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An analysis of perishable food chain in the Brazilian nanostores

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Abstract In developing markets, income distribution and purchasing patterns are different from developed markets. One feature of developing markets is the presence of small family markets called “nanostores”. This article analyzes the management of the unprocessed perishable food supply chain from the standpoint of nanostore owners. To achieve the proposed objective, first a literature review about supply chain management and nanostores was performed. Then, using a qualitative approach, a script of interviews was elaborated. Semi-structured interviews were conducted with the owners of four nanostores. After that, the interviews were analyzed by the content analysis methodology. The results of this study point out the importance of developing researches about nanostores in countries such as Brazil, as it is considered a market to be explored, characterized by precarious supply chain management. These results were evidenced by both the literature review and the practices reported in the interviews, although studies are still needed to better characterize the country's scenario.

Keywords: Retail logistics, Nanostores, Supply chain management.

1 Introduction

Please note that the first line of text that follows a heading is not indented (“p1a” style). Small markets operating in food retail represent 6% of GDP in Brazil and account for 35% of sales in the supermarket sector (SEBRAE, 2015). In a survey conducted by the Brazilian Micro and Small Business Support Service (SEBRAE, 2015), it was identified that 40% of the mini markets are small-sized, that is, they have attributes such as 1 or 2 cash registers, less than 4 employees and up to 50 customers served per day (SEBRAE, 2015).

Small markets that do not have branches and whose decisions are centralized on a single owner can be called nanostores (Fransoo, Blanco and Argueta, 2017). Also, in nanostores, often the employees are owner family members (Fransoo, Blanco and Argueta, 2017). These small companies are in risk of losing their competitive capacity due to inefficient demand forecasting information (Eksoz and Mansouri, 2012) and internal inventory control failures (Småros, no date).

A competent supply chain management can maximize agent integration by lowering inventory across the chain, enabling rapid replacement of goods and avoiding stockout. This practices lead to a better service to the end consumer (Vollmann and Cordon, 1996). This paper aims to analyze the management of the unprocessed perishable food supply chain from the standpoint of nanostores owners.

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2 Literature review

The concept of Supply Chain (SC) encompasses all the efforts involved in a product from production to release and arose from the development of trade and growth in the quality of products and information systems (Pires, 2011). Therefore, it develops from the first "supplier of the supplier" to the last "customer of the customer". In the scope of SC, four basic processes are defined, which are: planning, supplying, making and delivering. SC comprises the functional steps from supply to logistics distribution, as well as integrating demand and supply management internally and between links in the chain (Moellmann, 2008).

The supply chain management (SCM) involves the integration between the various components of the chain in physical and operational terms (Novaes, 2007). It is appropriate to differentiate between SC and SCM. SCM, when implemented, promotes a significant qualitative gain, as SC companies start to treat their activities in a strategic way, expanding its importance due to the rapid changes and challenges in the management of various industrial sectors (Svensson, 2002; Novaes, 2007).

Thus, with a view to improving organizational performance, five distinct dimensions were defined to measure the practice of SCM (Li *et al.*, 2006). They are: partnership with strategic suppliers, relationship with customers, level of information sharing, quality of information sharing and postponement. These five constructs cover the upstream (partnership of strategic suppliers) and downstream (customer relationship) sides of a supply chain, information flow in a supply chain (level of information sharing and quality of information sharing) and internal process supply chain.

Supply chain management is one of the essential aspects of conducting business. However, the consumer does not realize its importance, but feels its effects such as an stockout, rising prices due to scarcity, or an e-commerce purchase that took longer than expected or the wrong product was sent (Gámez Albán *et al.*, 2015; Lu and Swaminathan, 2015). Thus, the implementation of supply chain management practices is inserted from manufacturing to delivery in companies in the retail sector (Gilchrest, 2007; Randall *et al.*, 2011).

Supply chain management is one of the essentials of conducting business, since the effects of mismanagement are stockout, price increases due to scarcity or delayed delivery (Berger, Frazzon and Danielli, 2018). Therefore, the implementation of supply chain management practices should range from manufacturing to delivery in retail companies (Randall *et al.*, 2011).

It was expected that the entrance of modern supermarkets would expel nanostores from the market (Child, Kilroy and Naylor, 2015). At the same time, nanostores continue to hold a significant - sometimes even dominant - share of retail sales in emerging economies (Burch, 2015).

The social characteristics of emerging economies lead to the coexistence of various distribution channels to reach end consumers, some of them direct and some indirect (wholesalers and distributors). The modern distribution channel comprises supermarkets and retailers, while nanostores are in the traditional distribution channel (Blanco and Fransoo, 2013; Gámez Albán *et al.*, 2015). Table 1 shows the comparison of a modern channel, exemplified by supermarkets, and the traditional channel, exemplified by nanostores.

Table 1. Comparison between supermarkets and nanostores. Souce: Adapted from Blanco & Fransoo (2013).

Functions	Supermarkets	Nanostores
Logistical support	Professionals and distribution centers	Owner only
Financial flow	Formal credit	Credit based on relationship
Line items	Full casepacks to store	Consumer units, mixed casepacks
Number of SKUs	Thousands to tens of thousands	Hundreds
Number of categories per SKU[1]	Half a dozen to dozens	One or two
Number of consumers served by store	Tens of thousands	A few hundred
Technology	Business systems	Personal phone

Family businesses, where managers often do not master or know managerial techniques, face numerous sales, inventory, and demand challenges. In order to control demand, they must pay attention to customer behavior in past purchases and changes in customer perception (Bilgicer *et al.*, 2015; Melis *et al.*, 2015).

While supply chains containing nanostores often seem chaotic and inefficient, they are in fact able to align many needs (Guarín, 2013). On a nanostore, customers can buy a single cigarette or crackers in a smaller package. Nanostore is also close to consumers' homes and providing the informal credit option (Blanco and Fransoo, 2013). It is common practice for manufacturers to frequently send sales agents to visit nanostores to sell and deliver their products (Ge *et al.*, 2020)

3 Methods and procedures

The present research uses a qualitative approach and semi-structured interviews in order to understand supply chain management of unprocessed perishables in a nanostore environment (Yin, 2017). The questionnaire used contained nineteen questions divided into two parts: the first part was about the characterization of the nanostore environment and the second part was related to the supply chain management of unprocessed perishable products. The script used in the interviews are presented in Table 2.

Table 2. Interview Script

Questions
1) How was the choice of place where the establishment would be installed?
2) What is the customer profile?
3) What is the approximate number of customers?
4) Are there any periods of the year when sales are lower?
5) Do you have more than one store?
6) How many employees do you have?
7) What is the approximate size of the establishment?
8) What are the payment methods available to your customers?
9) How many varieties do you have by product type?
10) How is the product mix defined?
11) Do you work with unprocessed perishable products?
12) What are the main challenges encountered with marketing unprocessed perishable products?
13) How do you do volume planning for purchasing unprocessed perishables?
14) When is the purchase of unprocessed perishable products made?
15) Does the supplier require minimum purchase volumes for unprocessed perishable products?
16) Does the purchased volume of unprocessed perishable products imply the price?
17) When purchasing an unprocessed perishable product is validity considered?
18) How do suppliers deliver unprocessed perishable products?
19) How are expired unprocessed perishable products discarded?

Data collection was performed in May 2019. To assist in data analysis and prevent details from being lost, interviews were recorded. Regarding content analysis, the registration units and the enumeration rules were defined.

The registration unit corresponds to the fraction of content that is coded in order to allow for later coding and eventual counting (Bardin, 2011). In this content analysis, the registration unit used was the respondents' responses, involving a paragraph or a sentence (Bardin, 2011). The enumeration rule can be understood as the counting mode used to perform a given analysis (Bardin, 2011). In this analysis, the rule

named by Bardin (2011) was considered as presence or absence. This made it possible to identify the presence, or not, of the categories in each response. The questions were divided into two groups "characterization of the nanostore environment" and "organization in terms of logistics and supply chain", the categories emerged from the questions and were defined before the analysis, while the subcategories emerged from the collected data (Bardin, 2011).

4 Experimental/numerical setting

The field research was conducted with a non-random, intentional and non-probabilistic sample, however, the choice of respondents was made to ensure diversity and cover different points of view. To ensure the desired diversity, nanostores from different neighborhoods of a city with 200 thousand inhabitants located in the interior of Rio Grande do Sul were selected. The purpose of the sample was to produce in-depth and illustrative information. In order to maintain the confidentiality of the participants, letters were used to name the nanostores. The questionnaire was conducted individually with the four owners of the surveyed nanostores. The interviews were conducted in-person at the companies at previously scheduled times.

5 Results and Discussion

The most cited words throughout the questions in all interviews were "products," followed by "purchase," "volume," and "customers." These are words that identify the nanostore in general. After, the words “validity” and “perishable” were more mentioned. These words relate to the focus of the second part of the questions regarding supply chain management of unprocessed perishable products.

The first section of the interviews was conducted with the objective of characterizing the nanostores. The answers are presented in Table 3.

Table 3. Characterization of nanostores and professionals who contributed to the research.

	Nanostore A	Nanostore B	Nanostore C	Nanostore D
Operation time (years)	15	10	24	4
Number of Employees	2	4	6	3
Property Type	Rented	Owned	Owned	Rented
Lives on property	Yes	No	No	Yes

Table 3 shows that the sample of companies includes companies that are between 4 and 24 years old. Thus, it can be said that we have relatively young companies established in the market and older companies. According to SEBRAE (2015), 7.2% of registered mini-markets are up to two years old; 15.4% from 3 to 5 years; 22.1% from 6 to 10 years; 20.7 from 11 to 15 years and 33.3% more than 15 years.

The companies have 2 to 6 employees. According to SEBRAE (2015), 48.9% of registered mini-markets have 1 to 4 employees and 23.4% more than 5 people (Bardin, 2011). In addition, companies are divided into whether the property is owned or rented and whether or not the family lives in the commercial establishment. These last two questions were necessary to understand the importance and the investment made by the family in choosing the property.

The first part of the interviews was also categorized by the content analysis method. Table 4 and Table 5 presents the categories used and the results obtained. The letters A, B, C and D represent the responses of nanostores.

Respondents from Nanostores A and D opened the business in their own place, so the owners live in the back of the establishment where they work. One of the interviewees said: “the place that chose me, I was born and raised here”. Companies B and C rented the place.

Table 4. Coding of responses from the first section of the interviews using the presence/absence rule part A.

Category	Subcategory	A	B	C	D	Total
Choice of place of establishment	Own property	1	-	-	1	2
	Rented property near the residence	-	1	1	-	2
Consumer Profile	Neighbors Only	-	-	1	1	2
	Neighbors and other customers	1	1	-	-	2
Approximate Number of Customers	100-200	1	1	1	1	4
Number of Stores	Only 1	1	1	1	1	4
Number of employees	Up to 3 employees	1	1	-	1	3
	4 to 6 employees	-	-	1	-	1

Table 5. Coding of responses from the first section of the interviews using the presence/absence rule part B.

Category	Subcategory	A	B	C	D	Total
Approximate Size of Nanostore	15 to 40 m²	1	1	1	1	4
Payment Methods Available	Cash and card only	-	-	1	-	1
	Money, card and informal credit	1	1	-	1	3
Number of varieties by product type	Up to 2	1	-	1	1	3
	More than 2 depending, on product	-	1	-	-	1

The clients of the establishments are mostly neighbors, which was confirmed in all respondents, according to one interviewee: “It's from the neighborhood. The customers have been the same for years, for years ”. In addition, the number of clients was questioned and the responses were around 200, but it was emphasized that: “With the financial crisis, it has decreased a lot”. According to Blanco and Fransoo, J. (2013) nanostores have a hundred people as clients. SEBRAE (2015) states that 38.3% of mini-markets serve up to 50 customers per day and 29.3% of 51 to 100 people per day.

In addition, none of the companies has branches, that is, they have a single store where the owner is also an operator (Blanco and Fransoo, 2013). The city is located close to the beach, when questioned about seasonality, all respondents stated that in the summer there is a significant decrease in customers. The following sentence can be highlighted: “In winter more people come. In summer, customers go to the beach, then some disappear”.

In Nanostore A works the owner and her husband, in Nanostore B the owner, her husband and their two children. In Nanostore C works the owner, her mother and two employees and, in Company D, the owner, the husband and the son. None of the owners could tell the size of the nanostore, however, through direct observation, it was possible to infer that the establishments are between 15 and 40 m². According to SEBRAE (2015) 41.6% of mini markets have up to 100m².

The payment methods available to the customers of Nanostore A, Nanostore C and Nanostore D are: cash, card and notebook notes (or informal credit). However, the informal credit is granted exceptionally, for the most assiduous and reliable customers, as can be highlighted by the phrases: "Only two customers in the notebook, who pay correctly", "They are only the oldest customers, because now it is kind of difficult" and "Sometimes someone owes me and I make a note". Nanostore B said that it does not operate with informal credit due to the fact of the large default of customers and the unavailability of cash for possible purchases. According to Blanco and Fransoo (2013) credit in nanostores is based on the relationship, which is confirmed in this question.

Table 6 and Table 7 presents the results obtained in the second part of the interviews, where questions related to the supply chain management of unprocessed perishable products were performed.

Table 6. Coding of responses from the second section of the interviews using the presence/absence rule part A.

Category	Subcategory	A	B	C	D	Total
Product mix definition	Consumer Behavior (Empirically Observed)	1	1	1	1	4
Nanostore Availability of Perishable Products	Unprocessed	1	1	1	1	4
	Processed	1	1	1	1	4

Table 7. Coding of responses from the second section of the interviews using the presence/absence rule part B.

Category	Subcategory	A	B	C	D	Total
Challenges encountered on commercialization of unprocessed products	Variability in purchased volume to avoid loss	1	1	1	-	3
	Product ripening variability	-	-	-	1	1
Frequency planning of unprocessed food procurement	Up to 3 times a week	1	1	1	1	4
Point when perishable goods are purchased	When the products reach a minimum stock.	1	-	-	1	2
	On stipulated days	-	1	1	-	2
Supplier Type	Wholesale Supplier	1	1	-	-	2
	Farmers (delivery on nanostores)	-	-	1	-	1
	Farmers (no delivery on nanostores)	-	-	-	1	1

When asked about the variety, all companies use two varieties of each product. However, Company B emphasized that some products it usually buys more varieties, and Company C stressed that it always buys two, one cheaper and one more expensive, but when the owner's husband does the shopping, he usually buys more than two varieties, as he believes it is important to have more varieties of the same product to offer to customers. As seen in the literature, nanostores are typically retail outlets of very small size, with limited shelf space available. Typically, they carry inventory from just one or two brand manufacturers for each product category (Fransoo, Blanco and Argueta, 2017).

The product mix is established according to customer demand in all companies interviewed. The main challenge in selling perishable products is the short shelf life of the items, which leads to a large variability of purchase volumes to avoid loss. Companies A and B claim to buy in sufficient volume to be sold before the products spoil. Company C said it discards what has not been sold but is not a significant volume. Company D emphasized that when it buys a product, it picks some more mature than others and so can sell according to maturity.

Company B purchases on predefined days regardless of the available inventory of each product. Company C noted that it usually buys the same volumes, and these are delivered by suppliers once or twice a week, depending on the product. The company also stated that suppliers do not require minimum purchase volumes. Other companies have a visual control of inventory. In these companies the purchase of perishable foods is performed whenever they reach the minimum stock.

The companies reported that the purchased volume does not influence the purchase price. Companies A and B purchase their products from the city's wholesale supplier, while Company D in the public market and Company C from other suppliers.

When asked about expired products, it was highlighted by all respondents that they are discarded, which can be emphasized by the phrases “Go to waste. Something always goes to waste”, “This we discard, there is no way”. However, it was emphasized by companies A and C that most of the time nothing is discarded because it is consumed at the owners' residence.

Supply models for nanostores are inefficient, caused mainly by the small size of these stores and the lack of storage space. This means that if a product is not on the shelf, it will be out of stock, which will later lead to continuous replenishment of stock (de Magalhães, 2010). Only company C has delivery at the nanostore (due to its cost). Kin (2018)suggests that small volumes, such as those delivered to nanostores, are suitable for delivery concepts that use spare transport capacity in vehicles that circulate anyway in that region.

5 Conclusions and future research

Research results show that nanostores operate with a small mix and volume of unprocessed perishable foods due to their short shelf life. Research results show that nanostores work with a small mix and volume of unprocessed perishable foods due to their short shelf life. Respondents still agree that keeping a minimum inventory is very important, and that, therefore, the purchase must be made up to 3 times a week, which implies an increase in the cost of purchasing the products. Regarding inventory control, sale and purchase of unprocessed perishable products, the analyzed nanostores have precarious control and there is ample opportunity for improvements in this area.

The main limitation of the research is related to the context in which it is inserted. The companies interviewed are located in a city with 200 thousand inhabitants. Thus, the information contained in this paper cannot be generalized to other contexts.

The results found may be useful for identifying research gaps in nanostores. As suggestions for future work, we indicate conducting researches that will deepen the knowledge about the supply chain management in nanostores, such as: i) conducting interviews with all supply chain agents, ii) understanding customer purchasing patterns, iii) verify suppliers' interest in being part of a collaborative network to supply nanostores; iv) identify advantages of forming partnerships for each link in the chain.

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