



From Apparent to True Customer Profitability: An Applied Study Using Insights from Attribute-Based Costing and Hidden Cost Accounting

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Abstract_____ This study expands on the results of our previous research on the Attribute-Based Costing System (ABCII) and its contribution to cost measurement and rationalization, resource consumption management, and strategic decision-making. Accordingly, the present study does not seek to replicate the assessment of these effects; rather, it builds upon the findings of the previous research as a methodological foundation for advancing the analysis through the integration of hidden cost accounting. In this context, an integrated model was developed to link the cost of cable products determined under the Traditional Costing System and the ABCII System to move from apparent customer profitability toward true customer profitability by incorporating measurable hidden costs. The model was empirically applied using the revenues generated by ten customers, leading to several key findings. The findings suggest that variations in the product cost between the Traditional Costing System and the ABCII System directly affect customer profitability, either increasing or decreasing it. The obtained results show that the lower product cost calculated by ABCII leads to higher profitability, while the higher cost calculated by the Traditional Costing System leads to lower profitability. This finding supports the view that accurate cost measurement is an essential foundation for the efficient management of profitability. In addition, the hidden cost accounting model, which uses the outputs of the ABCII System, represents a further advancement in expanding the scope of the analysis beyond the simple calculation of costs associated with product features and specifications. The analysis is extended to customer service costs and measurable hidden costs. This provides an empirical basis for assessing the impact of including these costs on true customer profitability.

Keywords: Cost; Activities; Attribute-Based Costing System; Cost Accounting; Hidden Costs.

JEL CLASSIFICATION : M41, M31, M49.

1. Introduction:

The rapid changes occurring in the contemporary business environment, driven by globalization and technological advancement, have been accompanied by the continued evolution and intensification of customer requirements and needs in line with the ongoing development of

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digital technologies. Consequently, the success and growth of organizations no longer depend only on the development of their products or services, but increasingly on their ability to manage organizational resources efficiently. This, in turn, requires effective measurement and management of the true cost of serving customers and support sound financial and managerial decision-making. As a result, organizations seek to enhance their revenues and profitability, thereby strengthening their competitive advantage. The financial management function is increasingly required to develop appropriate methods and tools to ensure the provision of adequate, accurate, clear, and relevant financial information and data to managerial decision-making. Such information is essential for supporting pricing decisions, managerial control, timely decision-making, cost reduction, and revenue maximization. However, many organizations have overlooked the importance of maximizing customer value, as they continue to rely primarily on indicators based on apparent profit margins. Consequently, achieving sustainable profitability at the individual customer level requires a comprehensive approach to customer profitability measurement, particularly given that a considerable number of customers consume substantial organizational resources whose impact is not clearly reflected in traditional accounting reports, such as customer service costs, urgent orders, complaints, rework, collection-related costs, and other customer-specific costs. Therefore, information that enables management to reassess and evaluate customers constitutes a valuable basis for managerial decision-making. Such information allows organizations to re-rank and reclassify their customers according to their actual profitability, thereby supporting decisions aimed at retaining profitable customers who make a significant contribution to overall profitability, while enabling organizations to reconsider their relationships with customers whose profitability is low or negative. As part of the ongoing efforts to advance cost measurement systems, the two researchers have undertaken several studies throughout their research trajectory on the Attribute-Based Costing System (ABCII), which has demonstrated its ability to enhance, rationalize, and improve the accuracy of cost measurement and to allocate resources according to the characteristics and specifications of product requirements and, subsequently, customer requirements. However, the present study focuses primarily on advancing the cost measurement framework itself, while the utilization of its outputs to construct a more comprehensive model for measuring true customer profitability remains an area that warrants further investigation. In this light, the present study constitutes a natural extension of our previous research. It does not seek to retest the effectiveness or efficiency of the ABCII; rather, it builds upon its outputs as an accounting framework capable of providing more accurate information on patterns of resource consumption. On this basis, the study develops an applied model for measuring true customer profitability by integrating customer service costs and measurable hidden costs, while examining their impact on the reclassification of customers and the enhancement of managerial decision-making. Based on the foregoing, this study seeks to develop an integrated applied framework that moves beyond the mere measurement and rationalization of costs toward the measurement of true customer profitability. This is achieved by integrating the outputs of the ABCII with customer service costs and measurable hidden costs, with particular emphasis on their implications for pricing, service-level decisions, and customer relationship management.

1.1 Main Research Problem



“To what extent does the traditional accounting perspective overstate or understate customer profitability when customer service costs and measurable hidden costs are incorporated based on the outputs of the ABCII ?”

1.2 Research Hypotheses

H1: Customer profitability differs between the traditional accounting perspective and the customer profitability measure obtained after incorporating customer service costs and measurable hidden costs based on the outputs of the ABCII.

H1-1: There is a difference between the product cost determined under the traditional accounting perspective and that determined based on the outputs of the ABCII System.

H1-2: The incorporation of customer service costs and measurable hidden costs creates a substantive difference between apparent customer profitability and true customer profitability.

H1-3: The incorporation of customer service costs and measurable hidden costs leads to the re-ranking and reclassification of customers according to their profitability.

1.3 Significance of the Study

The significance of this study is based on several key points. Most importantly, it contributes to enriching the accounting literature by integrating customer profitability analysis, customer service costs, and measurable hidden costs in the framework of the ABCII, which provides a more accurate basis for determining the true cost of the product. The study also points out the deficiencies of traditional cost accounting systems that are largely based on visible and direct product costs and may accordingly not provide a proper measure of customer profitability. In particular, customer profitability may be overstated or understated when costs of customer service and measurable hidden costs are ignored. This research has both strategic and practical significance. Its purpose is to develop a practical framework for the organization in question to calculate the actual cost of serving each customer, thus improving the precision of customer profitability assessment and facilitating more effective profitability management. This approach helps distinguish highly profitable customers from low-profitability customers. It helps identify customers whose service requires greater consumption of organizational resources. The proposed framework can also support managerial decision-making in various areas, such as pricing strategies, sales terms and conditions, service level management, resource planning, profitability improvement, and customer relationship management. The present study contributes to improving decision-making on customer portfolio management and optimization by providing a more complete picture of resources and costs attributable to individual customers.

1.4 Research Objectives

The primary objective of this study is to provide an applied extension of our previous research, particularly the study conducted at ENICAB, entitled “Determining the Optimal Product Cost Using the ABCII Attribute-Based Costing Technique: A Case Study at the ENICAB Electrical Cable Manufacturing Company in Biskra.” In that study, the ABCII System was applied to one of the key cable products, H07V-U 2.5 mm² 450/750 V, with the aim of determining its cost in a more accurate and reliable manner. While the previous study focused on determining product cost based on the product’s attributes and specifications in accordance with customer requirements, the present study advances the analysis to the subsequent stage by utilizing the outputs generated by the ABCII System. The objective is to develop a more comprehensive method of customer profitability



analysis, which includes customer service costs and measurable hidden costs, and to explain why these cost elements can be overlooked in conventional accounting systems. Specifically, the present study aims to achieve the following objectives:

- To extend and develop the findings of the previous study conducted at ENICAB, an electrical cable manufacturing company, which identified the steps of calculating the cost of the product according to its specifications using the ABCII System.
- To develop a framework for measuring customer service costs rather than focusing solely on product costs by identifying the various resources and costs incurred by the organization to meet the requirements of its customers regarding the product under study.
- To uncover measurable hidden costs of customer service that are not explicitly recognized or fully captured by traditional accounting practices.
- To evaluate the effect of including these costs on customer profitability and to determine whether neglecting them results in an overstatement or understatement of actual customer profitability.
- To evaluate the extent to which the outputs of the ABCII can support customer profitability analysis when complemented by customer service costs and measurable hidden costs.
- To examine the feasibility of moving from the concept of product cost to that of overall customer profitability, thereby providing a more comprehensive basis for managerial and marketing decision-making.
- To develop an integrated analytical model that combines product cost under the traditional accounting framework, the outputs of the ABCII, customer service costs, and measurable hidden costs, with the aim of achieving a more accurate and transparent assessment of customer profitability.

1.5 Previous Studies

❖ Study: (Guerreiro, Rodrigues, & Villamor, 2008)

The objective of this research was to investigate the usefulness of measuring the cost of customer service for customer profitability management. This is done by analyzing the relationship between the cost to serve each customer and the profitability of the customer. The research was conducted in a Brazilian food-processing company, with complex operations and diverse products and commercial services. The results indicated that measuring the cost of serving each customer provides detailed and accurate information that permits more complete analyses of customer profitability than traditional methods. The results also show that including the cost of customer service in the profitability analysis can help organizations to better determine the actual profitability of customers, thus improving the effectiveness of managerial decision-making related to customers.

❖ Study: (Khelaifa & Metidji, 2023)

The objective of this study was to develop an applied model of the ABCII aimed at rationalizing and reducing production costs. The study was conducted in a corrugated cardboard manufacturing company in Algeria, through interviews with production and sales managers and an analysis of one of the company's major production lines. The findings demonstrated that the ABCII System can significantly contribute to the rationalization of production costs and to achieving a more accurate determination of product costs. The study also revealed that the organization under investigation had not sufficiently adopted modern strategic cost management systems, particularly Activity-Based Costing (ABC) and ABCII. For this reason, this study provided the basis for the



present research because of its contribution to linking costing systems with cost rationalization, thereby providing a basis for determining the true internal cost of the product.

❖ **Study: (Kelaifa, 2025)**

This study aims to propose a conceptual framework of the ABCII as an advanced costing approach beyond the traditional costing systems. The proposed system aims to find the true cost of a product based on the set of attributes and specifications that make up the product. The research was carried out in the electrical cable manufacturing company ENICAB, where a specific type of cable was chosen for the analysis. The study calculated the product cost on the basis of its attributes and specifications, and the positive variance shows that the ABCII approach is more accurate and reliable in the computation of product cost as compared to the traditional costing used by the company.

❖ **Study: Food and Agriculture Organization (FAO) (Markandya, 2023)**

This study aims to review the methods and data required to estimate the hidden environmental, health, and social costs of agri-food systems using the True Cost Accounting (TCA) approach. The study shows that the hidden costs in agri-food systems are huge, providing a strong rationale for action at the global and national level. The study recommends using secondary data sources when primary or empirical data are not available, with the support of research institutions where necessary. It emphasizes the importance of contextualizing the methodologies of TCA to the data availability and institutional capacities of the different countries, especially for those countries with significant data limitations for the proposed methodological solutions. It also suggests that the TCA approach can offer a helpful basis for supporting evidence-based decision-making and for guiding policies to address the wider environmental, health and social impacts of agri-food systems.

❖ **Study: Institute of Socio-Economics of Enterprises and Organizations (ISEOR) (Savall & Zardet, 2024-2025)**

This paper addresses the organizational and managerial dimension, defining hidden costs as a consequence of organizational dysfunctions. What makes it important is that it can convert qualitative indicators of dysfunction to quantifiable monetary values. The study was conducted in the retail sectors of France, the United States, and Mexico. The results show that hidden costs could represent 30% to 50% of the total operating costs of the studied organizations. Research has identified five major signs of dysfunctional organizations: absenteeism, employee turnover, workplace accidents, poor quality, and low productivity. To solve the costs, the suggested method is the development of a framework for participatory management. It ties the incentives of employees to the reduction of costs.

❖ **Study: (Ramzi, Ridzwan, Baharudin, Firdaus, & Mohamad, 2023)**

The present study seeks to draw attention to the role of technology and digital transformation in discovering hidden costs that appear as a consequence of conflicts of interest in organizations. The study was conducted in Malaysia and Southeast Asia, focusing on small and medium-sized enterprises (SMEs). One of its important findings is that digital infrastructure leads to a substantial decrease in costs, and it confirms a positive relationship between the quality of management accounting systems and the capacity to identify and resolve hidden deviations in the budget.

❖ **Study: (Croes & Vermeulen, 2015)**

This study aims to develop a comprehensive method for identification and quantification of hidden costs of products in different stages of their life cycle and supply chain. Such costs can cause



project failure if they are unaccounted for or under-evaluated. The paper critically reviews traditional Life Cycle Costing (LCC) approaches and suggests that they are heavily biased toward environmental dimensions, while struggling to incorporate social dimensions and supply-chain considerations holistically. As a result, the paper suggests a life-cycle-based approach and a product-oriented bottom-up methodology that combines hidden costs from earlier stages with the costs generated in each subsequent stage, and translates them into monetary values. One of the main findings is that indirect compliance costs are identified as a factor limiting profitability. The proposed approach focuses on the use of Life Cycle Assessment (LCA) as a complementary tool to identify potential hidden costs before they arise. Moreover, the study confirms that failure to account for such costs in the short run can lead to substantial losses in the long run. In general, the study establishes a link between the product life cycle, hidden costs, and supply-chain management, thus providing a more robust foundation for sustainability assessment and cost management.

❖ **Study: (Zhang, Rosca, & Pradhan, 2026)**

This research aims to review the approach of TCA by analyzing 53 studies to trace its development, evolution, and comparative applications. The results show a significant change in the TCA approach from a conceptual framework to a practical application. There is an increasing reliance on approaches that combine monetary and non-monetary measures, but there is not yet any standard way of doing this. The study also shows that the applications of TCA have been almost exclusively focused on the environmental, health, and economic aspects with the aim of contributing to social balance and sustainability. It indicates that the ability of TCA to provide a more comprehensive assessment of true cost patterns and implications makes it an important decision support tool for sustainability and pricing decisions. The study also highlights the need to increase the application of TCA and further develop and standardize its methodological framework to improve comparability, consistency, and practical usability.

❖ **Study: (Campbell & Frei, 2009)**

The objective of this study is to estimate the impact of online banking services on the volume of service consumption and on the cost of serving customers and to estimate customer profitability. The study was conducted on a sample of individual banking customers of a major bank in the United States, over a period of 30 months. The results indicate that online banking service adoption increases transaction volume and customer service costs, and decreases short-term customer profitability, while it contributes to increased customer retention rates in the longer term. The research verifies that customers' profitability is not only decided by revenues and product-related costs but also is affected by customer service costs and resources consumed by the customers on different service channels.

1.6 Research Gap

Although the literature on customer profitability analysis has been growing, previous studies have largely focused on customer profitability with ABC, ABCII, customer service cost measurement, and the Resource Consumption Accounting (RCA) approach. However, these costing approaches have been largely investigated in isolation rather than in an integrated analytical framework. The current literature has proved their importance in distributing resource consumption related to customer service. However, their joint contribution to a complete evaluation of customer profitability is still comparatively modest. Against this backdrop, the present study seeks to integrate Attribute-Based Costing with the systematic measurement of measurable hidden costs



attributable to customers within a unified customer profitability framework. Costs arising from the complexity of customer requirements, frequent orders, urgent orders, complaints, returns, rework, collection efforts, and additional administrative activities may not be adequately captured by conventional customer profitability analysis approaches. Thus, in this paper, an applied model is proposed, which combines Attribute-Based Costing, customer service costs, and measurable customer-related hidden costs. The model is intended to test whether the inclusion of these cost elements makes a material difference between apparent and true customer profitability, and if this difference in turn results in changes in the rank and classification of customers based on their actual profitability. The previous studies related to customer profitability analysis have mainly been on customer profitability analysis through ABC, ABCII, customer service cost measurement, and the RCA approach, although the literature on this subject is increasing. However, these costing approaches have not been examined within an integrated analytical framework, but rather in isolation. Existing literature has shown their relevance for the allocation of resource consumption associated with customer service, but their combined contribution to a comprehensive assessment of customer profitability is relatively limited. In this context, the present study aims to integrate Attribute-Based Costing with the systematic measurement of measurable customer-related hidden costs within a single customer profitability framework. Conventional customer profitability analysis approaches may not fully reflect the cost of the complexity of customer requirements, frequent and urgent orders, complaints, returns, rework, collection efforts, and other administrative activities. Thus, this research proposes an applied model that integrates Attribute-Based Costing, customer service costs, and measurable customer-related hidden costs. The model addresses the question of whether the inclusion of these cost components creates a material gap between apparent and true customer profitability and if such a gap therefore changes the ranking and classification of customers by actual profitability.

1.7 Scientific Contribution

The scientific contribution of this study is to extend the researchers' previous work by providing a more complete view of cost and profitability analysis. It also helps explain the link between costs, customer behavior, and profitability and provides useful support for strategic cost management. Table 1 summarizes the main scientific contributions of the present study compared with the researchers' previous studies.

Table 1. Scientific contribution of the study.

Previous Studies Conducted by the Researchers	Current Study
ABCII	It serves as the basis for the present study and is not re-tested
Cost Measurement Based on Product Attributes	The study builds upon the measurement outputs
Cost Allocation	The analysis is extended to the customer level.
Cost Rationalization	
The primary focus was not on identifying and measuring hidden costs.	A primary focus on hidden costs as a core measurement dimension
Profitability from a Cost Perspective: A Theoretical Assessment	Applied measurement of true cost-based profitability



Apparent and Internal Costs	Hidden costs, apparent costs, and true costs
Ranking Customers According to Their Requirements for Product Attributes	Re-ranking customers from the organization's perspective based on their true profitability

Source: Prepared by the Researchers

2. Theoretical Framework of the Study

2.1. Customer Service Cost

Customer service cost is defined as “an analytical approach aimed at measuring all activities and costs incurred to meet customer requirements for a given product throughout the entire supply chain, from beginning to end. This approach enables organizations to monitor their costs and, consequently, strategically manage pricing and profitability.” (Kone & Karwan , 2011). Not all customers consume the same level of organizational resources. Therefore, measuring customer service costs at the individual customer level enables a more accurate assessment of customer-specific profitability. This perspective facilitates the classification of customers according to their characteristics and, consequently, the determination of the cost of serving each customer. (Kone & Karwan , 2011), According to (Kumar & Telang, 2011, pp. 5-7), product design and customization can influence customer behavior, which in turn affects the level of resources consumed by each customer. Consequently, customer behavior plays a significant role in determining the cost of serving individual customers and, ultimately, their true profitability.

2.2. Hidden Costs

The term "hidden costs" is a relatively new concept in management accounting and is largely attributed to the French scholar H. Savall, who viewed professional life from socio-economic and organizational perspectives. The following section first introduces the concept of hidden costs in general and then discusses hidden production costs in particular. Hidden costs are costs that are not identified, measured, or explicitly recognized in an organization's information systems but which influence organizational performance and profitability. They are a consequence of activities or organizational problems for which the economic consequences are not directly reflected in traditional accounting records. Such costs are not necessarily deliberately hidden but are often not measured or not recorded because the organization does not systematically identify, estimate, or build them into its costing processes. (Bektach & MokkaDEM, 2020, p. 2). Hidden costs are considered as part of the indirect manufacturing and operating costs allocated to respective cost centers according to cost accounting (Sami, Ibrahim Hamed, & Mouhame, 2026, p. 72). The difficulty in identifying and measuring these costs means that they are often not recognized or overlooked, although they are important for accurately determining and measuring the true cost of the product. In this sense, hidden costs may be regarded as actual and economically relevant costs attributable to the product that remain unrecognized by the organization. They may arise from events directly or indirectly associated with the product but are not identified, allocated, or assigned to it under the costing system currently in use. These costs can be estimated based on the actual resources consumed and subsequently allocated to the product by identifying the relevant cost drivers and activities associated with its attributes and specifications.

2.2.1. Hidden Costs as an Extension of the Outputs of the ABCII

Considering various studies on strategic cost management and their perspectives on its importance and relevance to the present study, it can be concluded that the increasing importance of



strategic cost management in current competitive conditions has broadened the scope of managerial decision-making beyond the simple reduction of costs. It is increasingly about comprehending the fundamental cost drivers and managing costs in a way that is consistent with the organization's competitive strategy, thereby creating sustainable value for customers. The ABC System is one of the most important strategic cost management tools because it gives more precise cost information by linking costs to activities and identifying the causes of costs. This enables management to identify and analyze the sources of costs and make more appropriate, strategic, and efficient decisions. Conversely, the ABCII is a process that begins at the design and planning stages and continues with the analysis of the characteristics and attributes of products and customer requirements. This allows organizations to take attribute-related considerations into account in pricing decisions and the cost structure before the costs are incurred. As a result, the combination of these two approaches may provide a more accurate basis for identifying costs that are part of hidden costs but are not directly captured by traditional costing systems. These may include costs of rework, customer complaints, returns, and other resources consumed by customer-related activities. From this point of view, the hidden cost accounting approach can be considered an extension of strategic cost management systems (especially the ABCII). It goes beyond managing visible costs and finding their underlying drivers to recognizing, measuring, and managing hidden costs. This broader view adds to the information available to management to support pricing decisions, product redesign, resource allocation, and managing customer profitability.

2.3. True Profitability Analysis

According to Hartono et al. (2021, p. 23), customer profitability analysis can generally be understood as a process that examines the service activities provided to customers and their associated cost drivers to determine the profitability of each customer or the overall profitability of the organization's customer base. According to Guerreiro et al. (2008, p. 392), most studies addressing customer service cost measurement have primarily focused on linking these costs to customer profitability analysis. Customer-specific profitability can be assessed based on the contribution of products sold to profit, less the **costs** of serving the customer. Consequently, the majority of studies examining customer service costs are closely associated with customer profitability analysis.

2.3.1. Stages of Cost Determination under TCA

The TCA process consists of four stages (Zhang, Rosca, & Pradhan, 2026, p. 6). Figure 1 presents the Stages of Cost Determination under TCA.

- **Scope Definition:** Identifying the functional unit on which the assessment will be based.
- **Measurement:** Measuring the indicators relevant to the assessment.
- **Valuation:** Converting the results obtained through the measurement process into monetary values, where appropriate.
- **Integration:** Integrating the results through monetary aggregation or non-monetary approaches, depending on the assessment perspective.

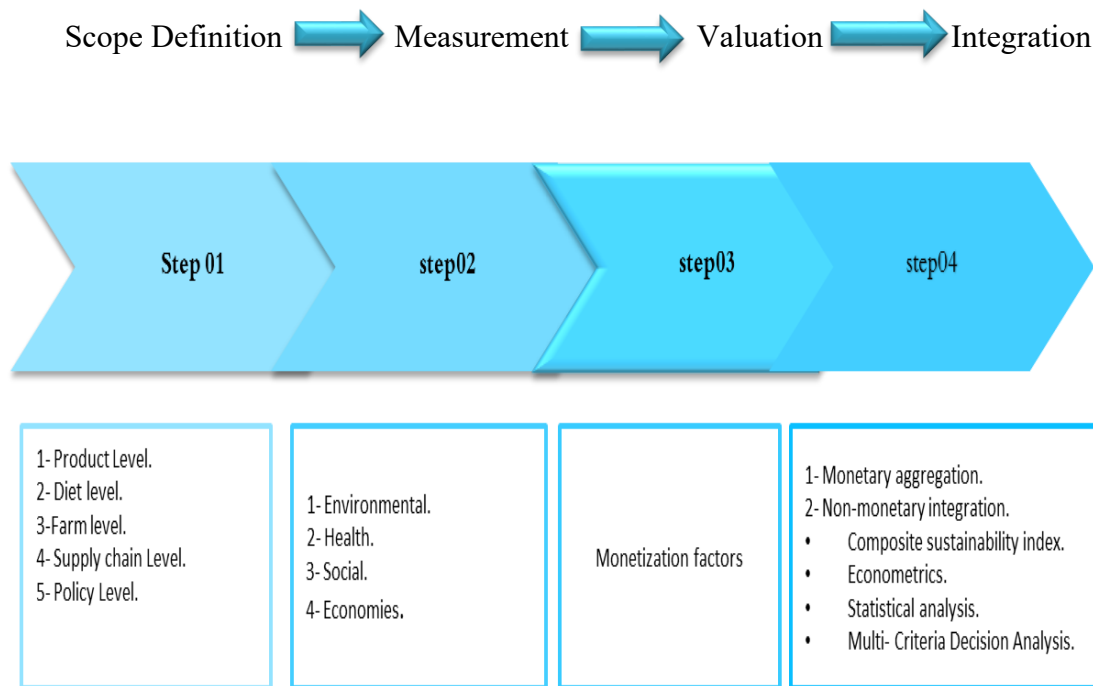


Figure 1. Stages of Cost Determination under TCA.

Source: (Zhang, Rosca, & Pradhan, 2026, p. 6)

The analysis of customer service costs, or the resources specifically allocated by the organization to serve its customers, should not be based on an equal or uniform allocation basis. Rather, these costs should be allocated according to each customer's actual share of the services and resources consumed. Consequently, differences in customers' resource consumption result in variations in the customer service costs attributable to each customer. This approach facilitates a more accurate allocation of costs based on the actual consumption of activities. Accordingly, customers should not be classified solely based on the revenues they generate, but rather according to their respective contribution after accounting for the resources consumed in serving them. This also enables a more accurate measurement of true customer profitability or the actual contribution of each customer to the organization's overall profitability.

The following relationship can thus be used to calculate true customer profitability:

$$\text{True Customer Profitability} = \text{Revenue} - \text{Product Cost} - \text{Customer Service Costs} - \text{Customer - Related Hidden Costs} \quad (1)$$

3. Applied Study

Study Period and Customer Population – Study Sample

Based on the findings we obtained from our research work entitled “**Determining the Optimal Product Cost Using the ABCII Attribute-Based Costing Technique: A Case Study at the ENICAB Electrical Cable Manufacturing Company in Biskra,**” this study extends the scope



of the analysis addressed in the previous study, which focused on measuring the optimal product cost according to its specifications. Thus, the present study expands the level of analysis and extends the research gap identified through the previous study, which necessarily calls for measuring and analyzing customer profitability according to the Attribute-Based Costing system and comparing it with the traditional costing system applied within the company. On this basis, we deemed it appropriate to focus on the strategic dimensions that ENICAB, as an electrical cable manufacturing company, seeks to achieve.

The application of the **ABCII system** in our previous research provided us with an opportunity to identify and analyze product cost in a manner that reflects the actual value of the product and is more closely related to its specifications. Accordingly, we extend the scope of application of this system to the customer level, as it is considered one of the more comprehensive systems in terms of its focus on identifying and meeting customer needs. Therefore, this study represents a transition from measuring product cost according to specifications to measuring customer profitability in light of product cost, customer service cost, in addition to measurable hidden costs that are directly and indirectly related to the customer. Accordingly, we do not limit ourselves to measuring customers' apparent profitability; rather, we seek to remeasure it after incorporating the measurable hidden costs that can be attributed to each customer, through which we can identify the significant differences in true profitability before and after the inclusion of hidden costs under each costing system applied.

In this study, we relied on the data recorded in the sales books concerning the sales volume of the product **H07V-U 2.5mm² 450/750V R100 RJ** for the month of **January 2023**, during which the total sales of the same product involved only **10 customers** who purchased this product. These are the data that we were able to obtain from the company under study despite the restrictions related to the strict confidentiality of commercial information, as the company did not permit the disclosure of total sales relating to its various products and customers. However, we were able to convince the company to provide us with this information after undertaking to use it solely for scientific research purposes. Accordingly, this number of customers was included in the analysis on the basis that they represent all customers for whom the company recorded sales transactions during the specified period. We therefore relied on the detailed data made available by the company within the reasonable limits it permitted for scientific research, which enabled us to prepare and apply the proposed model at the level of the study sample. Unlike our previous study, which focused on identifying and rationalizing costs according to specifications, the present study focuses on completing the analytical process by determining customer service costs and measuring the hidden costs associated with their transactions, ultimately leading to the determination of customer profitability in a more comprehensive and accurate manner.

Through the interviews we conducted with the targeted personnel at the company under study, we concluded that the company has no knowledge regarding the estimation of hidden costs. Rather, we found that it charges part of these costs as indirect costs without sufficient awareness that it is possible to estimate and distinguish between indirect costs and hidden costs. Accordingly, we relied on the interviews to identify and measure the hidden and apparent costs, and we obtained a set of data and information that we used in preparing our empirical study. Accordingly, the following figure illustrates the research process adopted in our study as follows:

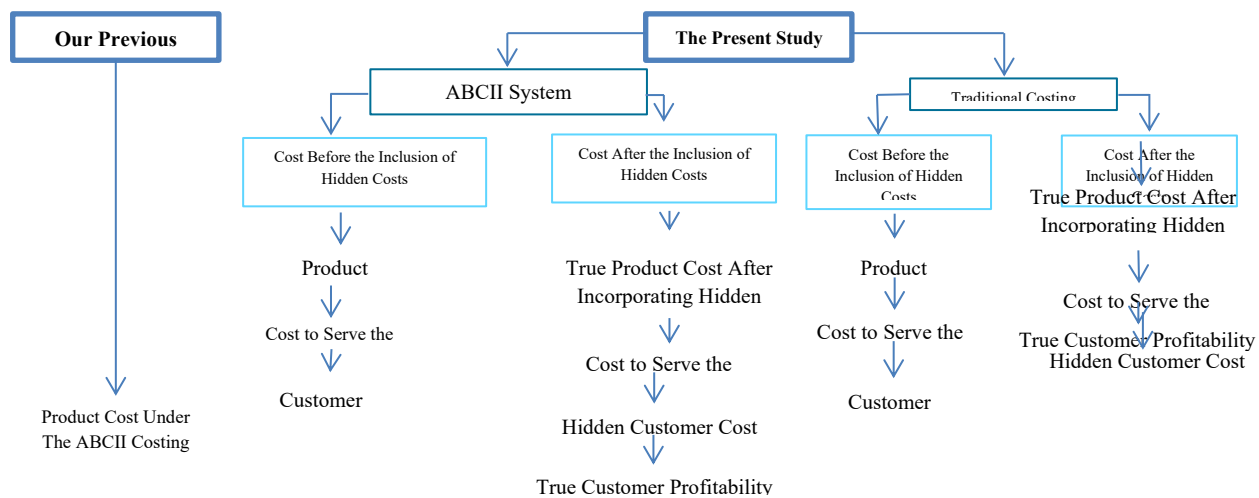


Figure 2. Research Model

Source: Prepared by the Researchers

$$TRUE_i = R_i - (C_{ABCHi} + HC_{Prodi}) - CSC_i - HC_{Custi} \quad (2)$$

Where,

R_i : Customer Revenue.

C_{ABCHi} : Product Cost Under Attribute-Based Costing of Customer i .

HC_{Prodi} : Production-related Hidden Costs.

CSC_i : Customer Service Cost i .

HC_{Custi} : Customer-related Hidden Costs i .

$TRUE_i$: True Customer Profitability i .

The organization goes through seven stages in the maturity of customer profitability measurement.

3.1 Stage One: Measuring the Cost of the H07V-U 2.5 mm² 450/750V R100 RJ Product under the Traditional Costing System

Stage one focuses on determining the production cost of the selected H07V-U 2.5 mm² 450/750 V R100 RJ product using the traditional costing system. This stage considers the direct and indirect costs incurred during the production process and determines the total production cost and cost per meter produced. The results provide the initial cost baseline for comparison with the adjusted cost obtained after incorporating hidden costs and the Attribute-Based Costing System (ABCII). Table 2 presents the cost measurement of the H07V-U 2.5 mm² 450/750 V R100 RJ product under the traditional costing system.

Table 2. Cost Measurement of the H07V-U 2.5 mm² 450/750 V R100 RJ Product under the Traditional Costing System

Cable Type	Family	Insulation Type	Product Quantity	Purchase Cost	Raw Material Consum	Total Direct Costs	Total Indirect Costs	Total Production Costs	Cost per Meter Produced
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					ed				ed
H07V-U 2.5mm² 450/750V	PFD O	Insulated	320000	28.05	8977233.99	568812.83	1309137.43	10855184.25	33.92

Source: Prepared by the Researchers Based on Appendix No.: 01,02

According to Table 2, the final cost of the H07V-U 2.5 mm² 450/750V product is determined by applying the conventional formula used to calculate product or service costs. Accordingly, the final cost of this product is calculated using the following formula:

$$\text{Production Cost} = \text{Cost of Raw Materials Consumed} + \text{Direct Production Costs} + \text{Indirect Production Costs} \quad (3)$$

$$8977233.99 + 568812.83 + 1309137.43 = 10855184.25 \text{ DZD} \quad (4)$$

The production cost per meter is calculated using the following formula:

$$\text{Production Cost per Meter} = \frac{\text{Total Production Cost}}{\text{Total Quantity Produced (meters)}} \rightarrow \frac{10855184.25}{320000} = 33.92 \text{ DZA} \quad (5)$$

Stage Two: Measuring the Cost of the H07V-U 2.5 mm² 450/750V Product Using the ABCII

After determining the cost of the product under the traditional costing system, this stage presents the product cost based on the ABCII system, as previously determined in our earlier research and adopted here as a basis for comparison with the cost calculated under the traditional system presented in Table 2. This comparison highlights the main differences in the cost allocation methodology applied during the determination of production cost. The following table presents these differences. Table 3 presents the results of using the ABCII system to determine the final cost per meter of the H07V-U 2.5 mm² 450/750V cable, which was estimated to be 32.758 DZD.

Table 3. Final cost of the H07V-U 2.5 mm² 450/750 V product specifications.

Arrangement	Specifications	Costs associated with production volume (1)	Costs associated with the activity (2)	Energy-related costs (3)	Costs associated with the decision (4)	Total specification costs (1+2+3+4) =5
1	Quality	1769730.6	28948.07	10.31538	163993.58	1994210.25
2	Pressure	1769730.6	28948.07	31537.10	163993.58	1994210.24
3	Cost	1436604.83	23499.024	25601.44	133124.11	1618829.49
4	Type	1330706.98	22988.18	25044.88	130230.19	1508970.23
5	Usage	1394964.12	22817.89	24859.37	129265.53	1571906.9

9	Color	49778.22	10216.97	11131.06	57880.09	129006.33
8	Marketing	383221.72	20433.93	22262.12	115760.17	541677.94
7	Design	677090.74	11919.80	12986.24	67526.77	769523.54
6	Thickness	165406.19	24350.44	26529.02	137947.54	354233.19
Total		8977233.98	194122.4	211490.11	1099721.63	10482568.09
Total production						320000 m
Cost of production per meter						32.758 DZD

Source: (Kelaifa, 2025, p. 1627)

This result provides a more accurate determination of the actual cost of the product's attributes, rather than allocating costs on traditional costing bases. Moreover, the cost produced by the ABCII system demonstrates that this approach provides a more detailed and accurate basis for determining the cost of products as it considers the major differences in resource use that are caused by the differences in the attributes of the products. These findings therefore provide a basis for proceeding to the next stage, namely, determining true customer profitability.

Stage Three: Measuring Customer Service Costs

This stage is one of the key steps undertaken by the organization to identify the sources of customer service costs, encompassing the various activities and resources consumed as a result of dealing with customers and providing services associated with them before, during, and after the sales process. As such, this stage is particularly important for the organization in terms of acquiring, serving, and retaining customers, as it involves the consumption of time, human and material resources, intangible resources, and logistical capacity. Customer service costs therefore vary from one customer to another; this variation is not determined solely by the amount of revenue generated, but is also associated with the complexity of dealing with each customer, the volume of services provided, and the intensity of activities required according to each customer's level of activity consumption. Consequently, this stage represents a critical step toward analyzing and determining the net true profitability of each customer. The measurement of customer service costs involves the following steps:

Step One: Identifying the Sources of Customer Service Activities

Following the field visit and interviews conducted with the relevant stakeholders in the organization under study, we identified the sources of customer service activities by surveying all activities associated with customer interactions, identifying the corresponding cost drivers, and determining the measurement unit for each activity. The information and data obtained are presented in Table 4.

Table 4. Sources of customer service activities.

Customer Service Activity	Resources Used	Allocation Basis	Quantity / Hours	Unit Cost	Total Resource Costs (DZD)
Customer Order Processing	Sales Service	Labor Hours	17 Hours	1,000 DZD/hour	17000
	Communications and Correspondence	Number of Orders	200 Orders	100 DZD/order	20000

	Administrative Supplies	Number of Orders	200 Orders	100 DZD/order	20000
Total Order Costs					57000
Invoice Preparation	Invoicing Staff	Labor Hour	32 hours	1,000 DZD/hour	32000
	Printing Supplies	Number of Invoices	200 invoices	50 DZD/invoice	10000
Total Invoice Preparation Costs					42000
Collection Follow-up	Collection Staff	Labor Hours	100 hours	1,000 DZD/hour	100000
	Telephone Calls	Number of Follow-ups	200 follow-ups	100 DZD/follow-up	20000
Total Collection Follow-up Costs					120000
Order Preparation	Warehouse Staff	Labor Hours	110 hours	1,000 DZD/hour	110000
	Material Handling Equipment	Equipment Usage Hours	100 hours	400 DZD/hour	40000
Total Order Preparation Costs					150000
Order Delivery	Transportation Vehicle	Number of Deliveries	200 deliveries	150 DZD/delivery	30000
	Delivery Driver / Delivery Worker	150 DZD/delivery	200 deliveries	150 DZD/delivery	30000
Total Delivery Costs					60000
Returns Processing	Customer Service Staff	Labor Hour	6 hours	1,000 DZD/hour	6000
	Administrative Processing	Labor Hour	6 hours	1,000 DZD/return	6000
Total Returns Processing Costs					12000
Complaints Processing	Customer Service Staff	Labor Hour	2 hours	1,000 DZD/hour	2000
	Quality Officer	Labor Hour	2 hours	2,500 DZD/hour	5000
	Telephone Calls and Correspondence	Number of Complaints	complaints	1,000 DZD/complaint	5000
Total Complaints Processing Costs					12000

Source: Authors' elaboration based on the findings of interviews conducted with the targeted personnel of the company under study, April 10, 2023.

Step Two: Identifying Customer Service Cost Pools

Following the identification of the sources of customer service activities presented in Table 04, the next step consists of grouping homogeneous activities into cost pools according to the nature of the activities and their common cost drivers. This step aims to determine the total cost of each



cost pool as a basis for subsequently allocating these costs to individual customers in proportion to their actual consumption of the relevant activities. Table 5 presents the total customer service activities and cost drivers.

Table 5. Total customer service activities and cost drivers.

Customer Service Activity	Cost Driver	Unit of Measurement	Total Activity Costs	Activity Volume	Activity Unit Cost
Customer Order Processing	Number of Orders	Order	57000	200	285 DZD/order
Invoice Preparation	Number of Invoices	Invoice	42000	200	210 DZD/invoice
Collection Follow-up	Number of Follow-ups	Activity	120000	200	600 DZD/follow-up
Order Preparation	Number of Order Preparation Activities	Activity	150000	200	750 DZD/preparation activity
Order Delivery	Number of Deliveries	Delivery	6000	200	30 DZD/delivery
Returns Processing	Number of Returns	Return	12000	6	2,000 DZD/return
Complaints Processing	Number of Complaints	Complaint	12000	8	1,500 DZD/complaint
Total Activity Costs	-	-	387000	-	-

Source: Authors' elaboration based on Table4.

The activity unit cost is calculated using the following formula: **Activity Unit Cost = Total Activity Cost ÷ Activity Volume.**

For example, the unit cost of the **Customer Order Processing** activity is calculated as follows:

$$\text{Activity Unit Cost} = \frac{\text{Total Customer Order Processing Cost}}{\text{Customer Order Processing Activity Volume}} \rightarrow 57,000 \div 200 = 285 \text{ DZD/order}$$

(6)

The results show that the Order Preparation cost pool has the highest cost. This indicates that the activities within this pool consume relatively costly resources. However, the Order Delivery cost pool has the lowest cost. This shows that the activities that comprise this cost pool use relatively limited resources. This difference highlights the importance of avoiding a uniform allocation of customer service costs and how important it is to trace each cost to the corresponding cost driver in accordance with the extent of each customer's actual consumption of the relevant activities.

Step Three: Allocating Customer Service Activities Across Customers

Following the identification of the customer service cost pools, this stage involves determining each customer's proportionate level of activity consumption and the associated cost

drivers. It also involves determining each customer's share of the activities and the number of times they use each activity. Table 6 presents the allocation of customer service activities across customers.

Table 6. Allocation of customer service activities across customers.

Customers	Orders	Invoices	Collection Follow-ups	Order Preparation Activities	Deliveries	Returns	Complaints
C1	0.175	0.175	0.175	0.175	0.175	0	0
C2	0.14	0.14	0.14	0.14	0.14	0.167	0.125
C3	0.09	0.09	0.09	0.09	0.09	0	0
C4	0.125	0.125	0.125	0.125	0.125	0.167	0.125
C5	0.11	0.11	0.11	0.11	0.11	0	0
C6	0.065	0.065	0.065	0.065	0.065	0	0.125
C7	0.05	0.05	0.05	0.05	0.05	0	0
C8	0.08	0.08	0.08	0.08	0.08	0.333	0.5
C9	0.115	0.115	0.115	0.115	0.115	0.167	0.125
C10	0.05	0.05	0.05	0.05	0.05	0.167	0
Total	1	1	1	1	1	1	1

Source: Authors' elaboration based on Table 5.

The table shows a substantial variation in customers' utilization rates of the customer service activity pools, reflecting differences in the volume of resources consumed by each customer. Consequently, the customer service cost varies from one customer to another. In other words, the higher a customer's utilization rate of a given activity, the greater the customer's consumption of the resources associated with that activity. Accordingly, a customer's utilization rate of an activity pool is determined using the following formula:

Customer Activity Pool Utilization Rate = (Customer Activity Consumption ÷ Total Activity Consumption by All Customers) × 100

For example, the utilization rate of Customer 1 for the Order Processing activity pool is calculated as follows:

Customer 1's utilization rate of the Order Processing activity pool =
Customer 1's consumption of the Order Processing activity pool ÷
Total consumption of the Order Processing activity pool × 100 → (35 ÷
200) × 100 = 17.5% (7)

Thus, Customer 1's utilization rate of the Order Processing activity pool is 17.5%

Step Four: Calculating Customer Service Costs

At this stage, the customer service cost incurred by each customer is determined based on the customer's utilization rate of the respective activity pools, as presented in Table 6, covering activities ranging from Order Processing to after-sales services and Complaints Processing. The cost attributable to each customer is determined according to the extent of their consumption of these activities, thereby enabling the costs attributable to each customer to be identified accurately and ultimately facilitating the determination of the customer's true profitability Table 7 presents the customer service costs.

Table 7. Customer service costs.

Customers	Orders	Invoices	Collection Follow-ups	Order Preparation Activities	Deliveries	Returns	Complaints	Total Customer Service Cost
C1	9975	7350	21000	26250	10500	0	0	75075
C2	7980	5880	16800	21000	8400	2000	1500	63560
C3	5130	3780	10800	13500	5400	0	0	38610
C4	7125	5250	15000	18750	7500	2000	1500	57125
C5	6270	4620	13200	16500	6600	0	0	47190
C6	3705	2730	7800	9750	3900	0	1500	29385
C7	2850	2100	6000	7500	3000	0	0	21450
C8	4560	3360	9600	12000	4800	4000	6000	44320
C9	6555	4830	13800	17250	6900	2000	1500	52835
C10	2850	2100	6000	7500	3000	2000	0	23450
Total	57000	42000	120000	150000	60000	12000	12000	453000

Source: Authors' elaboration based on Table 6.

$$CST_i = \sum_{j=1}^n (Q_{ij} \times UC_j) \quad (8)$$

Where,

CST i: Total customer service cost for customer *i*.

Q ij: Quantity of activity *j* consumed by customer *i*.

UC j: Unit cost of the activity cost driver *j*.

For example: the total customer service cost for Customer 1 is calculated as follows:

Total Customer Service Cost for Customer 1 = (7,350 + 9,975 + 21,000 + 26,250 + 10,500) = 75,075 DZD.

Stage Four: Identifying Potential Sources of Hidden Costs Associated with the Product

Within the proposed customer-related hidden cost measurement framework, hidden costs are identified and measured because they are either not explicitly recognized or are insufficiently allocated. This aspect is largely overlooked under the existing accounting system. Accordingly, following interviews with the relevant stakeholders within the organization, we identified and classified the sources of hidden costs associated with the product under investigation, as presented in Table 8.

Table 8. Sources of hidden costs associated with the product.

Process Stage	Potential Source of Hidden Costs	Information Sought from the Organization	Unit of Measurement	Proposed Estimation Method	Allocated/ Unallocated
Production	Rework	Number of Rework Hours	Hour	Number of Rework Hours ×	Not Fully Allocated



				Labor Hour Cost	
	Material Waiting Time Between Production Stages	Overtime Hours	Hour	Number of Overtime Hours $\times$ Hourly Labor Cost	Partially Allocated
	Unnecessary Internal Material Handling	Number of Additional Material Handling Operations	Operation	Number of Material Handling Operations $\times$ Cost per Operation	Not Fully Allocated
	Non-Conforming Products	Quantity of Non-Conforming Cable	Meter	Quantity of Non-Conforming Cable $\times$ Price per Meter	Partially Allocated
	Additional Waste	Quantity of Copper and PVC Insulating Material	Kilograms Used	Quantity $\times$ Material Cost	Partially Allocated
	Restarting/Reprocessing	Number of Product Reprocessing Cycles	Hour	Duration + Hourly Cost + Additional Material Cost	Not Fully Allocated
	Repeated Machine Maintenance	Additional Maintenance Time	Hour	Maintenance Hours $\times$ Hourly Maintenance Cost	Partially Allocated
	Machine Downtime	Product-Related Downtime Hours	Hour	Downtime Hours $\times$ Machine Operating Hour Cost	Partially Allocated
	Unplanned Equipment Breakdowns	Number of Breakdowns and Repairs	Hour	Repair Hours $\times$ Hourly Repair Cost	Unallocated



	Additional Inspection	Additional Inspection Hours	Hour	Inspection Hours × Inspection Hour Cost	Partially Allocated
	Retesting	Number of Additional Tests and Testing Time	Number of Tests per Hour	Number of Tests × Cost per Test	Partially Allocated
	Additional Material Consumption	Actual Quantity Compared with the Standard Quantity	kg/unit	Difference × Material Cost	Partially Allocated
	Additional Energy Consumption	Additional Energy Consumption Resulting from Reprocessing / Downtime	kWh	Additional Energy Consumption × Cost per kWh	Partially Allocated
	Waiting Time	Worker/Machine Waiting Hours Due to Product-Related Issues	Hour	Waiting Hours × Hourly Cost	Not Fully Allocated
Post-Production	Additional Sorting	Product Sorting Hours	Hour	Hours × Hourly Cost	Partially Allocated
	Repackaging	Number of Repackaging Operations + Materials	Operation / DZD	Labor Cost + Packaging Material Cost	Partially Allocated
	Relabeling	Number of Correction/Relabeling Operations	Operation	Number of Operations × Cost per Operation	Not Fully Allocated
	Additional Storage	Additional Storage Days	Day	Additional Days × Daily Storage Cost	Partially Allocated
Distribution and Sales	Urgent Orders	Number of Urgent Orders	Order	Additional Cost per Warranty Claim	Partially Allocated
	Special Delivery	Number of Special Delivery Operations	Delivery	Number of Deliveries × Cost per	Partially Allocated



				Delivery	
	Redelivery	Number of Redeliveries	Delivery	Number of Deliveries $\times$ Cost per Delivery	Not Fully Allocated
	Processing of Frequent Small Orders	Number of Orders Compared with the Normal Level	Order	Number of Additional Orders $\times$ Order Processing Cost	Partially Allocated
After-Sales	Customer Complaints	Number of Complaints + Complaint Resolution Hours	Complaint/Hour	Processing Hours $\times$ Hourly Cost	Not Fully Allocated
	Returns	Number/Quantity of Returns + Reason for Return	Unit/kg	Transportation Cost + Inspection Cost + Processing Cost	Partially Allocated
	Replacements	Number of Replacement Cases	Case	Product Cost + Transportation Cost + Labor Cost	Not Fully Allocated
	Warranty Claims	Number of Cases + Cost per Case	Case	Total Warranty Costs	Partially Allocated
	Additional Technical Support	Product-Specific Technical Support Hours	Hour	Number of Hours $\times$ Hourly Cost	Partially Allocated

Source: Authors' elaboration based on the findings of interviews conducted with the targeted personnel of the company under study, April , 2023.

Stage Five: Measuring Hidden Costs and Allocating Them to Customers

After identifying the sources of hidden costs in stage four, this stage focuses on determining and measuring the financial value of the hidden costs arising from customer-related transactions. These costs are then allocated to customers according to the extent to which each customer consumes the activities that generate them. The objective is to determine the hidden costs attributable to each customer and incorporate these costs into the measurement of **true customer profitability**. Hidden costs are determined through the following steps:

First: Determining Hidden Costs

Hidden costs are identified during and after the production stage, as well as before, during, and after the sales process. These costs are presented in detail in the table 9.

Table 9. Identification and measurement of the financial value of hidden costs.

Process Stage	Sources of Hidden Costs	Cost Driver	Actual Quantity	Normal Allocated Quantity	Hidden Quantity	Unit Cost	Hidden Cost (DZD)
Production	Rework	Rework Hours	19 hours	0	19 hours	680DZD/hour	11590
	Material Waiting Time Between Production Stages	Overtime Hours	22 hours	10 hours	12 hours	800 DZD/hour	9600
	Unnecessary Internal Material Handling	Number of Additional Material Handling Operations	10 operations	0	10 operations	600 DZD/operation	6000
	Non-Conforming Products	Quantity of Non-Conforming Cable	45 m	30 m	15 hours	240 DZD/m	3600
	Additional Waste	Quantity of Waste	25 kg	15 kg	10 kg	510 DZD/kg	5100
	Restarting/Reprocessing	Reprocessing Hours	10 hours	0	10 hours	650 DZD/hour	6500
	Repeated Machine Maintenance	Additional Maintenance Hours	10 hours	4 hours	6 hours	1,000 DZD/hour	6000
	Machine Downtime	Number of Downtime Hours	10 hours	5 hours	5 hours	2,000 DZD/hour	10000
	Unplanned Equipment Breakdowns	Repair Hours	5 hours	0	5 hours	1,000 DZD/hour	5000
	Additional Inspection	Machine	12 hours	6 hours	6 hours	700 DZD/hour	4200



		Adjustment s Due to Product Instability					
	Retesting	Order Changes Due to Planning Delays or Errors	10 times	4 tests	6 tests	500 DZD/test	3000
	Additional Material Consumpti on	Variance between Actual and Standard Quantities	35 kg	25 kg	10 kg	500 DZD/kg	5000
	Additional Energy Consumpti on	Number of Machine Downtime Hours Without Actual Energy Consumpti on	kWh 100	60 kWh	40 kWh	10 DZD/kWh	400
	Waiting Time	Product transfer delays caused by the unavailabil ity of the subsequent production stage	10 hours	0	10 hours	600 DZD/hour	6000
Total Hidden Production Costs							81590
Post- Productio n	Additional Sorting	Number of Sorting Hours	15 hours	9 hours	6 hours	600 DZD/hour	3600
	Repackagin g	Repackagi ng Operations	8 operatio ns	3 operatio ns	5 operatio ns	800 DZD/operatio n	4000
	Relabeling	Relabeling	6	0	6	320	1920

		Operations	operations		operations	DZD/operation	
	Additional Storage	Number of Additional Storage Days	18 days	7 days	11 days	500 DZD/day	5500
Total Hidden Post-Production Costs							15020
Distribution and Sales	Urgent Orders	Number of Additional Orders	20 orders	5 orders	15 orders	2,500 DZD/order	35000
	Special Delivery	Special Delivery Operations	12 trips	2 trips	10 trips	2,000 DZD/trip	20000
	Redelivery	Redelivery Operations	4 trips	0	4 trips	2,000 DZD/trip	8000
	Processing of Frequent Small Orders	Additional Orders	12 orders	4 orders	8 orders	3,000 DZD/order	30000
Total Costs of the Sales Stage							93000
After-Sales	Customer Complaints	Complaint Handling Hours	50 hours	0	50 hours	320 DZD/hour	16000
	Returns	Quantity of Returned Products	1,000 m	50 m	950 m	40.71 DZD/m	38674.5
	Replacements	Replacement Cases	12 cases	0	12 cases	3,000 DZD/case	36000
	Warranty Claims	Warranty Cases	100 cases	20 cases	80 cases	2,000 DZD/case	160000
	Additional Technical Support	Additional Technical Support Hours	70 hours	10 hours	60 hours	250 DZD/hour	15000
Total Hidden After-Sales Costs							265674.5
Grand Total							455284.5

Source: Authors' elaboration based on Table 8.

Second: Determining the Adjusted Product Cost

This stage determines the adjusted product cost by incorporating the hidden costs identified in the previous analysis. The adjusted cost is calculated for both the traditional costing system and the

ABCII, allowing the corresponding cost per meter to be determined. Table 10 presents the total production costs before and after the inclusion of hidden costs.

Table 10. Total production costs before and after the inclusion of hidden costs.

Total Hidden Costs	Product Cost	Adjusted Cost	Adjusted Cost per Meter
Product Cost under the Applied Traditional Accounting System	10855184.25	Adjusted Cost = Product Cost under the Traditional Costing System + Hidden Production Costs + Hidden Post-Production Costs 10,855,184.25 + 81,590 + 15,020 = 10,951,794.25 DZD	320,000/10,951,794.25=34.22 DZD/m
Product Cost under the ABCII	10482568.09	Adjusted Cost = Production Cost under the ABCII System + Hidden Production Costs + Hidden Post-Production Costs =10,482,568.09+81,590+15,020=10,579,178.09 DZD	320,000/10,579,178.09=33.06 DZD/m

Source: Authors' elaboration based on Tables 3,2,9.

Third: Allocation of Hidden Costs to Customers

After determining the financial value of the hidden costs, as presented in Table 9, this step involves measuring and determining each customer's share of the hidden costs based on the extent of their consumption of the activities that give rise to these costs. The detailed allocation is presented in the Appendix 03,04, while Table 11 illustrates the method used to measure and allocate the hidden costs.

Table 11. Measurement of hidden costs for each customer.

Custo mers	Urgen t Order s	Speci al Deliv ery	Redeli very	Small and Frequ ent Order s	Custom er Compla ints	Retur ns	Replace ment	Warr anty	Additi onal Techni cal Suppo rt	Total Hidd en Cost
	35000	20000	8000	30000	16000	386745.	36000	160000	150000	358674.5
C1	2333.333	2000	0	3000	1280	2900.588	3000	8000	25000	47513.92
C2	4666.667	2000	2000	3000	1600	4350.881	3000	14000	12500	47117.55
C3	2333.333	0	0	3000	640	2417.156	3000	10000	17500	38890.49
C4	4666.	4000	2000	3000	1920	4885.	6000	20000	17500	63971

	667					2				.87
C5	2333. 333	2000	0	3000	1280	3256. 8	3000	12000	12500	39370 .13
C6	2333. 333	0	0	3000	640	1831. 95	3000	8000	12500	31305 .28
C7	4666. 667	2000	2000	3000	1920	4071	3000	16000	15000	51657 .67
C8	4666. 667	4000	0	3000	2560	6106. 5	6000	30000	7500	63833 .17
C9	2333. 333	2000	2000	3000	1920	4478. 1	3000	22000	7500	48231 .43
C10	4666. 667	2000	0	3000	2240	5902. 95	3000	20000	22500	63309 .62

Source: Prepared by the researchers based on Table 7 and Appendix No: 03,04.

$$CHC_i = THC \times R_i \quad (9)$$

Where,

- **CHC_i** = Hidden Costs Attributable to Customer *i*
- **THC** = Total Hidden Costs
- **R_i** = Customer *i*'s Proportion of Activity Consumption

Customer 1's Share of the Hidden Cost = $35,000 \times (1 \div 15) = 2,333.33$ DZD

Stage Six: Measuring True Customer Profitability

To measure the true profitability of the selected group of customers included in the study, the analysis proceeds through a series of steps, as follows:

Step One: Determining Customer Revenues

This step is particularly important for determining true customer profitability, as it involves identifying customer revenues based on the actual sales value generated and attributable to each customer. Accordingly, the company determines the selling price of the H07V-U 2.5mm² 450/750V cable by applying a 20% profit margin. Accordingly, the selling price per meter is determined before and after the incorporation of hidden costs as follows:

$$34.224 + (34.224 \times 20\%) = 41.07 \text{ DZD/m}$$

Therefore, the selling price per meter is estimated at 41.07 DZD.

For the ABCII, the same approach is adopted. However, since the company under study does not currently apply this costing system, no actual selling price is available under the ABCII system. As a result, the selling price of this type of cable is estimated using the same method adopted under the traditional costing system. Accordingly, the estimated selling price is 39.75 DZD per meter. Table 12 shows the customer revenues calculated before and after the inclusion of hidden costs.

Table 12. Determination of customer revenues before and after the inclusion of hidden costs.

Custo mers	Quan tity Sold	Selling Price under the Traditional Costing System	Selling Price under the ABCII System	Total Revenue under the Traditional Costing System	Total Revenue under the ABCII System
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		Before Adjust ment	After Adjust ment	Before Adjust ment	After Adjust ment	Before Adjust ment	After Adjust ment	Before Adjust ment	After Adjust ment
C1	65000	40.704	41.07	39.33	39.67	264576 0	266955 0	255645 0	257855 0
C2	55000	40.704	41.07	39.33	39.67	223872 0	225885 0	216315 0	218185 0
C3	45000	40.704	41.07	39.33	39.67	183168 0	184815 0	176985 0	178515 0
C4	35000	40.704	41.07	39.33	39.67	142464 0	143745 0	137655 0	138845 0
C5	30000	40.704	41.07	39.33	39.67	122112 0	123210 0	117990 0	119010 0
C6	25000	40.704	41.07	39.33	39.67	101760 0	102675 0	983250	991750
C7	20000	40.704	41.07	39.33	39.67	814080	821400	786600	793400
C8	15000	40.704	41.07	39.33	39.67	610560	616050	589950	595050
C9	10000	40.704	41.07	39.33	39.67	407040	410700	393300	396700
C10	20000	40.704	41.07	39.33	39.67	814080	821400	786600	793400
Total	32000 0	40.704	41.07	39.33	39.67	130252 80	131424 00	125856 00	126944 00

Source: Prepared by the authors based on an interview with the Head of the Sales Department, May 7, 2023, and elaboration based on Table N: 11.

$$R_i = Q_i \times P_i$$

(10)

Where,

- R_i = Revenue generated by Customer i
- Q_i = Quantity Sold to Customer i
- P_i = Unit Selling Price for Customer i

Step Two: Determining the Product Cost for Each Customer

This step aims to determine the contribution margin for each customer after establishing the cost of the products sold, based on the unit cost applied to the quantity sold. Costs at this stage are determined both before and after the inclusion of hidden costs, thereby assigning to each customer the costs associated with the products purchased. Table 13 presents the customer contribution margins calculated before and after the inclusion of hidden costs.

Table 13. Customer contribution margin before and after the inclusion of hidden costs.

Customers	Production Cost under the Traditional Costing System	Production Cost under the ABCII System	Customer Revenue under the Traditional Costing System	Customer Revenue under the ABCII System	Contribution Margin under the Traditional Costing System	Contribution Margin under the ABCII System
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	Befo re Adju stme nt	After Adju stme nt	Befo re Adju stme nt	After Adju stme nt	Befo re Adju stme nt	After Adju stme nt	Befo re Adju stme nt	After Adju stme nt	Befo re Adju stme nt	After Adju stme nt	Befo re Adju stme nt	After Adju stme nt
C 1	2204 800	2224 560	2129 270	2148 900	2645 760	2669 550	2556 450	2578 550	4409 60	4449 90	4271 80	4296 50
C 2	1865 600	1882 320	1801 690	1818 300	2238 720	2258 850	2163 150	2181 850	3731 20	3765 30	3614 60	3635 50
C 3	1526 400	1540 080	1474 110	1487 700	1831 680	1848 150	1769 850	1785 150	3052 80	3080 70	2957 40	2974 50
C 4	1187 200	1197 840	1146 530	1157 100	1424 640	1437 450	1376 550	1388 450	2374 40	2396 10	2300 20	2313 50
C 5	1017 600	1026 720	9827 40	9918 00	1221 120	1232 100	1179 900	1190 100	2035 20	2053 80	1971 60	1983 00
C 6	8480 00	8556 00	8189 50	8265 00	1017 600	1026 750	9832 50	9917 50	1696 00	1711 50	1643 00	1652 50
C 7	6784 00	6844 80	6551 60	6612 00	8140 80	8214 00	7866 00	7934 00	1356 80	1369 20	1314 40	1322 00
C 8	5088 00	5133 60	4913 70	4959 00	6105 60	6160 50	5899 50	5950 50	1017 60	1026 90	9858 0	9915 0
C 9	3392 00	3422 40	3275 80	3306 00	4070 40	4107 00	3933 00	3967 00	6784 0	6846 0	6572 0	9915 0
C 10	6784 00	6844 80	6551 60	6612 00	8140 80	8214 00	7866 00	7934 00	1356 80	1369 20	1314 40	1322 00
T ot al	1085 4400	1095 1680	1048 2560	1057 9200	1302 5280	1314 2400	1258 5600	1269 4400	2170 880	2190 720	2103 040	2115 200

Source: Authors' elaboration based on Table N: 12.

$$C_i = \sum_{j=1}^n (Q_{ij} \times UC_j) \quad (10)$$

Where,

- C_i = Cost of Products Sold to Customer i
- Q_{ij} = Quantity of Product j Sold to Customer i
- UC_j = Unit Cost of Product j

Step Three: Measuring True Customer Profitability Before and After the Inclusion of Measurable Hidden Costs

This step represents the final stage in determining and measuring the true profitability of each customer. It involves comparing the revenues generated by each customer with the costs attributable to them, both before and after incorporating measurable hidden costs. The primary objective of this

stage is to determine the impact of hidden costs on the actual profitability of each customer, as presented in table 14.

Table 14. Measurement of true customer profitability before and after including hidden costs.

Customers	Contribution Margin under the Traditional Costing System		Contribution Margin under the ABCII System		Customer Service Cost	Profitability Before Hidden Costs		Hidden Costs	True Profitability After Hidden Costs	
	Before Adjustment	After Adjustment	Before Adjustment	After Adjustment		Under the Traditional Costing System	Under the ABCII System		Under the Traditional Costing System	Under the ABCII System
C1	440960	444990	427180	429650	75075	365885	352105	47513.921	322401.0792	307061.0792
C2	373120	376530	361460	363550	63560	309560	297900	47117.548	265852.4521	252872.4521
C3	305280	308070	295740	297450	38610	266670	257130	38890.490	230569.5104	219949.5104
C4	237440	239610	230020	231350	57125	180315	172895	63971.867	118513.1333	110253.1333
C5	203520	205380	197160	198300	47190	156330	149970	39370.133	118819.8667	111739.8667
C6	169600	171150	164300	165250	29385	140215	134915	31305.283	110459.7167	104559.7167
C7	135680	136920	131440	132200	21450	114230	109990	51657.667	63812.3333	59092.3333
C8	101760	102690	98580	99150	44320	57440	54260	63833.167	5463.16667	9003.16667
C9	67840	68460	65720	99150	52835	15005	12885	48231.433	32606.4333	1916.4333
C10	135680	136920	131440	132200	23450	112230	107990	63309.617	50160.38333	45440.38333
Total	2170880	2190720	2103040	2115200	453000	2147430	1650040	495201.12	1242518.875	1166998.875

Source: Authors' elaboration based on Tables N 07, 11, 13.

$$\text{Profitability Before Hidden Costs} \rightarrow P_i^{\text{Before}} = R_i - C_i - CSC_i - HC_i \quad (11)$$

$$\text{True Profitability After the Inclusion of Hidden Costs} \rightarrow P_i^{\text{True}} = R_i - C_i - CSC_i - HC_i \quad (12)$$

Where,

- P_i^{Before} = Customer i 's Profitability Before Hidden Costs
- P_i^{True} = Customer i 's True Profitability After the Inclusion of Hidden Costs
- R_i = Revenue Generated by Customer i
- C_i = Cost of Products Sold to Customer i
- CSC_i = Customer Service Cost Attributable to Customer i
- HC_i = Hidden Costs Attributable to Customer i

Stage Seven: Ranking and Classifying Customers According to True Profitability Before and After Measurable Hidden Costs

The primary objective of this stage is to rank and classify customers according to their true profitability before and after the allocation of measurable hidden costs. This is achieved by comparing the profitability of each customer before and after the inclusion of these costs under both the Traditional Costing System and the ABCII System, in order to assess the extent to which hidden costs affect each customer's profitability position. Customers are then ranked in descending order, from the most profitable to the least profitable or unprofitable. This ranking helps identify highly profitable customers, as well as those whose profitability declines as a result of higher customer service costs or other customer-related costs. Consequently, customers are classified and ranked based on the level of profitability generated by each customer, as presented in Table 15.

Table 15. Ranking and classification of customers according to true profitability before and after the inclusion of measurable hidden costs.

Customer	Profitability Before Hidden Costs		True Profitability After Hidden Costs		Customer Classification		Customer Ranking	
	Under the Traditional Costing System	Under the ABCI System	Under the Traditional Costing System	Under the ABCII System	Under the Traditional Costing System	Under the ABCII System	Under the Traditional Costing System	Under the ABCI System
C1	365885	352105	322401.0792	307061.0792	Highly Profitable	Highly Profitable	C1	C1
C2	309560	297900	265852.4521	252872.4521	Highly Profitable	Highly Profitable	C2	C2
C3	266670	257130	230569.5104	219949.5104	Highly Profitable	Highly Profitable	C3	C3
C4	180315	172895	118513.1333	110253.1333	Moderately Profitable	Moderately Profitable	C4	C4

C5	156330	149970	118819.8667	111739.8667	Moderately Profitable	Moderately Profitable	C5	C5
C6	140215	134915	110459.7167	104559.7167	Moderately Profitable	Moderately Profitable	C6	C6
C7	114230	109990	63812.3333	59092.3333	Low Profitability	Low Profitability	C7	C7
C8	57440	54260	-5463.166667	-9003.166667	Unprofitable	Unprofitable	C9	C10
C9	15005	12885	-32606.4333	-1916.433333	Unprofitable	Unprofitable	C10	C9
C10	112230	107990	50160.3833	45440.3833	Low Profitability	Low Profitability	C8	C8
Total	2147430	1650040	1242518.875	1166998.875	-	-	-	-

Source: Authors' elaboration based on Table N: 14.

After determining and measuring customers' true profitability before and after the inclusion of hidden costs, as presented in Table 14, the analysis enabled the customers to be ranked and classified according to their respective levels of profitability, as reported in Table 15. The results reveal differences in both the ranking and classification of customers between the Traditional Costing System and the ABCII System. These findings demonstrate that customer profitability assessment depends not merely on the volume of revenues generated or the contribution margin achieved, but also on the underlying approach to cost allocation and measurement, the resources consumed by each customer, and the hidden costs associated with serving them. The results presented in the aforementioned table further confirm that a customer's apparent profitability does not necessarily correspond to its profitability after the costs actually attributable to that customer have been fully incorporated.

Results:

- The present study extends the scope of cost measurement to customer service costs and measurable hidden costs, based on the findings of our previous study, which was devoted to the determination of product costs based on product specifications. This wider view of costing allows a more complete assessment of the real profitability of customers and provides a basis for ranking and classifying customers by their real profitability.
- The inclusion of hidden costs in strategic cost management improves both the measurement of the true product cost and the assessment of true customer profitability.
- The ABCII achieves cost balance by incorporating hidden costs, which represents an important step toward more accurate measurement of the true product cost.



- Differences in the hidden costs attributable to customers arise from differences in their behavioral patterns, namely, the extent to which each customer consumes the activities that generate these costs.
- The findings of this study demonstrate that the measurement of costs based on activity consumption leads to a more equitable distribution of costs, especially by ensuring that each customer pays costs according to the resources actually used.
- Identification of hidden costs contributes significantly to supporting decision-making in customer relationship management and increasing customer profitability.
- The incorporation of hidden costs reduces the profitability of customers who bear a relatively high share of these costs, thereby providing a more accurate representation of their true profitability.
- There are significant differences between customers' apparent profitability and their true profitability because measurable hidden costs are not taken into account. The results of this study showed that incorporating these costs is important for effective management and optimization of customer profitability.
- Improved measurement of customer profitability leads to better managerial decisions regarding pricing, service levels, and terms of contract, particularly in developing effective strategies for retaining and managing profitable customers.
- The variations in product costs between the Traditional Costing System and the ABCII will have a direct impact on the profitability of customers, either increasing or decreasing their profitability. As demonstrated in Table 14, the lower product cost determined under the ABCII System leads to higher customer profitability, whereas the higher cost determined under the Traditional Costing System results in lower profitability. This finding confirms that the accuracy of cost measurement constitutes a fundamental basis for effective profitability management.
- Customer rankings and classifications change with variations in customer service costs and hidden costs. Thus, customer classification based solely on revenues or conventional profitability does not necessarily correspond to their ranking according to true profitability after the incorporation of hidden costs.
- Profitability measurement based on reported revenues and visible costs alone does not necessarily give an accurate picture of true profitability. The costs of customer service and quantifiable hidden costs can be added to provide a complete and more accurate picture of customer profitability. This can then be used to re-rank and re-classify customers on the basis of their actual contribution to total profitability.

Recommendations:

- Based on the findings of this research, we suggest that organizations should adopt customer-level profitability measurement. Profitability measurement at the individual customer level provides significant managerial benefits over aggregate profitability measurement at the organizational level alone.
- The ABC system provides an activity-based approach to the allocation of customer service costs that can significantly improve the determination of each customer's share of service costs and, therefore, the hidden costs attributable to them.
- Based on the results of previous studies, future research can expand the scope of analysis by examining the focal variable from multiple dimensions and perspectives.



- To detect and monitor hidden costs of production and customer-related activities, organizations should establish a periodic monitoring system. Such a system should capture the underlying activities which drive these costs, many of which may go unrecognized in conventional costing systems. Systematic monitoring would be very helpful in identifying hidden costs which have not previously been accounted for and improving the accuracy of cost measurement and management.
- Organizations should periodically review customer profitability, particularly those that generate high revenues but low profitability, to understand the reasons for the discrepancy and take appropriate corrective action.
- Organizations should strengthen the role of the management control function in identifying the sources of increases in hidden costs and in developing appropriate measures for their reduction in accordance with the actual cost measurement framework and the specific operational characteristics of the organization.
- Organizations should adopt customer profitability as a key performance indicator and a decision-support tool for retaining the most profitable customers, addressing low-profitability customers, reducing hidden costs, and improving pricing policies.

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List of Appendices

Appendix No. 1

Customers	Orders	Invoices	Collection Follow-ups	Order Preparation Activities	Deliveries	Returns	Complaints
C1	35	35	35	35	35	0	0
C2	28	28	28	28	28	1	1
C3	18	18	18	18	18	0	0
C4	25	25	25	25	25	1	1
C5	22	22	22	22	22	0	0
C6	13	13	13	13	13	0	1
C7	10	10	10	10	10	0	0
C8	16	16	16	16	16	2	4
C9	23	23	23	23	23	1	1
C10	10	10	10	10	10	1	0
Total	200	200	200	200	200	6	8

Appendix No. 2

Customer s	Order s	Invoice s	Collectio n Follow-ups	Order Preparatio n Activities	Deliverie s	Returns	Complaint s
C1	0.175	0.175	0.175	0.175	0.175	0	0
C2	0.14	0.14	0.14	0.14	0.14	0.166666 7	0.125
C3	0.09	0.09	0.09	0.09	0.09	0	0
C4	0.125	0.125	0.125	0.125	0.125	0.166666 7	0.125



C5	0.11	0.11	0.11	0.11	0.11	0	0
C6	0.065	0.065	0.065	0.065	0.065	0	0.125
C7	0.05	0.05	0.05	0.05	0.05	0	0
C8	0.08	0.08	0.08	0.08	0.08	0.333333 3	0.5
C9	0.115	0.115	0.115	0.115	0.115	0.166666 7	0.125
C10	0.05	0.05	0.05	0.05	0.05	0.166666 7	0
Total	1	1	1	1	1	1	1