessity of Adopting Activity Based Costing in Mechanical Industrial Enterprises in the State of Constantine

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Abstract: This study advocates for the adoption of activity-based costing systems by mechanical industrial enterprises in state of Constantine, while also identifying obstacles to their implementation. Employing a descriptive analytical approach, the research distributed 40 questionnaires among these enterprises, with 35 deemed valid for analysis. Data processing was conducted using the (SPSS-25).

Results revealed that many enterprises still rely on traditional costing methods due to unfamiliarity with activity-based costing, with various factors impeding its adoption. This highlights the need for greater awareness and support for transitioning to activity-based costing systems in the mechanical sector.

Keywords: Activity-based costing; Costing system; Mechanical industrial enterprises; Traditional costing.

1. Introduction

The Activity-Based Cost Accounting (ABC) system emerged as a response to the lack of information related to the needs of organizations and their inability to compete as a result of the use of traditional systems, as the new system created by Kaplan and Cooper has many benefits, it has helped the organization increase its competitiveness, and is used to support strategic decisions such as pricing, designing new products or blending products as well as supporting operational decisions.

Although the activity-based costing system has been known and used for nearly 40 years, since its emergence it has been the subject of many scientific publications, and has strengthened its prevalence in the professional community in most Western countries, but many surveys have confirmed that there are difficulties that stand in the way of adopting the ABC system.

1.1. Research problematic

The research problem can be expressed by asking the following main question: the necessity of applying the cost accounting system based on activities in industrial enterprises in the mechanical sector of Constantine?

Based on the central question, and in order to cover all aspects of the topic, we decided to ask the following sub-questions:

- is there a need to adopt ABC in industrial enterprises in the mechanical sector of Constantine?

- Are there any obstacles lead to in industrial enterprises in the mechanical sector in Constantine not adopting the system of cost accounting based on activities?

To investigate the research questions outlined above, the following hypotheses were proposed:

- the necessity of changing from the application of traditional cost systems and switching to the ABC system in mechanical manufacturing enterprises in the state of Constantine.

- There are obstacles that make the implementation of activity-based costing difficult in mechanical manufacturing enterprises in the state of Constantine.

The study of the subject of "The necessity of adopting Activity Based Costing in mechanical manufacturing Companies in the state of Constantine" with its various variables and the attempt to link these variables makes us use the descriptive analytical approach in the theoretical aspect, while on the practical side, we will apply it to industrial enterprises in the mechanical sector in the state of Constantine, to test the validity of the hypotheses set or not.

1.2. Research Aims

This research aims to achieve the following:

- Familiarization with the cost systems adopted in industrial enterprises in the mechanical sector of Constantine.

- Highlight the need for the enterprises in the mechanical sector to implement a cost accounting system based on activities.

- Identify the main difficulties that stand on the possibility of applying the cost accounting system on the basis of activities.

2. Theoretical framework of the study

This section will delve into the theoretical aspects of Activity Based Costing (ABC)

2.1. Definition of ABC system

Life has changed, and businesses along with their requirements have evolved as well. Despite minimal advancements in traditional costing methods, small enterprises continue to rely on them. Small business owners acknowledge the significance of functions such as logistics, IT, and customer service, which play a crucial role for both the business and its clientele. The accounting model is designed to illustrate how to leverage excess resources for future advantages.

Activity-based costing, also known as ABC, is a methodology that allocates costs to activities and products. Its objective is to offer businesses more accurate data to facilitate cost-effective decision-making. ABC diverges from conventional costing methods by attributing costs according to activities rather than labor or machine hours. (Zamrud & Abu, 2020)

2.2. Historical Background

Many businesses, including Alcoa, AT&T, Kodak, and General Motors in the US, embraced this new costing model as a result of ABC's success and clear advantages. These days, ABC is used all over the world in a variety of fields and sectors, such as accounting, engineering, marketing, logistics, and so forth. In fact, a recent survey by the Consortium of Advanced Management-International (CAM-I) revealed that more than 85% of Fortune 1000 companies have either implemented ABC or plan to do so. (Kitsantas et al., 2020)

In response, Kaplan and Cooper created Activity Based Costing (ABC), a novel and cutting-edge management accounting approach, in the middle of the 1980s. This new costing

system is innovative in that it emphasizes the cost of activities as the primary cost driver; that is, the overall cost of a product is determined by adding up the costs of all the activities needed to produce it. When it comes to determining the cost of specific items and services, ABC offers significantly more accurate measurements than traditional costing approaches, which base their cost driver on one or a small number of volume-related indicators. This is particularly pertinent to the industrial sector because of the enormous resources and complexity involved. (Ghouzi, 2021)

US enterprises, especially in the manufacturing sector, had to contend with a fast-evolving economic climate in addition to fierce competition from overseas during the 1960s and early 1970s. The outdated costing methods were no longer able to provide precise estimates of manufacturing costs since they were mainly concerned with assigning direct costs and indirect costs to items based on a single overhead cost driver, like machine hours or direct labor hours. The diversity and complexity of products, as well as the manufacturing and administrative processes, were the causes of this, as were the rising overhead expenses brought on by the need for additional facilities and equipment to support the altered operation. (Ghandour, 2021)

2.3. *Benefits and Limitations*

This method has many Benefits and Limitations, the most important of which are the following: (Zamrud & Abu, 2020)

-Activity Based Costing (ABC) provides detailed expense information for manufacturing, services, and other activities.

-It allows pinpointing overhead sources accurately, enhancing cost management.

-ABC aids in evaluating project effectiveness and expenses for continuous improvement.

-This method aligns with Lean Manufacturing philosophy, focusing on waste reduction.

-ABC facilitates project measurement and budgeting, prioritizing successful endeavors.

-Its application extends beyond cost accounting, encompassing broader management activities (ABM).

-ABC enhances profitability by identifying value-added processes and cost reduction opportunities.

-It ensures true overhead costs are integrated into product design, preventing over-design issues.

-ABC supports sustainable product development by minimizing resource use and waste.

-Ultimately, ABC fosters cost efficiency, environmental responsibility, and business competitiveness.

2.4. *Challenges in Implementing Activity Based Costing*

Implementing ABC presents its first set of challenges: data collecting and accuracy. Meaningful results require collecting comprehensive data and examining it for cause and effect links. Employee resistance to change presents another difficulty because it could expose inefficiencies and jeopardize job security. Significant financial and time expenditures are associated with implementing ABC, including system modifications and training. Implementing ABC can increase competitiveness and provide long-term value despite these difficulties. (Quesado and Silva2021)

2.4.1. *Data Collection and Accuracy*

The main challenge in using an activity-based costing system is the quality of data, as errors can lead to misleading conclusions and incorrect judgments. Inaccuracies often stem from defining activities and collecting data, with traditional methods like self-reported time and manual studies prone to errors. Recent trends show a shift towards business process

management and information technology systems for improved accuracy in data collection. Despite advancements, challenges like data integrity and departmental perspectives continue to impact reliable activity-based costing analysis. Failure to produce accurate data can result in dislocation costs and internal dysfunction within organizations. (Al-Dhubaibi, 2021)

2.4.2. Resistance to Change

People's fear of having their positions rationalized or abolished makes resistance to change a major problem in the context of activity-based costing. The strongest resistance are the highly competent and personally impacted individuals. Employee resistance is more likely when they have less control over the processes under examination. Another reason for resistance is a fear of losing status and authority. Modifications in performance measurement may also cause resistance, especially if they pose a risk to an individual's livelihood. It is necessary to determine the resistance-causing factors and their detrimental effects. (Pietrzak et al., 2020)

2.4.3. Cost of Implementation

The cost of implementing Activity-Based Costing (ABC) has sparked significant controversy. There are two main aspects to this debate. Firstly, many argue that the perceived high cost of ABC outweighs the benefits it offers, leading to a low benefit-to-cost ratio. Consequently, potential adopters often shy away due to the substantial cost involved, resulting in many failed implementations. Secondly, the debate emphasizes that costs are inevitable with any change, making it a challenging aspect to navigate. This perspective tends to discourage potential adopters and further solidify the negative view of ABC's expenses. Despite this, one notable advantage of ABC is its ability to reduce overheads and cut costs, creating an ironic situation where a cost-saving tool is seen as excessively expensive. (Quesado and Silva2021) It helps to have a sense of what ABC cost is and how it is incurred in order to extrapolate whether or not it is unreasonably large. Basically, the costs that are most frequently incurred are those associated with purchasing the software suite, hiring a consultant, training users, and managing the risk of having a high turnover rate among trained users. Generally speaking, the price might be anywhere from \$4,000 for a specialized reporting tool with basic activity drivers to \$40,000 for an off-the-shelf package (whole cost = purchase price + setup cost) and up to \$250,000 for more complex applications, depending on how sophisticated the software is. (Tsai et al., 2024)

2.5. The Activity Based Costing in industrial enterprises

The evolution of the modern manufacturing enterprise to just-in-time and total quality management has led to a detailed and integrated attention across what can be broadly thought of as the three factors of production: material, labor, and overhead. Although the traditional accounting system, which accrued fixed overhead to products based upon labor or machine hours, was often maligned, it was an integrated system that used more than just our intuition or perception to assign costs. Activity-based costing is a methodology that identifies and matches important activities throughout an organization with the costs of such activities. Activities are said to place a demand on resources. In the aggregate, activity-based costing is considered a best practice in the calculation of product costs. (Al-Dhubaibi, 2021).

3. Practical framework

In this section will delve into the practical applications of the study.

3.1. Study Tool

As we mentioned earlier, the questionnaire was used as a primary source of study, where the questionnaire was written by selected academics and their opinions and observations were taken, and we then made the necessary adjustments to appear as it is in the annex to the study,

Ordinal scales were employed in this study. An ordinal scale employs integers arranged in

either ascending or descending order to rank or rate facts. The numbers (1,2,3,4,5) allocated to the significant points do not denote absolute values or a uniform spacing between scales. All they are numbers on labels. The following are our findings based on the Likert scale:

Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
Scale	1	2	3	4	5

The Student's t-test will be used to reject or accept the hypotheses, as it is the most appropriate test for accepting or rejecting the hypotheses.

the study was divided as described in the annex into three sections:

section one: The characteristics of the research sample, including age at work, degree of education, and occupation.

section two: It contained one main axis, which is as follows: The independent variable is the presence of factors that made traditional costing systems insufficient to determine the cost of products. The variable was measured through 5 questions.

section three: This axis was divided into three sections, i.e. three independent variables, each variable contained a set of questions. The first variable represented the lack of management's conviction of the necessity of adopting a cost-based cost accounting system, while the second variable represented the lack of expected information systems that hindered the implementation of a cost-based cost accounting system. The last variable was the accountants' lack of awareness of the importance of the institution's application of a cost-based cost accounting system.

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3.2. Population and sample of the study

The study included officials in industrial enterprises in the mechanical sector in Constantine, 40 questionnaires were distributed, the number of questionnaires recovered reached 40 questionnaires and 5 questionnaires were rejected, and the following table shows the demographic characteristics of the study sample.

The questionnaire was distributed to those responsible for the analytical accounting department, the production department, the finance department, and others, due to their knowledge and familiarity with the subject of our study.

A - Age

Table 1. Frequency and percentage of age

	Frequency	Percentage
25-35	4	11,4
36-45	18	51,4
46-55	13	37,1
Total	35	100

Source: Based on the output of SPSS25

B - Scientific qualification

Table 2. Frequency and percentage of Scientific qualification

	Frequency	Percentage
Higher technician's certificate	13	37,1
proficiency certificate	2	5,7
University diploma	20	57,1
Total	35	100

Source: Based on the output of SPSS25

C -Job title

Table 3. Frequency and percentage of Job title

	Frequency	Percentage
Senior Management Officer	7	20
Official in the production department	7	20
Responsible for the analytical accounting department	7	20
Responsible for the Management Control Section	7	20
Other Sections	7	20
Total	35	100

Source: Based on the output of SPSS25

D - Seniority in job

Table 4. Frequency and percentage of Seniority in job

	Frequency	Percentage
From 1to 10 years	11	31,4
From 11to 20 years	20	57,1
From 21 to 30 years	4	11,4
Total	35	100

Source: Based on the output of SPSS25

3.3. Analysis of study data

3.3.1. Analysis of data for the first hypothesis

There is a need to shift from traditional costing systems to cost-based and cost-effective costing systems in mechanical manufacturing enterprises in the state of Constantine.

Table 5. Frequency Distribution and Percentages of the Responses of necessity of changing from the application of traditional cost systems and switching to the ABC system

		N	Percentage marginal
1-The company records a significant increase in indirect costs	agree	12	34,3%
	Strongly agree	23	65,7%
2-Many products are manufactured at the enterprise level.	agree	12	34,3%
	Strongly agree	23	65,7%
3-The difficulty of determining the costs of each product accurately	neutral	7	20,0%
	agree	12	34,3%
	Strongly agree	16	45,7%
4-The difficulty of accurately determining the profitability of each	disagree	2	5,7%
	neutral	3	8,6%
	agree	14	40,0%

product	Strongly agree	16	45,7%
5-There's too much competition in the markets.	agree	20	57,1%
	Strongly agree	15	42,9%
Valide		35	100,0%
Manquant		0	
Total		35	

Source: Based on the output of SPSS25

The outcomes listed in the above table are as follows:

- That all officials polled (100%) stated the company records a significant increase in indirect costs as well for the second and final question

- 80% of officials believe that it is difficult to accurately determine the costs of each product.

-85,7% of officials believe that it is the difficulty of accurately determining the profitability of each product.

Based on the prior findings, it is evident that the officials being studied are in agreement with the necessity of implementing the ABC system and doing away with the conventional costing systems to a high degree in all categories (strongly agree and agree).

The mean and standard deviation of the questions pertaining to the preceding hypothesis are displayed in the following table.

Table 6. The t-test about the need to convert from using old cost systems to the ABC system

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	t	ddl	Sig. (bilatéral)	mean difference	The 95% confidence interval for the mean difference	
					Inf	Sup
the need to convert from using old cost systems to the ABC system	26,228	34	,000	1,95143	1,8002	2,1026

Source: Based on the output of SPSS25

The results of a one-sample t-test strongly suggest that there is a high need to move to ABC system. The observed mean difference of 1.95143, coupled with a p value of less than 0.0005, provides compelling evidence to reject the null hypothesis and verify Hypothesis H1. The 95% confidence interval for the mean difference, which ranges from 1.8002 to 2.1026, reinforces this conclusion.

3.3.2. Analysis of data for the second hypothesis

There are obstacles that make the implementation of activity-based costing difficult in mechanical manufacturing enterprises in the state of Constantine.

Three primary questions were posed in order to confirm or refute the hypothesis's validity. The questions are followed by their respective sub-questions:

3.3.2.1. Axis one: Management is not convinced of the need to adopt a ABC system

Table 7. Frequency Distribution and Percentages of the Responses of Axis one

		N	Percentage marginal
1- ABC is a new concept unknown at responsible administrative levels.	Strongly disagree	5	14,3%
	Disagree	4	11,4%
	Agree	12	34,3%
	Strongly agree	14	40,0%
2- According to your department, there is no need to adopt ABC on the grounds that the cost system currently in use is sound.	Disagree	9	25,7%
	Neutral	1	2,9%
	Agree	9	25,7%
	Strongly agree	16	45,7%
3- Senior management considers that the costs of introducing a modern system such as ABC outweigh the benefits expected from its implementation.	Strongly disagree	1	2,9%
	disagree	8	22,9%
	Neutral	2	5,7%
	Agree	11	31,4%
	Strongly agree	13	37,1%
4- Senior management isn't ready to spend money on modern equipment to help implement the ABC system.	Strongly disagree	1	2,9%
	disagree	8	22,9%
	Agree	8	22,9%
	Strongly agree	18	51,4%
5- Senior management believes that the cost of using ABC experts from outside is very high.	Strongly disagree	2	5,7%
	disagree	6	17,1%
	Neutral	3	8,6%
	Agree	6	17,1%
	Strongly agree	18	51,4%
Valid		35	100,0%
wanting		0	
Total		35	

Source: Based on the output of SPSS25

1-74,3% of officials answered that ABC is a new concept unknown at responsible administrative levels.

2-71,4% of officials stressed that it is not necessary to adopt ABC on the grounds that the cost system currently in use is sound.

3-68,5% of respondents considered that the costs of introducing a modern system such as ABC outweigh the benefits expected from its implementation.

4-74,3% of officials who responded to this survey confirmed that senior management isn't ready to spend money on modern equipment to help implement the ABC system.

5-68,5% of officials answered that Senior management believes that the cost of using ABC experts from outside is very high.

3.3.2.2. The second axis: the lack of awareness of accountants of the importance of the institution's application of the ABC system

Table 8. Frequency Distribution and Percentages of the Responses of second axis

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		N	Percentage marginal
1-There are no qualified accountants in the enterprise to design an ABC system.	neutral	2	5,7%
	Agree	15	42,9%
	Strongly agree	18	51,4%
2-There are no experts to call upon in the field of ABC system.	neutral	2	5,7%
	agree	13	37,1%
	Strongly agree	20	57,1%
3-There are no consulting centers specialized in the development of cost systems	agree	13	37,1%
	Strongly agree	22	62,9%
4-The lack of training and awareness courses by universities and institutes to highlight the need to adopt modern cost accounting systems.	agree	12	34,3%
	Strongly agree	23	65,7%
5-Absence of a guiding role for auditors to implement the ABC system.	agree	13	37,1%
	Strongly agree	22	62,9%
6-Neglect of senior management of the need to train its workers in modern cost accounting systems.	neutral	9	25,7%
	agree	10	28,6%
	Strongly agree	16	45,7%
Valid		35	100,0%
wanting		0	
Total		35	

Source: Based on the output of SPSS25

-that 94,3% of respondents considered that there are no qualified accountants in the enterprise to design an ABC system

-that 94,2% of respondents agreed that there are no experts to call upon in the field of ABC system

-As for the third, fourth and fifth questions, the answers were in full agreement

-that 74,3% of respondents confirmed that Neglect of senior management of the need to train its workers in modern cost accounting systems.

3.3.2.3. The third axis: the lack of expected information systems hindered the implementation of the cost accounting system on the ABC.

Table 9. Frequency Distribution and Percentages of the Responses of third axis

		N	Percentage marginal
1-The enterprise does not rely mainly on computers and automated data processing at all levels.	neutral	5	14,3%
	agree	13	37,1%
	Strongly agree	17	48,6%

2-The enterprise does not use an ERP system.	Strongly disagree	10	28,6%
	Strongly agree	25	71,4%
	agree	17	48,6%
3-The enterprise does not use the MES	Strongly agree	18	51,4%
4-The enterprise does not use the BI	agree	16	45,7%
	Strongly agree	19	54,3%
Valid		35	100,0%
wanting		0	
Total		35	

Source: Based on the output of SPSS25

- That 85,7% of those surveyed attested to the fact that the enterprise does not primarily rely on computers and automated data processing at all levels.

-That 71,4% of respondents agreed that the enterprise does not use an ERP system.

-Regarding the third and fourth questions, all the answers were in agreement.

Table 10. The t –test about There are obstacles that make the implementation of activity-based costing difficult.

	t	ddl	Sig. (bilatéral)	mean difference	The 95% confidence interval for the mean difference	
					Inf	Sup
There are obstacles that make the implementation of activity-based costing difficult	18,011	34	,000	1,73048	1,5352	1,9257

Source: Based on the output of SPSS25

Based on the t-test results of one-sample t-test with a t-value of 18.011 and 34 degrees of freedom, the statistical analysis revealed a substantial and statistically significant distinction between the sample mean and the assumed population mean. The associated p-value of 0.000, well below the traditional alpha level of 0.05, suggests that the observed variance is highly unlikely to have arisen by random chance alone, providing strong support for the rejection of null hypothesis in favor of the alternative hypothesis (H1).

The average difference of 1.73048 between the sample mean and the assumed population mean confirms the significant observed deviation. Furthermore, the 95% confidence interval for the average difference, which runs from 1.5352 to 1.9257, indicates a high level of confidence that the actual difference in the average population falls within this range.

In conclusion, the results strongly advocate the rejection of the null hypothesis and verify the hypothesis with obstacles and obstacles to the implementation of the ABC system.

4. Conclusion

The study arrived at the following results after examining participant responses to the inquiry and examining the study data:

1- The industrial establishments in the mechanical sector in Constantine are characterized by technological development, which resulted in the diversity and complexity

of the production process, which made it necessary to apply the ABC system.

2- The increasing competition in this sector has made price variation an important factor for the adoption of the ABC system, and this will help to determine the cost of the product accurately and thus determine the competitive price.

3- Industrial enterprises in the mechanical sector must switch to the ABC system and abandon traditional systems that have become insufficient to determine the cost of products accurately due to the increasing indirect costs in this sector in addition to other reasons, as we mentioned earlier in the first hypothesis;

4- It was also shown through the second hypothesis and the questions that were asked that there are difficulties and obstacles to the application of this system in several respects, starting with the administration that is ignorant of this system and is not ready to apply it financially, as well as the lack of experience of accountants and finally the lack of advanced information systems that facilitate the application of the ABC system.

The following is a summary of the most significant recommendations, which are based on the earlier conclusions:

1- The need for senior management to plan the transition from the traditional system to the ABC system through:

2- The use of experts and consultants with sufficient experience in the field of application of the ABC system.

3- Holding awareness courses at all levels of the institution on the importance of the ABC system in order to have cooperation among them to ensure the success of its application.

4- Carrying out training courses for accountants and auditors.

5- Using advanced systems such as ERP and MES as well as BI to be able to implement the ABC system.

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