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Influence of the Structure of Product Portfolio Performance in a Small Business Retail

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ABSTRACT

Small businesses ensure a livelihood for a large part of the population in many countries, in the same way, the services offered by them generate benefits for a large part of the community. In accordance with the above, promoting the improvement in the performance of this type of organization is a way to contribute to the economic development of a territory. Within this type of business, those aimed at retailing occupy an important percentage, where the structure of the portfolio of products with which they operate is important and constitutes one of the possible reserves of efficiency and effectiveness. The purpose of this research was to explore the impact of the structure of the product portfolio of a small retail company on general performance indicators and to evaluate improvement strategies that generate greater business performance. For the analysis of the product portfolio, it was operated with general performance indicators such as procurement expenses, income, profits, inventory levels and the percentage of customers served; depending on the initial state of these indicators, strategies for modifying the structure of the portfolio were designed and applied, keeping the supply costs constant and modifying the levels of purchase from one product to another. As a result of the application of the strategies, positive and statistically significant improvements were obtained in the performance indicators evaluated.

Keywords: Products portfolio; Variety of offer; Retail; Small business.
JEL classification: M, M3, M31.

1. Introduction

Ecuador is a country with a high presence in its economy of micro, small and medium enterprises. Particularly in relation to retail there are more than 230000 companies that are dedicated to this business. of which, 114,104 are dedicated specifically to the retail sale of food, beverages or tobacco. The foregoing gives an account of the importance of analyzing this type of business.

The structure of the portfolio of products adopted by retail businesses can influence their overall levels of efficiency and effectiveness. On the one hand, buying products for subsequent sale in quantities

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that exceed demand influences their levels of expenses, inventories and consequently on profits. On the other hand, allocating capital to products that do not have an acceptable rotation limits the possible purchase of other products whose demand exceeds the offer presented by this small company, which results in the generation of opportunity costs because it can not generate income through the sale of demanded products. The above described can be considered as one of the expression of what in the literature is called cannibalization of products (Díaz, Martín-Consuegra, & Esteban, 2015; Guide & Li, 2010; McColl, Macgilchrist & Rafiq, 2020; Ramani & De Giovanni, 2017), given that the diversity of product offerings causes that some products consume the demand of others whose sale could be more profitable, while the presence of the level of inventory in general brings with it higher operating costs.

The aforementioned effect does not only occur in commercial establishments, but is also observed in production or service, causing also effects in other concepts related to operating costs and the learning curve. An example of this is found in the experience of the founders of the successful McDonald's business, which observed that of all the products initially offered, more than 80% of their sales were concentrated in a very small amount of the offer presented, while the rest limited the capacity of operation affecting the time of rendering of services, the quality, the expenses and the utilities in general.

In contrast, with all the foregoing highlights the fact that most models of product portfolio analysis, or at least the best known, such as those of the Boston Consulting Group Matrix or the General Electric Matrix (Bold, 2011; Torquati, Scarpa, Petrosillo, Ligonzo & Paffarini, 2018), analyze the product portfolio considering the impact on sales or market of each of these separately but do not consider the synergistic relationship that can occur between the products that are offered.

The research on retail sales that are related to this research are numerous and varied in relation to the object of study being addressed. Among these are those oriented to the analysis of competition (Villena & Araneda, 2017); the demand forecast (Guo, Wong, & Li, 2013; Qiang, 2015); the analysis of customer behavior (Sanjit Kuma, Balajim, Sadeque, Nguyen & Melewar, 2016; Muslichah, Wiyarni & Nursasi, 2019); the marketing mix that is carried out for the management of the sale (Mercer, 2014; Scott & Walker, 2017) or the behavior of the inventory management (Xue, Caliskan Demirag, Chen Frank & Yang, 2017).

Despite the abundance of these investigations, no research was found that, at least explicitly, deepened the affectations that led to the performance of small organizations not to develop an adequate management of the product portfolio, which constitutes a problem they face the majority of small businesses that assume the commercialization function in Ecuador. For this reason, the purpose of this research is to explore the impact of the structure of the product portfolio of a retail store on general performance indicators and to evaluate improvement strategies that generate better business performance.

Thereafter, this research presents an analysis of the theoretical foundations that are related to the research and that are available in the literature; a description of the methodology used (characterization of the existing situation, design of solution strategies, evaluation of the results); the main results achieved; as well as an assessment of the limitations and recommendations derived from the study and the main references used for the development of the research.

2. Review of literature

Currently, there are multiple researches in the scientific literature that deal with retail sales as an object of investigation from diverse angles, among which are those who deepen in the incidence of the levels, types and dynamics of competition in this kind of business (Villena & Araneda, 2017). Other authors (Guo, Wong, & Li, 2013; Qiang, 2015; Fildes, Ma & Kolassa, 2019; Huang, Fildes & Soopramanien, 2019; Loureiro, Miguéis & da Silva, 2018) delve into methods and techniques to make forecasts of future retail sales with a greater degree of assertiveness. Similarly, (Mercer, 2014; Scott & Walker, 2017) analyze the influence of pricing policies on the behavior of retail sales. Some studies are oriented to the behavior of the consumer in the process of adopting new technologies in retail (Sanjit Kuma, Balajim, Sadeque, Nguyen & Melewar, 2016; Ashif, 2019), while others, of relative similarity, are oriented to analyze the mechanisms to stimulate consumers to act on impulse when making retail purchases, deepening fundamentally in promotional and advertising mechanisms (Prashar, Parsad, Tata & Sahay, 2016).

A separate analysis deserves the research of Mou, Robb & DeHoratius (2017), which conduct a study of 41 journals with the highest impact factor of five years among the 82 journals included in the Thomson Reuters Journal Citation Reports (JCR) of 2015 in the areas of research sciences and operations management, they also added other magazines of high importance related to retail, reaching about 2716 papers on the subject published between 2008 and 2016.

The first conclusion that can be drawn from this review is that the subject is highly relevant for scientific research given the volume of publications and the impact factor of the journals analyzed (Mou, Robb & DeHoratius, 2017). In addition, the authors identified that the study factors could be summarized in three aspects: customers, employees and products. Similarly, decision research focuses on the following aspects: demand forecasting, in-store logistics, inventory management, assortment and visualization, product promotion, payment operations and employee management. According to these authors, performance research focuses on financial indicators, customer service, inventory management and personnel.

Among the topics analyzed in greater depth in the study of retail sales are the analysis of inventory levels, among which different investigations are observed (Eroglu, Williams Brent, & Waller Matthew, 2012; Gallino, Fisher & Moreno- Garcia, 2012; Grubor, Milićević & Djokic, 2016; Gülşah, Alper & Esra Ağca, 2016; Tompkins International, 2014; Xue, Caliskan Demirag, Chen Frank & Yang, 2017; Yang & Zhang , 2014) that seek to establish methods of forecasting the demand and then, based on these results, proceed with the management of the inventories. Similarly, other authors (Condea, Thiesse & Fleisch, 2012) analyze how the level of inventory and the way it is managed according to the visibility they present to the customer and how they influence the purchase decision. of customers, from generating two major decision alternatives: that of buying from which they identify signs of being depleted and interpreting it as possible future shortages or high demand caused by quality, or on the contrary observe high levels of existence from which they infer that they are of little rotation and therefore do not possess quality to provoke demand or take a long time in the establishment and may be close to their expiration date or ultimately they are products that can be expected to be purchased, since that there are enough. Based on these analyzes, the authors propose using these observations to influence the demand and manage the inventory levels based on the statistical behavior of the demand and with a double inventory system, one visible to the client and another hidden from view.

Although they are not general, there is a line of research that tries to deepen the impact that the existence of substitute products generates in the total volume of sales, so that in the absence of a product this can be replaced by another one (Gümüş, Kaminsky, & Mathur, 2016; Wan, Huang, Zhao, Deng & Fransoo, 2018; Zhao, Tang, Zhao & Wei, 2012).

The authors cited deepen in several questions: How does the space available for a product influence the discount offered during a price promotion? How does the potential for substitution between products within the retail assortment affect the depth of the discounts? Although it is a reference study, this research does not contribute much to the objective of the present investigation because it focuses on evaluating the effects of promotional strategies.

3. Methodology

Considering that the complexity of the study increases as the structure of the portfolio of products with which the business operates increases, that companies with large spaces operate with inventory levels in commissions where they do not assume the costs for non-sale of products, Besides, they are less accessible for investigations where they must offer information that could be protected for them, and finally, the volume of small businesses in the region, which has an important weight in the structure of the economy of the territory, was decided begin the study in small businesses with a view to extracting experiences that later allow to develop research in more complex environments. For the study, a small business with only one worker and with a reduced supply complexity was chosen.

The business under investigation operates with six product lines, and a depth ranging between 4 and 14 products per line. The retail space are located on the outskirts of the city, in front of a school center. This location causes two specificities for most products: the supply of competition is reduced and the total demand tends to be stable. The suppliers of the establishment usually carry out the supply process on a weekly basis, which is why the week was chosen as the period to measure the performance of the indicators, although to summarize the trends, work is done with the accumulated of the month in

regarding the total of clients. The initial measurements were made in the first three months of the year and the evaluation of the validity of the actions applied in the other three months of the first semester.

The methodology used in this research focuses on three fundamental steps, each of which is described below.

3.1 Characterization of the current situation

To characterize the initial situation, the starting point is to analyze the product offer by line, considering the indicators in Table 1.

Table 1.

Indicators to consider.

Input indicators	Result indicators
	Utility
	Opportunity cost
	Cost of inventory
Quantity of products by type and line	Quantity of products at the end of the period (inventory level)
Inventory level of each product	Number of customers to whom the total of products ordered is delivered
Prices of each product	Number of customers to whom part of the requested products is delivered
Sales of each product in the period	Number of customers to whom the requested products are not delivered because they do not exist in inventories
Cost of product acquisition	

Based on the data provided by the above indicators, utility (1), inventory cost (3) and inventory cost (4) are determined.

$$U = I - Ca (1)$$

Where:
U: Utility.
I: Income
Ca: Acquisition Costs.

$$I = Q(pv) (2)$$

Where:
Q: Quantity of products sold.
pv: Sale price.

$$Ci = Q_{nv}(ca) (3)$$

Where:
Qnv: Quantity of products not sold at the end of the period.
ca: Cost of acquisition.

$$Co = Q_{ne}(pv) \ (4)$$

Where:
Qne: Quantity of product that are demanded and do not exist in inventory.
pv: Sale price.

Based on the above indicators, the sales concentration analysis is carried out to identify the products that contribute most and least to the performance of each of the indicators. The analysis excludes cost data related to personnel and the establishment because they are considered constant for the interests of the study and others are considered insignificant, such as the storage costs related to the consumption of inputs (current or water) for reasons similar to the previous ones.

3.2 Design and application of strategies

Once the initial situation has been characterized according to the results, strategies must be designed where, using the same amount for the purchase of the products, actions related to the

structure of the offer and the purchase levels of each product are combined so that an integral improvement of the results is sought. Once these actions have been designed, they should be applied and their results recorded.

3.3 Evaluation of the results of the strategies

For the evaluation of the effectiveness of the strategies, the evaluation of the exit indicators is carried out and they are subjected to a hypothesis test analysis by means of the t Students statistic to evaluate the significance of the changes and be able to reach conclusions based on the statistical significance of this.

4. Results

Characterization of the initial situation. Table 2 summarizes the behavior of the product portfolio of the entity under study. As you can see there are six product lines, each of which has different depths, ranging from 4 to 14 products, the versions of water products for drinking and the most varied jams being the least diverse.

Table 2.

Characterization of the product lines.

Product lines	Sales volume per week	Variety of products
Soft drinks	352	9
Waters	518	4
Jams	463	14
Ice creams	104	6
Candies	214	7
Tobacco	136	5

Figure 1 shows the behavior of the product lines in terms of sales volume in physical units and the contribution that each line makes to the total of products sold in a week of work.

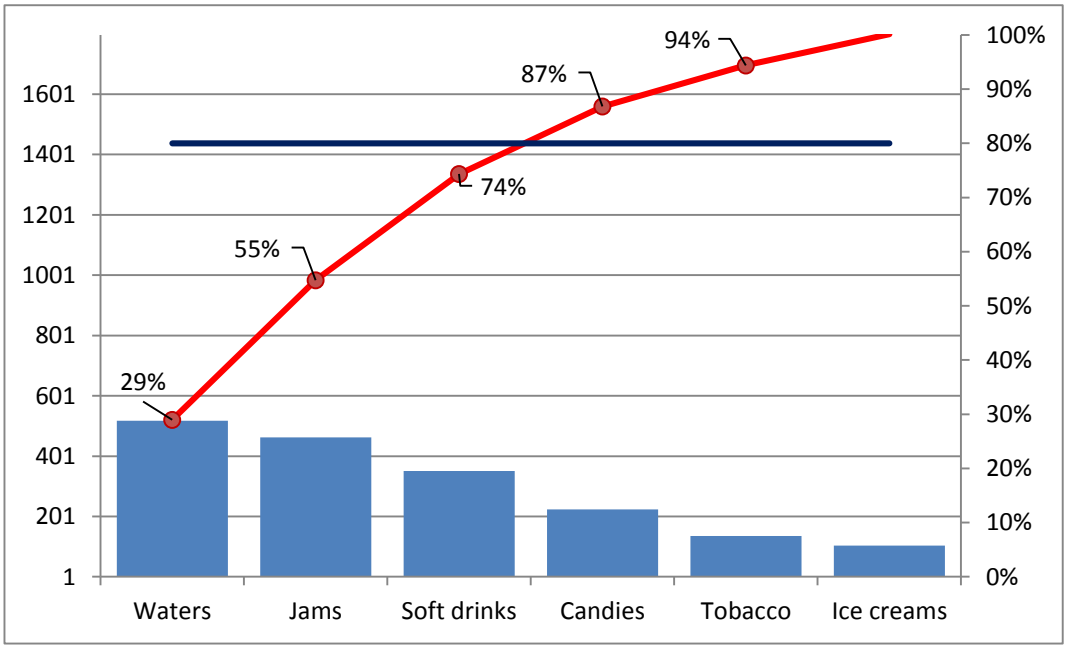


Figure 1. Volume of sales per week per product line and percentage of sales of the lines

Table 3 summarizes the level of existence (E), sales (V) and unsatisfied demand (DI) or the level of inventory of each of the products. As it is observed, in most of the products inventory is generated, and only in the first two options there is usually more demand than the purchase level (To facilitate the representation of the data the products were organized from higher to lower demand) .

Table 3.
Level of existence (E), sales (V) and unsatisfied demand (DI) or the level of inventory of each of the products.

	Jams			Soft drinks			Candies			Ice creams			Tobacco			Waters		
	E	V	DI	E	V	DI	E	V	DI	E	V	DI	E	V	DI	E	V	DI
A	220	220	123	216	216	156	140	140	37	72	72	41	100	100	112	432	432	189
B	160	160	65	72	72	81	40	40	15	15	15	0	20	20	18	48	48	34
			I			I		I			I			I			I	
C	20	14	6	24	16	8	20	13	7	24	5	19	10	9	1	24	21	3
D	20	12	8	24	15	9	20	12	8	24	5	19	10	4	6	24	17	7
E	20	11	9	24	8	16	20	9	11	24	4	20	10	3	7			
F	20	9	11	24	8	16	20	6	14	24	3	21						
G	20	6	14	24	6	18	20	4	16									
H	20	6	14	24	6	18												
I	20	6	14	24	5	19												
J	20	5	15															
K	20	4	16															
L	20	4	16															
M	20	3	17															
Ñ	20	3	17															
Total	240	843	533	744	640	578	460	404	160	270	191	161	270	256	274	1008	998	456

Based on the above, the inventory costs and opportunity costs were determined as shown in Figure 2. As can be seen, for both products, both costs are manifested, the incidence of inventory costs being more considerable in the lines of: jams, soft drinks and ice cream, in this last one together with candies were the only lines where the inventory costs surpass the opportunity costs, which constitutes a clear signal that they must evaluate their offer. Similarly, it becomes clear that in the case of water the demand in certain products is much higher than the current level of sales.

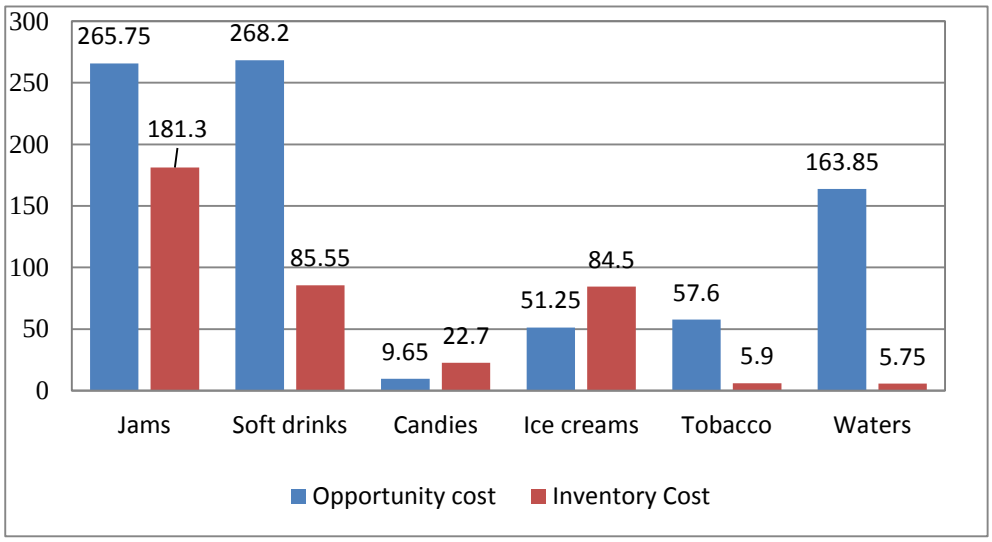


Figure 2. Behavior of opportunity and inventory costs

The behavior of these two types of costs affects the final levels of income and utility, generating in general an unfavorable behavior of the indicators summarized in Figure 3.

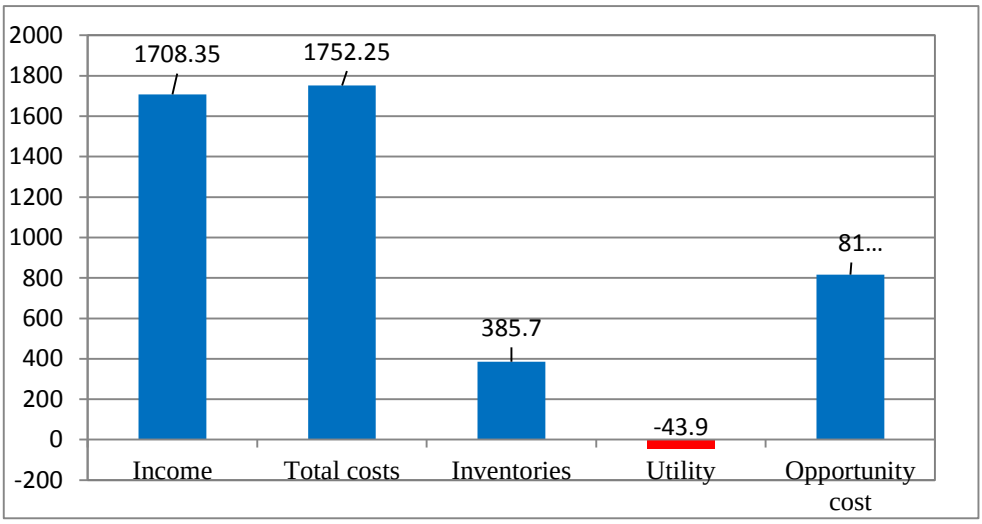


Figure 3. Behavior of the general indicators in the initial situation.

As can be seen, the income levels are lower than the total costs, given that many of the products purchased can not be sold in the period, which leads to negative values of the profits, which would obviously have another result with only being able to eliminate the levels of Inventory. It should be noted that the nature of the products analyzed and the weather conditions of the place under study make it possible to state that the indicators analyzed are not influenced by factors specific to seasonality, which affects other types of products in environments where variations in the Climate generates seasonal changes in demand. Opportunity costs, although they have a negative influence on the income statement, are not considered as a factor that influences profits. Based on the negative state of the previous indicators, we proceeded to design solution strategies, evaluating two possible strategies:

Strategy 1: Adjust the purchase levels to the observed demand and negotiate with the suppliers the purchase of only the amount required for the sale.

Strategy 2: Adjust the purchase levels to the observed demand and calculate the purchasing levels to the suppliers based on the observed demand and the size of the normal lot offered by the suppliers.

Applying the above strategies would achieve the sales levels that are reflected in Table 4. As noted, in strategy 2 the same products are sold as in the 1, but because inventory costs are generated it is not possible to bid the same number of products as in strategy 1.

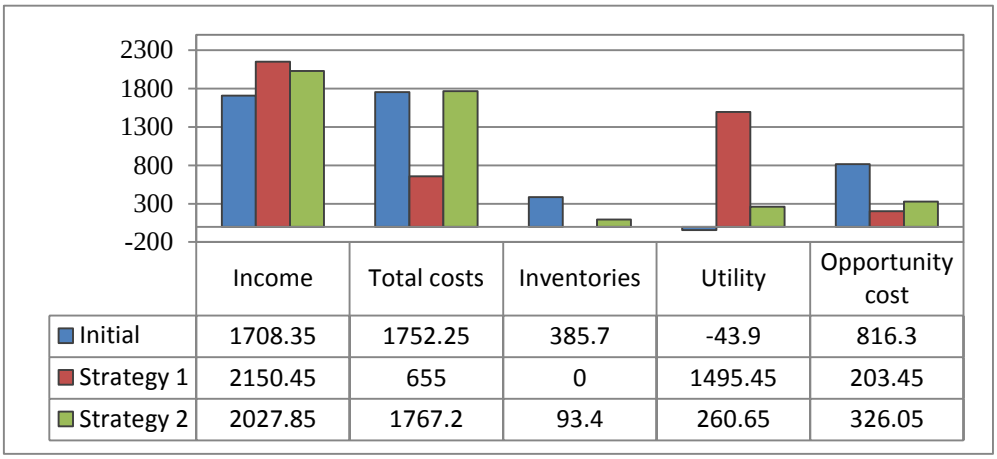
Table 4.

Sales levels of each strategy.

Product line	Product	Sales	
		Strategy 1	Strategy 2
Jams	A	343	343
Jams	B	225	225
Jams	C	14	
Jams	D	12	
Soft drinks	A	372	372
Soft drinks	B	153	153
Soft drinks	C	16	
Soft drinks	D	15	
Waters	A	621	621
Waters	B	82	82
Tobacco	A	212	212
Ice creams	A	5	5
Candies	A	177	

Candies	B	55	
Candies	D		12

The application of these strategies, according to the analysis, could generate the following results (Figure 4):



	Income	Total costs	Inventories	Utility	Opportunity cost
Initial	1708.35	1752.25	385.7	-43.9	816.3
Strategy 1	2150.45	655	0	1495.45	203.45
Strategy 2	2027.85	1767.2	93.4	260.65	326.05

Figure 4. Evaluation of the indicators before the proposed strategies.

In correspondence with the results shown, it is clear that Strategy 1 allows the achievement of more satisfactory results, being the one that allows higher income, lower total costs and inventory levels and, consequently, the achievement of higher profits and lower costs of opportunities However, this is not always possible to apply since it is not always possible to negotiate with suppliers to buy only the required quantity and not the offer of a complete lot. Strategy 2, although to a lesser extent, also allows satisfactory levels of the analyzed indicators to be achieved. Based on these criteria, the choice of Strategy 1 was decided and only if it was not possible to negotiate with the suppliers to buy the amount required to make purchases of the lot established by the suppliers.

The application of these strategies originated a change in the final demand of the number of customers, as well as in the degree of satisfaction of the clients, all of which is summarized in figures 5 and 6. The application of the selected strategy was initiated in April, as can be seen, although at the

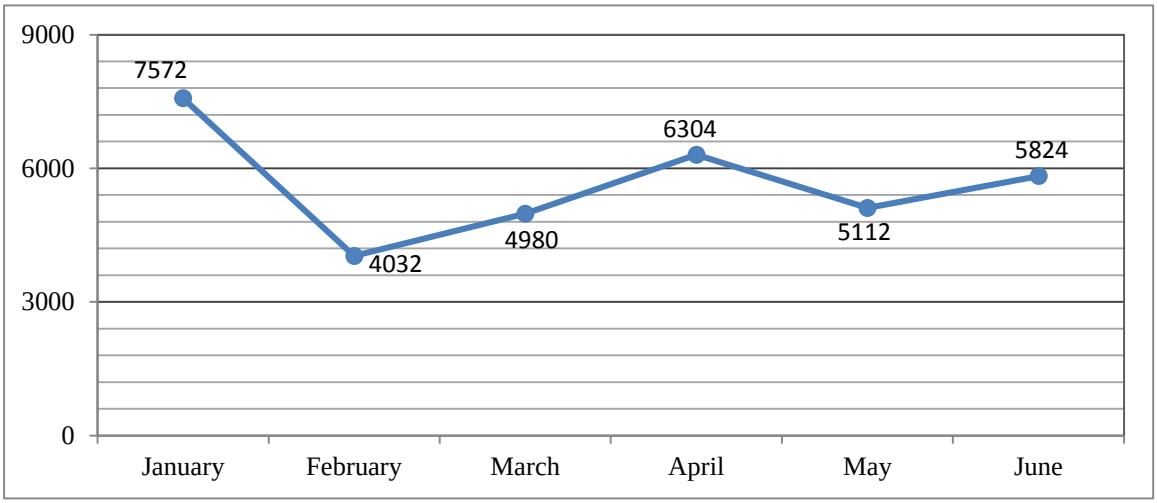
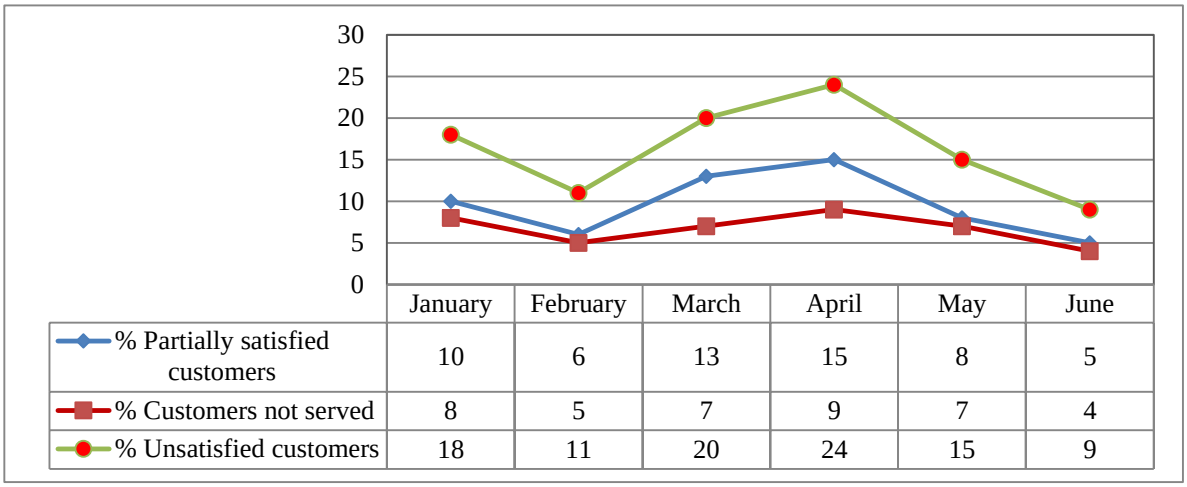


Figure 5. Total demand per month.

beginning demand maintains a growth trend, this is accompanied by an increase in total or partial dissatisfied customers, due to the decrease in the variety of supply; the following month the levels of dissatisfaction begin to decrease and the levels of total demand, although the following month they react with a decrease to the next, the demand begins to grow in response to the specialization of the establishment and a signal that the clients did not have high levels of loyalty to the brands that previously requested.



	January	February	March	April	May	June
% Partially satisfied customers	10	6	13	15	8	5
% Customers not served	8	5	7	9	7	4
% Unsatisfied customers	18	11	20	24	15	9

Figure 6. Percentage of demand satisfaction per month.

In order to evaluate the consistency and significance of the statistical changes achieved in the indicators, a Student Hypothesis Test was carried out based on establishing a weekly measurement frequency of the indicators and two comparison periods: the first contemplated by the measurements before April, and the second for those after the date. The results are shown in Table 5.

Table 5.
Result of an average comparison test of the indicators.

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Income	5.217	26	.000	761168.296	461268.5404	1061068.0522
Costs	4.099	26	.000	603922.148	301106.0633	906738.2330
Utilities	.915	26	.001	174313.333	-217260.2803	565886.9470
Inventories	3.958	26	.369	2032441.29	976941.6514	3087940.9412
Customers fully cared for	9.563	26	.000	6861.03704	5386.3577	8335.7163
Partially served customers	7.581	26	.000	599.00000	436.5886	761.4114
Customers not served	6.805	26	.000	428.70370	299.2040	558.2034
Unsatisfied customers	6.251	26	.000	851.00000	571.1597	1130.8403

The previous results certify the validity of the changes from a statistical conception. The only indicator that does not show a significant change is Inventories. This is because it certainly does not change in quantity but in its composition, which is why the test does not identify a significant variation. What makes it possible to affirm that the strategies applied were effective? Impact not only on the purely economic indicators but also on those associated with customer satisfaction.

5. Discussion

The research carried out justifies its pertinence and validity by being in correspondence with the main variables to which the investigations in retail establishments are oriented, according to the results obtained by Mou, Robb & DeHoratius (2017). Similarly, the results of the research contribute to providing additional information to that offered by related research on the incidence of procurement costs and inventory levels at performance levels in retail sales establishments (Condea et al., 2012; Eroglu et al., 2012; Gallino et al., 2012; Alexandar Grubor, Nikola Milićević, & Nenad Djokic, 2016; Gülşah et al., 2016; Tompkins International, 2014; Xue et al., 2017; Yang & Zhang, 2014).

However, the solution offered in this research differs from the previous ones because it does not seek to influence the decisions of consumers based on a double management of inventories, but induces

customers to change their product choices impacting in a way favorable in the established performance indicators.

6. Conclusions

The study developed is an experience that shows managers the need to rethink the strategy of shaping their product portfolio, considering not only the influence that this has on the market and competition, but also it must be taken into account that a wide variety of offer is not always synonymous with good economic performance; and that on many occasions the effect of a wide variety has negative effects on organizations, mainly on inventory levels, opportunity costs, profits and customer satisfaction, since a wide variety is not always synonymous with greater sales but in fact what happens is a distribution of domestic demand and consequently the sale of one product causes the non-sale of another, which is another form of cannibalism of the offer (Díaz et al. , 2015). Likewise, the above results can be considered as further evidence of compliance with the Pareto Principle, which could be summarized as follows: 80% of the sales and profits of a trade can be achieved with 20% of the purchases with which it operates, which could constitute a general guide or strategy for the improvement of the product portfolio.

The results achieved in the characterization of the structure of the product portfolio, as well as in the application of the proposed strategies and its favorable impact on the product portfolio allow us to affirm that the objectives set were achieved. Similarly, it is considered that the research carried out can be considered as another reference to be taken into account in relation to the improvement of the structure of the product portfolio in retail businesses.

7. Limitations and recommendations

It is necessary to point out that this research did not consider important aspects that may be worth taking into account in future investigations such as the incidence of nearby establishments that may lead to a shift in demand in response to a reduction in supply; In the same way, the incidence of other aspects of the establishment itself is excluded, such as the possible complementary strategies of loyalty to demand to retain unmet demand. In addition, it should be noted that the results correspond to a small establishment, with low level of supply and variety, as well as minimum operating expenses among which are considered staff costs, for this reason it is advisable in future investigations to explore how the results of being applied in establishments of greater magnitude and complexity would behave. Other aspects already analyzed in the literature are also not evaluated (Condea et al., 2012; Eroglu et al., 2012; Gallino et al., 2012; Alexandar Grubor et al., 2016; Gülşah et al., 2016; Tompkins International, 2014; Xue et al., 2017; Yang & Zhang, 2014), such as the incidence of visible inventory levels for the customer in the decision to purchase them.

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