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Integrated 5S Model and ABC Classification for Continuous Improvement in Business Management Inventories of a Community Pharmacy

Integrated Model of 5S and ABC Classification for Continuous Improvement in Inventory Management of a Community Pharmacy

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ABSTRACT. Efficient inventory management is essential for the operational and financial viability of organizations. This article analyzes the implementation of the ABC methodology and the 5S technique as a tool to optimize inventory control and organization in a pharmaceutical company. ABC classification allows products to be prioritized according to their value and turnover, facilitating the strategic allocation of resources. Furthermore, the 5S contribute to maintaining order, cleanliness, and standardization in the storage area and provide benefits in reducing product search time. Through an analysis applied to a pharmacy, it is demonstrated how these tools, when applied together, improve operational efficiency. The study concludes that the integration of the ABC methodology and the 5S promotes an organizational culture focused on continuous improvement and safety, benefiting areas such as customer satisfaction.

KEYWORDS: 5s/ improvement/ pharmaceutical company/ inventory management/ ABC methodology

ABSTRACT Efficient inventory management is essential for the operational and financial viability of organizations. This article analyzes the implementation of the ABC methodology and the 5S technique as a tool to optimize inventory control and organization in a pharmaceutical company. The ABC classification allows prioritizing products according to their value and turnover, facilitating a strategic allocation of

resources. On the other hand, 5S helps maintain order, cleanliness, and standardization in the storage area and provides benefits in reducing product search time. Through the analysis applied to a pharmacy, it is demonstrated how these tools, when applied together, improve operational efficiency. The study concludes that the integration of the ABC methodology and 5S promotes an organizational culture focused on continuous improvement and safety, benefiting areas such as customer satisfaction.
KEYWORDS: 5s/ improvement/ pharmaceutical company/ inventory management/ ABC methodology

1. INTRODUCTION

Nowadays, the opening of new markets, the increase in similar establishments, competition Aggressive and technological advances directly influence the complexity of decisions that must be taken into account in a company, while indirect costs increase. Therefore, information Traditional cost management is no longer sufficient. Proper warehouse management plays a key role essential role in optimizing logistics operations and overall efficiency (Villamil, 2024). In a dynamic and competitive business environment, proper management of Warehouses are a determining factor for the timely availability of products, minimizing costs storage and maximize customer satisfaction. This process involves careful planning, organization and control of all activities related to storage and inventory movement (Cisneros Huamán, AE, & Centeno Marín, E., 2024).

Most companies face a lack of strategies to remain in the market. market, so, according to Cisneros H. (2024), the implementation of advanced methods, such as ABC analysis for classifying products according to their importance, and the 5S methodology for Organization and maintenance of storage space are crucial components in the modern warehouse management. Such approaches allow for efficient resource allocation, precise identification of critical products, a reduction in search times and a overall improvement in the productivity and quality of storage processes. In this dynamic, The convergence of theory and practice becomes essential to achieve highly efficient warehouses and adaptive to changing market demands. Inventory management is the process of monitor and control the flow of products within a company, from procurement to storage and eventual distribution or sale.

Inventory management is a key activity that connects directly to the entire supply chain. value, in the same way it must be aligned with the general strategy and operational tactics of the organization, since only in this way is it possible to guarantee that the products or services are available at the right time, in the necessary quantity and with the expected quality (González, 2022) In this sense, adequate inventory management contributes significantly to satisfy customer needs, optimize resources and maintain competitiveness in the market, In addition to reducing costs associated with excess or shortage of stock, which has a positive impact on

the profitability of the company (González, 2022). It is important to recognize that the basis of any The company's main focus is on the products that enter and leave it, which underlines the importance of efficient inventory management (Castro and Salas, 2022).

In this context, the implementation of the ABC methodology has become a tool Key. Having a management system that uses this methodology allows for greater control on the actual costs of each activity. However, in an environment marked by constant innovation and improvement, companies face increasing competition, which is why Organizations need tools and advantages that they can rely on to optimize the development of their operations and better control of their processes or, in this case, their products (Bellido, 2023), therefore, in addition to this methodology, support tools were developed with the idea of obtaining better inventory management which can be applied to medicines (Luna, 2024).

According to Bellido, JDP, & Guevara, KL V, (2023) the implementation of an ABC model offers substantial benefits, highlighting the classification and prioritization of inventories to improve inventory levels. Similarly, the 5S provides benefits focused on reducing of the time spent searching for goods and minimizing the risk of obsolete inventory, promoting thus greater productivity and improved customer service. The importance of considering these methodologies as key tools in management oriented towards efficiency and optimization of resources lies in improving productivity and mitigating risks associated with the warehouse More efficient management, in addition to boosting sales, improves the company's ability to address customer satisfaction in a timely and effective manner (Castro & Salas, 2022; Montesinos-González, 2022). To this end, this work presents a proposal for management, organization and inventory control of a pharmaceutical company.

In the pharmaceutical industry, inventory is a crucial part of the business. Pharmacists and pharmacy owners must have detailed control of their medicine stocks and other products to ensure they are always available to your customers. It is essential It should be noted that medications have a limited shelf life, which highlights how essential it is to monitor their expiration to avoid wasting medicines and loss of profits (Castro, 2023; Angulo, 2023, Salazar, 2022).

Inventory management based on ABC methodology will be a great help for the case study selected, it is crucial to have accurate and effective control within the company. For understanding clear and precise definition of the problem, using the observation technique and quantitative analysis of the data through direct approach to the facilities and the use of some guides such as the inventory turnover, shortages and overstocks, one can find in the literature that the ABC classification ties with the VEN (Vital, Essential, and Desirable) analysis

being AV, BE and CN (Herlambang, 2021; Nguyen, 2022).

2. METHODOLOGY

The selected company is a family SME dedicated to the purchase/sale of materials pharmacists, the facilities are located in the municipality of Axapusco in the State of Mexico, Mexico.

It should be noted that, although the company has external accounting advice, the director is limited to daily operational tasks (various payments, collections, billing, policy registration, preparation of account statements, among others) without performing any type of analysis and interpretation. By what this type of administration is reflected in inventory management.

This system seeks to effectively improve product management and streamline its control. through the implementation of the ABC technique. Through observation and analysis of data from the business you get a general overview of the problems, mainly about the management of your inventory, with the aim of generating an improvement proposal that achieves optimization of the control of the pharmacy warehouse, thus optimizing customer satisfaction and business profits.

The activities carried out as part of the research and implementation were the following:

- Observation and search: The SICAR program database was accessed, evaluating the most relevant information related to the research topic, taking as criteria key sales reports and product demand from past periods.
- Inclusion criteria: Based on the information collected, the information and the main data for this analysis, then these data were organized for their separation.
- Exclusion criteria: Information outside the range of interest was discarded, the use of monthly reports for a single year, due to the variability of purchases in products each year.
- Data analysis: A diagnosis of the company's initial situation was made, and They identified the key processes related to the warehouse.

The company uses the SICAR program to keep track of its inventory, finances and operations. locally (from which the monthly demand per product was obtained), as well as notebooks logbook manuals. Due to this organization, we can highlight some main problems observed:

- Purchasing decisions and priorities are authorized and evaluated by the director at his discretion. experience and judgment (sometimes with less information than necessary).

- Overinvestment in some inventories due to “opportunity” purchases of products that are not Do you sell.
- Although there is a professional inventory register (SICAR program), its use is not exploited. potential as needed.
- The customer is the primary indicator for inventory shortages, expiration, or discontinuation.
- The program is out of date with inventory due to poor communication during daily sales.
- Daily finances are managed solely by the director and manually, there is no system concrete and controlled.

It is also important to mention the sales divisions in the business, the products for sale are divided into the following sections:

I. Generic medications
II. Patent medicines
III. Perfumery and personal hygiene items
IV. Healing material
V. Baby items
VI. Backroom
VII. Drinks
VIII. Confectionery
IX. Gifts

3. RESULTS

In order to develop the implementation of inventory control in pharmaceutical products,
As a first method, a checklist was developed using the 5s tool that
It was later applied to the person who collaborates with the company, and this tool proved effective.
to ensure the accommodation of the warehouse, and proper management of this suitable for the activities of the company, hoping to increase productivity.

The evaluation and analysis covered the five stages of the tool used, organization, order, cleanliness, standardization, and discipline. The total score is one hundred points, which indicates the fulfillment of all requirements if the highest grade is obtained. For the evaluation, the following were used: a scale from zero (poor performance) to four (excellent performance).

After obtaining the answers, we proceeded to review and compare the scores reflected in the Table 1. In this analysis, it was observed that the cleaning and discipline stages present a performance similar, since they share the same score, which suggests a balanced level in the application of both. On the other hand, it was identified that the standardization stage obtained the lowest score among

all those evaluated, which indicates the need to strengthen the related actions and tools with this stage to achieve greater consistency and continuity in established practices.

Table 1

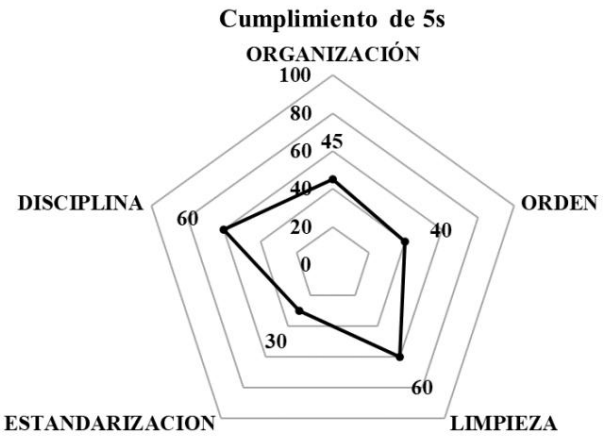
Checklist results

Aspect	Score
Organization	45
Order	40
Cleaning	60
Standardization	30
Discipline	60

The results obtained were also compared with the ideal score for each section of the 5S methodology. It was presented in a radial diagram that indicates the level of compliance, as can be seen in Figure 1. It can be observed from the lowest score, which is zero, to the full compliance with the section, which is one hundred.

Figure 1

Radial diagram of compliance level



In relation to the problems identified in the product warehouse, the tool was implemented 5s for its rearrangement, the inadequate arrangement of the warehouse can be seen in figure #, with unnecessary objects that obstruct the optimal search for products, while in Figure 2 It shows how excess inventory exceeds warehouse capacity, forcing the company to keep part of the inventory products in inappropriate places, obstructing the space for customer service, hallways and entrances.

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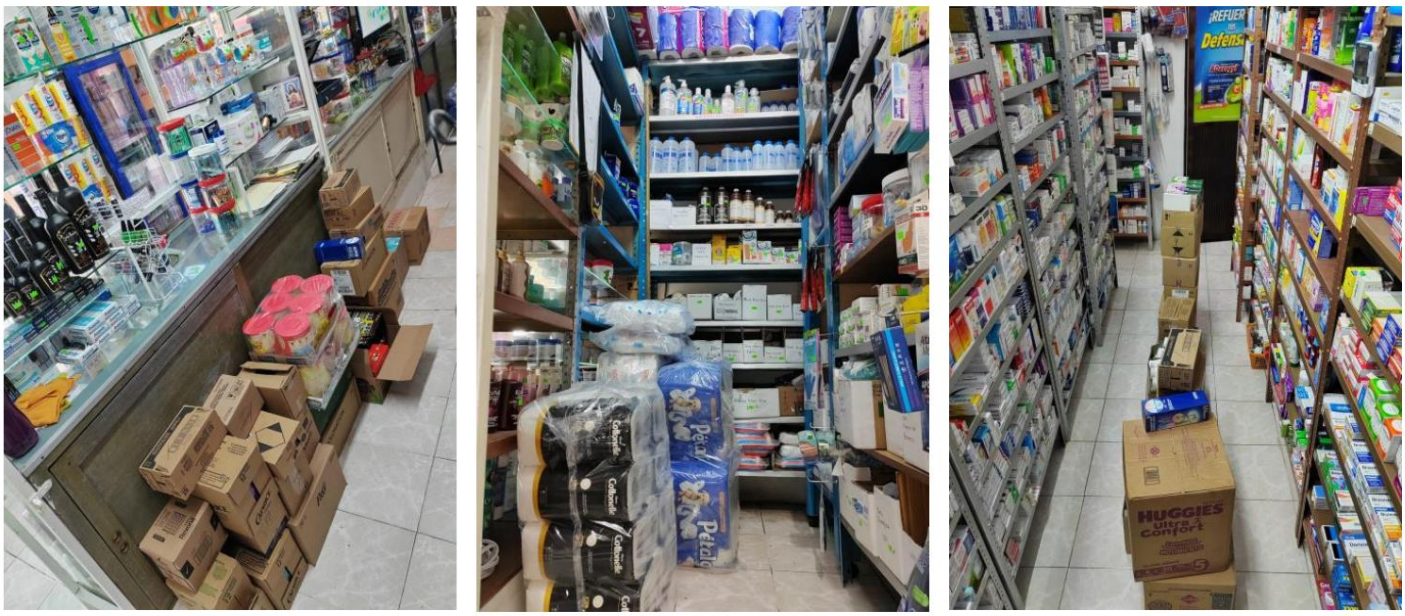
Figure 2. *Evidence of inadequate warehouse order*

Figure 3. *Evidence of interferences due to excess inventory*



There is a great lack of order and non-existence of standardized locations for each product and box, which generates uncertainty, disorganization and misinformation about the existence or Non-existence of products, lack of knowledge of their location and, therefore, delays in service to the client.

Together with the previously developed checklist, it was possible to achieve order and cleanliness. and organization of the warehouse and other spaces affected by inadequate control of this.

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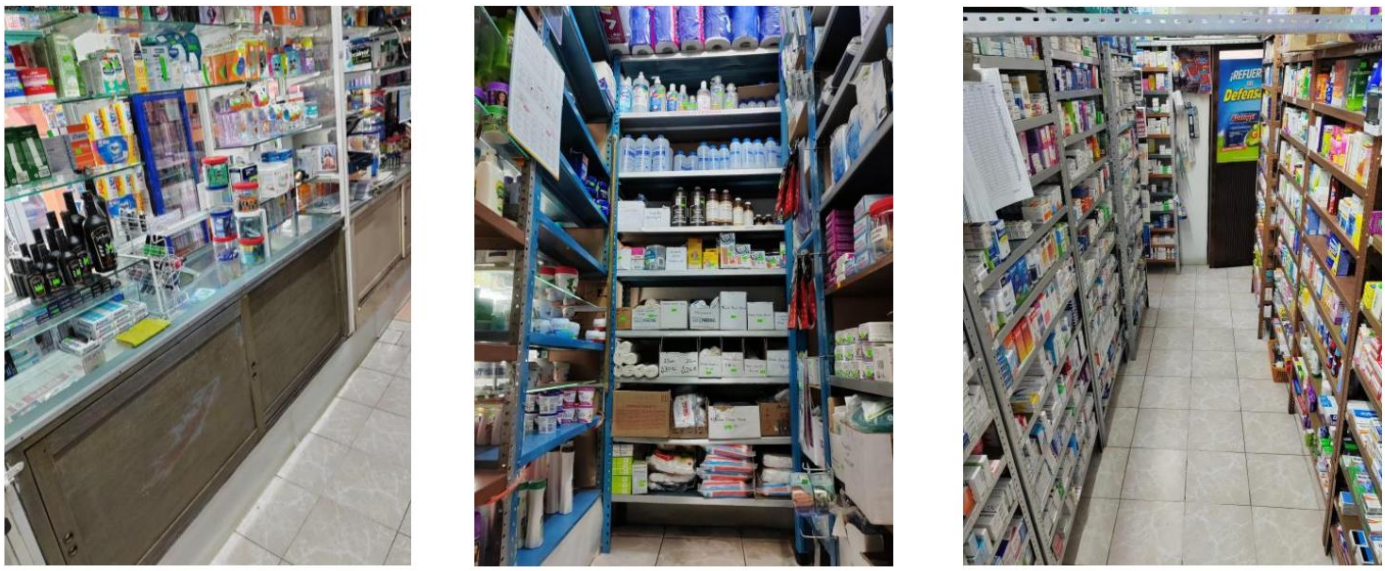
Figure 4. *Evidence of cleanliness and order in the warehouse*

Figure 5. *Evidence of cleanliness and order in affected areas*



The Ishikawa Diagram is one of the effective and efficient quality tools in the actions of reducing a central problem, becomes a fundamental element, which makes it possible to examine the elements that intervene in the quality of the product/service through a cause-and-effect interaction and effect, helping to bring to light the causes of dispersion and also to order the relationship between the causes in a matter that can be focused on various fields: in the case of the present research in education (Delgado, B. et. al. 2021). For this case study (Figure 6), it is It is essential to examine the possible causes and factors involved that intervene in the inefficiency of the order and standardization of the warehouse. To construct this diagram, not only the data were analyzed operational, but rather resorted to the direct experience of the staff, through directed questions

to the collaborators and the analysis of the previously developed checklist for the 5S methodology. This approach allowed for a more complete view, which is not limited to the technical, but also incorporates the daily experience of those who work directly.

The predominant causes that emerged from the analysis were:

- **Excessive purchases,** which generate saturation of spaces and hinder visibility of the inventory.
- **Lack of a clear returns policy,** leading to product backlog rejected or expired, without a defined route for their management.
- **Lack of product rotation,** which means that many items remain stored for long periods, generating risk of expiration or loss.
- **Inappropriate use of the management system or program,** whether due to ignorance, lack of inconsistent training or use by staff.

These causes, although varied, share a common background: **internal disorganization.** That is, Beyond the physical problem of disorder, there are **processes that are not well defined and tools that are not being used correctly.** Faced with this situation, **the solution cannot be Simply organizing the warehouse,** because clutter is only a symptom. The real improvement will come from **changing the way inventory is managed,** and that requires a more solid. Therefore, the **design and implementation of a management proposal based on the ABC methodology,** which allows **products to be classified according to their importance and to establish differentiating controls for each group,** prioritizing what is really important and facilitating the decision making.

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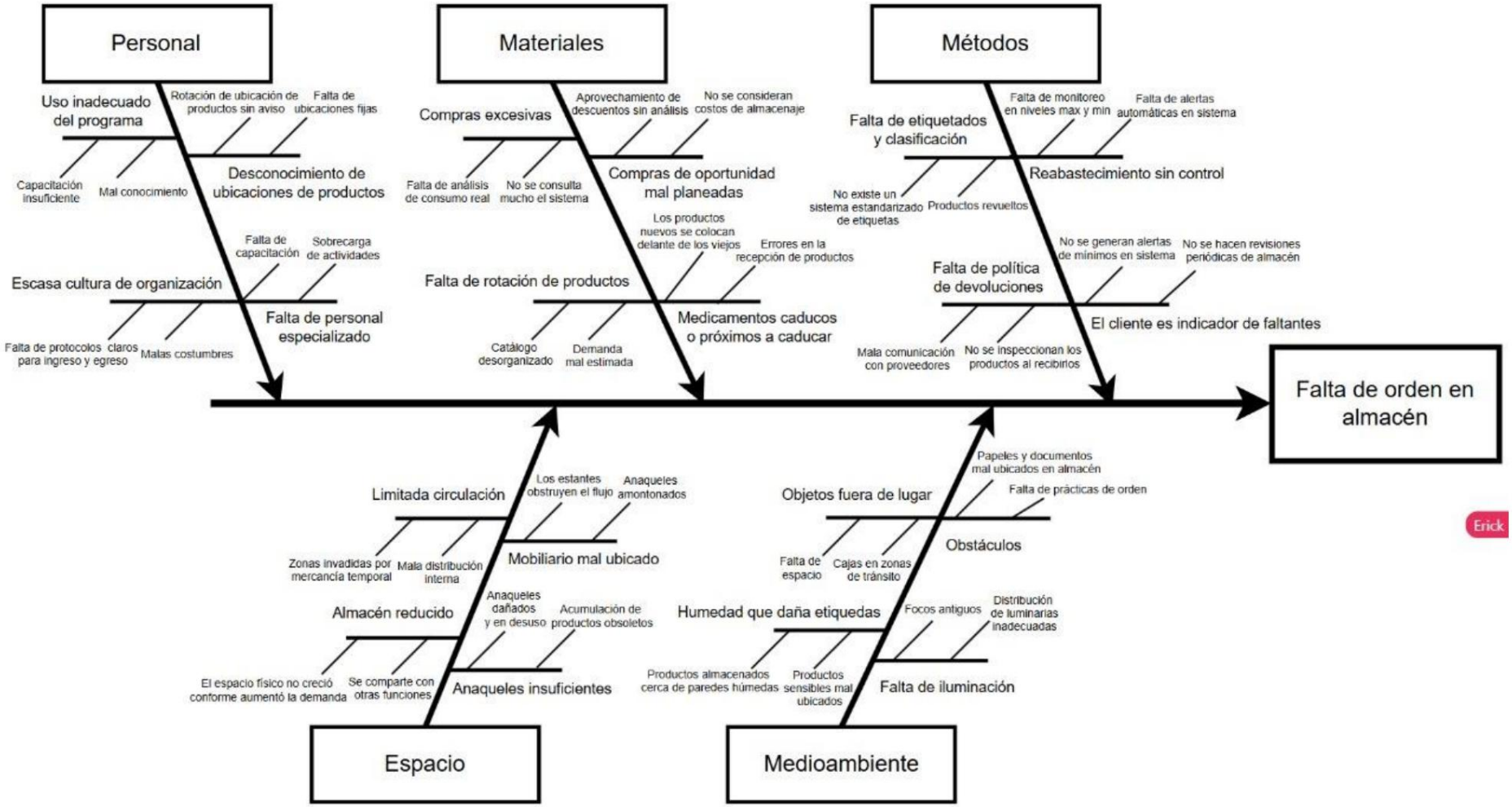

Figure 6 *Ishikawa diagram of possible causes of warehouse order shortages*

After analyzing the tools implemented so far, and with the problems

Initially in the diagnosis, we can observe that the lack of an adequate classification of the products in the warehouse generates obvious disorganization in the company, which is why the ABC matrix of inventories for their grouping and classification. To develop this methodology, the products were concentrated in Table 2, grouped according to the nine existing sections of the company.

Table 2. *Number of articles grouped into sections*

No.	Section	Number of items
1	Generic drugs	1505
2	Patent medicines	131
3	Perfumery and articles of personal hygiene	1524
4	Healing material	450
5	Baby items	226
6	Rebotica	94
7	Drinks	101
8	Confectionery	52
9	Gifts	40
	Total	4123

They were classified according to their existence and unit price, and the following steps were taken:

1. Calculate the total value of each item in inventory by multiplying the stock by the price unitary.
2. Sort the items based on their total value, from highest to lowest, a step that will help identify the most expensive products in inventory.
3. Calculate the accumulated total value.
4. Obtain the percentage of total value and its accumulated value, a step that will help classify them. subsequently.
5. Divide the products into three categories, called A, B and C, according to their percentage of value.
6. Prepare the Pareto chart of the results obtained

Table 3. *Summary of results according to ABC classification*

	Classification	No. items % items		% total value
0-80%	TO	1674	40.60%	79.9969%
80%-95%	B	1280	31.05%	14.9963%
95%-100%	C	1169	28.35%	5.0068%
	Total	4123	100%	100%

After creating the ABC matrix, it was possible to segment the inventory into three main categories, which which allowed us to identify which products deserve more attention in terms of management and control inventories.

Type A: With a total of 1674 products, it represents 40.60% of the total products. These products account for 80% of consumption (or sales), which shows their high turnover and economic relevance within the business. Due to their significant impact on profitability, these Items require strict control, frequent stock monitoring, and policies efficient replenishment and continuous analysis of demand, since its proper management is essential to avoid shortages or excesses that could affect profits.

Type B: Consisting of 1289 products, it represents approximately 31.05% of the total products, but they only account for 15% of the value of consumption (sales), which They comprise a lower degree of contribution to utility, have a moderate turnover and contribution and therefore Therefore, less control is required. Although they are not as critical as type A, it is advisable maintain a level of periodic control over your stock and sales behavior, so that that they do not become excess inventory or a source of obsolescence and expiration.

Type C: This last group comprises a total of 1169 products, representing 28.35% of the total, with a low level of investment in inventory, which means they have a low turnover and a minor impact on profit. Given their low contribution to total value, these products require a level Minimal supervision. They can be managed with simpler methods, such as recurring orders. or replenishment by minimums and maximums, focusing management resources on the most criticisms.

This analysis is reflected in the Pareto diagram (Figure 7), we can interpret the percentages of values provided by each type of product classified as A, B or C. It shows which group of products (type A) generates the majority of the total value, validating the 80/20 principle. Viewing that not all products should be treated equally, because they do not all generate the same value.

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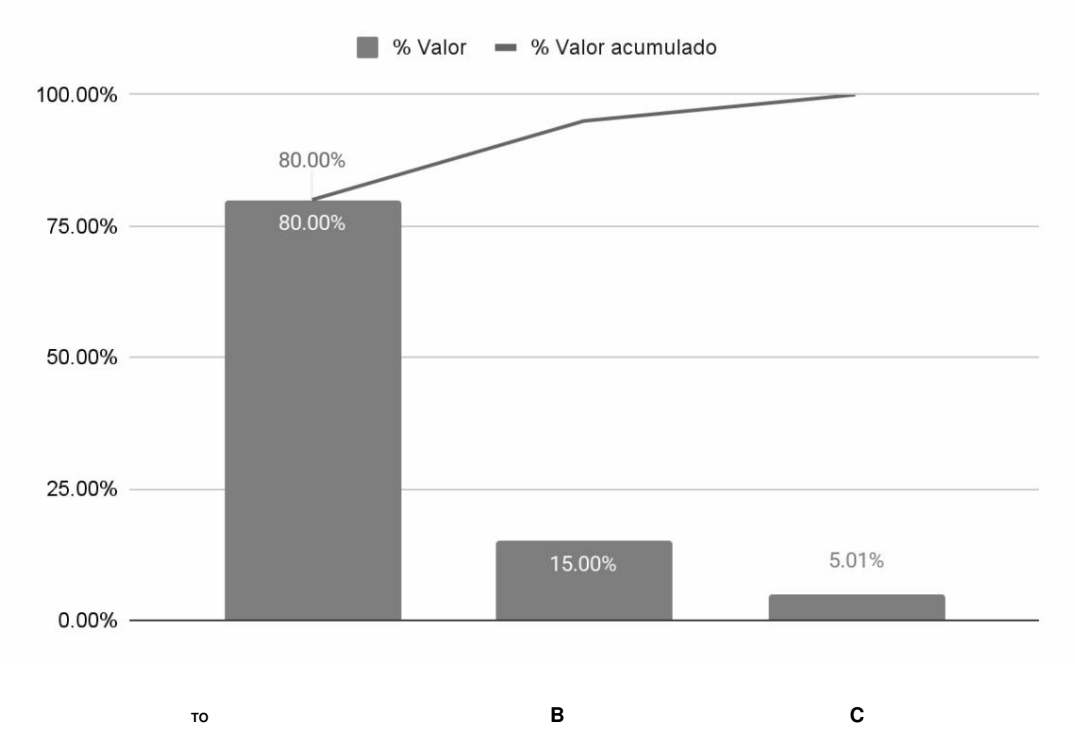
Figure 7. *Pareto chart*



Based on this classification, a physical rearrangement of the warehouse by fraction is proposed, which consider the 3 classification categories (A, B and C), and also assign special spaces for products with specific characteristics, such as those close to expiration, expired, and returns.

Regarding the physical location of the “A” products, it is recommended that they be as close as possible from the warehouse exit to expedite dispatch and facilitate return. It is even advisable to place them in shop windows or visible points for the customer, that is, outside the store, to promote sales direct and reduce handling times.

For products classified with “B” it is recommended to place them in higher spaces within the warehouse, where they do not interfere with the main flow, but remain accessible to staff when needed. This allows quick access areas to be freed up for more critical products, without neglecting the control of these support items.

Finally, for the product group “C” it is not necessary to assign them privileged spaces or dedicate too much space to them. The recommendation is to place them in open or secondary spaces, where they do not interfere with the operational flow and where they take up as little space as possible. Their location Strategic planning should focus on taking advantage of less accessible corners or areas, thus prioritizing the use from the warehouse for higher value products.

4. DISCUSSION

The use of Pareto analysis for proper inventory management has been used successfully.
in research focused on classifying and establishing priorities derived from a high number of
products, Castro (2022) was able to verify the 80/20 law for a company focused on clothing,
For the present investigation, the analysis found that 40% of the articles represent
approximately 80% of the total value of the inventory, corresponding to category A very high values
similar to that reported by Gómez (2023) where category A represented 39% of its inventory,
For the case study of this article, most of the items consisted of medications
generics, perfumery and personal hygiene items, high turnover items and similarly the
sections with the largest quantities of items for sale.
It is suggested to the administration that said category A articles should be located with the greatest
proximity to the exit or even in nearby and visible displays for customer service, taking
Note that for generic drugs, stricter control is needed, referring to
a constant and controlled review of its stock, following the company's existing program
and with scheduled check-ups separating medications that are close to expiring and those that have expired.
Regarding the cost reduction part, the Tomás Lafora Hospital (Pacasmayo, Peru) implemented
the ABC model reducing inventory costs by 34.8% by identifying the
most relevant products (Blas, 2019), in our case it is observed that category A also
It concentrates a high percentage of the value, although with a difference of 30.46% in proportion to the
mentioned study, this distinction could be due to the limits used for classification in
categories or even the differences between a hospital pharmacy and a community pharmacy in a
local location like the one in this case.

Other studies conducted in the healthcare sector (a community pharmacy in Alicante, Spain)
showed that by adjusting the relationship between sales and inventory value after the intervention, a
better balance while maintaining the quality of service, their results showed that group A and B
They had a justified inventory level, one could even say that it was deficient, since the percentage
on sales was greater than the percentage on the value of the inventory. However, in groups C and D
an excess of stock was detected (Castelló, 2016), our interpretation is not the same, since it was used
another methodology to complement the ABC, however agrees that category A with
larger quantities of products have a justified inventory level since they are the products that
the most in stock and those that generate the most value for the company, therefore also of the
most in demand in the company, while for products categorized in C it is not needed
have as much existence and control as the other two, since they do not generate great value for the
company, it is worth mentioning that most of them are pharmacy products and gifts, thus justifying the

results since they are not items that are mostly purchased at a local community pharmacy,
However, that does not mean they should be eliminated.
On the other hand, regarding order and cleanliness in the work areas, it was implemented in a
satisfactory a quantitative tool to evaluate the degree of compliance with each of the
5S, Zamora (2025) implemented improvement strategies focused on disposing of non-working objects.
necessary, comply with signage and visual boards as well as implement and follow up on
a 5S program being important to establish a standard for the case study of this
research and thus be able to monitor the performance of this tool once it is optimized
inventory.

Derived from the above, the improvement plan based on the diagnosis using the ABC methodology and
the 5S, it is suggested:

1. Sort and organize the products according to categories, for products A with a higher
proximity to the warehouse exit and in areas where the customer has them present, for the products
B in higher spaces or not so close to the exit and not in counter spaces like in the
previous, finally for products C their location will be in free spaces in the warehouse and where
do not invade too much space.
2. Keep strict control of the reviews of each category, taking into account that the products
A must be inspected and/or controlled more frequently than the other two
categories.
3. Separate products, mainly expired medicines, from those close to expiry,
worn or broken ones from those that are in good condition, so that we can keep these in mind
products and implement some marketing strategy or simply sell them sooner and save
the process of returning the material to the supplier laboratories.
4. Use and take full advantage of the SICAR program to make it a better stock indicator
and more standardized than simple knowledge of collaborators.
5. Communicate and train company personnel in the SICAR program to record sales
of the day and the registration of each new item.

CONCLUSION

The proposal presented in this paper demonstrates that improving inventory management in a
A small business does not require large resources, but rather vision, organization and commitment.
Despite having a functional program, the company showed significant flaws in how it was
They made decisions, the organization of products and how information was used
available. This led to overbuying, shortages, and wasted time searching for products.

With the 5's methodology, order could be restored to the workspace, making it easier to find products and improving aspects such as cleanliness and discipline, although it was very clear that It was necessary to work on standardization or rules to maintain that order, which led to the plan proposal of the ABC model, which, in turn, provided clarity on which products really matter more for the business, helping to prioritize and make better purchasing, storage and decisions rotation. This model allowed products to be grouped by their value and impact, demonstrating which should have stricter control and which ones should not.

This made it possible to reorganize the warehouse strategically, giving priority access to the more valuable and higher turnover items.

The proposal helps to understand how these two tools complement each other, because while the 5S methodology focuses on physical order, ABC focuses on strategic order. Together improve efficiency, order, and customer service. This experience shows that no additional costs are needed. Large investments to improve: with analysis, organization and consistency, it is possible to transform a company or business from within.

This proposal is expected to be implemented in the company for the improvement, optimization and even greater profits for the same, by applying the plan based on the developed proposal.

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