



ORIGINAL ARTICLE

Business Modeling for Information Management in the Provincial Optical and Auditory Warehouse

Pedro Acosta-Candelaria^{1*} , Oliver Wilian Milán-Tellería² , Yaicel García-Benítez¹ , Yusleivy Rivers-Martínez¹ , Yenisleidys Valdés-Martínez³ , Dunesky Travieso-Ramos ⁴

¹University of Medical Sciences of Pinar del Río. Faculty of Medical Sciences "Dr. Ernesto Guevara de la Serna." Pinar del Río, Cuba.

²University of Pinar del Río "Hermanos Saiz Montes de Oca." Pinar del Río, Cuba.

³University of Medical Sciences of Pinar del Río. University Polyclinic Pedro Borrás Astorga. Pinar del Río, Cuba.

⁴University of Medical Sciences of Pinar del Río. Pinar del Río, Cuba.

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ABSTRACT

Introduction: the management of warehouse processes requires the implementation of agility and efficiency. To achieve these objectives, it is essential to develop a business model that accurately represents these processes, responding to a sequence of actions that yield observable outcomes for the various stakeholders involved.

Objective: to design a business model focused on the information management of the Provincial Optical and Auditory Warehouse in Pinar del Río Province.

Methods: a technological innovation study was conducted based on a dialectical approach, which serves as the philosophical foundation for the elements addressed in this research. From this perspective, various research methods, procedures, and techniques were applied, encompassing both theoretical and empirical domains, including mathematical and statistical tools.

Results: a business model was developed for the information management of the Provincial Optical and Auditory Warehouse in Pinar del Río, resulting in improved process clarity, enhanced decision-making, increased efficiency, attraction of investments, and greater competitiveness.

Conclusions: overall, a business model was elaborated that optimizes information management within the Provincial Optical and Auditory Warehouse of Pinar del Río. This model will significantly contribute to the warehouse's development, supporting the achievement of key objectives that promote its growth and sustainability.

Keywords: Business Modeling; Information Management; Warehouse; Use Case Diagram.

INTRODUCTION

The use of Information and Communication Technologies (ICTs) has become a key accelerator for resource management in organizations. Modern organizations increasingly base their decisions on knowledge derived from data stored in their databases or data warehouses through business modeling techniques. These techniques allow for the creation of a formal and clear representation of real processes within an organization, aiding in the conceptualization and visualization of the business model—adaptable to each company type and its specific industry.^(1,2,3)

Modeling has evolved to adapt to the changing needs of society. The earliest documented example dates back to our most remote ancestors, the hominids, who crafted stone tools for hunting and gathering. This milestone marked the beginning of what would eventually become both an art and a science, as modeling experienced remarkable evolution alongside civilization.⁽⁴⁾

Technology plays a fundamental role in business frameworks. Business design proves highly useful in the analysis phase of software development, as it helps to understand the computational context and recognize the activities and procedures carried out within the organization to ensure proper functioning. This is achieved through the use case model, which illustrates business processes and clients in terms of use cases and actors, represented by business use case diagrams.^(5,6)

In the literature, business modeling is described as a resource that aids in understanding the problem and its study area, facilitating the detection, analysis, and definition of software requirements. The business model is characterized as a narrative that explains how an enterprise operates.⁽⁷⁾

In general, there is no absolute consensus in the literature regarding the definition of a business model, which has led to a plurality of approaches and interpretations. In recent years, the concept has generated growing interest among researchers, managers, and organizational scholars due to its relevance in understanding and transforming business structures. However, the term *business model* is not always used uniformly in the specialized literature and is often confused with other expressions such as *business idea*, contributing to conceptual ambiguity and complicating its practical application in specific contexts.^(8,9)

Today, digitalization and information technologies have dramatically changed how modeling is approached. Business processes can now be modeled and automated with great efficiency, enabling companies to operate more effectively and agilely than ever before.^(10,11) Cuba has recognized the importance and necessity of integrating and mastering Information and Communication Technologies, emphasizing the need to identify processes suitable for digitalization—either through available solutions or the design of new ones.⁽¹²⁾

To digitalize the procedures carried out at the Provincial Warehouse of Pinar del Río, it is essential first to model these processes for a better understanding. One of the most important factors in choosing the appropriate software program is ease of use. Employees must be able to manage all operations efficiently via tablet, computer, or mobile phone. Business models provide a clear understanding that enables more comprehensive service delivery and the identification of areas for improvement in internal processes. They also serve as an excellent tool for meeting the needs of optical designers, resulting in increased efficiency and cost reduction, as well as a valuable means for organizing company tasks.^(13,14)

In Cuba, all processes related to social health services are undergoing digitalization, particularly in the fields of optometry and optics.⁽¹⁵⁾ To achieve this, it is essential to model these services. Therefore, the objective of this study is to develop a business model for the Information Management of the processes carried out at the Provincial Warehouse of Pinar del Río, utilizing modern technologies.

METHODS

To develop the business model oriented toward information management in the Provincial Optical and Auditory Warehouse of Pinar del Río, theoretical methods such as analysis, synthesis, and modeling were applied. These techniques enabled the identification of the essential characteristics of the study object and the establishment of fundamental relationships among its components, facilitating the conceptual construction of the model. In parallel, empirical methods were applied through a documentary review of current regulations, allowing for the extraction of business rules governing the internal processes of the warehouse.

RESULTS

A business model was successfully developed for information management at the Provincial Optical and Auditory Warehouse in Pinar del Río. Initially, the business use cases, actors, and workers involved were identified. Once the actors and workers were recognized, along with the use cases to be considered in this procedure, a use case diagram and an activity diagram were created. All of this resulted in a greater understanding of processes, improved decision-making, increased effectiveness, attraction of investments, and enhanced competitiveness.

Business under study

This research focused on analyzing, as part of the digitalization process, the reception, storage, and distribution sections carried out at the Provincial Warehouse of Pinar del Río, as shown in Figure 1.

Among the measures considered in the business design, the initial emphasis was placed on identifying the main usage scenarios:

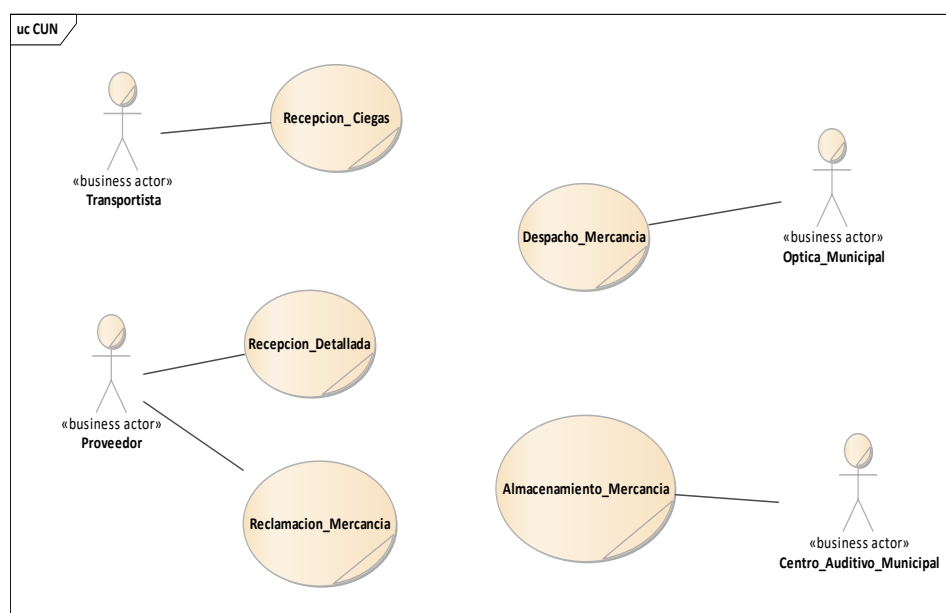
1. Blind reception
2. Detailed reception
3. Goods storage
4. Goods reclamation
5. Goods dispatch

Once these cases were identified, the corresponding actors and workers, along with their respective functions, were determined, as shown in Table 1.

Table 1. Business actors and workers.

Role		Description
Actor	Transporter	– Responsible for transporting goods
	Supplier	– Provides or supplies goods to the warehouse
	Municipal Optical Center	– Entities that serve the municipal population and are supplied from the warehouse
	Auditory Center	– Provincial center that serves the population and is supplied from the warehouse
Worker	Warehouse clerk	– Responsible for receiving, organizing, and dispatching goods within the warehouse

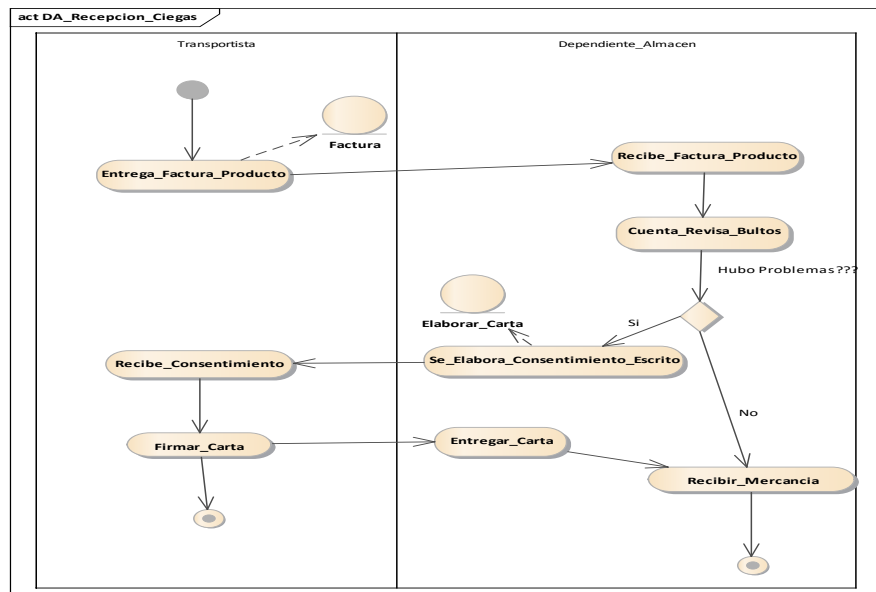
Once the actors and workers were identified, as well as the use cases to be considered in the process, the business use case diagram was developed (Fig. 1).



Source: Authors' own elaboration

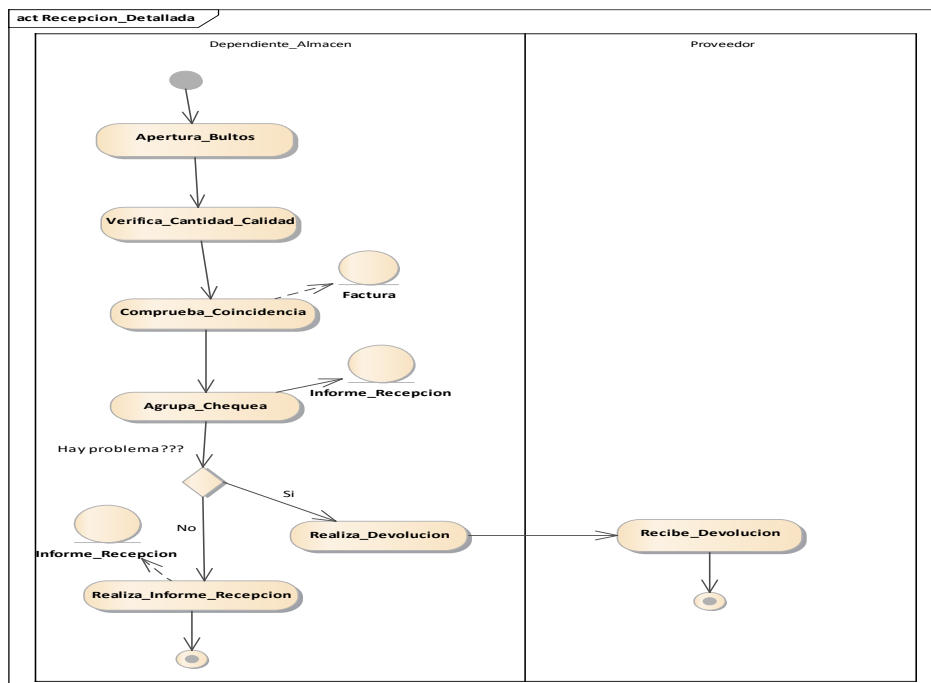
Figure 1. Business use case diagram.

The research focused on the processes of receiving, storing, and distributing goods, identifying five key operational scenarios: blind reception (Fig. 2), detailed reception (Fig. 3), storage (Fig. 4), and reclamation (Fig. 5).



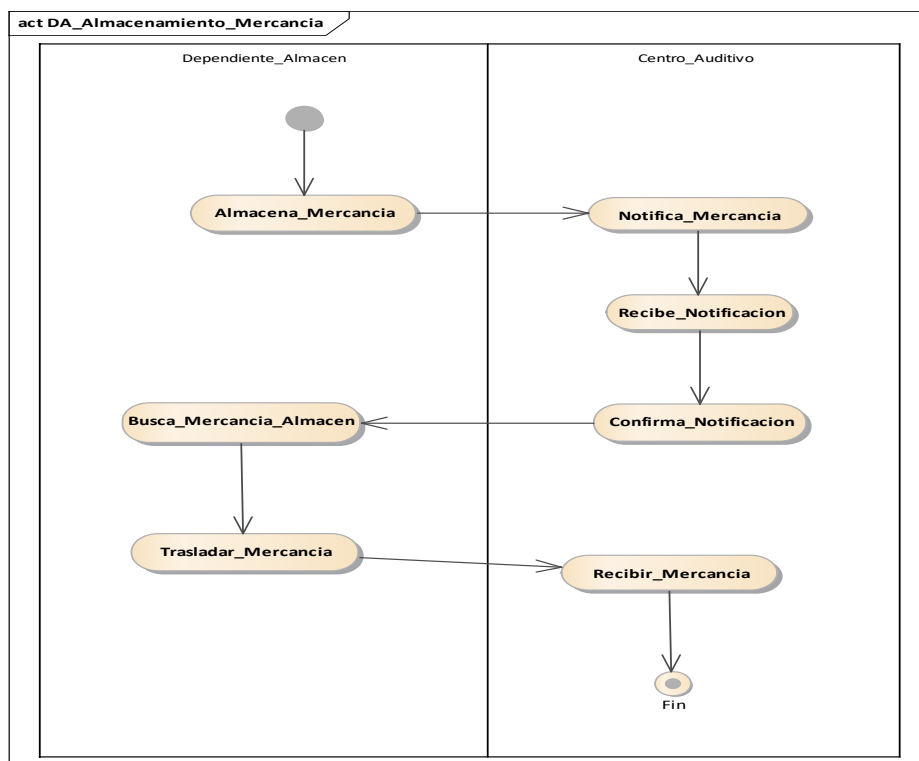
Source: Authors' own elaboration

Figure 2. Blind reception diagram.



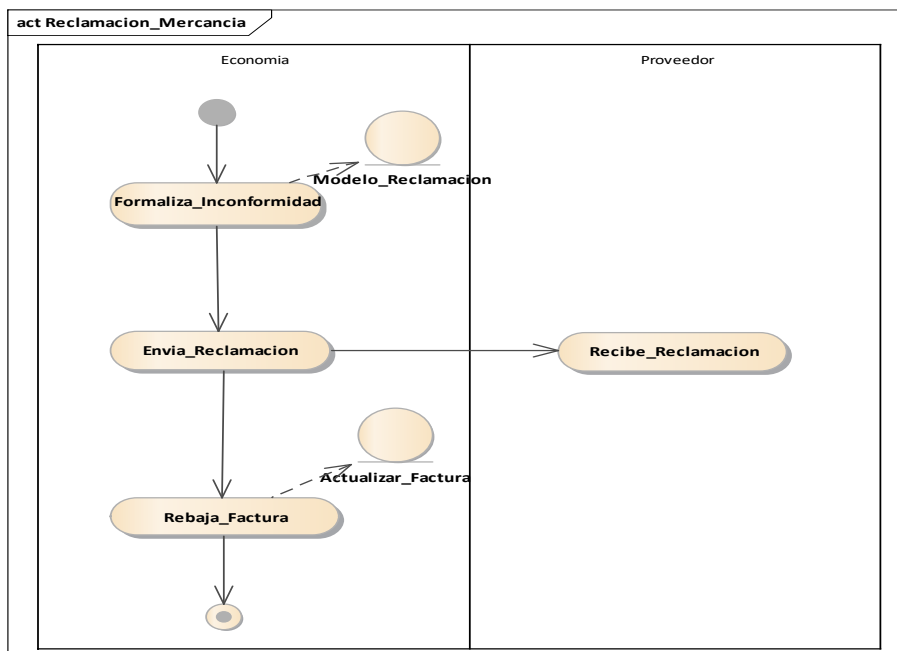
Source: Authors' own elaboration

Figure 3. Detailed reception diagram.



Source: Authors' own elaboration

Figure 4. Goods storage diagram.



Source: Authors' own elaboration

Figure 5. Goods reclamation diagram.

Each of these scenarios was modeled considering the business rules that ensure efficiency and quality control.

Business rules

- Maintain proper hygiene and organization within the storage area.
- Authorized personnel must be formally designated, as the warehouse is a restricted access area.
- To facilitate product location, shelves, drawers, and pallets must be correctly labeled, following the product classification order: positive and negative spherical lenses, positive and negative sphero-cylindrical lenses, men's, children's, and women's frames, etc. (Lenses grouped in increments according to diopters).
- The unit of measure for organic or mineral lenses shall be pairs.
- Each type of merchandise must be clearly identified and separated from the rest, organized according to procedures and expiration date (for raw materials).
- Diminutives, trade names, or unapproved codes shall not be used for product identification.
- Updated and organized records reflecting the stock of each product, its expiration date, and corresponding forms (e.g., stacking cards, models) must be maintained.
- Periodic inspections and monitoring shall be conducted to randomly verify stock conservation both quantitatively and qualitatively, with the results properly documented.
- If a product quality issue is detected, all existing stock of that product shall be evaluated. If the issue is confirmed, the affected product shall be retained, and the Provincial Company must be notified immediately for appropriate action.
- Product placement within different areas must be carried out carefully and systematically, avoiding excessive stacking, overloading, or damage to goods.
- Stock preservation constitutes the warehouse's main function, and both its quantitative and qualitative aspects must be properly monitored. ⁽¹⁶⁾

DISCUSSION

The digitalization of health services in Cuba has been recognized as a strategic transformation aimed at improving the quality, efficiency, and traceability of care, teaching, and research processes within the national health system. In this context, the present study aligns with the global trend toward digitalizing business models in the healthcare sector, particularly in areas where logistics management and product traceability are essential to ensure service continuity and quality. ⁽¹⁷⁾

As part of the analysis of the object of digitalization, a theoretical review of business model regulations and related topics was conducted, both nationally and internationally, to assess their feasibility for application at the Provincial Optical and Auditory Warehouse in Pinar del Río. The evaluation also considered perspectives related to business modeling.

It is crucial to recognize the importance of addressing the shortcomings of the current business model to optimize information management at the Provincial Optical and Auditory Warehouse in Pinar del Río, as the proposed model will significantly contribute to the warehouse's development, helping achieve key objectives that promote growth and sustainability.

An exploratory study of the current state of business modeling in information management processes at the Provincial Warehouse of Pinar del Río, combined with the authors' experience, revealed a series of deficiencies:

- Lack of organization and space within the warehouse can cause delays in order preparation, hinder product access, and increase accidents.
- Inefficient inventory management and lack of digital technology for handling inventory can generate errors and delivery delays.
- Poor communication between departments can lead to human errors and task duplication.
- Lack of traceability and control of goods can slow operations and harm customer relations.
- Suboptimal human resource allocation and task overload can cause delays and errors.

Therefore, it is appropriate to develop a business model through technological tools that address these identified shortcomings.

Various studies have shown that implementing digital technologies in hospital warehouse management can significantly reduce human error, improve product traceability, and optimize resource planning. ^(18,19,20)

CONCLUSIONS

Overall, a business model was developed to optimize information management at the Provincial Optical and Auditory Warehouse in Pinar del Río. This model will significantly contribute to the warehouse's development by helping achieve key objectives that promote growth and sustainability through the use of technology. It involved developing an accurate representation of warehouse operations and how a warehouse focused on optical products adds value. Likewise, it facilitates a clearly defined and successful business model that is essential for the efficient performance of the Optical Warehouse of Pinar del Río. The model provides a clear operational perspective and emphasizes operational efficiency.

Conflict of interest

The authors declare that there is no conflict of interest.

Author contributions

All authors participated in the conceptualization, formal analysis, project administration, writing—original draft preparation, writing—review and editing, and approval of the final manuscript.

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