

Creation of a distribution center to optimize the process of purchasing indirect materials in a company dedicated to the sale of consumer goods

Creación de un centro de distribución para optimizar el proceso de compra de materiales indirectos en una empresa dedicada a la venta de bienes de consume

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Abstract

In the present investigation, it was possible, through the description of activities, to implement a distribution center that helped optimize the purchase of indirect materials from a store dedicated to the sale of consumer goods in the Municipality of Toluca, State of Mexico. A quantitative approach with transectional design was used. To achieve this, "the procedure for the purchase of indirect materials" was defined as the dependent variable and the "distribution center" acts as the independent variable. From this, the variables were operationalized in 14 dimensions that were evaluated through a 22-item questionnaire. The participating population was 80 employees who work in the company (object of study). The results showed that there were major gaps in the indirect materials purchasing process stemming from a poor warehouse system. For this reason, measures were implemented to create the distribution center, based on historical information and a general inventory survey. From this information it was possible to project annual sales; It was even possible to negotiate prices with suppliers, which resulted in savings of 15% in the amount of annual purchases.

Distribution, Optimization, Indirect materials

Resumen

En la presente investigación se logró, mediante la descripción de actividades, implementar un centro de distribución que ayudó a optimizar la compra de materiales indirectos de una tienda dedicada a la venta de bienes de consumo en el Municipio de Toluca, Estado de México. Se utilizó un enfoque cuantitativo con diseño transeccional. Para lograr esto se definió "el procedimiento de compra de materiales indirectos" como variable dependiente y el "centro de distribución" funge como variable independiente. A partir de eso, se operacionalizaron las variables en 14 dimensiones que fueron evaluadas por medio de un cuestionario de 22 reactivos. La población participante fue de 80 empleados que laboran en la empresa (objeto de estudio). Los resultados mostraron que existían grandes carencias en el proceso de compras de materiales indirectos que surgían de un sistema deficiente del almacén. Por ese motivo se implementaron medidas para crear el centro de distribución, basándonos en información histórica y un levantamiento general de existencias. A partir de esa información fue posible proyectar las ventas anuales; incluso se logró negociar precios con proveedores, lo cual repercutió en un ahorro de 15% en el monto de compras anuales.

Distribución, Optimización, Materiales indirectos

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Introduction

In this research article, the creation of a distribution centre (CEDIS) to optimise the purchase of indirect materials of a shop dedicated to the sale of consumer goods in the Municipality of Toluca, State of Mexico, will be presented.

In the reference framework, the theoretical foundations of the administrative process and its organisation are addressed. Likewise, a distinction is made between the different types of companies and how to optimally deal with the resources that make up the company: material (direct and indirect), human, financial and technical. It also describes the principles of distribution control and the concepts of supply chain, value, distribution and logistics.

Subsequently, the problems detected are described and the method used to develop this work is explained, for which the methodological elements implemented are cited and referenced. The hypothesis and variables that guided the collection of data to relate "the purchase of indirect materials" (dependent variable) with "the distribution centre" (independent variable) are presented.

In the same way, the results obtained from applying the data collection instrument are presented in order to take the pertinent measures for the creation of the CEDIS. Highlighting the materials that were identified in the warehouse and assigning them their respective keys. Also, a projection was made based on historical data in order to have a basis for making purchasing decisions in the future.

Finally, the crucial points that were achieved in developing the proposal are highlighted. It highlights the fact that, with the implementation of the CEDIS, significant financial savings were achieved in the purchasing area. Thus, in the conclusion section, the benefits obtained by the company are emphasised and some recommendations are proposed to maintain a successful business management.

Frame of Reference

When thinking about the creation of a new organisation, it is important to take into account the steps of the administrative process (AP), which is defined as a series of phases or stages through which administrative practice is carried out.

According to Chiavenato (2007), some characteristics of the AP are: a) the administrative process is made up of a set of steps in a cyclical manner. b) it is carried out through planning and control. c) its objective is to systematise knowledge and generate a structure of efficiency. d) it stimulates innovation and progress. e) it fosters the development of a managerial and entrepreneurial philosophy and culture.

Management is a practice that constitutes itself from the initiative to undertake actions to remedy problems and satisfy needs to strengthen the control of the organisation's resources, which is governed by various functions and rules in its operations, organisations can be profit and non-profit.

The importance that organisations have is that they are continuous in nature, this refers to the fact that the company and its resources are subject to constant changes such as: expansion, contraction, new products, among other aspects; it is also a means through which the best way to achieve the objectives of the social group is established, carrying out methods to perform activities efficiently with a minimum of effort, reducing costs and increasing productivity in order to reduce duplication of efforts by delimiting roles and responsibilities (Delgado, 2017).

On the other hand, the enterprise is the unit of production of goods and services in which capital, labour and the capacity of managers are coordinated to achieve certain economic or social results that respond to the requirements of the human environment in which the enterprise acts (Münch, 2008).

According to the above definition, the company has two objectives: the production of goods or services to satisfy social needs and the production of capital through the movement, sale and distribution of these.

With the above definitions it is possible to establish the difference between organisation and company, the former refers to the set of actions that are undertaken to achieve an objective, while the company focuses on the lines of action and organisation that are undertaken for the creation of goods and services, as well as the distribution of the sales process, thus satisfying the social needs of a context in a specific way. Companies are classified on the basis of three criteria: according to their activity or line of business, according to their origin of capital and according to their size. By their activity or line of business they can be industrial, commercial and service, according to their origin of capital they are classified into: public and private and by the size of the company they are classified into large, medium or small companies (Albisetti, 2018).

Strategies for locating distribution centres are: close to the sales market, close to production and intermediate location between the market and the company. The structure and location of these warehouses must be taken into account as their impact is significant on the costs they serve when delivering goods to the customer and, therefore, on the final price of the product sold (Ballow, 2004).

The best retail distribution centres are those that provide high quality services to consumers and at minimal cost, sometimes retail chains or some large chain shops dispense with distribution centres and rely on supplies directly from distributors, but in the event of a disruption in the supply of products the normal operation of the business is compromised, however when these systems are implemented the control of suppliers is more efficient and the correct delivery of products to the shop shelves is ensured. In addition, a great advantage of distribution centres is that contracts for receiving products can be concluded directly with the manufacturer without the involvement of intermediaries; this will allow you to avoid additional overpayment charges and also provide the opportunity to receive large wholesale discounts.

Distribution centres benefit not only large manufacturers but also start-up companies, such complexes consist of many structural parts such as: international certification and laboratory control areas, storage rooms including freezers.

The aspects taken into account in a distribution centre include: indirect materials, direct materials, human resources, financial resources, technical resources, warehousing, purchasing, distribution, quality control, supply chain, value chain, distribution channels and logistics. These are described below:

On the other hand, indirect materials are those used in the production process, but which cannot be linked to a specific product or job and some of them are: fuel, energy, tools, dies, moulds, spare parts, maintenance materials, gloves, glasses, footwear, safety clothing and equipment, catalysts, solvents. It is important to allocate a space for these materials in the accounting records in order to have control over them.

(Aladi, 2013). It mentions that it is difficult to keep an exact record of the costs represented by these types of materials, however, they must be present since each organisation needs them according to its needs.

Some of the characteristics of indirect materials are the following: they are small materials that are purchased in large quantities, they do not add much value to the product being produced (which is why they are not charged to expenses such as factory supplies or shop materials), they are not easily identified, they are not tracked through a formal inventory record keeping system.

Colmenares L. (2016). In his article "Materials control as a cost management tool in manufacturing companies". Mentions the control of materials as the set of activities designed, planned and executed by the company, whose objective is to serve as a basis for the decision-making process, in order to provide it with objectives on the requirements, acquisitions and use of raw materials within it.

In the development of the study, the control of materials was taken into account, classifying them, accounting for them and taking into account the principles that govern their control. In the case of indirect materials, the supplies necessary for manufacturing and which in some way make up the final product are included, a situation which makes the control of the company favourable for the development of cost management.

As it can design action plans and control tools that allow them to optimise their use and reduce the indiscriminate application of unnecessary materials that would increase the manufacturing cost of a certain article or product. Direct Materials, also called raw materials, are those used for the manufacture of a product and which have traceability (production, processing and distribution), they represent the basic elements for the development of the company's production process.

They are identified, measured and quantified with relative ease, are the last step of a finished product, are charged to the production budget and are sought to be of the highest quality (Romero, 2016).

To carry out the production budget, the estimated quantities of direct materials to be purchased must be determined, then multiplying these quantities by the expected unit purchase price, determine the total cost of direct materials to be purchased.

Human Resources, on the other hand, is the department in charge of personnel management and administration, whose objective is personnel training. It focuses on ensuring that workers perform their duties in line with the company, matching the objectives and aspirations of professionals with the company's strategy (García, 2006).

Financial resources refer to the money that is available to be spent in cash, credit and liquid securities at any given time. From an economic perspective, these resources are part of the assets or properties of a company, it refers to the money that a business has available to spend and these resources can be funds that require three general resources: share capital or accounting capital, capital markets and financial institutions.

Without the material resource, the development of activities is not viable either, since there would not be the capital to meet the needs of the organisation, even when the capital already exists and is operating as in the case of organisations, the company runs the risk of going bankrupt, disappearing on many occasions as a result of this situation of bankruptcy.

Technical resources, also known as technological resources, are used as instruments and auxiliary tools to coordinate the other resources of an organisation, such as sales systems, production systems, administrative systems, among others; as well as for patents, formulas, machines, energy, information, tools, people (which is the most important technical resource, as they are the ones who manufacture a product, produce information, operate machines, sell products, among many other activities). And their characteristics are: tangible and intangible. The tangible ones refer to the use of machines, computers and printers and the intangible ones to the application of systems and virtual ones; among other of their characteristics are that they improve human work, have an impact on production, cost savings and to be able to manage them, training is needed to be able to make the most of them.

As we know, technology changes very quickly, due to the fact that people search, design and implement new ideas. Technical resources make the process of creating something more effective and efficient, as well as help to increase productivity in organisations.

Storage consists of the temporary handling of inputs or goods, keeping them under control in a certain space to avoid their deterioration and reduce waste. Storage needs will depend on the line of business and resources of the company, but in general they can be satisfied by the different types of warehouses in logistics, such as: general, specialised, customs, CEDIS distribution centres. These are described below: general warehouses are those that cover the storage of any type of merchandise that is not under a storage regulation, specialised warehouses have sanitary registration (for perishable products), or permission to handle dangerous goods (flammable, corrosive or toxic products), bonded warehouses are those warehouses authorised by the customs authorities to store import operations and distribution centres handle large quantities of inventory in high rotation, for a short period of time and mostly from resellers or retailers.

The warehousing process according to Ortega. (2013) in his article on "Business logistics in the optimisation of marketing processes", includes the following aspects: reception of products, storage, conservation and maintenance, inventory management and transport.

In the reception of products, the state of the incoming products is checked and recorded, as well as the quantity, quality, among some characteristics, this according to the customer's requirements, storage consists of storing the products in such a way that their access is easy, for conservation and maintenance the products must be kept in perfect condition during their storage, Inventory management consists of keeping a record of the goods to keep the customer informed about their products and the quantity they have of them, and transport is carried out once the product order is placed, packed and sent to its destination according to its characteristics.

The purchasing area is always present when it comes to logistics and CEDIS, and therefore corresponds to both the administrative and accounting areas. In the purchasing process, the following steps will be followed: requisition, quotation, purchase order, receipt of materials, quality control, rejections and/or returns and payment.

(Jurado, 2015). He mentions that purchasing means acquiring and is of utmost importance for organisations as it refers to the constant acquisition of raw materials and various items that allow them to sustain their operations properly and must be reflected in numbers, i.e. it generates costs, by generating costs, competitors seek to make purchases that allow them to generate higher profits on the price of their products, acquire their goods at competitive prices and seek that the rest of the production processes can have a low cost and quality, so that in this way they can continue to compete in the market; to achieve the above, it is necessary to describe the objectives that must be maintained in the purchases and these are: to continue with the continuity of supply, to do so with the minimum investment in stock, to avoid duplication, waste and unusability of materials or products, to maintain quality levels, to acquire materials or products at the lowest possible price that are compatible with the required quality and service, to maintain the company's competitive position and to maintain the level of its profits in terms of material costs. (Montoya, 2014).

Distribution is one of the elements that correspond to the topic under study and symbolises a way of attracting capital by offering customers home delivery of products, however.

This distribution is not only limited to the attention of external customers but also to internal aspects, i.e. companies that need to efficiently place their goods within their own shops to contribute to the constant creation of product as is the case of industries.

Their function begins with the receipt of an order, fulfilling specific customer orders, and ends when the order is delivered and cashed. Companies can also use three types of supply chains: direct chain, short chain and long chain. The direct chain is the distribution without intermediaries of the products from the manufacturer's warehouses to the consumer's place, the short chain is when the products go from the factory to the hands of an intermediary who is in charge of marketing it to the consumer, such as most retail shops, and the long chain is when several intermediaries such as wholesalers or distributors may be involved.

On the other hand, there are four distribution models where, depending on factors such as geographical location, technical requirements or urgency of supply, companies adopt an infrastructure and one or more defined strategies to get their products to market, these models are centralised, decentralised, cross-docking and consolidation platforms. The centralised model is when products are distributed from a regulatory warehouse to branches that are responsible for distribution in a specific area, and is the one most used by manufacturers, but also the one that involves higher infrastructure costs.

In the decentralised model, the company plans its own routes and distribution vehicles, requiring more navigation technologies and optimised routes such as roads or motorways. Cross-docking, where branch offices are replaced by sites for receiving and forwarding goods from the manufacturer to the distributor on loading/unloading platforms (cross-docking). They avoid the warehousing requirement and speed up the flow to the point of sale. And consolidation platforms are used by distribution centres (CEDIS) or logistics service providers with their own warehouses that distribute products from different manufacturers.

Torres (2019), in his thesis work "Proposal for the improvement of the internal storage and distribution system (Lay-out) of the warehouses of a company dedicated to the sale of plastic products).

He mentions that, to carry out the improvement of storage and internal distribution, it is important to diagnose the main causes and symptoms that plague the warehouse of the company through the application of techniques, methodologies and existing tools within the field of industrial engineering to develop a storage that is effective. The result is to have order in the warehouse to locate the products by applying logistic concepts to achieve the distribution of products, redesigning the optimal place and having the necessary tools.

On the other hand, Alvarado and García (2016). In their thesis work "Comprehensive logistics scheme for distribution centre operations in retail companies (Retail)". They mention the importance of a logistics scheme in distribution centres to improve internal processes by achieving integration and synchronisation of all operational areas, taking into account the following approaches to warehousing: the economic approach that aims to improve the prices of their products, the technical approach is in charge of reducing idle times, eliminating idleness of workers and increasing their productivity, the social approach refers to their efforts to reduce costs in their supply chain in order to offer better prices since consumers will have the opportunity to acquire more and better products with more favourable prices for their personal economy and the ecological approach is not only necessary but also an obligation for all companies since they must include strategies that open up the development of an ecological culture, in which everyone contributes to environmentally friendly operations and actions. In this research the focus is on the cedis, which are a logistical infrastructure in which products are stored and scheduled for distribution, being the object of study of this project in the retail sales sector.

The optimisation of distribution is an element that must be constantly considered, since the more efficient the distribution system is, the higher the profit margins the company can obtain, as well as other benefits such as customer loyalty when they see the efficiency and effectiveness of the service.

Quality control, an important part of the production chain, which must be understood from the appropriate characteristics and conditions that a product, whether it is a good or a service, must meet.

In order to achieve a reliable quality control it is necessary to make use of statistical elements that help to know the reality of the product from an objective perspective, this fact also contributes to decision-making when it comes to intervene to improve the prevailing situation.

(Suárez, 2016). Quality control is the set of techniques and procedures used by the management to obtain a product with the desired quality, in turn it is an investment that must produce adequate returns and in which all members of a company must be involved.

The objective of quality control, according to the above definition, is to optimise costs and increase profits. In this sense, the quality control techniques employed are directed at the product, but their impact must be reflected in the sales revenue.

A fundamental element of the philosophy of modern quality control is the widespread use of scientific procedures including statistical methods, planning, data collection and data analysis so that decisions are not based on mere conjecture (Chiavenato, op. cit.).

Quality control has been established as one of the vital processes in any productive process, it must guarantee the adequate execution of the processes, notifying that the production complies with what was planned. This type of control is essential due to the characteristics of the current market, especially in terms of competition, so much so that large organisations have experts, machinery and computer systems to validate what is produced in their factories (García, op. cit.).

The quality of the products is what establishes the difference between being competitive in the current market or staying out of it, to achieve a high degree of market dominance is necessary to follow some important criteria in the assessment that companies make of the products how: quality of design and matching quality; the quality of design is the inherent value that the product has in the market how performance, features, reliability, service, among others and the quality of matching is the degree to which the product or service agrees with the design specifications (Carro and Gonzalez, 2017).

It is important to implement methodological criteria in organisations where quality control is taken into account in order not to run the risk of providing poor quality services or goods that do not meet the needs of consumers and that may have an impact on the reputation of a business.

On the other hand, the supply chain, in distribution centres, functions as an intermediary, providing flexibility to the company and giving it the capacity to respond to the needs of companies with very short lead times in their orders and in the marketing of their products.

Currently, the fundamental strategy to be fulfilled in an efficient and competitive supply chain is collaboration between links through the exchange of operational information in real time on production plans, operational costs and inventory levels (Carreón, 2014).

(Vilana, 2014), argues that the supply chain encompasses all activities associated with the flow of transformation of goods and associated information from the raw materials stage to the end user being essentially the set of connected suppliers and customers where each customer is in turn a supplier to the next organisation until the finished product reaches the end user.

The value chain of an organisation is achieved by realising and dividing the most relevant strategic activities in order to understand how costs, current sources and where differentiation lies.

(Garcia, op. cit.). He argues that the origin of this concept arises in 1985 when Professor Michael Porter of Harvard University introduced the analysis of the value chain in his book entitled "Competitive Advantage", where he carried out an internal analysis of a company through its disaggregation into its main value-generating activities.

In this sense, the value chain is understood as the sum of the elements that make up the company and that add value to it, through the performance of its assigned activities or functions, and its purpose is to be carried out within a value system, which is made up of: the value chain of suppliers, the value chain of other business units, the value chain of distribution channels and the value chain of customers.

The identification of the links that contribute value to the entire chain is an activity that makes it possible to locate in detail the characteristics that constitute each of these, in order to be able to intervene in the value chain in the following links: links with suppliers, links with customers, process links within the value chain of a business unit and links through the value chain of the business units within the company.

The set of areas previously exposed leads to the conformation of the value system, the intervention in each one of them entails the search for a balance in which it is possible to sustain adequate relationships, thus contributing to the achievement of the business objectives.

Distribution channels are the means used by any company to get its products to the final consumer. Their functions are the following: to transport, organise supply, stock products, contact the target public, inform about the market, simplify exchanges, offer a variety of products, participate in marketing activities, finance the commercial process, generate consumer satisfaction, counteract risks and standardise commercial transactions (Kotler, 2008).

The importance of a distribution channel lies mainly in the fact that there are graphical or locational and chronological separations. Therefore, there is a need for warehousing, transport and sales of the goods from the producer to the final customer through wholesalers and retailers. Wholesalers intermediate between the manufacturer and retailers are involved in the purchase and sale of products and services in large quantities that will be sold either to other wholesalers, manufacturers or mainly to retailers.

Retailers link the supply of wholesalers and manufacturers with the final consumer of the products and, like the wholesaler, perform functions that justify their existence, such as bundling products in different ways for the final consumer, granting credit and payment facilities.

The last aspect that was taken into account for this research work is logistics, which is an approach that allows the management of an organisation based on the study of the flow of material, information flow and financial flow, associating from suppliers to customers, with the aim of delivering the product at the right time.

In the desired quantity, in the required conditions, all this at the lowest possible cost. The route that a product takes starts at the production centre, from there it is transferred by different means of transport to other intermediary centres where it is stored until it is delivered to the point of sale, to finally be sold to the consumer. Another concept, according to the Logistics Management Council (LMC), is defined as the process of planning, implementing and controlling the efficient and cost-effective flow of goods and storage of raw materials, in-process inventories and finished goods from the point of origin to the point of consumption to meet customer needs.

Among the objectives of logistics are: to increase competitive advantage, retaining customers and increasing the economic benefits of the company, through the interaction of the fundamental activities; to reduce operating costs in the tasks of handling and transporting goods, minimising travel distances; to provide the products or materials required by customers in an efficient and timely manner.

Problem statement

The object of study of this research was a company dedicated to the sale of consumer goods located in the municipality of Toluca, State of Mexico, whose problems were the long delivery times of orders, high storage costs, use of unnecessary transport, among others. Therefore, the main objective of this study is to optimise the purchase of indirect materials through the efficient storage, control, custody and dispatch of inventories, as well as ensuring that the goods remain in the warehouse for the shortest possible time in order to avoid generating costs.

In addition, there were operations that generated a deficient administration of the financial resources, which put them at risk, so the interest is to safeguard the integrity of the organisation's capital. For the present work, the importance of the creation of a distribution centre (CEDIS) was considered in order to manage the purchase of indirect materials in a fast and efficient way; a distribution centre is a space for distribution logistics that functions as an intermediary within the supply chain, streamlining processes and prioritising speed, flexibility in service and punctuality in deliveries.

The distribution centre performs the following functions: repackaging, packaging, customs clearance, cargo certification, warehouse inventory, rejects, defects, returns, among others.

It is important to mention that, within the human resources department of the CEDIS, in which this research was carried out, various activities are carried out with the intention of improving the performance of the workers, as well as the various areas by which it is conformed, taking as an important point the good communication.

Methodology

The method used in this research has a quantitative approach with a descriptive type of study using the descriptive cross-sectional design.

According to Hernández, Fernández and Baptista (2010), the type of study is descriptive, which seeks to specify the properties, characteristics and profiles of individuals, groups, communities or any other phenomenon under analysis.

In turn, descriptive cross-sectional designs aim to investigate the incidence of the modalities or levels of one or more variables in a population; they are purely descriptive studies. The procedure consists of locating one or several variables in a group of people, living beings, objects, situations, contexts, phenomena, communities, etc. and providing their description (Hernández, Fernández and Baptista, op. cit).

The present research is of a descriptive transectional type due to the fact that, through the analysis, the description of the activities and logistical elements that should constitute the distribution centre that helps to optimise the purchase of indirect materials of a shop dedicated to the sale of consumer goods in the Municipality of Toluca, State of Mexico, will be carried out.

Research hypothesis (Hi):

With the creation of a CEDIS of indirect materials, the purchasing procedures of indirect materials of the company dedicated to the sale of consumer goods are optimised.

Null Hypothesis (Ho):

With the creation of a CEDIS of indirect materials it is not possible to optimise the purchasing procedures of indirect materials of the company engaged in the sale of consumer goods.

Variables

According to Hernández, Fernández and Baptista (idem) a variable is a property that can vary and whose variation can be measured.

Dependent variable

Purchasing procedure of indirect materials, its proper functioning is a function of the implementation of the CEDIS.

Independent variable

The distribution centre is the independent variable because, through its creation, the process of purchasing indirect materials may or may not be optimised.

Operationalization of variables

The intervening variables that are operationalized are mentioned below.

The procurement procedure for indirect materials is operationally defined on the basis of 5 steps:

- Forecasting of material requirements
- Planning the supply in good time.
- Procurement of these materials.
- Ensuring that the ordered products are received in the agreed quantity and time and that they arrive in perfect condition.
- Administrative management of the supply.

The dimensions of the variables are explained in tables 1 and 2.

Variable: Purchasing procedure for indirect materials		
Conceptualisation: Materials used in the production process, but which cannot be linked to a specific product or job.		
Dimensions	Definition	Indicator
Requisition	Document generated to notify the purchasing department of the requirements of a user department or warehouse.	Purchase requisition slips
Payment	A means of extinguishing obligations through the actual performance of a due performance.	Goods issue control
Entry	A revenue, in accounting, is the increase in net economic income from the business activity of the enterprise or economic entity.	Payment vouchers
Storage	The function of managing the locations where the product has to be deposited to ensure the continuity of the logistics chain.	Delivery slips
Inventory	The function in charge of managing the locations where the product has to be deposited in order to ensure the continuity of the logistical chain.	Goods receipt slips
Outgoing	A goods issue is a transaction is the recording of the departure of a product from the cost centre.	Warehousing procedures

Table 1 Dimension of the variable "Indirect materials purchasing procedure"
 Source: Own Elaboration

Variable: Creation of Distribution Centre (CEDIS)		
Conceptualisation: Refers to layout, identification of storage capacities, attention (in number of doors or parking positions, order processing at a certain speed (throughput).		
Dimensions	Definition	Indicator
Warehouse	Installation which, together with the storage equipment, handling equipment, human and management resources, makes it possible to regulate the differences between incoming and outgoing flows of goods.	Areas comprising the warehouse.
Information systems.	It is a set of data that interact with each other for a common purpose.	Technological resources used in the development of activities.
Marketing	Actions through which a company studies the needs or problems of a public of interest and establishes strategies to solve them through its product or service.	Product promotion strategies.
Suppliers	A company that supplies others with goods or services necessary for the correct functioning of the business.	Number of companies that maintain relationships for the purchase of merchandise for subsequent sale.
Customers	A person who, in exchange for payment, receives services from someone who provides them for that concept.	Average number of customers per day.
Shelving	A piece of furniture with shelves or shelving used to store books, papers or other items.	Number of shelves in stock.
Dispatch area	A warehouse function in charge of the dispatch of goods, its objective is to send the products demanded by the client in the agreed time and in perfect condition.	Areas for dispatching goods
Distribution	The set of actions that are carried out from the time a product is manufactured until it is purchased by the end consumer.	Number of distribution strategies employed.

Table 2 Dimension of the variable "Creation of a Distribution Centre"

Source: Own Elaboration

The instrument used for the collection of information was the questionnaire consisting of 22 questions, which allows for the evaluation of the study variables and provides sufficient parameters to determine whether or not the necessary conditions exist for the creation of the Distribution Centre.

Sample size

The population is made up of a total of 80 workers who make up the organisation's staff.

According to Hernández, Fernández and Baptista (op. cit.) the minimum sample for descriptive studies is 30 elements or cases per group (p. 188). The randomly selected elements make up the sample (p. 183).

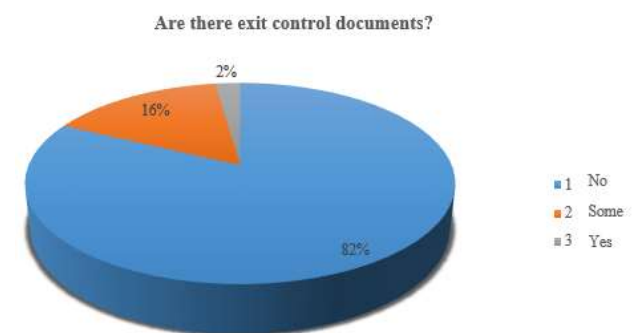
For the study it was decided to select a sample of 45 elements, 15 units above the minimum units required for a sample for descriptive studies.

The selection of the elements that make up the sample was carried out by the simple random method, using the tombola technique where all the elements of the population had the same probability of being chosen.

Results

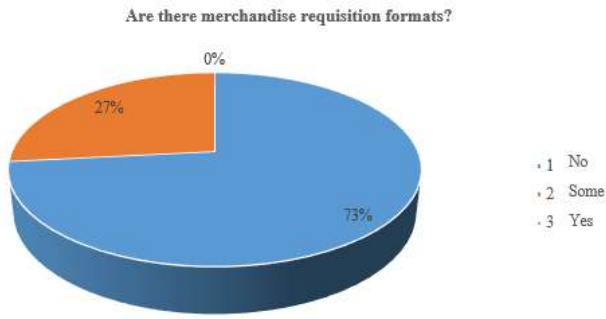
The results obtained from the application of the instrument used are presented below.

Graphs 1 and 2 correspond to the evaluation of the dimension "Requisition".



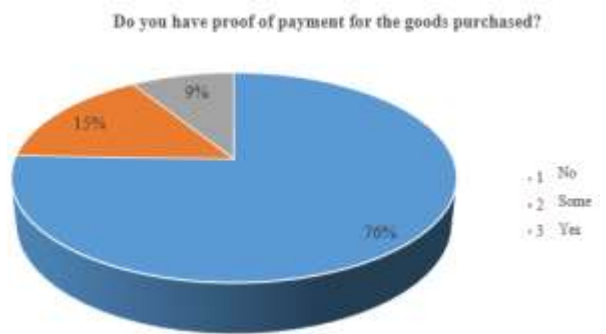
Graphic 1 Existence of exit control documents

Source: Own Elaboration

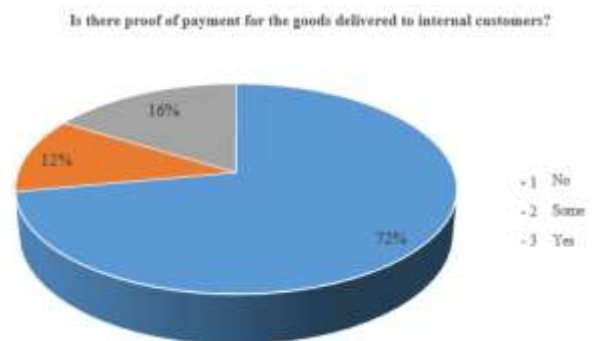


Graphic 2 Existence of goods requisition forms
Source: Own Elaboration

Graphics 3 and 4 show the results of the evaluation of the dimension "Payment".

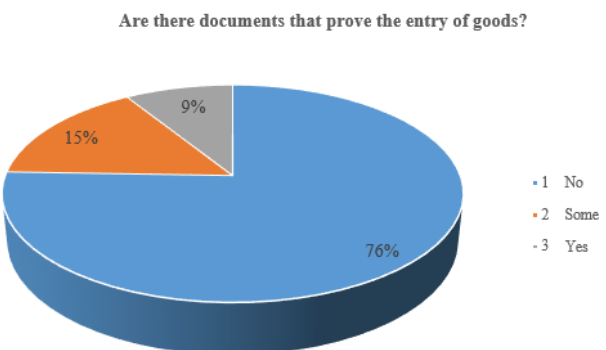


Graphic 3 Existence of payment receipts for purchased goods
Source: Own Elaboration

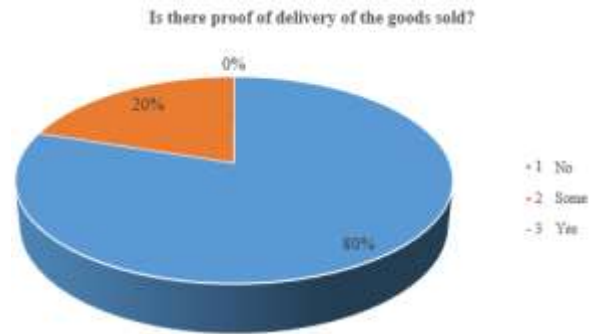


Graphic 4 Existence of payment documents for goods for internal customers
Source: Own Elaboration

Graphics 5 and 6 show the results of the evaluation of the dimension "Income".

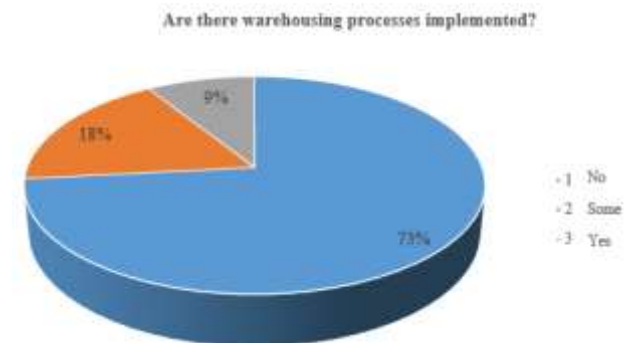


Graphic 5 Existence of registration documents of receipt of purchased goods
Source: Own Elaboration

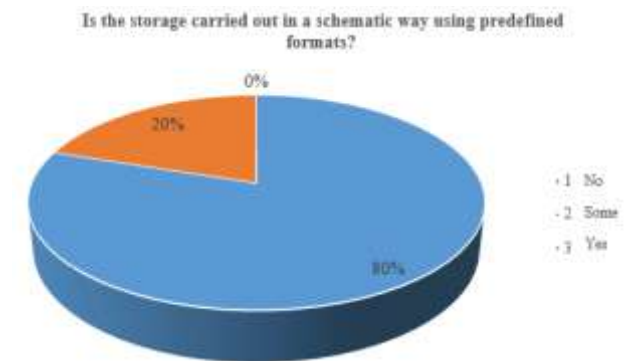


Graphic 6 Existence of proofs of delivery of goods to customers
Source: Own Elaboration

With regard to the dimension "Storage", graphs 7 and 8 show the results of its evaluation.



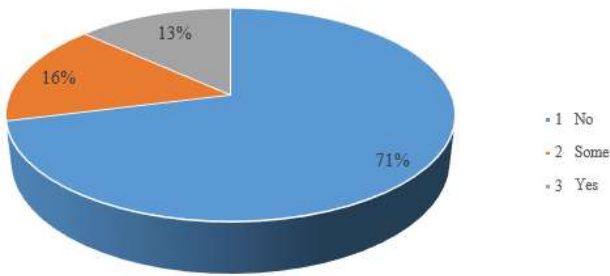
Graphic 7 Existence of warehousing processes
Source: Own Elaboration



Graphic 8 Schematic warehousing using predefined formats
Source: Own Elaboration

Graphics 9 and 10 show the results of the evaluation of the dimensions "Inventory and Outputs".

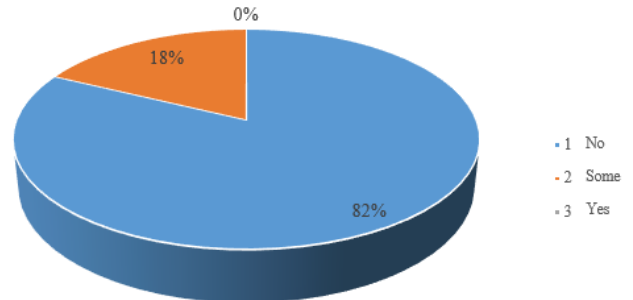
Is there an inventory of merchandise in stock?



Graphic 9 Existence of stock of goods in stock
Source: Own Elaboration

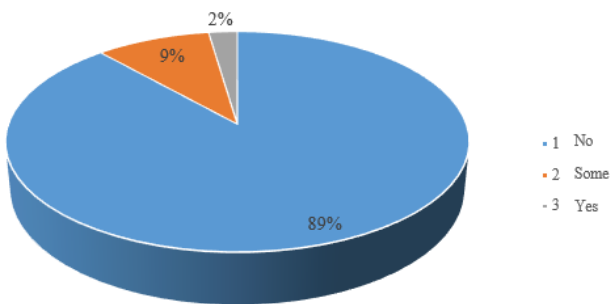
Graphs 13 and 14 give an answer to the dimension "Information Systems".

Is there enough technological infrastructure?



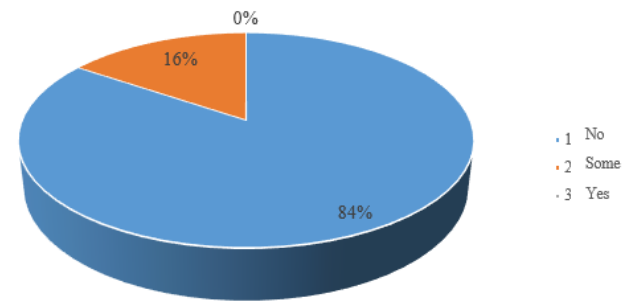
Graph 13 Existence of sufficient technological infrastructure
Source: Own Elaboration

Is there an inventory of the company's assets?



Graphic 10 Inventory of company's assets in stock
Source: Own Elaboration

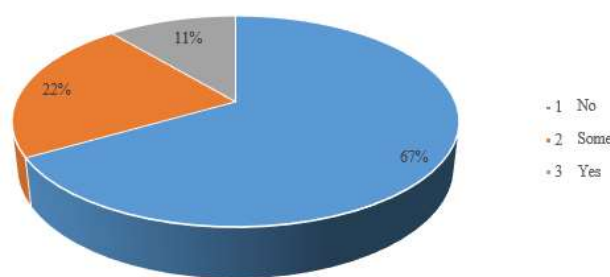
Does the information system have the appropriate input, processing, exit, and feedback components?



Graph 14 Relevance of the Information System
Source: Own Elaboration

With regard to the "Warehouse" dimension, the results are shown in graphs 11 and 12.

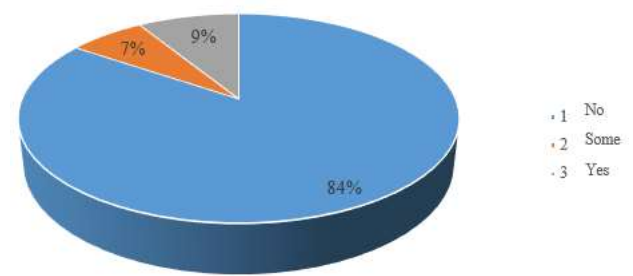
Are there enough areas for the implementation of a CEDIS?



Graphic 11 Existence of area for the creation of a CEDIS
Source: Own Elaboration

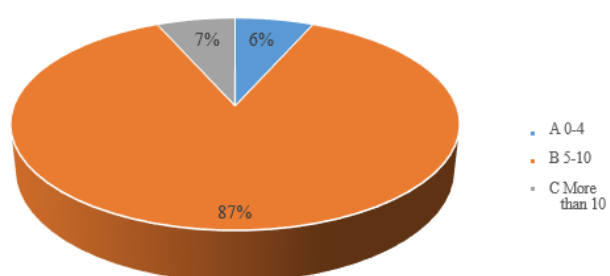
Regarding the dimension "Marketing" the answers are shown in graphs 15 and 16.

Are there promotion strategies within the organization?



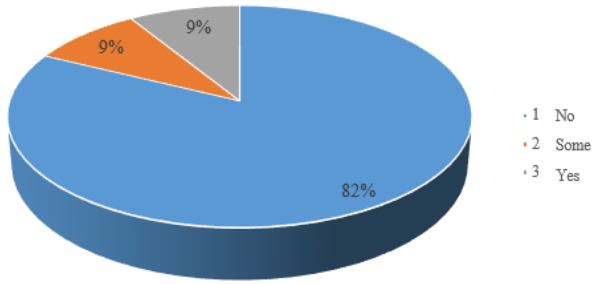
Graphic 15 Existence of promotion strategies
Source: Own Elaboration

How many areas are there in the warehouse?



Graph 12 Existing areas in the warehouse
Source: Own Elaboration

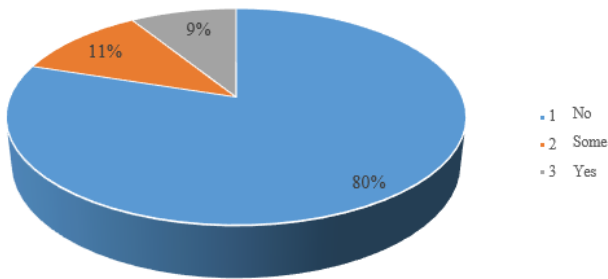
Have the marketing strategies been effective?



Graph 16 Effectiveness of marketing strategies
Source: Own Elaboration

Graph 17 shows the results of the evaluation of the dimension "Suppliers".

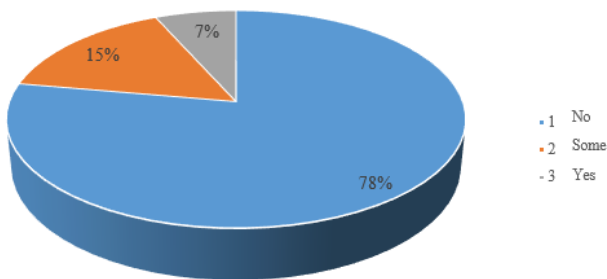
Does the organization have the necessary suppliers for the development of moral activities?



Graph 17 Existence of sufficient suppliers for the development of moral activities
Source: Own Elaboration

On the other hand, graph 18 shows the evaluation of the dimension "Customers".

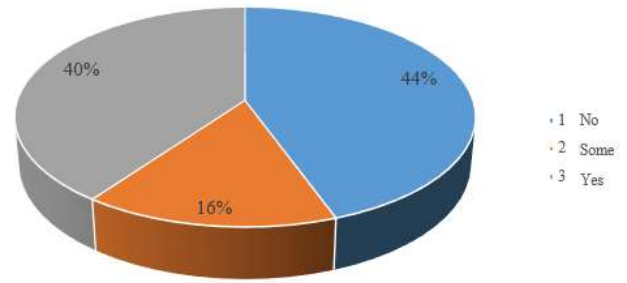
Does the organization have customer records?



Graphic 18 Existence of customer records
Source: Own Elaboration

The dimension "Shelving" is evaluated and the results are shown in graph 19.

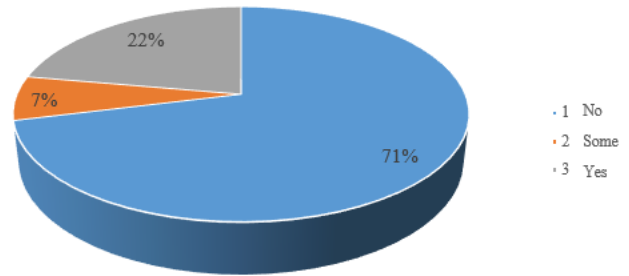
Is there enough shelf space to store indirect materials?



Graph 19 Existence of sufficient shelves
Source: Own Elaboration

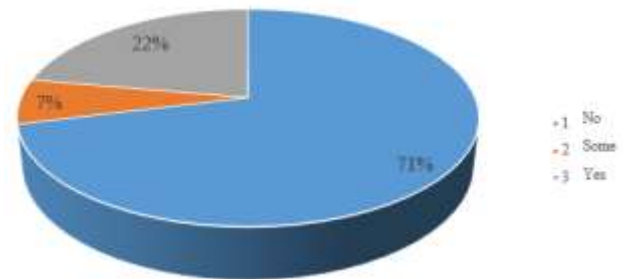
The dimension "Dispatch area" is evaluated and the results are shown in graphs 20 and 21.

Do the existent areas satisfy the organizational needs?



Graph 20 The areas meet the needs of the company
Source: Own Elaboration

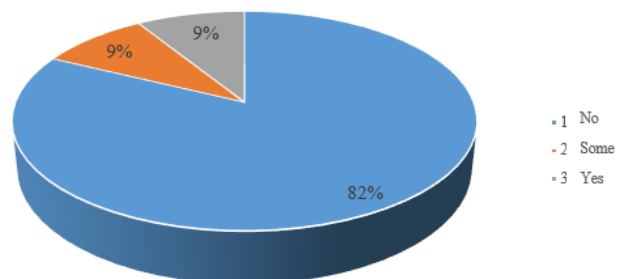
Is it necessary to create new areas in the organization?



Graph 21 Need to implement new areas
Source: Own Elaboration

Finally, graph 22 shows the results of the evaluation of the dimension "Distribution".

Are there strategies for the distribution of indirect materials?



Graph 22 Existence of distribution strategies for indirect materials
Source: Own Elaboration

The results show, on the one hand, the need for the creation of a CEDIS for indirect materials in order to optimise the purchasing procedures for these materials, and on the other hand, the existence of the conditions for the creation of such a centre. The operation of the distribution centre was then defined as follows:

1. Identification of indirect materials

Information was collected to identify all the materials used in the consumer goods sales company. The result was the creation of the indirect materials catalogue, which contains 236 material numbers listed in annex 1. Catalogue of indirect materials.

2. Determination of purchase volume

The determination of the purchase volumes (maximum and minimum) was carried out by analysing the sales history of the 236 materials listed in Annex 1. Of the previous year for the 236 indirect materials. Table 3 shows an example of the calculation for material number 108543. To determine the volume of new purchases, the average purchase volume for each month was calculated, to this value was added 14.4%, which corresponds to the expected increase in sales for this year; the total was calculated and distributed among the twelve months, considering that the minimum purchases were 100 pieces to favour negotiation with the supplier. The same procedure was applied to determine the purchase volumes for each of the 236 part numbers.

Product: Playo Stretch Film			
Material number: 108543			
Unit: PZA			
Month	Purchase volume of previous year	Projected purchase volume (+14.4%)	Determination of purchase volume
January	125	143	150
February	55	63	100
March	48	55	100
April	156	178	200
May	125	143	150
June	175	200	200
July	100	114	150
August	200	229	200
September	144	165	150
October	200	229	250
November	40	46	100
December	500	572	600
Average	156	178	150
Total	1868	2315	2350

Table 3 Determination of purchase volumes. Playo Stretch Film

Source: Own Elaboration

3. Negotiation with suppliers by purchase volume. One-year purchase contracts

For this step, the part numbers representing the highest annual purchase volume were identified; using the Pareto diagram, the part numbers representing 80% of the total annual purchase volume, and therefore the company's greatest economic impact, became visible.

The Pareto analysis showed that 8 part numbers represent 80 % of the total annual sales volume, so that annual negotiations were worked out, through the allocation of purchase orders, with scheduled deliveries and with minimum and maximum purchase volumes.

As a result of these negotiations, a saving of 15% of the annual purchase amount was achieved as shown in table 4.

Material number	Description	Cost Total annual Initial	Cost Total final	Annual savings
108543	Playo stretch film	\$539,280	\$496,480	\$42,800
394086	Thermal roll for berkel scale	\$412,800	\$283,200	\$129,600
394093	Poliopropylene bag for totopos	\$405,000	\$345,000	\$60,000
394087	Sealant for 2" recalls	\$300,000	\$264,000	\$36,000
394049	Remanufactured toner 83a	\$132,000	\$120,000	\$12,000
394090	Remanufactured toner 17a	\$115,500	\$105,000	\$10,500
394103	Multiprice label roll 90*30	\$79,200	\$67,680	\$11,520
394091	Remanufactured toner 79a	\$77,440	\$70,400	\$7,040
Amounts expressed in mxn		\$2,061,220	\$1,751,760	\$309,460

Table 4 Annual savings with consolidated purchases

Source: Own Elaboration

Conclusions

In a globalised world such as the one in which organisations should create and develop their business, the need for growth cannot be met without synchronising all the organisation's processes. In this way, an efficient logistics management will allow the company to obtain better financial results and a better positioning in the market.

Over the last few years, companies have been facing a progression of difficulties, including strong competition, internationalisation of business sectors, and a greater need for strategies in each area. They also have to cope with an increasing variety of products and services, with more emphasis on quality and flexibility. In the current circumstances, they must react to meet two basic needs: productivity and competitiveness.

In any case, the design of a Distribution Centre should be seen as an opportunity to "get it right" from the start, without compromising its subsequent exposure to the (usually insufficient) attributes of the current environment. Consequently, for these ventures, the initial perspectives involve carrying out a detailed analysis of the circumstances that the company in question is experiencing and thus designing a distribution centre that responds to that reality.

In this sense, it is concluded that it is of utmost importance to have designed a distribution centre in the company under study, as this way substantial improvements in the financial areas were observed. But it should not be forgotten that having a well-established CEDIS system allows operations to be carried out in a better way and also the employees benefit because they work in an orderly environment that does not generate friction for daily operations.

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Annex 1 Indirect materials catalog

Indirect materials catalog		
Material number	Description of the material	Unit
394086	ROLLO TERMICO PARA BASCULA BERKEL	PZA
394087	SELLADOR PARA RETIROS 2"	PZA
394088	CAJA DE TWIST 2000 PARA TOTOPOS	CJ
394089	TONER REMANUFACTURADO 83A	PZA
394090	TONER REMANUFACTURADO 17A	PZA
394091	TONER REMANUFACTURADO 79A	PZA
394092	DIUREX SELLO DE GARANTIA C/LOGO	PZA
394093	BOLSA POLIPROPILENO PARA TOTOPO	PZA
394094	ROLLO PARA CALCULADORA	PZA
394095	SIERRA CINTA A116	PZA
394096	EMPAQUE PARA MOLINO MICARTA	PZA
394097	EMPAQUE PARA MOLINO BRONCE	PZA
394101	CUCHILLA PARA REBANADORA 909	PZA
394102	CUCHILLA PARA REBANADORA 827	PZA
394103	ROLLO ETIQUETA MULTIPRECIO TOSHIBA 90*30	PZA
394104	ROLLO ETIQUETA P NORMAL TOSHIBA (CHICA)	PZA
394105	ROLLO ETIQUETA OFERTA TOSHIBA	PZA
394106	BOLSA PARA RETIRO DE VALORES	PZA
394107	GUIA DE ACERO ONIXIDABLE RODOTEC	PZA
394108	BOLSA PARA MORRALLA	KG
394109	ROLLO ETIQUETA PARA ROPA	PZA
394110	ROLLO ETIQUETA C/ LOGO BLANCA	PZA
394111	ROLLO ETIQUETA C/LOGO VERDE	PZA
394112	ROLLO ETIQUETA C/LOGO AZUL	PZA
394113	ROLLO ETIQUETA C/LOGO AMARILLA	PZA
394114	ROLLO ETIQUETA C/LOGO NARANJA	PZA
394115	ROLLO ETIQUETA S/LOGO BLANCA	PZA
394116	ROLLO ETIQUETA S/LOGO VERDE	PZA
394117	ROLLO ETIQUETA S/LOGO AZUL	PZA
394118	ROLLO ETIQUETA S/LOGO AMARILLA	PZA
394119	ROLLO ETIQUETA S/LOGO NARANJA	PZA
394120	ETIQUETA CODIGO DE BARRAS AM	CJ
394121	CEPILLO PARA LAVADO DE MANOS	PZA
394122	CUBETA DE GRAFITO 4 K	PZA
394123	RIBBON TRASFERENCIA TOSHIBA	PZA
394124	BOYA DE GAS FREON R22 13.6	PZA
394125	BOYA DE GAS FREON R404 10.5	PZA
394126	TERMOMETRO DE VASTAGO (TAYLOR)	PZA
394127	CHALECO SK AZUL CHICO	PZA
394128	CHALECO SK AZUL MEDIANO	PZA
394129	CHALECO SK AZUL GRANDE	PZA
394130	CHALECO SK AZUL EXT GDE	PZA
394131	CHALECO SK NEGRO CHICO	PZA
394132	CHALECO SK NEGRO MEDIANO	PZA
394133	CHALECO SK NEGRO GRANDE	PZA
394134	CHALECO SK NEGRO EXT GDE	PZA
394135	FILIPINA RECTA SK BLANCA	PZA
394136	PANTALON DE HOMBRE AZUL #32	PZA

394137	PANTALON DE HOMBRE AZUL #34	PZA
394138	PANTALON DE HOMBRE AZUL #36	PZA
394139	PANTALON DE HOMBRE AZUL #38	PZA
394140	CASACA AZUL REY	PZA
394141	CASACA ROJA	PZA
394142	CASACA NEGRA	PZA
394143	PLAYERA CUELLO REDONDO SK ROJO CHICO	PZA
394144	PLAYERA CUELLO REDONDO SK ROJO MEDIANO	PZA
394145	PLAYERA CUELLO REDONDO SK ROJO GRANDE	PZA
394146	PLAYERA CUELLO REDONDO SK ROJO EXT GDE	PZA
394147	PLAYERA CUELLO REDONDO SK AZUL CHICO	PZA
394148	PLAYERA CUELLO REDONDO SK AZUL MEDIANO	PZA
394149	PLAYERA CUELLO REDONDO SK AZUL GRANDE	PZA
394150	PLAYERA CUELLO REDONDO SK AZUL EXT GDE	PZA
394151	CHALECO TERMICO SK AZUL CHICO	PZA
394152	CHALECO TERMICO SK AZUL MEDIANO	PZA
394153	CHALECO TERMICO SK AZUL GRANDE	PZA
394154	CHALECO TERMICO SK AZUL EXTRA GRANDE	PZA
394155	CHALECO TERMICO BLANCO CHICO	PZA
394156	CHALECO TERMICO BLANCO MEDIANO	PZA
394157	CHALECO TERMICO BLANCO GRANDE	PZA
394158	CHALECO TERMICO BLANCO EXTRA GRANDE	PZA
394159	PLAYERA POLO PIQUE ROJA CHICA	PZA
394160	PLAYERA POLO PIQUE ROJA MEDIANA	PZA
394161	PLAYERA POLO PIQUE ROJA GRANDE	PZA
394162	PLAYERA POLO PIQUE ROJA EXTRA GRANDE	PZA
394163	PLAYERA POLO PIQUE AZUL CHICA	PZA
394164	PLAYERA POLO PIQUE AZUL MEDIANA	PZA
394165	PLAYERA POLO PIQUE AZUL GRANDE	PZA
394166	PLAYERA POLO PIQUE AZUL EXTRA GRANDE	PZA
394167	PLAYERA POLO LOGO SK ROJA CHICA	PZA
394168	PLAYERA POLO LOGO SK ROJA MEDIANA	PZA
394169	PLAYERA POLO LOGO SK ROJA GRANDE	PZA
394170	PLAYERA POLO LOGO SK ROJA EXTRA GRANDE	PZA
394171	PLAYERA POLO LOGO SK AZUL CHICA	PZA
394172	PLAYERA POLO LOGO SK AZUL MEDIANA	PZA
394173	PLAYERA POLO LOGO SK AZUL GRANDE	PZA
394174	PLAYERA POLO LOGO SK AZUL EXTRA GRANDE	PZA
394175	MANDIL VERDE	PZA
394176	MANDIL AZUL REY	PZA
394177	MANDIL ROJO	PZA
397100	ZAPATO BCO SEG C/CASQUILLO #22	PZA
394178	ZAPATO BCO SEG C/CASQUILLO #23	PZA
394179	ZAPATO BCO SEG C/CASQUILLO #24	PZA
394180	ZAPATO BCO SEG C/CASQUILLO #25	PZA
394181	ZAPATO BCO SEG C/CASQUILLO #26	PZA
394182	ZAPATO BCO SEG C/CASQUILLO #27	PZA
394183	ZAPATO BCO SEG C/CASQUILLO #28	PZA
397101	ZAPATO BCO SEG C/CASQUILLO #29	PZA
397102	ZAPATO BCO SEG C/CASQUILLO #30	PZA
397103	ZAPATO BCO SEG C/CASQUILLO #31	PZA
397104	ZAPATO NEGRO SEG C/CASQUILLO #22	PZA
394184	ZAPATO NEGRO SEG C/CASQUILLO #23	PZA
394185	ZAPATO NEGRO SEG C/CASQUILLO #24	PZA
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394188	ZAPATO NEGRO SEG C/CASQUILLO #27	PZA
394189	ZAPATO NEGRO SEG C/CASQUILLO #28	PZA
397105	ZAPATO NEGRO SEG C/CASQUILLO #29	PZA
397106	ZAPATO NEGRO SEG C/CASQUILLO #30	PZA
397107	ZAPATO NEGRO SEG C/CASQUILLO #31	PZA
403724	MANDIL AZUL MARINO	PZ
403725	BLUSA MULTIRAYAS ROJA CHICA	PZ
403726	BLUSA MULTIRAYAS ROJA MEDIANA	PZ
403727	BLUSA MULTIRAYAS ROJA GRANDE	PZ
403728	BLUSA MULTIRAYAS ROJA EXT GRANDE	PZ
403729	MANDIL BLANCO DE LÁTEX	PZ
403730	CUBREBOCAS	PZA
403731	COFIAS	PZA
403732	GUANTES DE LÁTEX	PZA
403733	FAJA CHICA	PZ
403734	FAJA MEDIANA	PZ
403735	FAJA GRANDE	PZ
412812	FAJA EXTRA GRANDE	PZ
403736	BOTA DE HULE #22	PZ
403737	BOTA DE HULE #23	PZ
403738	BOTA DE HULE #24	PZ
403739	BOTA DE HULE #25	PZ
403740	BOTA DE HULE #26	PZ
403741	BOTA DE HULE #27	PZ
403742	BOTA DE HULE #28	PZ
403743	BOTA DE HULE #29	PZ
403744	BOTA DE HULE #30	PZ
403745	BOTA DE HULE #31	PZ
403746	GORRA AZUL MARINO	PZ
403747	GORRA BLANCA	PZ
403748	GORRA AZUL DE MALLA	PZ
403749	GOOGLES	PZ
403750	MASCARILLA	PZ
132495	ROLLO MARBETE SAP PRECIO 30X90 CON 3000	PZ
108543	PELICULA STRETCH (PLAYO)	KG
236368	CARTUCHO DE TÓNER 85°	PZ
236370	CARTUCHO DE TÓNER 36°	PZ
409787	BATA AZUL REY #28	PZA
409788	BATA AZUL REY #30	PZA
409789	BATA AZUL REY #32	PZA
409790	BATA AZUL REY #34	PZA
409791	BATA AZUL REY #36	PZA
409792	BATA AZUL REY #38	PZA
409793	BATA AZUL REY #40	PZA
409794	BATA AZUL REY #42	PZA
409795	BATA AZUL REY #44	PZA
409796	BATA AZUL REY #46	PZA
409797	BATA AZUL REY #48	PZA
409798	BATA ROJA # 28	PZA
409799	BATA ROJA # 30	PZA

409800	BATA ROJA # 32	PZA
409801	BATA ROJA # 34	PZA
409802	BATA ROJA # 36	PZA
409803	BATA ROJA # 38	PZA
409804	BATA ROJA # 40	PZA
409805	BATA ROJA # 42	PZA
409806	BATA ROJA # 44	PZA
409807	BATA ROJA # 46	PZA
409808	BATA ROJA # 48	PZA
409809	CAMISOLAS AZUL MARINO #28	PZA
409810	CAMISOLAS AZUL MARINO #30	PZA
409811	CAMISOLAS AZUL MARINO #32	PZA
409812	CAMISOLAS AZUL MARINO #34	PZA
409813	CAMISOLAS AZUL MARINO #36	PZA
409814	CAMISOLAS AZUL MARINO #38	PZA
409815	CAMISOLAS AZUL MARINO #40	PZA
409816	CAMISOLAS AZUL MARINO #42	PZA
409817	CAMISOLAS AZUL MARINO #44	PZA
409818	CAMISOLAS AZUL MARINO #46	PZA
409819	CAMISOLAS AZUL MARINO #48	PZA
409820	PLAYERA AZUL CUELLO REDONDO XL	PZA
409821	PLAYERA ROJA CUELLO REDONDO XL	PZA
414473	CUCHILLO PARA DESPELLEJAR 14 PULGADAS	PZA
414474	CUCHILLO DESHUESADOR 6 PULGADAS	PZA
414725	AFILADOR ESTRIADO	PZA
414726	MACHETE CON FILO MANGO DE MADERA	PZA
394094	ROLLO PARA CALCULADORA	PZA
409611	FILIPINA #28	PZA
409612	FILIPINA #30	PZA
409613	FILIPINA #32	PZA
409614	FILIPINA #34	PZA
409615	FILIPINA #36	PZA
409616	FILIPINA #38	PZA
409617	FILIPINA #40	PZA
409618	FILIPINA #42	PZA
409619	FILIPINA #44	PZA
409620	FILIPINA #46	PZA
409621	FILIPINA #48	PZA
409623	CASACA AZUL REY	PZA
409624	CHALECO ROJO CHICO SURTI-TIENDA	PZA
409625	CHALECO ROJO MEDIANO SURTI-TIENDA	PZA
409626	CHALECO ROJO GRANDE SURTI-TIENDA	PZA
409627	CHALECO ROJO EXT GRANDE SURTI-TIENDA	PZA
409628	CHALECO ROJO CHICO PRAKTIS	PZA
409629	CHALECO ROJO MEDIANO PRAKTIS	PZA
409630	CHALECO ROJO GRANDE PRAKTIS	PZA
409631	CHALECO ROJO EXT GRANDE PRAKTIS	PZA
409632	BLUSA MULTIRAYAS ROJA XL	PZA
409633	PLAYERA TIPO POLO AZUL XL	PZA
409634	PLAYERA TIPO POLO ROJA XL	PZA
409635	PANTALON DE HOMBRE #28	PZA
409636	PANTALON DE HOMBRE #30	PZA
409637	PANTALON DE HOMBRE #40	PZA
409638	PANTALON DE HOMBRE #42	PZA
409639	PANTALON DE HOMBRE #44	PZA
409640	PANTALON DE HOMBRE #46	PZA
409641	PANTALON DE HOMBRE #48	PZA
409642	CHALECO AZUL MARINO SURTI-TIENDA CHICO	PZA
409643	CHALECO AZUL MARINO SURTI-TIENDA MEDIANO	PZA
409644	CHALECO AZUL MARINO SURTI-TIENDA GRANDE	PZA
409645	CHALECO AZUL MARINO SURTI-TIENDA EXTRGDE	PZA
409646	CHALECO AZUL MARINO SURTI-TIENDA XL	PZA
415045	ANTIADHERENTE	PZA
415046	DISCO PARA PULIR (DISCO CANELA)	PZA
415047	PASTA PARA PULIR	PZA
415048	ACEITE PARA MOPEAR	PZA
464791	RUEDA P/CARRITO SK 5X1	PZA
464792	BASE PARA CARRITO SK	PZA
464793	RUEDA P/TARIMA 5X2	PZA
464794	BASE GIRATORIA P/TARIMA	PZA
464795	BASE FIJA P/TARIMA	PZA
464796	RUEDA MINI P/CARRITO 2X3/4	PZA
464797	RUEDA P/CARRITO SK 4X50	PZA
465709	VALE FONDO DE CAJA	PZA
465710	VALE DE RETIROS PARCIALES	PZA
465711	VALE DE SALIDA	PZA
465712	CARTUCHO CF226X	PZA