

A study on the systematization and implementation of autonomous or self-service supermarkets



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ABSTRACT

The retail market in Brazil has been undergoing a major technological transformation, with the emergence of new business models, such as autonomous markets. These establishments offer an innovative and convenient shopping experience for consumers, with the possibility of making purchases fully automatically, from access to the store to payment. Thus, the present study addresses as a question the respective problem: How does the systematization of an intelligent market work? Thus, this work aims to demonstrate the implementation and systematization of an intelligent market focused on convenience. For this, as a methodological support, a bibliographical research was carried out, with the analysis of scientific articles, books and sites specialized in the

subject. From the analysis of the collected data, it was possible to identify the main components of an autonomous market, as well as the challenges and opportunities for its implementation in Brazil. Thus, we point out that the components of an autonomous market include: Technology (image identification systems, artificial intelligence, sensors and others); Infrastructure (cameras, sensors, alarms and others); Process (business rules, flow of purchases, among others). In this sense, the challenges for the implementation of autonomous markets in Brazil include: Need for technology investments, autonomous markets are dependent on advanced technologies such as artificial intelligence and computer vision; Consumer confidence: consumers need to be confident that their data and purchases will be safe; Regulation of the sector: the sector of autonomous markets is still new in Brazil and there is no specific regulation for this type of business. Opportunities for autonomous markets in Brazil include: Operational cost reduction: autonomous markets do not need employees to serve customers, which can generate cost savings; Increased sales: autonomous markets can increase sales, because they offer a more convenient and flexible shopping experience; Improved customer experience: autonomous markets can offer a more personalized shopping experience and adapted to the needs of consumers. Finally, this study contributes to the knowledge about autonomous markets, presenting an overview on the subject and discussing the main challenges and opportunities for its implementation in Brazil.

Keywords: Self-Service, Technology, Retail, Autonomous Markets.

1 INTRODUCTION

The retail market in Brazil has been undergoing a major technological transformation, seeking to offer new experiences and facilities to its customers. Self-service is already a reality in several segments, such as banks, where almost everything is solved by the machine. Following this trend,



autonomous markets or also called smart markets emerge in retail, where everything is done automatically to make purchases, from accessing the store to making the payment

It is an early-stage business model in the country and, therefore, still little known. This work aims to demonstrate the implementation and systematization of a smart market with a focus on convenience

According to Barbosa (2020), unlike face-to-face contact with the employee of the establishment in a traditional market service, in self-service establishments it requires the active participation of the consumer with the equipment, that is, the consumer himself produces the customer service. Therefore, there is a need for the consumer to have a minimum knowledge of these technologies.

Freire (2020) states that most of the new technologies introduced in retail aim to increase customer acceptance and business profitability. In the case of autonomous markets, you can mention the fact that you do not have the need for employee expenses for service. This also contributes to these stores having more flexible opening hours or staying open 24 hours a day, giving more options for shopping times to their customers or facilitating last-minute needs.

Thus, this work has as a tone of relevance for the area of commercial management the fact that these establishments are one of the main innovations in commerce and with the potential to significantly transform the way consumers make their purchases. And in light of this, help identify the best practices and strategies to make the most of the possible benefits that this new form of commerce can bring. To show society these new forms of retail that can in some ways positively impact it, such as greater convenience, privacy, reduction of waiting times, more flexible hours, among others. For companies to identify new opportunities and offer new experiences to their customers and stay up to date in an increasingly dynamic and competitive market. To provide professionals in the commercial sector with up-to-date knowledge and information about this new way of doing business.

Thus, the present study treats as a question the respective problem: How does the systematization of a smart market work?

Faced with this problem and as a way to reach answers to this question, we outline the general objective of demonstrating the implementation and systematization of a smart market.

To achieve the general objective, we have defined the following specific objectives, namely: To study the systematization of a smart market; Know and analyze the implementation of a store in this segment.

Next, we present a theoretical breakdown for the achievement of answers to the problem and the meeting of the established objectives.



2 SYSTEMATIZATION OF A SMART MARKET

2.1 SELF-SERVICE TECHNOLOGY

Barbosa (2020) says that self-service technology is increasingly present in our society and that products and services through which they make use of this technology show accelerated growth. Self-service technology has been presenting itself as one of the great transformations of retail. Among the goals of this technology, we can mention improving operational efficiency and offering new, more agile and convenient experiences for customers. Among the retail sectors that are implementing this technology, which also promises more autonomy and convenience for their customers at the time of purchase, are supermarkets and minimarkets.

For Campos (2022), technology is revolutionizing our way of living and, consequently, how we consume, but with the pandemic (coronavirus) and consequently the need for social distancing, this technological process was accelerated, as many daily activities, such as shopping, required the use of technologies such as the internet and self-service equipment so that social distancing was possible.

Chagas (2023) says "[...] Making the buying process faster is an important role in aggregate technology." Self-service in the supermarket is an innovation that streamlines the shopping journey. Through cashiers equipped with barcode readers, customers can scan their products, weigh them when necessary and make payments without the need for employees. In addition, the use of collected data allows us to offer personalized promotions and recommendations that also collaborate to streamline the shopping process through self-service.

Ease of use and frictionlessness are essential factors in providing a more satisfying shopping journey. With technology acting as a connector, self-service supermarkets eliminate barriers, such as queues and waiting, making the shopping process faster and more efficient (Chagas, 2023).

2.2 SELF-SERVICE ESTABLISHMENTS

Regarding self-service establishments, Campos (2022) states that shopping quickly, at the most convenient time for the consumer and independently will be a reality for a larger group of consumers in a short period of time. This boost of self-service markets will also be due to the change in people's consumption behavior, especially the younger generations.

Autonomous markets with their convenience serve small groups of people in their surroundings, with 24-hour service also having the characteristic of saving time and safety (Chagas, 2023). It is an interesting, convenient and very affordable alternative for a group of people in your surroundings, in a condominium for example. They provide easy access to essential products at any time of the day.

Freire (2020) says that retailers who are looking for differentiation with the smart retail market need to be aware of the points of success or failure of this type of commerce. It is not enough to equip



them with the most modern equipment for this segment without first a careful analysis of their functionality and adaptation by their potential customers.

2.3 FUNCTIONALITY AND SYSTEM

To what he understands as functionality, Santos (2022) presents that self-service supermarkets are a promise for the future of consumers. This trend has increased significantly among consumers because many like to feel independent and attuned to new technologies, striking characteristics of autonomous markets because in this type of commerce it is the customer who assumes the entire process from product choice, weighing and payment.

There are three types of this type of establishment in the country. Vending *machines are vending machines* where you produce and pay for them. The conveniences or *honest markets* are mini-markets in restricted places such as condominiums and as the name says, it relies on the honesty of customers. And autonomous stores, with a more intensive technology that relies on facial biometrics, artificial intelligence, among others (Dias, 2022).

2.3.1 Vending Machines

According to the EECS Jr. Blog (2020), *vending machines* are machines used to make fully automatic sales of various products, from *snacks* to electronic products. Therefore, they are a great way to sell products without the need for a salesperson. They are a convenient option for consumers, who can buy what they need anytime and anywhere. *Vending machines* are also a good option for retailers because they can increase their sales without having to increase their workforce.

With a simple operation, where the customer orders the product on a panel of the machine and chooses the payment method according to the pre-selected options, for example, cards. After payment confirmation, the selected product is made available to the consumer without any need for employee intervention (Star Mídia e Café, 2023)

For the iFood Partners Blog (2022), the benefits of this type of commerce are the practicality of an intuitive system for consumers who gain from the autonomy of purchase, choice and acquisition quickly without facing queues for payments. It is a great sales option because they can be placed in places with high traffic of people, making it a great opportunity for a considerable volume of sales. Also according to the iFood Partner Blog (2022), its acquisition can be made by rent or purchase where renting may be more viable, as the rental company is responsible for maintenance if necessary.

2.3.2 Honest Markets

Brandão (2022) states that *honest markets* is a type of market or convenience store where the customer's honesty is directly linked to the business. In these establishments, consumers choose their



products and make their payment at an electronic terminal or through an app, without the mediation of an operator. That is why the honesty of the customer is necessary in this type of business. A quick shopping option with no queues and flexible schedules. This type of commerce is mostly found inside condominiums.

This type of commerce, because it operates 24 hours a day and is open every day, is a convenience for those consumers who work during business hours and need to make their purchases when practically everything is closed and without the need to travel long distances, since most of the time these establishments are inside the condominium where these consumers live (Tecnisa, 2022)

According to Modularis (2022), the *honest market* stands out in relation to *vending machines*, among other reasons, because they provide a greater variety of products such as bread, cartoned milk, meat, among others, that are incompatible with the vendig machine, in addition to customers being able to touch, read the labels and check the expiration date of the products. Also according to Modularis (2022), another advantage is the fact that *honest maket* can adapt according to the installed location. When installed in a company, its mix is directed to quick meals, sandwiches, salads and fruits. When they are installed in condominiums, their mix can be extended to cleaning and hygiene items, for example.

Among the benefits of investing in this type of commerce is the fact that it is highly scalable because there is practically no competition since it is located within a condominium, it does not require employee costs where the entrepreneur can carry out the bureaucratic part, purchases and replacement of goods. The *honest market* also makes it possible for the investment to be made anywhere in the country, in large and medium-sized cities, as long as there is a condominium with the availability to implement this store (Market4u, 2022).

The companies responsible for developing this type of self-service commerce propose to organize everything in a very intuitive way so that customers do not need training or guidance to access the place and make their purchases (Tecnisa, 2022)

For Eyemobile (2021), the *honest mark* can also help in brand differentiation for those who have another type of business. A space is reserved in the establishment for the implementation of the *honest market*. This will bring convenience to the patrons of this business and residents of the surrounding area and will help in the differentiation of this business.

2.3.3 Technology-intensive stores

According to Blasi (2021), to make purchases in this type of establishment, you just need to access the store with the help of a company application that allows access by reading QR CODE, get what you need and leave. The payment will be automatically registered by the payment method registered in the app without the need for any scanning of product codes in a *self-checkout*.



These stores use artificial intelligence and sensor systems that automatically read the products chosen by customers without the need for an employee to carry out any type of control (Malar, 2023)

The security of the system avoids the possibility of theft for the establishment and for the customer, because for access it is necessary to have an application, a registration and easy recognition requested to enter and to leave. In addition to the use of labels on the products read by radio frequency. These stores have a very wide mix of products that even contain fresh food that can be consumed on site, some stores are equipped with microwaves for on-site preparation and consumption (Ximenes, 2019)

3 IMPLEMENTATION OF THE SMART MARKET

At this moment, due to the great difficulty in finding Brazilian academic scientific support in relation to the implementation of the smart market, as it is a current and innovative content. In this way, the following explanation and structure, by which he presents the implementation of the smart market, is based on the article "Everything you need to know about condominium markets" by the author Flores (2021).

3.1 OPENING PROCESS

According to Flores (2021), with a report on the blog "Vida em Condominium" (2021), the installation of a market in a condominium occurs as follows:

The syndicator or syndicate analyzes the companies that offer this service in the region, selecting at least 3 quotes.

The proposals and budgets are presented at an assembly meeting and are voted on and evaluated by the condominiums.

After the decision is made at the assembly meeting, the condominium provides an empty space in one of the common areas so that a company can install the market.

The format of the market is defined taking into account the space available in the residential building, the profile of the condominium residents, the chosen company and other particular issues.

Likewise, the responsibility for issues such as the execution of the installation and maintenance works of the equipment varies according to the agreement provided with the company providing the service. For the most part, companies don't charge for installation.

3.2 TYPES OF MARKET WITHIN THE CONDOMINIUM

For Flores (2021), it is not necessary to have ample free space for the installation of a market in the condominium. It is recommended to have at least 2 square meters available in a common area of the condominium, which can include an entrance hall, reception, hallway or even a parking space.



The *layout* of the marketplace to be installed in the condominium is determined based on the available space and preferences of the condominiums. To clarify, we highlight the most common layouts for condominium markets:

The grocery store resembles a convenience store, with food shelves and refrigerators containing drinks.

A market is set up to simulate a visit to the supermarket, with wide aisles, shopping carts, baskets, a produce section, etc. This is ideal for residential accommodation with significant extra space.

The market is accommodated inside a container, typically placed in a part of the condominium parking lot. This option is suitable for horizontal condominiums, where the container can take up the space of a parking space.

There are also more compact options, where market space is limited to one or two shelves containing only essentials. This is ideal for condominiums with reduced infrastructure.

The market inside the condominium may consist of only a few refrigerators, similar to soda vending machines. This option is suitable for trading recommendations.

3.3 TO INVEST OR NOT IN THE SMART MARKET

According to the website Habita Administração de Condomínio (2023), it highlights the importance that the syndic should consider before taking the matter to be discussed at an assembly meeting. To make it easier to understand, we list some advantages of having a grocery store in the condominium:

3.4 ADVANTAGES OF THE MARKET IN CONDOMINIUMS

3.4.1 Practicality

Residents do not observe leaving the condominium to purchase essential products. This convenience is particularly useful in unfavorable weather conditions or emergency situations.

3.4.2 Revenue Generation for the Condominium

Grocery stores can constitute a source of revenue for the condominium, thus assisting in the financial management and financing of other needs of the condominium community.

3.5 DISADVANTAGES OF SETTING UP A GROCERY STORE INSIDE THE CONDOMINIUM.

3.5.1 Initial Investments and Maintenance

Establishing and maintaining a no-compromise market entails financial expenses that can be redistributed among condominiums through condominium fees.



3.5.2 Administration

In addition to the financial aspects, marketplace management requires supervision of purchases, inventory control, sales tracking, and other management activities.

3.5.3 Impact on the use of space

Allocating a space in the condominium to the market can influence the aesthetics of the location or compete with other planned uses for that space.

3.5.4 Security Considerations

The presence of a mini-market can have implications for the security of the condominium, making it more vulnerable to theft.

Each condominium should evaluate its own resources, needs, and residents' preferences to determine whether or not the installation of a market is relevant

4 CASH SYSTEM

According to the Teknisa website (2022), a self-service checkout system represents a tool of great value for any enterprise, including smart markets. Here are some of the fundamental reasons for its relevance:

4.1 OPERATIONAL COST SAVINGS

With the implementation of Self-Checkout, the reorganization of the workforce allows the relocation of cashiers to other areas of the company, thus reducing the costs associated with this operation. In addition, there is a reduction in the need for physical space, since Self-Checkout units take up less area compared to traditional cashiers.

4.2 AGILITY IN PURCHASE TRANSACTIONS

The main benefit of Self-Checkout is notably reduced queues for payment of purchases, ensuring a faster and more effective shopping experience for consumers.

4.3 AGILE AND INTUITIVE PAYMENT PROCESS

Self-Checkout allows customers to go directly to a self-service machine, where they can make purchases and payments independently, quickly and, above all, simply. This innovation does not require an instruction manual, as the process is so intuitive that the interaction between the consumer and the machine is practically immediate. The payment system in the Self-Checkout machines intelligently accompanies and guides the process until its completion.



4.4 NEW CONSUMER EXPERIENCE AND SPONTANEOUS MEDIA COVERAGE

The growing presence of artificial intelligence and technology in everyday life is an irreversible trend. The combination of technology and machine intelligence is becoming increasingly common, facilitating routine tasks and, in some cases, altering roles performed by professionals. Self-Checkout, widely spread in developed countries, is another of these innovations that is gaining ground, including in Brazil. Being a technological novelty, this innovation attracts new customers out of curiosity, generating positive and spontaneous media coverage for companies that adopt this system. If an establishment stops the pioneer in their city to implement this technology, even better, as this can attract the positive attention of various media, such as social networks, television, radio and newspapers, in addition to offering consumers a unique experience in tune with the future.

4.5 STORE SPACE OPTIMIZATION

A common goal of store owners is to maximize the use of available space to display products, promote the brand, or invest in decoration. Replacing the old boxes, which take up a lot of space, with innovative self-checkout machines, which are more compact, provides a more efficient use of space. In addition to taking up less space than a traditional cashier, self-service machines contribute significantly to the common queues in front of cashiers operated by attendants, speeding up the flow of customers within the establishment.

4.6 SYSTEM SECURITY

To ensure a safe and optimized operation of the Self-Checkout system, it is advisable to use surveillance cameras and a security panel. This allows that, if the system is implemented in a supermarket, for example, a supervisor can follow all the steps of the customers. An electronic dashboard can be used to identify problems or questions from customers during operation, allowing the supervisor to step in and provide assistance, while also analyzing the potential causes of the problem.

4.7 INCREASE IN SALES

Due to the many benefits offered to consumers and the optimization of store processes, the result is an increase in sales, a key goal for any retailer. In addition to attracting new consumers who are looking for technological innovations and want to avoid long lines, the faster and more efficient payment process attracts a greater flow of customers, whether they are new or old. These factors have resulted in a significant increase in sales, attracting more customers in different situations. An example is the customer who leaves home to buy a single product, such as a soft drink or a chocolate, and chooses not to buy due to the long and unwanted lines at the checkout. With self-service technology,



the total time of the process is considerably reduced, attracting this type of customer to make smaller purchases. In addition, the customer who makes a small purchase at an establishment that uses this technology is not likely to be limited to purchasing just one item. When inside the establishment, it may be suitable for other products or special promotions.

4.8 VERSATILITY IN IMPLEMENTATION

For smaller markets, Self-Checkout plays a crucial role in efficiently utilizing the available space. Occupying about one-third of the space occupied by traditional cashiers, self-service machines are an ideal solution to modernize and improve space, allowing for more effective product display. In addition to the main advantage of this new system, which is the creation of a new technological experience, digital convenience promotes several improvements and optimizations in sales processes for a diverse audience

5 FINAL CONSIDERATIONS

In this study, the implementation and organization of a smart market was explored, highlighting the technological transformation of the retail sector in Brazil. Thus, at the end of the research, the following crucial points are highlighted.

By articulating answers to the problematization and achievement of objectives, we provide the core of the research, focusing on the understanding of the operation of a smart market, with specific goals of investigating the organization of this market and analyzing its implementation, providing a comprehensive view.

The elements of an autonomous market, by which : The main components of an autonomous market are investigated, including technology (artificial intelligence, sensors, etc.), infrastructure (cameras, sensors, alarms, among others) and processes (business rules, purchase flow, among others) that are fundamental to ensure effective performance.

The challenges faced in the implementation of autonomous markets in Brazil, such as investments in technology, gain consumer trust and the absence of specific regulation, were analyzed, as well as opportunities, such as reducing operating costs, increasing sales and improving the customer experience.

In this way, several types of autonomous markets were investigated, such as vending machines, honest markets, and high-tech stores, each catering to different audiences and needs.

The procedure for establishing a smart market in condominiums was detailed, emphasizing the importance of evaluating proposals, cost estimates, and the active participation of condominiums in decisions, as well as discussing the most common types of markets found in condominiums.



We emphasize the importance of a self-service-based checkout system for smart marketplaces, highlighting its advantages, such as the reduction of operating expenses, agility in the purchasing process, optimization of store space and increased sales, as well as the security of this method and the details of its implementation.

In addition, the study expanded the knowledge about autonomous markets, providing an overview of the topic and exploring the main aspects of its implementation in the Brazilian context. Despite addressing many aspects, it is crucial to point out that the study does not completely exhaust the subject, leaving room for future research and further investigation.



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