Activity-Based Costing (ABC) and its Contribution to Hospital Financial Sustainability: An Analysis of the Hospitalization Process in a Colombian Public Hospital

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Abstract
This article analyzes the contribution of the activity-based costing (ABC) system to the financial sustainability of public hospital institutions, based on the study of the hospitalization process in a Colombian hospital. Unlike traditional approaches focused on cost estimation, this research adopts an analytical perspective aimed at evaluating the use of cost information in financial decision-making. Methodologically, a case study was developed with a quantitative approach, based on the identification of activities, allocation of resources through cost drivers and determination of the cost of the day of hospital stay as the object of analysis. The results show a high concentration of resource consumption in healthcare and administrative activities, as well as significant deviations between real costs and contracted rates, which affects the profitability of services. It is concluded that the ABC system not only improves the accuracy in the determination of costs, but also constitutes a strategic tool to strengthen financial planning, tariff negotiation and institutional sustainability in the health sector.
Keywords: Activity-based costing; hospital financial management; hospital costs; financial sustainability; Cost Drivers

INTRODUCTION

In contemporary health systems, the financial sustainability of public hospital institutions has become a structural challenge, particularly in emerging economies where budget constraints, regulatory pressures, and a growing demand for services converge (Keel et al., 2017). In this context, financial information ceases to be a simple recording instrument to become a strategic element in organizational management.
The operation of public hospitals under competition and self-sustainability schemes has generated the need to have tools that allow a precise understanding of the behavior of costs and their relationship with income. However, traditional costing models persist in many institutions that make it difficult to identify the real consumption of resources, limiting the capacity for financial analysis and evidence-based decision-making (Kaplan & Anderson, 2004; Cardinaels & Soderstrom, 2004).
This problem is particularly relevant in complex processes such as hospitalization, where multiple activities, specialized human resources, and indirect costs are involved that are

not always correctly assigned (Etges et al., 2019). In this scenario, the lack of accurate information can lead to inefficient decisions, such as the undervaluation of services or the inability to identify activities that do not generate value.

Faced with these limitations, activity-based costing (ABC) has been recognized as a methodology that allows improving the allocation of costs by linking them directly to the activities that generate them. However, its relevance lies not only in its technical precision, but also in its potential to transform the financial management of organizations, by providing useful information for the evaluation of the efficiency, profitability and sustainability of services (Kaplan & Anderson, 2004; Etges et al., 2019; Ruiz Pérez et al., 2022)

In this sense, this study proposes to analyze the ABC system from a different perspective than the traditional one, focusing not only on its application, but also on its capacity to support financial decision-making in public hospital institutions. To this end, the hospitalization process in a Colombian hospital is examined, with the purpose of determining the cost of the day of hospital stay and evaluating its implications in financial management.

The relevance of this analysis lies in the fact that it allows us to transcend the operational vision of costing and place it in the strategic sphere, showing how cost information can contribute to improving financial sustainability, optimizing the use of resources and strengthening the negotiation capacity of health institutions.

LITERATURE REVIEW (FINAL VERSION)

The analysis of costing systems in the health sector has gained special relevance in recent years, due to the sustained increase in health costs and the need to improve efficiency in the allocation of resources. In this context, recent literature has evidenced a transition from traditional costing models to more precise approaches, oriented towards strategic cost management and value generation in health care (Porter, 2010).

Traditional costing systems have been widely questioned for their inability to reflect the actual consumption of resources, especially in organizations with high operational complexity, such as hospitals. These models tend to allocate indirect costs using general criteria, which generates distortions in financial information and limits decision-making (Tan et al., 2009; Keel et al., 2017). In this sense, the lack of accuracy in cost information can affect the operational efficiency and financial sustainability of health institutions.

Faced with these limitations, activity-based costing (ABC) has been recognized as a methodology that allows costs to be allocated according to resource-consuming activities, providing greater accuracy and traceability. Various studies have shown that the implementation of ABC improves profitability, competitiveness, and organizational efficiency, both in productive sectors and in health services (Kaplan & Anderson, 2004; Etges et al., 2019).

In the hospital setting, the application of the ABC system has proven to be particularly useful for determining unit costs of services, especially in processes such as hospitalization. Research has shown that the use of this methodology allows for the more accurate identification of costs associated with clinical and administrative activities, generating significant differences compared to traditional rate calculation systems (Keel et al., 2017; Kaplan et al., 2014).

In addition, the development of the Time-Driven Activity-Based Costing (TDABC) approach has strengthened the application of these models in the health sector, by incorporating time as a key variable in cost allocation. This approach has proven especially useful in improving accuracy in cost estimation, identifying inefficiencies, and optimizing the use of resources at different levels of care (McLaughlin et al., 2014; Koolmees et al., 2021).

Likewise, the Value-Based Healthcare approach has reinforced the importance of costing systems as strategic tools. In this context, cost analysis is not only oriented to operational efficiency, but also to the relationship between costs and health outcomes, which makes it possible to evaluate the generation of value in the services provided (Kaplan & Porter, 2011).

From a financial perspective, empirical evidence suggests that the implementation of ABC and TDABC systems allows the identification of gaps between actual costs and established rates, which is essential to improve the profitability and sustainability of hospital institutions. Various studies have found that the costs calculated using these methodologies tend to differ significantly from the current rates, evidencing problems in the price structure and in the negotiation processes with financing entities (Etges et al., 2019; Akhavan et al., 2016).

Finally, the literature agrees that the main contribution of the ABC system lies not only in the technical precision in the allocation of costs, but also in its ability to generate strategic information that supports decision-making, financial planning, and the improvement of organizational efficiency. Consequently, the analysis of activity-based costing in hospital institutions must be approached from a comprehensive perspective that allows understanding its impact on financial sustainability and the management of health services (Keel et al., 2017; Kaplan & Porter, 2011).

METHODOLOGY

The present study was developed under a quantitative approach, with a descriptive-analytical scope, aimed at examining the behavior of costs in the hospitalization process and its relationship with financial management in a public hospital institution. Unlike traditional studies focused solely on the implementation of the costing system, this research incorporates an analytical approach that allows evaluating the usefulness of cost information in decision-making (Yin, 2018; Creswell, 2014).

The design of the research corresponds to a non-experimental case study, in which the hospitalization process of a State Social Enterprise (E.S.E.) located in Colombia was analyzed. This approach allowed for a detailed analysis of the behavior of costs in a real context, considering the operational, administrative, and financial particularities of the institution (Yin, 2018).

The analysis unit was made up of the hospitalization care process, which involves multiple care and administrative activities, as well as various human, technical, and financial resources. This process was selected due to its relevance within the hospital cost structure and its direct impact on the financial sustainability of the institution.

Secondary sources from institutional records were used to collect the information, including financial reports, administrative databases, clinical records, service production reports, and documents related to hospital operations. This information made it possible

to identify the resources used in the process, as well as the activities that make up the value chain of the hospitalization service.

The methodological procedure was structured in several stages. First, the identification of the cost centers involved in the hospitalization process was carried out, classifying the resources into categories such as labor, materials and supplies, and indirect costs. Subsequently, the analysis of the processes and activities was carried out, in order to determine the tasks that make up the provision of the service.

In order to clearly structure the activity-based costing model applied to the hospitalization process, Table 1 presents the organization of the main elements that make up the ABC system. This structure allows understanding the relationship between resources, activities and the cost object, facilitating the traceability of costs within the analyzed process.

Table 1 Structure of the ABC costing model applied to the hospitalization process

System Element	Description
Cost centers	Assistance and administrative areas
Resources	Labor, inputs, indirect costs
Activities	Clinical and administrative processes
Cost Drivers	Variables that allocate costs
Cost Object	Day of hospital stay

As can be seen in Table 1, the model is based on the identification of cost centers, resources, and activities, which are articulated through the use of cost drivers (Kaplan & Anderson, 2004). This structure makes it possible to overcome the limitations of traditional systems by establishing a direct relationship between the consumption of resources and the activities executed, which is essential to improve the accuracy of the allocation of costs.

In a second stage, the costs were assigned to the activities through the use of cost drivers, considering different levels of analysis. This process made it possible to establish the relationship between the resources consumed and the activities executed, ensuring greater precision in the allocation of costs.

Finally, the main cost object of the study was determined, corresponding to the cost of the day of hospital stay, which was calculated from the distribution of the costs of the activities through third-level inducers. This indicator made it possible to evaluate the behavior of the costs of the service and its relationship with the established rates, providing inputs for financial analysis.

Quantitative analysis techniques were used for the treatment of the information, including the construction of cost distribution tables, percentage analysis and calculation of financial indicators related to the efficiency and profitability of the service. This approach made it possible to interpret the results not only from an operational perspective, but also from their impact on the financial management of the institution.

RESULTS

The analysis of the hospitalization process allowed us to identify a cost structure highly concentrated in care activities, especially those related to direct patient care. In particular, activities such as medical assessment, clinical follow-up, and nursing care represent the

main sources of resource consumption, which shows the operational intensity of the service and its dependence on specialized human resources (Etges et al., 2020).
In the analysis of the hospitalization process, it is essential to understand the composition of costs according to their nature, in order to identify the main sources of resource consumption. In this sense, Table 2 presents the distribution of costs according to their classification in labor, materials and inputs and indirect costs.

Table 2 Composition of the costs of the hospitalization process

Cost Type	**Participation (%)**
Labor	45%
Materials and supplies	30%
Indirect costs	25%
Total	**100%**

The results show that labor represents the largest component of the total cost, which confirms the labor-intensive nature of the hospitalization service. Likewise, the significant share of indirect costs highlights the importance of an adequate allocation of these, since their inadequate distribution can generate distortions in the determination of the real cost of the service.
From a cost allocation perspective, the application of the ABC system has allowed evidence of a more precise distribution of resources compared to traditional schemes (Keel et al., 2017). The identification of cost drivers at different levels facilitated the traceability of expenditure, allowing the relationship between activities and resource consumption to be established more clearly.
In relation to the cost structure, a significant share of indirect costs was observed, particularly those associated with support services, maintenance, administration and use of infrastructure. These costs, which in traditional models are usually distributed in a generalized way, were assigned more precisely through the use of inducers, which made it possible to identify their real impact on the cost of the hospitalization service.
One of the most relevant findings of the study corresponds to the determination of the cost of the day of hospital stay as the main cost object. This indicator made it possible to show important differences between the real costs of the service and the rates contracted with the financing entities. In particular, scenarios were identified in which the real cost exceeds the established rates, which generates pressures on the profitability of the service and affects the financial sustainability of the institution (Keel et al., 2017).
In order to deepen the analysis of the consumption of resources, the analysis of the cost of the day of hospital stay is presented, which constitutes one of the main contributions of the ABC system, in order to deepen the analysis of the consumption of resources, the analysis of the cost of the day of hospital stay is presented. which constitutes one of the main contributions of the ABC system.

Table 3 Comparison between actual cost and contracted rate

Concept	**Value (COP)**
Actual cost day stay	$350,000
Contracted rate	$300,000
Difference	-$50,000

Change (%)	-14,3%

Table 3 shows that the real cost of the service exceeds the contracted rate, generating a negative gap that directly affects the profitability of the hospitalization process. This result highlights the need to strengthen tariff negotiation processes and to have accurate cost information for financial decision-making. Likewise, this gap reflects possible distortions in the financing structure of the service, which can compromise the financial sustainability of the institution in the long term.

This result highlights the existence of possible inefficiencies in the tariff structure, as well as limitations in the negotiation processes with insurance companies. The lack of accurate information on real costs can lead to undervaluation of services, affecting the ability of institutions to cover their operating costs and generate financial surpluses.

Additionally, the analysis allowed identifying variations in resource consumption between different activities of the hospitalization process, which shows the existence of opportunities to optimize operational management. In particular, the identification of resource-intensive activities opens up the possibility of implementing strategies aimed at improving efficiency, reducing costs, and optimizing the use of available resources.

One of the most relevant aspects in hospital financial management is the relationship between the actual costs of services and the rates established by the financing entities. In this context, Table 4 presents the distribution of costs by activities of the hospitalization process.

Table 4 Distribution of costs by activities of the hospitalization process

Activity	**Participation (%)**
Medical assessment	20%
Nursing Care	25%
Ongoing medical care	18%
Administrative support	15%
General Services	12%
Others	10%
Total	**100%**

Table 4 shows that healthcare activities account for the largest proportion of the cost, with nursing care and medical assessment standing out. This result allows identifying the critical points of the process from a financial perspective and guiding strategies aimed at improving efficiency in the provision of the service.

From a financial perspective, the results show that the ABC system not only improves the accuracy of cost determination, but also provides key information for the evaluation of service performance. The possibility of analyzing the composition of cost, the use of resources and the relationship between costs and revenues is a fundamental input for strategic decision-making.

In this sense, the information generated by the ABC system allows progress towards a more evidence-based financial management, facilitating the identification of gaps, the evaluation of the profitability of services and the design of strategies aimed at strengthening institutional sustainability.

DISCUSSION

The results obtained in the present study confirm that the application of activity-based costing (ABC) allows a more accurate understanding of cost behavior in hospital settings, particularly in complex processes such as hospitalization. This evidence is consistent with what has been stated in the recent literature, where it has been pointed out that ABC systems improve the traceability of expenditure and allow for a clearer identification of the factors that affect resource consumption (Keel et al., 2017).

However, beyond the technical precision in the allocation of costs, the findings of the study show a critical aspect that has been less explored in previous research: the existence of a significant gap between the real costs of services and the contracted rates. This result coincides with recent studies that have identified substantial differences between costs calculated using ABC methodologies and the values recognized in payment systems, which generates risks for the financial sustainability of health institutions (Etges et al., 2019).

From this perspective, the ABC system should not only be understood as an accounting tool, but also as a strategic instrument that allows questioning the financing structure of the health system. The evidence obtained suggests that the undervaluation of services may be associated with the lack of accurate information in the negotiation processes, which limits the ability of institutions to defend tariff structures in line with their real costs.

Additionally, the results of the study allow us to deepen the analysis of operational efficiency, by evidencing the concentration of resource consumption in specific activities of the hospitalization process. This finding is consistent with recent research that highlights the usefulness of the ABC approach to identify activities that do not generate value and that represent opportunities for improvement in organizational management (Etges et al., 2020).

In this sense, the application of the ABC system opens the possibility of moving towards more efficient management models, where decision-making is based on the detailed analysis of processes and the identification of the factors that affect costs. This approach is particularly relevant in the current context of health systems, where resource efficiency is a key element to ensure sustainability (Koolmees et al., 2021).

On the other hand, the results of the study also allow us to reflect on the limitations of traditional costing systems, which continue to be used in many health institutions. Evidence suggests that these systems not only present accuracy problems, but also limit the capacity for financial analysis, by not allowing an adequate understanding of the relationship between costs, activities and results.

In contrast, the ABC system provides a more solid basis for financial analysis, by allowing the profitability of services to be evaluated, identifying deviations and supporting the formulation of strategies aimed at improving organizational performance. In this sense, the information generated by this system becomes a key input for financial planning and strategic decision-making.

Finally, it is important to note that, although the implementation of the ABC system presents challenges related to the availability of information and the complexity of the processes, its benefits in terms of information quality and management support outweigh these limitations. Consequently, its adoption should be understood not only as a technical

improvement, but as a step towards the transformation of financial management in hospital institutions.

CONCLUSIONS

The present study allowed to analyze the application of the activity-based costing (ABC) system in the hospitalization process of a public hospital institution, evidencing its usefulness as a tool for financial management. From the results obtained, it is confirmed that the ABC system provides greater precision in the allocation of costs, by linking them directly to the activities that consume resources, overcoming the limitations of traditional costing systems.

From an analytical perspective, one of the main contributions of the study lies in the identification of gaps between the real costs of the hospitalization service and the contracted rates. This finding evidences the existence of risks for the financial sustainability of the institution, associated with the possible undervaluation of health services, which highlights the need to strengthen tariff negotiation processes based on reliable and structured information.

Likewise, the study showed the concentration of resource consumption on specific activities of the hospitalization process, which opens the possibility of implementing strategies aimed at improving operational efficiency. In this sense, the information generated by the ABC system not only contributes to the determination of costs, but also becomes a key input for the optimization of processes and the efficient use of resources.

In terms of financial management, the results allow us to affirm that the ABC system facilitates more informed decision-making, by providing tools to analyze the profitability of services, evaluate financial performance and design strategies aimed at improving institutional sustainability. This approach allows us to transcend the traditional view of costing, positioning it as a strategic element within organizational management.

Finally, the study provides empirical evidence on the relevance of the ABC system in the Colombian hospital context, contributing to the development of literature in the area of costs and financial management in health. However, it is recognized that the implementation of this type of system requires adequate institutional conditions, including availability of information, technical capacities, and organizational commitment, which represents a line of work for future research (Keel et al., 2017).

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