ISCTE Business School
Instituto Universitário de Lisboa

ASSESSMENT OF S.A.R. WAREHOUSING ACTIVITIES:
A PROPOSAL FOR IMPROVEMENTS

Alexandra de Melo Medeiros

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Supervisor:

Professora Doutora Teresa Grilo, Profª. Auxiliar, ISCTE Business School, Departamento de Marketing, Operações e Gestão Geral

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ABSTRACT

The logistics market has been evolving over the years as well as its importance and the role it has been performing in every human and organization's life.

This master thesis is a project developed about Sociedade Açoreana de Representações, Ltda. (S.A.R.), that is one of the 1.162.069 Portuguese SME (Small and Medium Enterprises) representing 99,9% of the Portuguese business market. S.A.R. operates in the non-specialized wholesale trade industry and it is responsible for product's distribution of exclusive and own brands in Azores.

This project is under the logistics study and, through the analysis of its warehousing activities, mainly the storing and picking activity, aims to propose improvement solutions.

In order to deliver value-added suggestions, information about the described activities and warehouse layout were collected with the goal of forecasting orders through different techniques. Afterwards, the analyzed families were allocated in the storing area through two different criteria, the ABC turnover rate of the forecasted orders as well as the COI criteria, according to the dedicated and class-based storage methods.

The final step of this project was to assess the performance of each storage model and compare it with S.A.R.'s current allocation of products, through the distance travelled by pickers. Results demonstrated that it is possible to improve S.A.R.'s current performance, between 47% and 66%, depending on the criteria and methods applied. These results represent an improvement between 2.298.720 and 3.192.144 travelled meters, considering the forecasted orders between July 2017 and June 2018.

RESUMO

Ao longo dos anos, a importância do mercado logístico tem vindo a evoluir, tanto no papel que desempenha na vida das organizações como na vida das pessoas.

Esta tese de mestrado é um projeto desenvolvido acerca da empresa Sociedade Açoreana de Representações Ltda. (S.A.R.) que se engloba no mercado de PME (Pequenas e Médias Empresas), representado por 1.162.069 empresas (99,9% do tecido empresarial português). A S.A.R. atua no mercado de Comércio por Grosso Não Especializado e é responsável pela distribuição de marcas exclusivas e produtos próprios, nos Açores.

Este projeto enquadra-se no âmbito da logística e, através da análise das atividades de armazenagem, sobretudo arrumação e *picking* de produtos, e propõe-se alcançar propostas de melhoria.

De forma a acrescentar valor, foi recolhida informação, sobre as atividades supramencionadas bem como sobre o *layout* do armazém, objetivando a previsão de encomendas mediante diferentes técnicas. Por conseguinte, as famílias analisadas foram alocadas na respetiva área de armazenagem de acordo com diferentes critérios, nomeadamente as análises ABC e COI (*Cube-per-Order Index*), tendo em conta o modelo de arrumação fixa e o *class-based*.

Finalmente, foi avaliada e comparada a performance de cada modelo de arrumação com a presente disposição de produtos da empresa em análise, mediante a distância percorrida pelos *pickers*. Resultados demonstram que é possível otimizar a performance da empresa entre 47% e 66%. Estas propostas permitem uma redução entre 2.298.720 e 3.192.144 metros tendo em conta a previsão das encomendas realizadas entre julho 2017 e junho 2018.

 Keywords: Logística, Armazenagem, Métodos de Arrumação, Picking, Análise ABC, *Cuber-per-Order Index*

JEL Classification System: L81- Retail and Wholesale Trade; Warehousing; e-Commerce

LIST OD ABREVIATIONS

ASN: Advanced Shipping Notice

COI: *Cube-per-Order Index*

FIFO: Fisrt In, First Out

LIFO: Last In, First Out

L.R.: Linear Regression

M.A.: Moving Averages

S.A.R: Sociedade Açoreana de Representações, Ltda.

SKU: Stock Keeping Unit

SME: Small and Medium Enterprise

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1. INTRODUCTION

The present chapter presents a brief overview of the research developed within the scope of this project, starting with an introduction to the logistics market and its challenges, followed by the presentation of the studied company and the objectives of this project. Moreover, a description of the thesis structure will be presented.

This project aims at exploring and advising proposals to improve the warehousing and storage of a Portuguese company, namely, Sociedade Açoreana de Representações, Ltda. (S.A.R.). Accordingly, this project is focused in the analysis of a key logistic activity.

1.1. Problem statement

S.A.R. is a Portuguese SME (Small and Medium Enterprise) that has just completed 80 years old. It operates in the non-specialized wholesale trade industry and is responsible for product's distribution of exclusive and own brands in Azores. Naming a few, S.A.R. represent products from L'Oréal, Garnier, Fructis, Cutty Sark, Gallo, Adega Mãe, Grupo SEB, Quinta da Lapa, between others. Nowadays, one of its greatest challenges is found in the management of the single warehouse owned by the company, which occupies around 800 square meters. The warehouse receives products from Mainland Portugal and from different European countries, such as Spain, Italy and England, and serves the Azorean retail and horeca market.

Accordingly, S.A.R. faces several challenges regarding warehousing and storing activity, and this occurs mainly due to the significant growth of the company in the past years. This growth originates the following situation:

- Volatility of the number of products;
- Reallocation of products due to the disorganization of the warehouse;
- Several locations for the same product;
- The lack of identification of each SKU in shelves;
- Products allocated in pallets on the floor as can be seen in figure 6 in the Appendix 1.
- Some of the office's localization that were adapted over time (in the middle of the storing area as it can be seen in figure 4 in Appendix 1).

Why it is relevant?

In 2015, the Portuguese business market was represented by 99.9% of SME's that represented 60% of the Portuguese market turnover, as it can be seen in Figure 1 and Figure 2, and, since 2008, the SME's turnover has been decreasing, being the year of 2010 an exception.

Portuguese Business Market in 2015
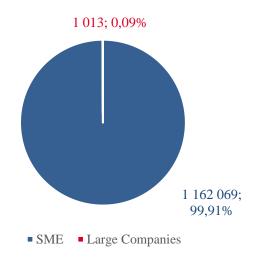
Figure 1 - Number and percentage of the Portuguese business market in 2015
Source: INE, 2015

Turnover of Portuguese Companies in 2015
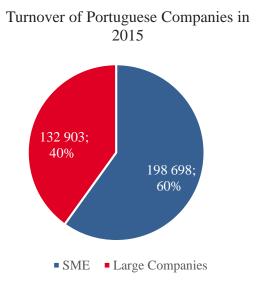
Figure 2 - Turnover of SME and Large Portuguese Companies in 2015 in 10^6 €
Source: INE, 2015

S.A.R. makes part of this 99,9% business market and this project aims to improve a regional small company in Azores. Being one of the biggest SME in the Azorean industry that operates, S.A.R. represents a high volume of sales per year, around 3 million € (taking into consideration

the market's size it operates), therefore, this project aims to help this company to improve its performance in the challenge that is currently facing. The proposal aims to achieve a more efficient allocation of products, reorganizing the warehousing activities and trying to solve the lack of standards and organized procedures. As proved, SME's have a huge importance in Portugal's economic life and with this project I hope to contribute in the improvement of one more Portuguese SME.

1.2. Objectives

This project aims to analyze S.A.R. current warehousing activities, namely, activities related to:

- Receiving
- Reserve storage (which includes order picking)
- Collation and value-added services
- Marshalling and Dispatching

Accordingly, the main objective of this project is to propose strategies to improve e S.A.R. warehousing activities in order to increase its management efficiency.

Within this main objective, there are several detailed goals to achieve, such as:

i. Description of S.A.R. warehousing activities;

ii. Identification of warehousing activities constrains and opportunities;

iii. Assessment of two main warehousing activities, storing and picking, performed currently;

iv. Present improvement proposals in the storing and picking activity;

v. Measure the impact of proposals in terms of the distance travelled on the picking activity;

vi. Compare S.A.R. currently situation with the results obtained in the improvement proposals;

vii. Present final proposals and guidelines of improvements.

1.3. Research Question

Within this setting, the research question (R.Q.) proposed to be explore in this project is as follows:

R.Q.: Can the warehousing and storage activity performed by S.A.R. be more efficient? Are products stored in the most desirable location? Can the distance travelled by pickers be reduced, given that picking is one of the most expensive activities performed in warehouses?

1.4. Methodology

This project will follow several steps in order to achieve the presented objectives, starting with the characterization of S.A.R. current state, collect information and analyze it, propose alternative storage methods and measure its impact and, finally, present the analyzed results and suggest improvements.

1.5. Structure of the Project

This project is structured in five chapters (as shown in Figure 3 - Case study structure), initiating with the present introduction, which provides an overview of the problematic in study and the main objective of this work. Chapter two presents the literature review regarding the concept of logistics, its role and importance inside organizations, as well as the most important activities that are involved in the logistics processes, focusing on warehousing activities (since this is the focus of this project). Then, the methodology applied in this project is described in chapter three. In chapter four, data collected about S.A.R. is presented along with the analysis and results obtained with it, proposals of improvement are made and the results obtained through its implementation are assessed. Finally, in chapter five, the main conclusions are expressed based on the obtained results, closing with suggestions for further research.

1. Introduction	Problem statement and research question Objectives	Why it is relevant? Struture
2. Literature Review	Logistics Concept Key Logistics Activities Warehouse Management	Warehousing Concept Warehousing Operations
3. Methodology	Current state and data gathering Data analysis Alternative proposals of storage models	Quantifying the impact of alternative proposals Analysis of results and suggestions of improvements
4. Case Study	S.A.R. presentation S.A.R. warehousing operations Data Analysis	Improving Proposals Results
5. Discussion and Conclusions	General conclusions Limitations and further research	

Figure 3 - Case study structure

2. LITERATURE REVIEW

The present chapter aims to review the concepts and different themes that will be explored within the scope of this project, and will allow for a better understanding on the complexity and functionality of warehouses and its management. Different author's perspectives are analyzed.

Two major themes are deeply explored. The first one regards the concept and importance of logistics, as well as which role and value is added by logistics inside organizations. The most important activities that are involved in the logistics processes are also explored. The second theme that is intensely researched is the **warehousing and storage activity**, one of the most important activities that make part of logistics, with these representing the logistics activities under analysis in this project.

2.1. Logistics Management

In this subchapter, the logistics concept and how logistics influence the day-to-day of enterprises and its customer is analyzed through the perspective of several authors. To demonstrate it, logistics activities are presented and it is shown how they interact one with another in the supply chain.

2.1.1. Logistics Concept

The concept of Logistics has been evolving over the time as well as its importance and role in every human's and organization's life, as mentioned by Stock and Lambert (2000: 2), "*the logistics process affects almost every sphere of human activity, directly or indirectly*".

To understand this concept, firstly it is important to mention that logistics management can assume different names. Rushton *et al.* (2010: 4) stated that "*there is, realistically, no 'true' name or 'true' definition that should be pedantically applied, because products differ, companies differ and systems differ. Logistics is a diverse and dynamic function that has to be flexible and has to change according to the various constraints and demands imposed upon it and with respect to the environment in which it works.*".

On the other hand, the Council of Logistics Management (CLM), quoted by Rushton *et al.* (2010: 5), defines logistics management as "*the part of supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related*

information from the point-of-origin to the point-of-consumption in order to meet customer's requirements".

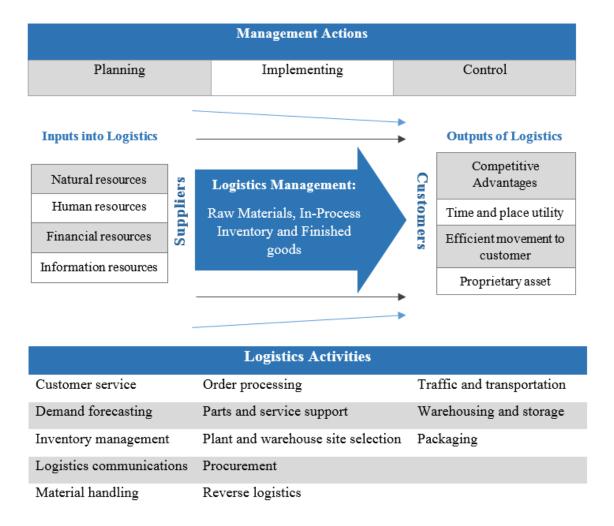To better understand this complex concept, the following figure is presented:

Management Actions		
Planning	Implementing	Control

Inputs into Logistics

Natural resources
Human resources
Financial resources
Information resources

Suppliers

Logistics Management:
Raw Materials, In-Process Inventory and Finished goods

Customers

Outputs of Logistics

Competitive Advantages
Time and place utility
Efficient movement to customer
Proprietary asset

Logistics Activities		
Customer service	Order processing	Traffic and transportation
Demand forecasting	Parts and service support	Warehousing and storage
Inventory management	Plant and warehouse site selection	Packaging
Logistics communications	Procurement	
Material handling	Reverse logistics	

Figure 4 - Components of logistics management

Source – Adapted from Stock and Lambert (2000: 3).

In summary, logistics teams are expected to manage different types of resources, through planning, implementing and controlling those same resources, which will ultimately assume the form of raw materials, in-process inventory and finished goods. It is in this process that the competitive advantage is gained.

For companies to achieve an effective logistical process, creating value added and consequently increasing its competitive advantage, Martin Christopher (2011) affirms that success can be accomplished based on a triangular model and through the relations between its three vertices:

the company, the customer and the competitors. Foremost, the company must develop a competitive advantage through differentiation, making the customer to choose that company instead of its competitors, and secondly, by operating at a lower cost. The foundation of this model is that the different operations, since the planning and coordination of materials flow from source to user, should be integrated to link the marketplace, the distribution network, the manufacturing process and the procurement activity in order to provide the customer the higher level of service at a lower cost.

The vision of Carvalho *et al.* (2010) converges with the model presented by Christopher (2011). In practice, the concept of Logistics Management is based in three central dimensions: time, cost and service quality (Figure 5). The product or service provided to a client should be delivered at the shortest period, at the lowest cost and with the highest service quality, to meet customers' expectations. These components should be performed at the highest level of efficiency, which is not always possible to achieve. The solution is to try to develop and combine two of these dimensions, to achieve the ideal logistical system position.
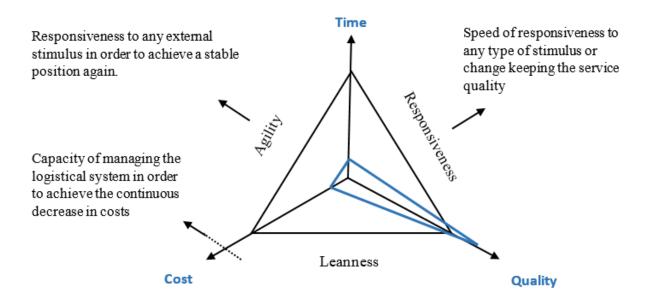

Figure 5 - The three logistics dimensions

Source: Adapted from Carvalho et al (2010: 29)

2.1.2. Key Logistics Activities

The logistical process is very complex, and includes different types of activities that have to be developed in an integrated base. According to Stock and Lambert (2000), these activities are involved in the flow of products from point-of-origin to point-of-consumption, as it is presented in Figure 6.
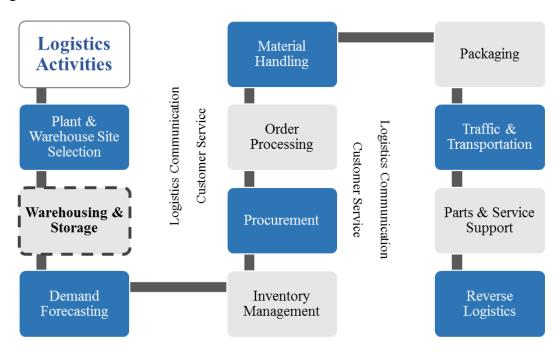

Figure 6 - Logistics Activities

Source: Adapted from Stock and Lambert (2000: 19)

The present literature review will be manly focused in one of the logistics activities, since this is the one related with the problem under study in this project: warehousing and storage. The warehousing and storage activity concerns the management of space needed to hold or maintain inventories, and involves making decisions regarding leasing, renting or owning a facility. It also influences decisions regarding the layout and design of storage facilities, product mix considerations, as well as safety and maintenance procedures, personnel training and productivity measurement. Normally, the greater the time lag between production and consumption, the larger the level of inventory. Once these decisions are made, equally important decisions need to be made concerning material handling. Particularly, a key goal is to eliminate handling whenever possible. This involves every movement or flow of raw materials, in process inventory and finished goods within a plant or warehouse. The ultimate goal of material handling, is to minimize travel distance and wastes.

So as to ensure an efficient and effective logistics management, all of these activities should be integrated with one another.

2.2.Warehousing and Storage

This subchapter focusses on one important logistic activity, the warehousing, which involves the reception, storing, collection and dispatch of products within a warehouse. It also deeply explores different methods and criteria of storing and analyze the perspective of several authors on the assessment of each one regarding its advantages and disadvantages.

2.2.1. Warehousing Concept

The warehousing and storage activity

The warehousing activity is described from Stock and Lambert (2000: 390) as the "*part of a firm's logistics system that stores products (raw materials, parts, goods-in-process, finished goods) at and between point-of-origin and point-of-consumption, and provides information to manage on the status, condition, and disposition of items being stored*".

For Carvalho *et al.* (2010), warehousing is an activity that makes part of every logistics system and is the most important activity performed in warehouses. In order to provide the client with the right product, at the right place, in the right position, for the right cost, at the right time, warehouses perform an important role, despite not adding any value to the product, since the product has the same features and value when enters and leaves the warehouse and sometimes can value less, due to the risk of obsolescence (e.g. breaks or deterioration).

The last two authors explain the contradiction around warehousing activity, since it does not add value to the product (and therefore to the client), but at the same time it has a major importance in the supply chain process. The necessity of storing and holding products comes from the necessity of achieving transportation and production economies, taking advantage of quantity purchase discounts, to maintain a source of supply, to support the firm's customer service policies, to meet changing market conditions as seasonality or demand fluctuations, to overcome the time and distance existing between producers and consumers, to accomplish least logistics total costs and to support the just-in-time programs of suppliers and customers (Stock and Lambert, 2000; Carvalho *et al.*, 2010).

Importance of warehouses

According to Rushton *et al.* (2010), warehouses are an essential component of most modern supply chain and are involved in various states of sourcing, production and distribution of goods, from the handling of raw materials, work-in-progress and finished goods, being the last stop before getting in touch with customers. Therefore, warehouses perform a crucial role to the provision of high customer services level.

Rushton *et al.* (2010) stated that recent trends, such as increasing market volatility, product range proliferation and shortening customer lead times have an impact on the roles that warehouses are required to perform. Warehouses must be design accordingly with the specific requirements of the supply chain as a whole and due to the nature of its facilities, staff and equipment required, warehouses are often one of the highest costs of the supply chain. Evidence of that is the capital and operating costs in USA which represent 22% of logistics costs, whilst in Europe this percentage is slightly higher, representing approximately 25% (ELA/AT Kearney, 2004) and therefore their successful management is critical in terms of both cost and service.

Faber *et al*., (2013), shows that warehouse management goal is to coordinate efficiently and effectively all its processes and activities including its planning and control. Warehouses have been showing its importance over the time, playing a pivotal role in the success or failure of businesses (Faber *et al*., 2013; Frazelle, 2002).

Regarding the warehousing activity, Stock and Lambert have identified several factors that influence the nature and importance of warehousing such as time, aiming to reduce the collection of an order; quality performed by the user of the warehouse; the improvement of asset productivity through reducing the total costs, reuse and recycle; and the development of workforce. An efficient warehouse is manly reachable when time is considered one of the most important aspects to control. This efficiency is obtained when all warehouse operations are designed to reduce every aspect of order cycle time.

However, the literature about the importance of warehouses and the drivers of warehouses planning and its structure is still unrefined (Frazelle, 2002).

Types of warehouses

The nature of warehouses within supply chain can assume diverse types of classification depending on the type of product that is being handled and its stage in the supply chain. It can also be classified by the area it serves, if it is owed or shared and by the type of equipment employed.

According to Baker and Canessa (2009) the supply chain and its network is so complex that exists a need for goods to be stored in inventory holding points with the purpose of delivering multi products orders together, e.g. break-bulk or make-bulk distribution centers.

Warehouses can be used to support manufacturing (e.g. a warehouse that receives several components coming from different suppliers that are later transported to manufacturing plants), to mix products from multiple production facilities for shipment to a single customer, to break-bulk, subdivide a large shipment of product into many smaller shipments to satisfy the needs of many customers and finally to combine or consolidate smaller shipments of products into a higher volume shipment. Product mixing often involves multiple plants locations that ship products to a central warehouse, where customer's orders for multiple products are mixed for shipment (Stock and Lambert, 2000).

Apart from warehouses function, there are three types of warehouses according to the type of products it stores (Gu et al, 2007):

- Raw-Material: products that are components that in the future will be used to produce finished goods;
- In-Process: products that are partial finished;
- Finished: products that are ready to be delivered to the next entity in the supply chain, that eventually will arrive to the final consumer.

The company that is analyzed in this project works with finished goods and receives large shipments of products, holds the inventory and transforms it in thousands of orders for hundreds of customers. As so, this will be the type of warehouse focused in the following chapter.

Warehouse's Layout

The definition of warehouse's layout has a major impact when it is intended to reduce travelled distances. To Rushton *et al.* (2010), warehouse's flow diagram is a useful starting point as it shows the relative flows between different zones. Noticeably, the designer will try to minimize the distances for the greatest flows and will avoid any backtracking or major cross flows. This process will have several objectives such as throughput efficiency by achieving it with the least resources, building utilization according to the required rules and making the best use of the available space and safety. A crucial decision is whether to adopt a through-flow or U-flow (see Figure 7 – Representation of Through-flow and U-flow layout) configuration that depends on different warehousing operations flows.
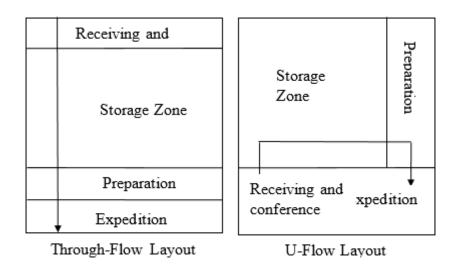
Figure 7 - Representation of Through-Flow and U-Flow Layout

Source: Adapted from Carvalho et al (2010: 231)

The main advantage of the Through-Flow layout, is the low congestion in the receiving and expedition area once they are separated physically, while the U-Flow layout represents the advantages of a lower travelled distance in the storage and picking activities.

Other layout considerations include building spans, column pitches, required clear operations heights and floor flatness tolerance, dock area design for vehicle loading and unloading, the location of offices, battery-charging area, pump room, toilets, just to mention a few.

2.2.2. Warehousing Operations

Every warehouse design should be adapted to meet its requirements in the supply chain. Nevertheless, there are several operations that are common to any warehouse. According to Rushton *et al.* (2010) perspective, the typical warehouse functions and material flow for an inventory holding warehouse are shown in Figure 8.

Put-Away

Receiving

Replenishment

Reserve storage

Order Picking (and Sortation)

Collation and Added Value Services

Marshalling and Dispatch
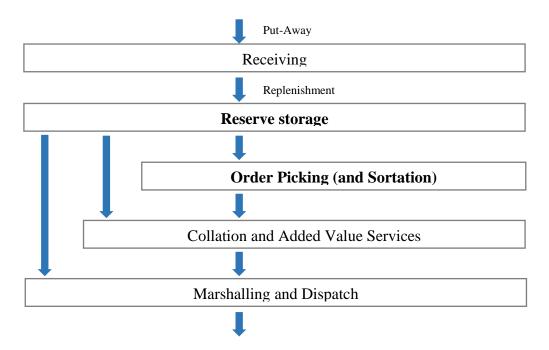
Figure 8 - Typical warehouse functions in a stock-holding warehouse

Source: Adapted from Rushton *et al.* (2010: 230)

2.2.2.1. Receiving

The first activity, receiving, starts with the physical unloading of incoming transport, checking against purchase orders and recording the incoming goods into the computer system. It can also include activities such as unpacking and repacking in a format suitable for the subsequent warehouse operations. Quality control checks may be undertaken to verify if there is any irregularity and if so the return process should be trigger (Rushton *et al.*, 2010). Carvalho *et al.* (2010) refers that in order to avoid congestion in the arrival of transports in the unloading dock and/or in the reception area, arrivals should be previously schedule manually or through a technological operating system such as Advanced Shipping Notice (ASN).

2.2.2.2. Reserve Storage

The reserve storage and replenishment is the activity where goods are normally taken to the reserve or back-up storage area, which is the largest space used in many warehouses. This area holds the bulk of warehouse inventory in identifiable locations. When required, goods are taken from reserve storage either directly to marshalling (for example, when a full pallet is required by a customer) or to replenish a picking location.

Storage types

Carvalho *et al.* (2010) refers that the way storage is done can have a significant impact in handling products inside the warehouse. According to these authors, there are two methods of storing products:

- **Fixed Location Storage or Dedicated Storage**: It's the allocation of products in a fixed area in the warehouse – this allocation can follow different criteria, such as turnover, number of entry and exit movements, volume, volume/number of movements ratio, among others. The disadvantage of this method is mostly related to the creation of underutilization spaces – this because the space required for each product has to be forecasted to the maximum stock, and usually this rarely happens in simultaneous to all product references, resulting in many empty spaces. Another issue is when a product's demand increases and the needed space cannot be added, and consequently the product storage area must be reallocated. In terms of advantages, it facilitates de work developed by pickers, since they know where products are. According to Koster *et al.*, 2007, heavy products should be placed at the bottom of the pallet and the lighter ones should be on the top

- **Random Location Storage**: The allocation of products is only defined at the time of its reception, taking into consideration the available spaces within the warehouse. This method drives to a situation where the product may never be stored in the same place again, and for this reason requires collaborators to be more aware of its location (Carvalho *et al.*, 2010).

On the other hand, Koster *et al.* (2007) refers four different methods:

- **Closest Open Location Storage**: It is similar to the random location system, but the order picker chooses the first empty space. Hausman *et al.* (1976) has previously argued

that these two systems have a similar performance only if products are moved in full pallets;

- **Full-Turnover Storage**: Products are stored according to their turnover, where products with higher sales rate are located in the most accessible area and products with the lowest sales rates are stored in the back of the warehouse;

- **Class-based Storage**: Products are stored based on a popularity criterion, where the goal is to group products into classes (as is illustrated in Figure 9), with different criteria being available for this classification (more details can be found below). While classes' areas are fixed, storage within each area (i.e., class-specific area) is random.
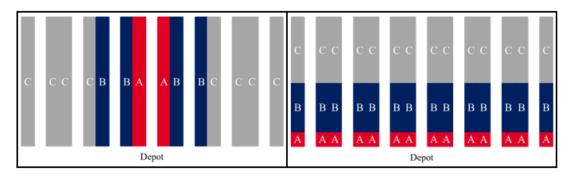
Figure 9 - Illustration of two common ways to implement class-based storage

Source: Adapted from Koster *et al.* (2007: 490)

- Family-Grouping: Similar products are stored close to each other.

Gu *et al.* (2007), Hausman *et al.* (1976), Grave *et al.* (1977) and Schwarz *et al.* (1978) compare random, dedicated and class-based storage using analytical and simulations models, and Gu *et al.* (2010) concludes that dedicated storage shows a significant reduction in travel time when compared with random storage. This analysis also concludes that class-based storage, with few classes, produces travel time reductions that are close to those obtained by dedicated storage. On the other hand, Petersen (2002), using simulation experiments, has shown that full-turnover storage has a better performance than class-based storage, when considering a manual order picking system. However, it is also suggested by the same author that the class-based method with two to four classes, in practice, it is easier to implement when compared to the full-turnover storage. Despite the full-turnover storage having a better performance when compared with the models referred above (Petersen and Aase, 2004), it requires a cyclic re-organization of products in the warehouse, once demand rates vary constantly. The potential loss of efficiency might be a serious risk associated with this method.

Storage criteria

To assign a product to a location, Frazelle (2002) refers three most frequently used criteria:

- Popularity: It is the number of storage/retrieval operations a picker performs to a given SKU (Stock-Keeping Unit). As it was explained above, products with the highest popularity are stored in the most desirable location.

- Maximum inventory: Products classes are ranked by increasing maximum inventory and classes with the lowest maximum inventory are stored in the most desirable location.

- *Cube-Per-Order Index* (COI): It correlates the volume of the allocated storage and the number of storage/retrievals operations of a SKU. It is a ratio that takes into consideration a SKU's popularity and its space requirement.

Carvalho *et al* (2010)*,* also states a different system that is called the ABC Model, also called the Pareto's Rule, which is based on the assumption that not all products have the same importance within a company. The ABC analysis is a method of classifying a group of products into three classes: A (more relevant products), B (products with intermediate relevance) and C (less relevant products). According to this rule, the A class products correspond to 20% of products that represent 80% of total invoicing, B class products correspond to 30% of products that represent 15% of total invoicing and C class products correspond to 50% of products that represent 5% of total invoicing (Carvalho *et al.*, 2010). Products that belong to A class are the most important for its high demand, monetary value or strategic value, meaning that a rupture of such products would have a significant impact to the company. The criteria to assess each group depends on the activity sector a company belongs and what is pretended with the ABC analysis results.

2.2.2.3. Order picking

The order picking (and sortation) represents a key objective of most warehouses since it represents 55% of the total warehouse operating costs (Koster *et al*., 2007). This activity involves the extraction of goods from inventory required by customers and bring them together to form a single shipment. When an order is received from a customer, goods need to be retrieved from the warehouse in the correct quantity and in time to meet the required service level. An order normally contains a number of order lines, each requesting a specific quantity of an individual product line. The order line can be for a full unit load (retrieved directly from

the reserve area) or less than a unit load (retrieved from the picking location). Order picking is a key warehouse operation, both in terms of costs and service, as a weighty portion of warehouse staff is normally needed for this activity and high levels of order accuracy are mandatory (Rushton *et al.*, 2010). According to these authors, there are three main methods to execute order picking:

- *Pick-to-order*: the picker prepares one order and runs the whole warehouse (by foot or on a truck) to pick the whole order;
- *Batch Picking*: the picker prepares a group of orders and picks each SKU in a single picking order. The goods are sorted at the end of the picking run into the different customer orders. Normally this picking system is used when there are several small orders;
- *Pick by line*: is where the unit load of one product is picked to waiting customer orders and the picking continues until that line is exhausted.

Stock and Lambert (2000) reffers two more methods characterized by zone or waves. In the zone picking method, each picker is assign a given zone of the warehouse. Under a zone picking plan, one order picker selects all parts of the order that are found in a given aisle and then passes the order to another picker, who selects all of the items in another aisle, and so on. The wave picking is set by groups of shipments characterized by a given characteristic, such as common carrier. For example, all of the orders for UPS (Universal Product Code) might be picked in a single wave. A second wave would pull all of the orders destined for parcel post and still other wave would select shipments routed by other carriers.

Picking systems can also be segmented into Man-to-Part or Part-to-Man (Carvalho *et al.*, 2010). In the more traditionally systems, Man-to-Part, the picker moves to the reference location, and in this case the number of movements is very high, therefore, this system requires an efficient stock location. In the Part-to-Man system, there are no picker movements since the products are the ones that automatically moves to reach the picker. This system is often seen in pharmacies. There are several factors that need to be considered when determining which of the above systems should be used, such as the product range, the size of orders, the picking equipment and the size of unit load or container into which orders are being picked.

2.2.2.4. Collation and added value services

According to Rushton *et al.*, 2010, collation and added value services is where goods are gathered into complete customer orders ready for dispatch. Products need to be assembled or packed together after picking. For example, goods may be passed to a packing station where they are packaged into a cartoon. This may in turn be stretch or shrink wrapped onto a wooden pallet ready for transit. This process may also involve final production postponement activities and value-added services such as kitting and labelling.

2.2.2.5. Marshalling and Dispatch

Finally, goods are marshalled together to form vehicle loads in the dispatch area and then loaded on to outbound vehicles for onward dispatch to the next "node" in the supply chain (to a trans-shipment depot or to a freight forwarder's depot for groupage/consolidation). Carvalho *et al.* (2010) affirms that the shipment is ordered through LIFO (Last In First Out) criteria, this means, the first loaded pallet corresponds to the last customer's delivery.

2.3. Defining the focus of the project

Within all these warehouse functions, picking represents the one accounting for 55% of total operational expenses inside a warehouse (Van den Berg and Zijm ,1999) – see Figure 10.
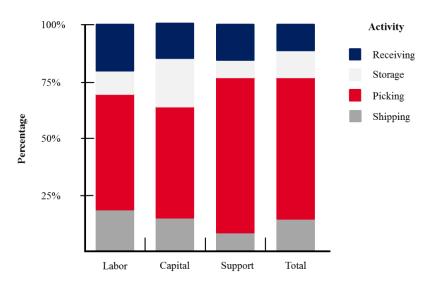
Figure 10 - Warehouse Cost Distribution

Source: Adapted from Van den Berg and Zijm (1999: 521)

Also, as shown in Figure 11 within the order-picking activity, the most time-consuming activity is related to the distance travelled by a picker.
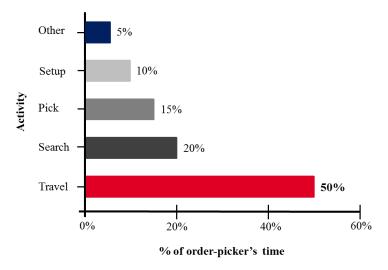
Figure 11 - Typical distribution of an order picker's time

Source: Adapted from Tompkins *et al.*, 2003

Accordingly, this project will propose alternative solutions so as to improve the picking process at S.A.R, and this will thus improve efficiency of warehousing and storage activities in the company (as proposed in this project). Improving the picking process thus implies reducing the time devoted to the picking process, and this time is directly influenced by the way materials are stored in the warehouse. According to Gu et al. (2007), planning the warehouse storage implies making decisions on i) the assignment of items to different warehouse departments and space allocation, and ii) the assignment of different units to different zones and specific locations. These decisions are directed related with warehouse operating planning, and the following is specially devoted to the review of studies focused on such problems.

2.4. Conclusion

The chapter 2, supported by important and recognized authors in the logistics area, allowed the development of concepts addressed in this project, which was required to support it. This chapter is mainly focused in two major themes: the first one on the importance of logistics and its activities; and the second one, on warehousing and storage activities (the activities more closely related with this project).

The logistic concept is very complex to define and can assume different names, but despite this complexity, all authors converge to the same point, logistics perform a more and more important

role in the supply chain process, a necessary role to products arrive from its origin to its destination. In a daily basis, people only notice the lack of an efficient logistical process when something occurs out of its normality. When a client needs a product that it is not available in a supermarket, when a strike occurs in any mode of transportation and products do not arrive at its destination, when a piece is missing and an entire production of a certain product is compromised, or simply when a supplier delays a delivery, are few examples of the importance of logistic processes in our daily routine.

Within the activities logistics, the warehousing and storage activity was the main focus of this chapter, once the project will be focus in it. Here, it was demonstrated the different activities that makes part of warehousing and storage, being these the receiving, reserve storage (where order picking occurs) collation and value-added services and marshalling and dispatch. Following, it was presented the different methods and criteria that are presented by authors to store products, as so the different methods there is to perform the picking process. Considering the different studies performed by several authors, it is concluded that in order to reduce travelled time performed by pickers, and consequent the distance travelled by them, orderly, the dedicated storage, the classed-based with two to four classes and the full-turnover methods are the ones that presents better results when the goal of picking is to reduce the distance travelled performed by pickers.

It was also shown that within the warehousing activities, picking is the one that represents the higher percentage of costs, around 55%, and within the picking process, the distance travelled by pickers represents the most consumption time activity, around 50%. It is thus clear the need to propose strategies focused on reducing this travelling distance when the aim is to improve efficiency in warehousing operations, such as it is the case of this project.

3. METHODOLOGY

This chapter introduces the methodology that will be used in the development of this project. As it was presented in the first chapter, the main goal of this project is to analyze S.A.R. warehousing activities, assess its performance and to present solutions aiming at improving its efficiency. Particularly, alternative solutions for the storage location assignment of SKUS within the warehouse are proposed in order to improve the efficiency of the picking process, and consequently, the efficiency of the overall warehousing activities. Accordingly, several methodological steps were followed within the scope of this project, as shown in Figure 12.
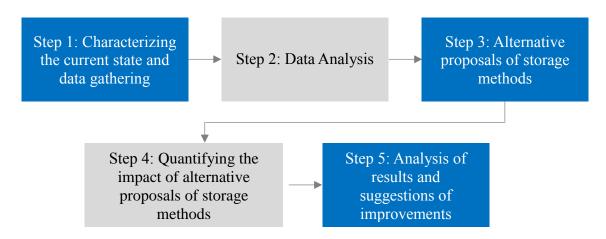
Figure 12 - Methodology Steps

3.1. Step 1: Characterizing the current state and data gathering

As an initial step, the current warehouse layout and its operations (receiving, reserve storage, within order picking, collation and value-added services and marshalling and dispatch) were observed in the field in order to define the current warehousing activities organization. A special focus was made on the storage location assignments, as well on the method of order picking. In this context, the following data was collected:

    i.   Layout design (offices, refectory and warehouse utilization area);
    ii.   Processes performed in each warehousing activity;
    iii.   Relative location of storage areas and distances between storage areas;
    iv.   Distances between storage areas and other warehouse departments/zones;
    v.   SKU organization

vi. Current allocation of SKUs to storage areas – the warehouse currently operates with dedicated storage, meaning that each SKU has a specific location;

vii. Measures of each SKU's occupation space;

viii. Historical data about orders (inbound and outbound) per SKU, monthly and yearly – data collected from July 2016 and June of 2017;

ix. Level of inventory at the time of the observation, 25th of July.

Information concerning warehousing activities procedures were collected through direct observation and unstructured interviews, and data about distances and other measures were gathered by direct observation, with distances being measured in meters. Information regarding SKUs was provided by the warehouse owner. All this information was gathered from 14th July 2017 and 31st August 2017

3.2. Step 2: Data analysis

Based on the data gathered, SKUs were aggregated into families, and several analyses were performed utilizing different techniques:

i. Projections of orders, per family, for the coming year were built based on the information about past orders. Alternative forecasting methods can be used, depending of the quantity and quality of historical data having on-hand (more details can be found below);

ii. Orders segmentation using ABC analysis based on the turnover, as well as using the COI criteria.

Regarding forecasting methods, and according to Ozcan (2009), there are judgmental and non-judgmental forecasts. The judgmental forecast is based on experience, judgment and technical expertise. The second one identifies the behavior of series by using factors such as seasonality, cycles and irregular variations. Time series is the method that will be applied in this project – the availability of the warehouse owner was limited, which made it impossible to build judgmental forecasts. Within this setting, there are three main class of methods to perform time series forecasts, according to Ozcan (2009): methods based on Seasonality, Averaging and Trends:

i.   *Methods based on Seasonality:* Seasonal variations can be seen in a data set that consistently repeats upward or downward movements of the data values that can be traced to recurrent events. Generally, and in order to obtain good forecasts with this technique, is it needed an historically data of, at least, three years.

ii.   *Methods based on Averaging:* This method provides forecasts based on the average of a certain period, considering historically data. It smooths out fluctuations in time series once individual highs and lows, cancel each other out.

iii.   *Methods based on* **Trends:** This method collects historically information and attempts to identify a pattern or a behavior that under other circumstances would be partially unrecognized.

For the presented methods, there are several techniques that can be applied, but according to Ozcan (2009), the most common are, respectively, the Additive Model, Moving Average and Linear Regression:

Additive Model

Seasonality is expressed as a quantity, which is added or subtracted from the series average, in order to incorporate seasonality.

Moving Averages Technique

Forecasts for the coming period (example: months or quarters) are based on the average of the last period.

Linear Regression Technique

This technique allows to predict one variable from one or several other variables, and thereby comprehend what kind of influence certain variables might have in a specific one.

$$y = a + bx \tag{1}$$

Equation (1) gives the general formula for linear regression, where y represents the dependent variable, x represents the independent variable, a gives a constant value and b gives the slope of the trend.

In order to assess the accuracy of each technique, the MAD (Mean Absolute Deviation), MAPE (Mean Absolute Percentage Error) and MSD (Mean Squared Deviation) errors can be used according to the equations (2), (3) and (4), respectively:

$$MAD = \frac{\sum_{t=1}^{n}|y_t - \hat{y}_t|}{n} \qquad (2)$$

Where: y_t = actual value; $\hat{y}_t$ = fitted value; n = number of observations.

$$MAPE = \frac{\sum |(y_t - \hat{y}_t)/y_t|}{n} \times 100, (y_t \neq 0) \qquad (3)$$

Where: y_t = actual value; $\hat{y}_t$ = fitted value; n = number of observations.

$$MSD = \frac{\sum_{t=1}^{n}|y_t - \hat{y}_t|^2}{n} \qquad (4)$$

Where: y_t = actual value; $\hat{y}_t$ = forecasted value; n = number of observations.

According to results, the selected method will be the one that presents lowest values of the presented techniques.

3.3. Step 3: Alternative proposals of storage models

As noted above, the warehouse currently operates with dedicated storage, organizing products by category – but no particular criterion is used to its allocation. Despite this, the organization was dispersed and different categories were mixed. For the purpose of this project, alternative storage models are explored:

i. Dedicated storage model, using:
   a. ABC analysis criterion, based on the turnover of forecasted orders, where families belonging to the A class should be located in the most desirable locations, i.e., families with the highest number of orders should be allocated in the nearest shelves of the receiving/expedition area and, orderly, follows B and C classes;
   b. COI criteria, based on the ratio volume/forecasted orders, where families with the lowest index should be allocated in the nearest shelves of the receiving/expedition area.

ii. Class-based (with 3 classes) based on the ABC analysis criterion, grounded in the turnover of the forecasted orders, following the ordering of family's allocation presented in the last step.

As shown in the literature review, these alternative storage models were recognized by Gu *et al.* (2007), Hausman *et al.* (1976), Grave *et al.* (1977) and Schwarz *et al.* (1978) as potential storage location alternatives when one aims at improving the efficiency of picking activities, i.e., when the goal is to minimize the distance travelled by pickers in the picking process.

Departing from this segmentation (using ABC and COI), products are then allocated in the best location, according to each criterion. The distance travelled by pickers should then be measured for a set of key orders most frequently received by the company (as detailed in the following section).

3.4. Step 4: Quantifying the impact of alternative proposals of storage methods

After selecting the alternative storage models that are considered relevant to explore, there is a need to quantify the impact of those changes. Particularly, considering orders forecasted from July 2017 until June 2018, the following measures will be computed and compared:

i.   Total travel distance (in meters) with the current storage location assignment;
ii. Total travel distance (in meters) with the alternative storage methods and criteria presented before.

These distances will be computed according to Equation (5):

$$\sum_{t=1}^{12} \sum_{i=1}^{n} \sum_{j=1}^{n} T_{ijt} \times D_{ij} \tag{5}$$

where T_{ijt} represents the number of movements between i and j areas during month t, D_{ij} represents the distance (in meters) between i and j areas, and n represents the number of existing areas in the warehouse. As assumption, it was considered that orders are collected family by family, where each collected family originates 2 movements (inbound and outbound), and there is no movement inside the storage zone. Accordingly, T_{ijt} is equal to twice the number of orders moved from i to j.

3.5. Step 5: Analysis of results and suggestions of improvements

Based on the obtained results, suggestions of allocation of families are presented, considering S.A.R. current allocation.

4. CASE STUDY

This chapter starts by presenting the studied company, part of its history, its current situation regarding its activities and logistical procedures, main suppliers and clients and also its products (section 4.1). Afterwards, in section 4.2, and in line with the methodological steps of this project, it will be also presented and analyzed data collected about orders, warehouse layout, warehousing activities, products allocation and utilization of space. The current state of the allocation of products will also be assessed, as well as the travelled distance performed by pickers when collecting orders. Then, the results obtained in the data treatment step are presented, namely, the forecasts obtained for orders for the coming year, as well as the resulting segmentation obtained with the ABC analysis and with the COI method (section 4.3). Afterwards, alternative proposals of improvements will be presented (section 4.4) and assessed (section 4.5). Final conclusions and suggestions for improvements are presented at the end of this chapter (section 4.6).

4.1. S.A.R. – Step 1

4.1.1. S.A.R. History

S.A.R. is a Portuguese company that was born in 1937 with Gil Afonso de Melo. He lived in the country side of the island and moved into Ponta Delgada to sell chaplets and small confections. Few years later, starts to work with confections companies from the north of the country, such as *the Sociedade de Tecidos de Vizela*, and starts to sell shirts from *José Olivier*, underwear from *Figure Four* and umbrellas from *Chussol*.

In the late 50's, a big step was taken and S.A.R. started to import non-confections products from England, namely chewing gum from Wrigley's, whisky from White Horse and, from French, the Courage Brewery beer. In the mid 60's, S.A.R. entered in the beauty industry, starting to work with L'Oreal (a partnership that continues until nowadays), Johnson and Gillete. It also diverged the business when started to work with Nobre (sauces) and Johnson Wax (cleaning products).

In the late 80's S.A.R. goes through a bad period when the founder dies and the company losses the business with Johnson Wax, Gillete and Lancôme (prestigious brand that belongs to

L'Oréal). Around 1991/1992 the company strengths its human resources with the coming generation, and recovers the business through new partnerships and starts to sell products from different companies such as Dolfin, Witors, Confeitaria da Ajuda, among others.

In 2001, S.A.R. creates its own brand, Delícias da Avó Maria, in the nuts and almonds industry. It is also in this years that the company buys its first and second warehouses (connected internally to each other) - until that point, the warehouse was rented. In the next year, owns the business with SEB Group, representing this company in the Azorean market, diverging its business into the small home appliances market. Around 2006 purchases the third warehouse and in 2009 the fourth one (the warehouses are all located next to each other). Between 2010 and 2015, S.A.R. enters the baking market with its own brand and makes new partnerships with Credin, Tremoceira da Piedade, Quinta da Lapa and Adega Mãe.

In summary, passing from generation into generation, S.A.R. is currently responsible for product's distribution of exclusive brands in Azores. Presents a wide range of products within different segments, such as health and beauty care, groceries, beverages and industry, representing brands such as L'Oréal, Garnier, Casa Pons, Credin, Dolfin, Wrigley, Werther's, Isostar, Cutty Sark, Vodka Klimat, Tefal, Krups, Rowenta, Moulinex among others, and has its own brand, Delícias da Avó Maria. It operates in the B2B (business to business) channel, covering the Horeca (Hotel/Restaurant/Café), mass market and retail (food and small home appliance) channels and also the baking industry.

To 2018, the challenge is to start a new project in the hospitality market, opening its own store, and as the business is growing year after year, to manage the warehouse in terms of its logistics performance, a challenge that is already present in the company.

4.1.2. S.A.R. Current Situation

In this chapter, the current situation of S.A.R. regarding the human resources, warehouse organization and its layout, procedures performed in each warehousing operation and the equipment and fleet available in the warehouse are presented.

4.1.2.1. Human Resources

Initiating with the human resources structure, S.A.R is composed by five partners, that are already retired, and fifteen workers. These workers are organized as follows: administrative services, counting with four workers; warehouse management, counting with one warehouse

manager and four more workers; commercial services with five workers, from which tree are commercials, one is a promoter and another is repository; and finally, one worker is responsible for the warehouse cleaning.

Being the department of interest for the purpose of this project, the warehouse management department is responsible for receiving, checking, unpacking, storage, picking, packaging, dispatching and distributing goods.

4.1.2.2. Layout

In Figure 13, the warehouse layout is presented. The warehouse is divided into one transformation room and four warehouses: 1W (1st warehouse), 2W (2nd warehouse), 3W (3th warehouse), 4W (4th warehouse).
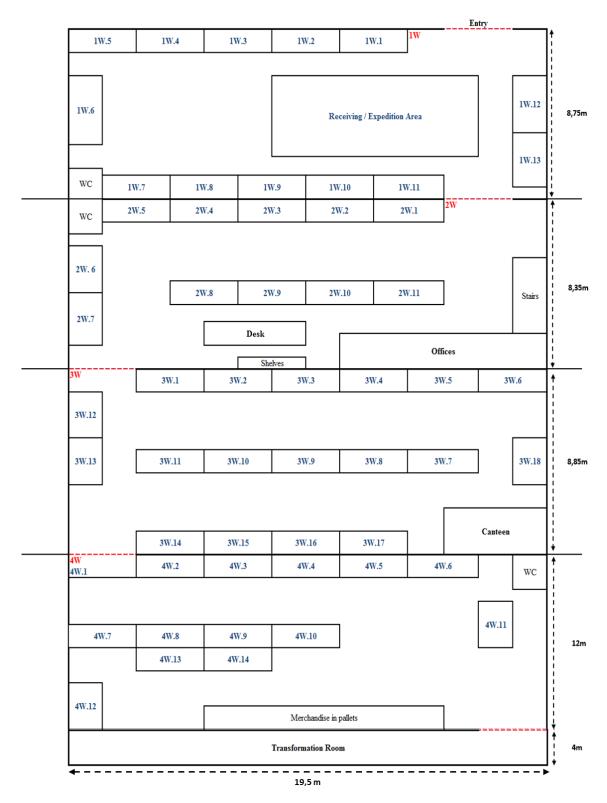
Figure 13 - Representation of the Warehouse Layout

As shown in Figure 13, the warehouse is divided into four warehouses that are connected through a passage (red lines in Figure 13). The fourth warehouse has controlled temperature, such as chocolate. The warehouse comprises 56 racks, in which one rack has only 1 level, four

have 2 levels, eighteen have 3 levels, twenty-six have 4 levels, six have 5 levels and only one has 6 levels. The total volume available in these 56 racks is $6.756.804m^3$ divided into 203 shelves. These shelves locations are identified and should be read as presented on Figure 14.

First rack, shelf A

1 W 1 A

First warehouse

Figure 14 - Shelve identification code

Accordingly, the shelf given as example in Figure 14, should be read as follows: the shelf is located in the first warehouse (**1W**1A), in the first rack (1W**1**A) and it is the shelf A (1W1**A**).

In Figure 15, an example of rack 11 in the second warehouse is presented:

2W.11
Shelf A
Shelf B
Shelf C
Shelf D
Shelf E
Shelf F

Figure 15 - Illustration of rack 11 in the second warehouse

The available volume per shelf, can be seen in Appendix 2.

The dimensions of the warehouse are presented in Table 1.

Table 1 – Warehouse Dimensions

Area	Dimensions in square feet (m^2)
Total Area	818
1st Warehouse total area	171
2nd Warehouse total area	163
3rd Warehouse total area	173
4th Warehouse total area	312
Total storing area (1W, 2W, 3W and 4W)	188
Expedition area	35
Offices area	20
Canteen area	20
Transformation room area	78

4.1.2.3. Equipment and Fleet

S.A.R. uses a wide variety of equipment for picking activities, and also has its own fleet composed by four vehicles (pictures can be found in Appendix 3):

- Two pallet trucks
- One counterbalanced fork-lift truck
- One electric powered rider straddle truck
- One Toyota Dina 1500 Kg
- Two Renault Master
- One Reanult Kangoo

4.1.2.4. Warehousing Activities

As stated by Rushton *et al.* (2010), five warehousing activities can be distinguished: receiving, replenishment into the storage area, order picking, collation and added value services and finally marshalling and dispatch. The description of how S.A.R. performs these activities are described below.

It should be noted that S.A.R. currently works with 1150 SKUs that are stored following a dedicated storage policy, meaning that each SKU has a specific area to be stored. There are two rules the company follows:

- The warehouse is organized by family, existing currently 95 families (Appendix 4)
- There are eighteen families of products that have to be stored in the 4th warehouse due to its controlled temperature: Amêndoas de Chocolate, Amêndoas Tradicionais, Avulso Kg, Bolos S Padaria, Cartonagens, Confeitos de Chocolate, F Secos Balde, Figos Secos, Fruta, Fruta Confitada, FS Culinária, FS Saquetas, Nozes, Ovos, Ovos de Páscoa, Panificação, Pastelaria and Snacks, highlighted in grey, in Appendix 4.

Every week, from Tuesday to Friday, shipments arrive usually once a week with, on average, 28 pallets of goods.

Receiving

The receiving area is right next the entry (it can be seen in Figure 13, presented before), where trucks come in only a few meters away and pallets of products starts do be unloaded through a counterbalanced fork-lift or electric-powered rider straddle trucks to the receiving/expedition area. The warehouse manager confronts the purchase order against the shipping guide and checks which products arrive and its quantities. Thereafter, the warehouse manager gives the transportation guide to the billing department, and products are introduced in the inventory system. The manager notes and requests the billing department a credit note in case any products are missing. All products are received in pallets. Goods might be received in two ways: one pallet with only one SKU or one pallet containing several SKUs (the most frequent one).

S.A.R. only uses one management software, namely, the PHC, to support its warehousing activities.
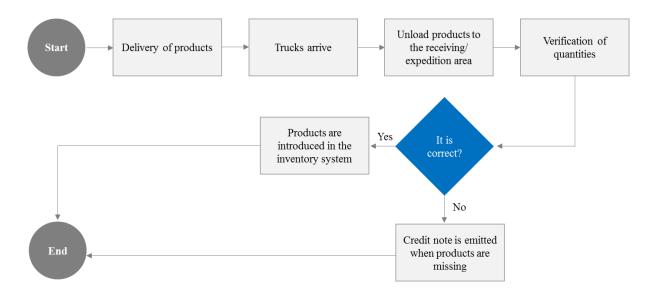
Figure 16 - Receiving activity flow chart

Replenishment into the Storage Area

After receiving goods, pickers separate and store each SKU. Thereafter, there are four possible situations:

- If pickers are busy, goods stay in the receiving/expedition area, in maximum, until the following day;
- If most of the assigned locations of each product is occupied, products remain at the floor, in front of its location;
- If there is free space in the locations assigned to a given SKU, products are directly allocated to each assigned location;
- If no free space is available in the locations assigned to a given SKU, products have to be allocated in a different location.

It is important to highlight that the last situation violates the dedicated storage model. Usually, when there is no space to store a product in its dedicated location, the remaining quantities go to the higher shelf of its rack; but if the higher shelf is also not available, the product is stored in the nearest available shelf. This situation may occur due to several reasons, for example, when a deal of quantities is done and the company purchases a higher quantity of products in order to obtain bigger discounts, the allocation of products in the wrong location or the lack of organization itself.

It should also be noted that dedicated storage is combined with family grouping, since products are organized into different categories: health and beauty care, groceries, beverages, industry and cold products (products that needs to be stored in a controlled temperature area).
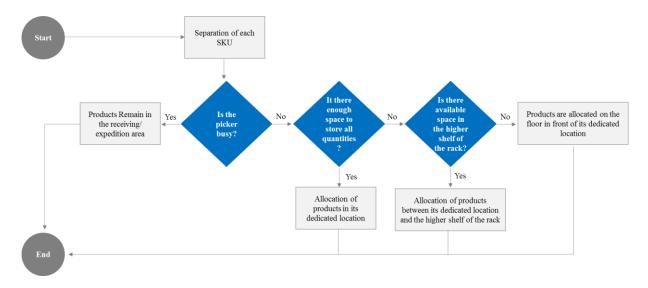
Figure 17 - Replenishment into the storage area activity flow chart

Order Picking

Before describing the order picking activity, it is important to refer that all warehouse workers perform this activity. The order picking process starts when the building department emits the reserve guide. Thereafter, each picker collects one order and follows a pick-to-order model. Orders are collected using platform trolleys or, if a requested SKU is made in pallet, products are collected through a counterbalanced fork-lift truck. Accordingly, the picking system executed follows a Man-to-Part system, where the picker is the one moving to the SKU location. One should however note that pickers sometimes show some difficulties and loose time when collecting orders due to the fact that each SKU may have multiple possible locations. In that case, the FIFO (Fisrt In, First Out) system is applied.
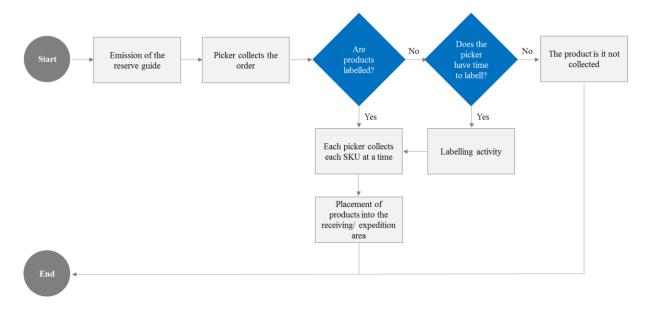
Figure 18 - Order picking activity flow chart

Collation and Added Value Services

After collecting orders, the picker assembles products in a pallet, and before being tapped, the guide reserve is confronted with the collected products, as a final check. This last step is executed on the expedition area. S.A.R. does not perform activities such as kitting and labelling for a specific client. This type of activity is only done internally, meaning that some products arrive without a label or a stamp (stamps are obligatory in some alcoholic beverages) and after being stored and before being separated to an order, one warehouse worker has to perform this activity. Normally, this situation happens with products of its own brand, i.e., Delícias da Avó Maria, which are labelled, beverages that needs a stamp or with Wrigley's chewing gum, which are also labelled internally. This activity may be also done when pickers are available and not necessarily after collecting an order.
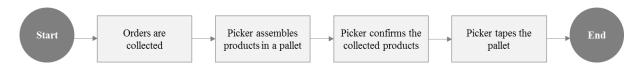
Figure 19 - Collation and added value services activity flow chart

Marshalling and dispatch

Finally, products are placed into vehicles (that are inside the warehouse, in the entry), to be transported to the client.
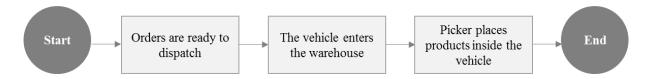
Figure 20 - Marshalling and dispatch activity flow chart

The activities that will be directly affected by the proposals of improvements proposed in this project are replenishment into the storage area and order picking, and so these will be the ones further explored in the following sections.

4.2. Dataset – Step 1

In order to present proposals of improvement for this project, first it is necessary to assess S.A.R. current situation in order to further compare its actual state and the results obtained from the suggested proposals. Note that the proposals of improvement made in this project certainly respond to S.A.R. current challenges without jeopardizing other related activities/procedures.

4.2.1. Assessment of S.A.R. current situation

From the 1150 SKUs S.A.R. works with, it was collected information about 904 SKUs, which corresponds to 72 families, that were matter of subject in this project. The remaining SKUs that were not analyzed had no stock when information on the field was observed and, as so, there was not possible to collect information. Some SKU were discontinued, and according to the suggestion of S.A.R. warehouse manager, information about it was not collected.

The collected information was treated according to the following steps:

I.   Identify the location of each SKU according to the Figure 21, that should be read as: the SKU is located in the first warehouse (**1W**1A), in the first rack (1W**1**A), in shelf A (1W1**A**), in the first location (1W1A**1**), counting from left to right

<div align="center">

First rack, shelf A

1 W 1 A 1

First warehouse Localization 1

</div>

Figure 21 - Location of SKU

If a shelf contains two different SKUs, one in the front and another in the back, the letter A was added to the SKU in the front and the letter B to the SKU in the back. The complete list can be found in Appendix 5. It should be noted that amongst the 904 SKUs analyzed, one was found in 6 different localizations, one in 5 different localizations, three in 4 different localizations, nine in 3 different localizations and sixty in 2 different localizations.

II.   Measure the volume occupied by each SKU (see Appendix 5);

III.   Measure the distance between each rack to the expedition area based on the distances shown in figure 23. The total distance between each shelf and the expedition area can be found in Appendix 6.
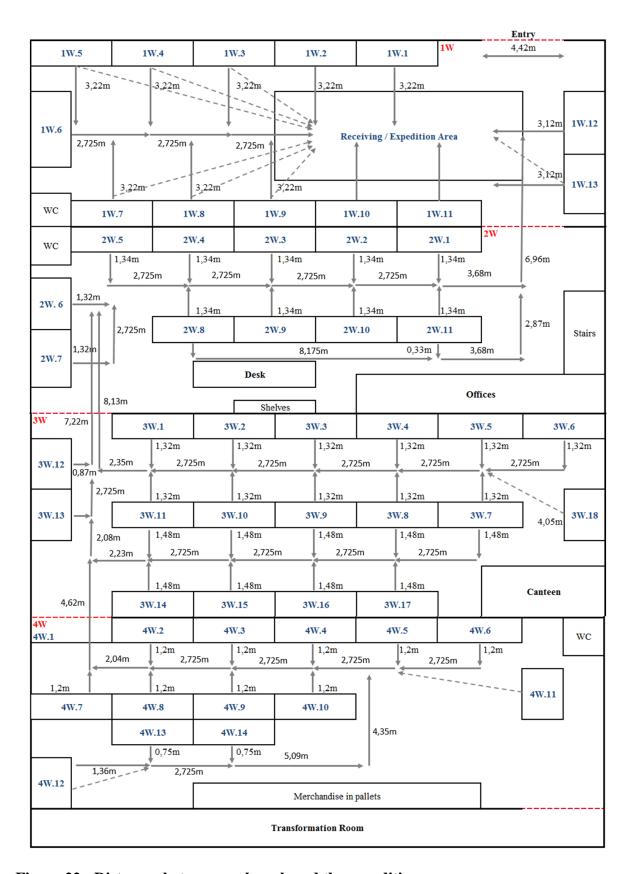
Figure 22 - Distances between each rack and the expedition area

One should however note that, to calculate the distance between each shelf and the expedition area, was assumed that shelves above 1,67 meters were not reachable by foot and there was the need of using the counterbalanced fork-lift truck or the electric powered rider straddle truck. Accordingly, the two situations shown in the Table 2 were assumed – this assumption considers that the time it takes to pick SKUs from shelves located between 1,67 meters and 2,67 meters is lower than the time it takes when shelves are located above 2,67 meters. This assumption was validated with the warehouse manager. The values shown in Table 2 were collected are assumptions validated by the company.

Table 2 - Scenarios to measure how much time it takes to reach higher shelves

	From 1,67m to 2,67m	Above 2,67m
To lift the equipment	15 seconds	20 seconds
To find the SKU	45 seconds	45 seconds
To collect the SKU	20 seconds	20 seconds
To lower the equipment	15 seconds	20 seconds
Total	**95 seconds**	**105 seconds**

Using the equation (6), time was transformed in distance, assuming that a human walk around 4km/h:

$$v = \frac{d}{t} \tag{6}$$

Based on this equation, 95 seconds corresponds to 105 meters and 105 seconds to 117 meters.

4.3. Data Analysis – Step 2

In this chapter, the collected information about orders, from July 2016 to June 2017, will be considered to forecast orders from July 2017 to June 2018. Afterwards, different criteria to allocate products will be presented.

The analyzed families can be found in Appendix 7, where the grey highlighted families correspond to the ones that need to be stored in the controlled temperature warehouse.

4.3.1. Orders' Forecast

As presented in the Methodology section, a key step involves the forecasting of orders for each family for the coming year. Since orders are not constant over time, there is a need to evaluate how these orders are expected to evolve in the coming years, so as to propose alternatives of how to reorganize the warehouse when considering future orders (instead of past orders).

As also mentioned in the Methodology section, non-judgmental forecasting techniques will be used, and within these, there are three main classes of techniques: techniques based on seasonality, averaging and trend.

In order to test seasonality, historical data from, at least, three years is required. Since no such information is available from S.A.R. operation - S.A.R only provided data for one year - it is only possible to test the other two techniques.

To forecast orders for the coming year, the following steps were taken:

I. Calculation of forecasts for each family based on two methods:
   a) Through the Moving Averages technique (technique based on averaging) for the coming twelve months, considering the average of the last three months. An example of family Avulso Kg. can be seen in Appendix 8, Table 1.
   b) Through the Linear Regression technique using the Excel data analysis tool and selecting the regression method. To calculate the forecast, each month was multiplied for the provided slope and added the intercept. An example for the Avulso Kg. family is also shown in Appendix 8 (Figure 1 and Table 2).

Complete results for both techniques are shown in Appendix 9.

II.   Calculation of absolute errors for each month and each family, through the difference of the actual orders and the forecasted orders for both Moving Averages and Linear techniques. An example of family Avulso Kg. can be seen in Appendix 8, Table 1 and Table 2.

III.   Calculation of MAD, MAPE and MSD errors in order to assess the accuracy of each technique. Complete results can be found in Appendix 9.

IV.   Selection of the forecast technique to apply to each family, i.e., the Moving Averages or the Linear Regression technique. This selection was based on the lowest value obtained for the three statistic criteria presented in the last step, considering the three following rules – for each family, select the technique whose forecasts results:

    a. In the lowest value for all the errors (MAD, MAPE and MSD);

    b. In the lowest value for two out of the three errors (MAD, MAPE and MSD);

    c. When Linear Regression presents a negative forecast, the Moving Average technique is selected.

Complete results can be found in Appendix 9.

Table 3 summarizes the results obtained for these forecasts. In particular, this table shows which technique was used for each family.

Table 3 – Selected Technique for each Family

	Families
Moving Averages	Amendoas Chocolate; Azeitonas; Confeitos de Chocola; Crackies; Elvive Sh. S/Água; F Secos Balde; Legumes Cozidos; Men Exp.Gel Banho; Nozes; Ovos; Whisky Velho
Linear Regression	Anitin; AVULSO KG.; Azeite e Óleos; Bol.S/Açucar; Botanicals; Café; Cartonagens; Casting; Coloração; Colorista; Deo Narta; DERMO; Dermo Tratamento; Diversos; Drop's; Elnett Mousse; Elnett Satin; Elvive Amaciador; Elvive Sh. S/Água; Elvive Shampoo; Elvive Tratamento; Excellence; Fructis Amaciador; Fructis Coiff.; Fructis Shampo; Fructis Tratamento; FS Culinária; FS Saquetas; Gama Permanente; Gela.Polaretti; Gin; Grafic; Higiene; Krup's; Limp. Face; Magic Retouch; Marmelada; Men Exp.Dermo; MEN EXP.DESOD.ROL ON; MEN EXP.DESOD.SPRAY; MIXA; Moulinex; Panificação; Pastelaria; Pipocas; Rosto; Rowenta; Rum; Solares; Studio Line; Tefal Electro; Tefal Menage; Trat. Face; Ultra Suave Amac.; Ultra Suave Body; Ultra Suave Shampo; Ultra Suave Shower; Ultra Suave Tratam.; Vinho; Vodka; Whisky Novo; Wrigley´s Original;

4.3.2. ABC & COI Criteria

In this chapter, two different criteria are used in order to assess the best way to allocate families to the most desirable location within the storing area. Although we found 11 families presenting zero orders for the coming year, these were also considered in this analysis, since it was verified that when data was collected there was stock for those families in the warehouse.

4.3.2.1. ABC Analysis

The ABC analysis aims at classifying stock into different groups, according to its importance. Products classified as A are the ones with higher importance or relevance, B products have an intermediate importance and C products and a lower importance.

As was stated before, there are families that have to be allocated in the 4th warehouse, since this is the one with controlled temperature. Considering this rule and that dedicated storage and class based storage will be tested, it was needed to apply two types of ABC analysis: according to the dedicated storage, each family is allocated to a fixed location; and according to the class-based storage, families are grouped into classes and allocated in a fixed location, but within each class storage is random.

As so, the first ABC analysis was performed considering the 72 families together, according to the following steps:

    I.   Organization of the forecasted orders, by family, from the highest to the lowest (see in Appendix 10);

   II.   Calculation of the weight of each family considering its orders (see Appendix 10);

  III.   Calculation of the weight of the analyzed items (see Appendix 10);

  IV.   Classification of families into A, B or C, according the results of the last steps.

In Table 4, a summary on the final results are presented. The detailed classification of each family can be seen in Appendix 10.

Table 4 – ABC Classification (1)

ABC Classification	Number of SKUs	Forecasted Orders	Forecasted Orders Weight (%)	Forecasted Orders Cumulative Weight (%)	Number of Families	Weight (%)	Cumulative Weight (%)
A	282	33.152	62,96%	63%	14	19%	19%
B	297	15.475	29,39%	92%	21	30%	49%
C	325	4.033	7,66%	100%	37	51%	100%
Total	**904**	**52.660**	**100%**		**72**	**100%**	

In order to apply the second ABC analysis, families that are stored in the 1st, 2nd and 3rd warehouse are classified as 1 and families that have to be stored in the 4th warehouse are classified as 2. The same steps were followed:

1. Organization of the forecasted orders, by family, from the highest to the lowest (see in Appendix 11 - Table 1 and Table 2);
2. Calculation of the weight of each family considering its orders (see Appendix 11 – Table 1 and Table 2);
3. Calculation of the weight of the analyzed items (see Appendix 11 – Table 1 and 2);
4. Classification of families into A, B or C, according the results of the last steps.

In Table 5, a summary on the final results are presented.

Table 5 – ABC Classification (2)

ABC Classification	Number of SKUs	Forecasted Orders	Forecasted Orders Weight (%)	Forecasted Orders Cumulative Weight (%)	Number of Families	Weight (%)	Cumulative Weight (%)
A1	253	25.724	60%	60,1%	12	19,7%	19,7%
B1	266	13.790	32%	92,4%	19	31,1%	50,8%
C1	260	3.267	8%	100,0%	30	49,2%	100%
Total	**779**	**42.780**			**61**		
A2	29	7.429	75%	75,2%	2	18,2%	18,2%
B2	31	1.685	17%	92,2%	2	18,2%	36,4%
C2	65	766	8%	100,0%	7	63,6%	100%
Total	**125**	**9.880**			**11**		

4.3.2.2 COI Criteria

Other valid criteria to store products in order to reduce the distance travelled by pickers, is the Cube-per-Order-Index (COI). This criterion correlates the occupied volume with the total number of orders (inbound and outbound). According to this criterion, families with the lowest index should be allocated in the nearest location of the receiving/expedition area.

Despite this criterion considers the inbound orders, there was no data available, since the provided data only refers to the total number of inbound orders for the complete period, from June 2016 to July 2017, not being detailed per month. As so, it was not possible to forecast it. Despite this, when comparing the inbound orders against the outbound orders (from June 2016 to July 2017), 2.345 vs. 32.725, respectively, it can be concluded that inbound movements are significantly lower than outbound movements, and so, it was decided to only consider the outbound forecasted orders. It was also considered that the volume occupied for each family was the same when data was collected.

Results can be found in Appendix 12.

4.4.- Alternative proposals of storage models – Step 3

In this chapter, three proposals to improve the storage in the warehouse are proposed and will be further described. It is important to state that the purpose of these proposals is to reallocate products in order to reduce the distance travelled by pickers, since this cost is usually the highest cost within the warehousing activities (as concluded in chapter 2).

As stated in the Literature Review, the dedicated storage shows a significant reduction in travel time when compared with random storage. Also, that class-based storage, with few classes, produces travel time reductions that are close to those obtained by dedicated storage. As so, these two methods were selected to be tested. Particularly, the following three proposals are explored:

i.   Dedicated storage, based on the ABC analysis;
ii.   Dedicated storage, based on the COI analysis;
iii.   Class-based storage, based on the ABC analysis.

When allocating the 72 analyzed families into the storing are, some rules were respected whenever possible:

- When there was no space in the same rack to allocate a family, it was considered the nearest rack, considering the warehouse layout;
- Having the same family in smallest number of different racks;
- Having the same family in the same warehouse;
- Make the most of the available space.

One rule that had no exception, was the allocation of the eleven families that had to be allocated in the 4th warehouse, being this one the only warehouse that has controlled temperature. These families are always highlighted in blue in the different analysis.

For the implementation of each method, it was considered the same number of SKUs and families when data was collected: 904 and 72, respectively.

4.4.1. Dedicated Storage - ABC analysis

The first proposal is based on the dedicated storage based on the ABC analysis, considering the turnover of the forecasted orders between July 2017 and June 2018 of the 72 analyzed families. As stated before, and similarly to all the proposals presented in this project, this proposal only considers the 904 SKUs, aggregated by families, in order to be able to compare the new allocation in the warehouse with S.A.R. current situation.

In Table 6 final results, according to the ABC classification, are presented. Accordingly, families belonging to the A class should be located in the most desirable locations, i.e., families with the highest number of orders should be allocated in the nearest shelves of the receiving/expedition area and, orderly, follows B and C classes. Complete results, per family, can be found in Appendix 13.

Table 6 – Allocation of families in the storing area, according to ABC Classification

ABC Classif.	Family	Shelves
A	FS Saquetas; Elvive Shampoo; Ultra Suave Shampo; FS Culinária; Excellence; Elvive Amaciador; Deo Narta; Coloração; Ultra Suave Amac.; Wrigley´s Original; Elnett Satin; Dermo Tratamento; Ultra Suave Tratam.; Fructis Shampo	4W2A; 4W7B; 4W7C; 4W7D; 1W10B; 1W10C; 1W11B; 1W11C; 1W12C; 1W12D; 1W1B; 1W1C; 1W2C; 1W2D; 1W9B; 1W8B; 1W8C; 1W9B; 1W9C; 4W2A; 4W2B; 1W13C; 1W13D; 1W3B; 1W3C; 1W4B; 1W4B; 1W4C; 1W7B; 1W8C; 1W5B; 1W6C; 1W6D; 1W6E; 1W7B; 1W7C; 1W7D; 1W4C; 1W5B; 2W1C; 2W1D; 1W5C; 1W13D; 2W11B; 2W11C; 2W11D; 2W11E; 2W11F; 2W2C; 2W2D;
B	Studio Line; Elvive Tratamento; Solares; Pastelaria; Café; Fructis Coiff.; Fructis Amaciador; Rowenta; Vinho; Trat. Face; Men Exp.Dermo; Cartonagens; Moulinex; Casting; Fructis Tratamento; Limp. Face; MEN EXP.DESOD.SPRAY; Pipocas; Ultra Suave Body; Drop's; MEN EXP.DESOD.ROL ON	1W5C; 1W5C; 2W10C; 2W10D; 4W2B; 4W8B; 4W8C; 4W8D; 2W10D; 2W3C; 2W3D; 2W3E; 2W4C; 2W4D; 2W4E; 2W9C; 1W5B; 2W8C; 2W8D; 2W5C; 2W5D; 2W5E; 2W6C; 2W6D; 2W6E; 2W7C; 2W7D; 2W7E; 3W12C; 3W12D; 3W13B; 3W13C; 3W10C; 3W10D; 3W11C; 3W11D; 3W1B; 3W1C; 3W1D; 3W2B; 3W2C; 3W2D; 3W3B; 3W3C; 3W3D; 2W2D; 2W8D; 4W3B; 4W3C; 4W8D; 3W14B; 3W14C; 3W15B; 3W15C; 3W9C; 2W4E; 2W4E; 2W8D; 3W9D; 3W9D; 3W4B; 3W4C; 3W4D; 3W15C
C	Higiene; Diversos; AVULSO KG.; Anitin; MIXA; Grafic; Magic Retouch; F Secos Balde; Tefal Electro; Bol.S/Açucar; Krup's; Marmelada; Nozes; Vodka; Rosto; Panificação; Gin; Rum; Tefal Menage; Whisky Novo; Elnett Mousse; Gela.Polaretti; Gama Permanente; DERMO; Ovos; Botanicals; Ultra Suave Shower; Colorista; Confeitos de Chocola; Azeite e Óleos; Amendoas Chocolate; Crackies; Men Exp.Gel Banho; Azeitonas; Legumes Cozidos; Elvive Sh. S/Água; Whisky Velho	3W16C; 3W16D; 3W8C; 3W8D; 3W4B; 4W3C; 4W3D; 3W4D; 3W5B; 3W5C; 3W13C; 3W16D; 4W9A; 3W5C; 3W6B; 3W6C; 3W7C; 3W7D; 3W17C; 3W17D; 1W11A; 3W17D; 3W18B; 3W18C; 3W6C; 1W12B; 4W9B; 1W12B; 1W13B; 1W2B; 3W13C; 4W9C; 1W3A; 1W3A; 1W3A; 1W4A; 1W5A; 1W6B; 1W7A; 2W11A; 2W1B; 1W11A; 1W13B; 3W9C; 1W12A; 1W1A; 1W2A; 2W10A; 1W5C; 4W9B; 4W9C; 2W2B; 2W10A; 2W10A; 2W10B; 4W4A; 1W10A; 1W9A; 4W4A; 4W4B; 2W10B; 1W13A; 1W13A; 1W13A; 2W11A; 1W8A

4.4.2. Dedicated Storage – COI Analysis

This method it was also tested based on COI criteria. Final results can be found in Appendix 14.

4.4.3. Class-Based – ABC Analysis

The Class-Based method aggregates the analyzed products, in this case families, into several classes, in this case 3, according to the ABC analysis. As there is 11 families that have to be stored in the controlled temperature warehouse, classes were classified as A1, B1 and C1 for the rest of the families, and as A2, B2 and C2 for these 11 families.

In Table 7 final results, according to the ABC classification, are presented. Accordingly, families belonging to the A class should be located in the most desirable locations, i.e., families with the highest number of orders should be allocated in the nearest shelves of the receiving/expedition area and, orderly, follows B and C classes. Complete results can be seen in Appendix 15.

Table 7 - Allocation of families in the storing area, according to ABC Classification

ABC Classif.	Family	Shelves
A1	Elvive Shampoo; Ultra Suave Shampo; Excellence; Elvive Amaciador; Deo Narta; Coloração; Ultra Suave Amac.; Wrigley´s Original; Elnett Satin; Dermo Tratamento; Ultra Suave Tratam.; Fructis Shampo	1W10B; 1W10C; 1W11B; 1W11C; 1W12C; 1W12D; 1W13C; 1W13D; 1W1B; 1W1C; 1W2C; 1W2D; 1W3B; 1W3C; 1W4B; 1W4C; 1W5B; 1W5C; 1W6C; 1W6D; 1W6E; 1W7B; 1W7C; 1W7D; 1W8B; 1W8C; 1W9B; 1W9C; 2W11B; 2W11C; 2W11D; 2W11E; 2W11F; 2W1C; 2W1D; 2W2C
B1	Studio Line; Elvive Tratamento; Solares; Café; Fructis Coiff.; Fructis Amaciador; Rowenta; Vinho; Trat. Face; Men Exp.Dermo; Moulinex; Casting; Fructis Tratamento; Limp. Face; MEN EXP.DESOD.SPRAY; Pipocas; Ultra Suave Body; Drop's; MEN EXP.DESOD.ROL ON	2W10C; 2W10D2W2D; 2W3C; 2W3D; 2W3E; 2W4C; 2W4D; 2W4E; 2W5C; 2W5D; 2W5E; 2W6C; 2W6D; 2W6E; 2W7C; 2W7D; 2W7E; 2W8C; 2W8D; 2W9C; 2W9D; 3W10C; 3W10D; 3W11C; 3W11D; 3W12C; 3W12D; 3W13B; 3W13C; 3W14B; 3W14C; 3W15B; 3W15C; 3W1B; 3W1C; 3W1D; 3W2B; 3W2C; 3W2D; 3W3B; 3W3C; 3W3D; 3W4B; 3W4C; 3W9C; 3W9D
C1	Higiene; Diversos; Anitin; MIXA; Grafic; Magic Retouch; Tefal Electro; Bol.S/Açucar; Krup's; Marmelada; Vodka; Rosto; Gin; Rum; Tefal Menage; Whisky Novo; Elnett Mousse; Gela.Polaretti; Gama Permanente; DERMO; Botanicals; Ultra Suave Shower; Colorista; Azeite e Óleos; Men Exp.Gel Banho; Crackies; Azeitonas; Legumes Cozidos; Elvive Sh. S/Água; Whisky Velho	1W10A; 1W11A1W12A; 1W12B; 1W13A; 1W13B; 1W1A; 1W2A; 1W2B; 1W3A; 1W4A; 1W5A; 1W6B; 1W7A; 1W9A; 2W10A; 2W10B; 2W11A; 2W1B; 2W2B; 3W16C; 3W16D; 3W17C; 3W17D; 3W18B; 3W18C; 3W4D; 3W5B; 3W5C; 3W6B; 3W6C; 3W7C; 3W7D; 3W8C; 3W8D
A2	FS Saquetas; FS Culinária	4W2A; 4W2B4W7B; 4W7C; 4W7D
B2	Pastelaria; Cartonagens	4W2B; 4W3B; 4W3C; 4W8B; 4W8C; 4W8D
C2	AVULSO KG.; F Secos Balde; Nozes; Panificação; Ovos; Confeitos de Chocola; Amendoas Chocolate	4W3C; 4W3D; 4W4A; 4W9A; 4W9B; 4W9C

4.5. Quantifying the impact of alternative proposals of storage models – Step 4

In this step, the total distance travelled by pickers for each proposal is computed (for the one year-period, i.e., July 2017 and July 2018). Particularly, and as explained in the Methodology section, this distance is computed by multiplying the distance between each rack location, considering the weight allocated in each shelf, and the receiving/expedition area, by the total

number of orders, per each family. It was considered that each order is collected one by one between its location and the receiving/expedition area.

The allocation of families in the storing area, considering S.A.R. currently allocation of products and the forecasted orders, is shown in Appendix 16.

In Table 8, final results, in terms of these distances, are presented as so the comparison between the three presented alternatives to allocate families in the storing area and the current allocation that S.A.R. performs.

Table 8 – Final results of the alternative proposals of storage models compared with S.A.R. currently storing performance

	Dedicated Storage: ABC Analysis	Dedicated Storage: COI	Class-Based Storage - ABC Analysis
Total	2.177.929	1.677.065	2.570.489
Current Situation	4.869.209	4.869.209	4.869.209
Improvement	2.691.280	3.192.144	2.298.720
Improvement (%)	55%	66%	47%

The total travelled distance quantifies both movements when picking is done.

As it can be seen, the proposal that offers the highest reduction in travelled distances, comparing with S.A.R. current storing performance, is the one that allocates products through dedicated storage based on the COI criterion, presenting an improvement of 66%, following the proposal with the same method but based on the ABC analysis, presenting an improvement of 55%, and, finally, the proposal based on the class-based method through the ABC criterion.

4.6. Conclusions and suggestions of improvements – Step 5

As it was presented in the Literature Review chapter, the picking activity represents 55% of total operational expenses inside a warehouse and within, the total travelled distance represents the most time-consuming activity, around 50%.

Hereupon, the focus of this project was to assess S.A.R. current situation regarding its warehousing activities, mainly the storing and picking activities, in order to assess if products were allocated in the best location possible, i.e., the most desirable products were in the closest location of the receiving/expedition area. As so data was collected and forecasts of orders for the coming year (July 2017 to June 2018) were performed.

In order to recommend alternative proposals to improve the warehousing activities, particularly, the picking activities, information about the most efficient storing methods and criteria were research, and conclusions about recognized authors were presented.

Within this setting, Gu *et al.* (2010) concludes that dedicated storage presents a better performance when compared with random storage and the class-based storage, with two to four classes, produces travel time reductions that are close to those obtained by dedicated storage. Still, Pertersen (2002) and Petersen Aese (2004) affirm that full-turnover presents a better performance than the class-based storage, despite the last one be easier to implement. Despite this, the full-turnover storage presents a serious risk due to the cyclic re-organization of products in the warehouse.

Accordingly, the dedicated and class-based storage based on ABC and COI criteria were tested and results corroborates the theoretically analysis that were made. Orderly, the dedicated storage method based on the COI criteria presented better results than the dedicated storage method based on ABC analysis and the class-based storage method based on ABC analysis. The first one (dedicated storage based on the COI criteria) presented an improvement of 66% (by reducing 3.192.144 meters in the distance travelled by pickers), the second one (dedicated storage based on the ABC analysis) presented an improvement of 55% (reducing 2.691.280 meters in the distance travelled by pickers) and the third one (class-based storage based on the ABC analysis) presented an improvement of 47% representing a reduction on the distance travelled by pickers of 2.298.720 meters, for the same period in analysis and when compared with S.A.R. currently storing performance.

Regarding the research question presented in chapter 1, and after an exhaustive review of the literature and testing several scenarios, it is concluded that it is possible to improve S.A.R. performance regarding its warehousing activities and to increase its efficiency. It is also concluded that products/families are not currently allocated in the most desirable locations, since the alternative storage proposals presented in this project proved that through any of the analyzed methods, the distance performed by pickers can be reduced.

Despite this, both criteria could be applied in different groups of families, once both presented excellent results. For example, to products/families which importance is very high, due to its high rate of turnover or invoicing, the ABC analysis could be implemented, over considering the volume it occupies. For those families whose volume is high but do not belong to the class of products that are most relevant, COI criteria could be implemented.

5. CONCLUSION

The importance of logistics as never been so notice as nowadays. Its concept has been evolving in the past years as the business market grows and adapts to the currently demand needs.

Despite this, the logistics concept it is still difficult to define, once it is an area that embraces so many activities. This project was focused in one of these activities, warehousing and storage. The challenge was to optimize S.A.R. current storing performance by reallocation products in the storing area in order to improve the picking activity by reducing the total travelled distance.

For this purpose, data was collected about S.A.R. warehousing activities, namely the receiving, storing, order picking, collation and added value services and marshalling and dispatch, its layout dimensions, distances within the warehouse, level of inventory and number of orders from June 2016 to July 2017. This information was collected regarding 904 SKUs that further were aggregated in the belonging families and then analyzed.

As the goal of this project was to provide solutions regarding the future, orders were forecasted based on the gathered data. As so, several methods were tested and selected for each family. Following, families were allocated in the storing area, per shelf, considering S.A.R. current layout, through the dedicated and class-based storage methods according to the ABC and COI criteria.

It was demonstrated that S.A.R. does not differentiates its stock according to its demand or to the relation between occupied volume and the demand. Results of the storing proposal demonstrate it. Allocating the 72 analyzed families according the dedicated storage and considering the COI criteria, pickers would travel less 3.192.144 meters, to collect the forecasted orders. This represents an improvement of 66% distance travelled by pickers, when compared with the currently allocation of products S.A.R. realizes. The second proposal, also based on the dedicated storage but tested with the ABC criteria, also presented an improvement, despite being a little lower, representing an improvement of 55%. The third proposal, based on the class-based method, was also tested with the ABC criteria and presented the lowest improvement (47%), representing a reduction in travelled distance of 2.298.720 meters.

It is concluded that any of the developed proposals present an improvement of the storing and picking activity performed by S.A.R., considering its current allocation of products.

After concluding this project, some suggestions are made to a possible further research. Despite the realization of order's forecast, in order to assess S.A.R. future demand, it was not considered inbound orders due to data limitations. Also, the occupied volume per family was the same as the collected in the field, not considering future stock growth or decrease. Thus, different storage methods and criteria could be tested, as for example the full-turnover. An interesting deeper study would be related to the layout configuration, once the currently used has low accesses to the different aisles.

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APPENDICES

APPENDIX 1 – Warehouse picture

Figure 1 – Warehouse Entry

Figure 2 – First Warehouse (1W)

Figure 3 –First Warehouse (1W)

Figure 4 –Second Warehouse (2W)

Figure 5 –Second Warehouse (2W)

Figure 6 –Third Warehouse (3W)

Figure 7 – Fourth Warehouse

Figure 8 – Transformation Room
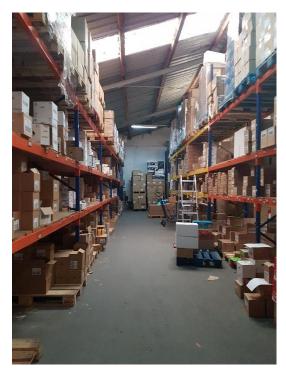
Figure 9 – One aisle of 2W
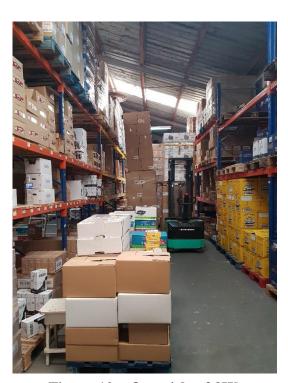
Figure 10 – One aisle of 3W

APPENDIX 2 – Available volume per shelve in m^3

Shelve Localization	Available Volume (m3)	Shelve Localization	Available Volume (m3)	Shelve Localization	Available Volume (m3)	Shelve Localization	Available Volume (m3)
1W1A	42.120	1W9A	38.880	2W3D	11.340	2W9C	17.550
1W1B	37.584	1W9B	52.488	2W3E	33.696	2W9D	35.964
1W1C	54.108	1W9C	41.148	2W4A	34.830	2W10A	48.600
1W2A	42.120	1W10A	38.880	2W4B	15.660	2W10B	24.300
1W2B	27.540	1W10B	52.488	2W4C	15.390	2W10C	17.550
1W2C	25.272	1W10C	41.148	2W4D	11.340	2W10D	35.964
1W2D	33.696	1W11A	51.840	2W4E	33.696	2W11A	64.800
1W3A	42.120	1W11B	35.964	2W5A	34.830	2W11B	22.410
1W3B	49.572	1W11C	31.104	2W5B	15.660	2W11C	9.720
1W3C	36.936	1W12A	48.600	2W5C	15.390	2W11D	9.720
1W4A	48.600	1W12B	35.316	2W5D	15.120	2W11E	11.340
1W4B	41.796	1W12C	34.668	2W5E	28.512	2W11F	11.340
1W4C	43.092	1W12D	34.020	2W6A	42.120	3W10A	55.728
1W5A	48.600	1W13A	48.600	2W6B	15.660	3W10B	28.350
1W5B	51.516	1W13B	35.316	2W6C	13.500	3W10C	17.550
1W5C	34.020	1W13C	34.668	2W6D	13.230	3W10D	36.612
1W6A	42.120	1W13D	34.020	2W6E	28.512	3W11A	55.728
1W6B	27.000	2W1A	34.830	2W7A	42.120	3W11B	28.350
1W6C	24.030	2W1B	15.660	2W7B	15.660	3W11C	17.550
1W6D	19.710	2W1C	29.700	2W7C	13.500	3W11D	36.612
1W6E	26.892	2W1D	33.696	2W7D	13.230	3W12A	43.740
1W7A	38.880	2W2A	41.796	2W7E	28.512	3W12B	28.512
1W7B	52.488	2W2B	15.660	2W8A	64.800	3W12C	33.048
1W7C	18.792	2W2C	29.700	2W8B	24.300	3W12D	35.316
1W7D	15.228	2W2D	33.696	2W8C	17.550	3W13A	43.740
1W8A	38.880	2W3A	34.830	2W8D	35.964	3W13B	38.556
1W8B	52.488	2W3B	15.660	2W9A	48.600	3W13C	25.272
1W8C	41.148	2W3C	15.390	2W9B	24.300	3W14A	45.360

Shelve Localization	Available Volume (m3)	Shelve Localization	Available Volume (m3)	Shelve Localization	Available Volume (m3)	Shelve Localization	Available Volume (m3)
3W14B	32.400	3W4A	45.360	4W3D	28.512	4W12A	38.880
3W14C	51.840	3W4B	26.190	4W4A	55.080	4W12B	43.740
3W15A	46.980	3W4C	19.710	4W4B	53.136	4W12C	36.936
3W15B	32.400	3W4D	29.160	4W5A	38.880	4W13A	54.108
3W15C	51.840	3W5A	45.360	4W5B	19.980	4W13B	54.108
3W16A	45.360	3W5B	26.190	4W5C	13.230	4W14A	54.108
3W16B	24.624	3W5C	52.812	4W5D	26.244	4W14B	54.108
3W16C	23.490	3W6A	45.360	4W6A	38.880		
3W16D	28.836	3W6B	38.880	4W6B	15.390		
3W17A	45.360	3W6C	46.980	4W6C	17.550		
3W17B	24.624	3W7A	55.728	4W6D	26.244		
3W17C	23.490	3W7B	28.350	4W7A	28.350		
3W17D	28.836	3W7C	17.550	4W7B	16.740		
3W18A	55.080	3W7D	36.612	4W7C	23.490		
3W18B	37.584	3W8A	55.728	4W7D	21.600		
3W18C	39.852	3W8B	28.350	4W8A	28.350		
3W1A	45.360	3W8C	17.550	4W8B	16.740		
3W1B	26.190	3W8D	36.612	4W8C	23.490		
3W1C	19.710	3W9A	55.728	4W8D	25.920		
3W1D	29.160	3W9B	28.350	4W9A	48.600		
3W2A	45.360	3W9C	17.550	4W9B	24.840		
3W2B	26.190	3W9D	36.612	4W9C	25.920		
3W2C	19.710	4W1A	32.400	4W10A	56.700		
3W2D	29.160	4W2A	69.012	4W10B	21.330		
3W3A	45.360	4W2B	45.360	4W10C	21.600		
3W3B	26.190	4W3A	34.020	4W11A	37.260		
3W3C	19.710	4W3B	16.740	4W11B	39.204		
3W3D	29.160	4W3C	18.360	4W11C	34.668		

APPENDIX 3 – Equipment's available for order picking activity and S.A.R. fleet

Figure 1 – Pallet Truck

Figure 2 – Pallet Truck

Figure 3 - Counterbalanced fork-lift truck

Figure 4 - Electric powered rider straddle Truck

Figure 5 – One Toyota Dina 1500 Kg

Figure 6 – Two Renault Master

Figure 7 – One Reanult Kangoo

APPENDIX 4 –Product's Families

Table 1 – Product's Families

Families			
Amendoas Chocolate	Dermo Limpeza	Gela.Polaretti	Rosto
Amendoas Tradicionai	Dermo Tratamento	Gin	Rowenta
Anitin	Desmaquilhante	Grafic	Rum
AVULSO KG.	Diversos	GREFUSA	Saquetas
Azeite	Drop's	Higiene	Snack´s
Azeite e Óleos	Elnett Mousse	Krup's	Solares
Azeitonas	Elnett Satin	Legumes Cozidos	Studio Line
Batatas Fritas	Elvive Amaciador	Limp. Face	Tefal Electro
Big Deal	Elvive Sh. S/Água	Magic Retouch	Tefal Menage
Bol.S/Açucar	Elvive Shampoo	Marmelada	Tequila
Bolos & Biscouitos	Elvive Tratamento	Men Exp.Dermo	Tostas
Bolos S Padaria	Excellence	MEN EXP.DESOD.ROL ON	Trat. Face
Bombom Kg.	F Secos Balde	MEN EXP.DESOD.SPRAY	Tremoço
Botanicals	Figos Secos	Men Exp.Gel Banho	Ultra Suave Amac.
Café	Fructis Amaciador	MIXA	Ultra Suave Body
Cartonagens	Fructis Coiff.	Modecor	Ultra Suave Shampo
Casting	Fructis Shampo	Moulinex	Ultra Suave Shower
Coloração	Fructis Tratamento	Nozes	Ultra Suave Tratam.
Colorista	Fruta	Ovos	Vinho
Confeitos de Chocola	Fruta Confitada	Ovos de Páscoa	Vodka
Crackies	FS Culinária	Panificação	Whisky Novo
Croissants	FS Saquetas	Pão	Whisky Velho
Deo Narta	Galetas Integrais	Pastelaria	Wrigley´s Original
DERMO	Gama Permanente	Pipocas	

APPENDIX 5 – Localization of each SKU (Current Situation)

Ref	Product Designation	Local. 1	Local. 2	Local. 3	Local. 4	Local. 5	Local. 6	Occupied Volume (m3)
8304	Amendoim Frito c/sal.A.M. 50 g.	4W10B6						2330,5
8305	Amendoim Frito Pic.A.M. 50 g.	4W10B7						2330,5
5632	MISTURA COCKTAIL AVO MARIA 200G	4W9B5						2054
5633	AMENDOIM C/CASC.TORR.A.MARIA 200	4W2B1						13440
5635	CAJU C/SAL AVO MARIA 200G	4W9C1						7680
5636	PISTACHIO COM SAL AVO MARIA 200GR	4W9B3						2714
5637	FAVA C/SAL AVO MARIA 200G	4W9B4						4784
5638	AMENDOIM C/SAL AVO MARIA 200G	4W8C7						6960
6460	MISTURA SALGADA AVÓ MARIA 200 G.	4W9B7						4784
5634	AMENDOIM C/CASC.TORR.A.MARIA 500	4W4B1						15744
5646	CAJU C/SAL AVÓ MARIA 500 GR	4W9B2						2714
5647	PISTACHO C/SAL AVÓ MARIA 500 GR	4W9B1						2714
5649	MISTURA COCKTAIL AVÓ MARIA 500 G	4W9C3						7680
5658	AMENDOIM C/SAL AVÓ MARIA 500 GR	4W10B5						4108
5703	MILHO FRITO AVÓ MARIA 500g	4W10C1						6400
6461	MISTURA SALGADA AVO MARIA 500 G.	4W2B2						13440
7554	AMEIXA S/CAROÇO PREMIUM A.M.150 GR.	4W10B1						2054
7555	TAMARA S/CAROÇO 1ª A.M.150 GR.	4W10B2						2054
7556	PASSAS MOSCATEL S/GRAINHA A.M.150 GR.	4W10B3						2054
5898	TREMOÇO A.M. BALDE 3 KG CAL 13 / 15	4W10B8						3318
6651	TREMOÇO BALDE 3 KG CAL.11	4W11B1	4W11C2					43776
2037	AMEIXA SE.(40/50) AVO MARIA 150G	4W9B6						2392
2038	PASSAS DE UVA JUMBO 100 G	4W8C6						4089
2039	SULTANAS TURCAS AVO MARIA 200 G	4W10B4						2054
2041	TAMARAS DA AVO MARIA 200 G	4W9C2						3840
2042	MIOLO DE NOZ METADES AVO M. 100G	4W8D2						7680
2044	MIOLO DE AMENDOA C/PELE AVO 150	4W8C1						2566,5
2046	AMENDOA LAMINADA S/PELE AVO 100G	4W8C5						2566,5
2047	AMENDOA PALITADA S/PELE AVO 100G	4W8C2						2566,5
2048	AMENDOA TRITURADA S/PELE AVO 100	4W8C4						2566,5
2049	AMENDOA MOIDA S/PELE AVO 100G	4W8C3						2566,5
10049	AMENDOA MOÍDA C/PELE AVULSO KG.	4W3C5						1972
7106	NOZ METADES AVULSO KG.	4W3C3						2040
7138	TAMARA MEDJOUL SELEC.AVULSO KG.	4W3B2						1798
7154	AMEIXA S/CAROÇO PREMIUM AVULSO KG.	4W3C4						1292
7567	COCKTAIL CHILY KG.	4W3C7						1836
7627	AMENDOA MOÍDA AVULSO KG.	4W3B4						3596
9074	AMENDOA LAMINADA AVULSO KG.	4W3C6						1972
9075	AMENDOA PALITADA AVULSO KG.	4W3B3						1798
9076	AMENDOA TRITURADA AVULSO KG.	4W3B1						1798
9619	COCO RALADO AVULSO KG.	4W6A1						11520
9620	CANELA RALADA AVULSO KG.	4W3C1						3196
9890	NOZ CALIB.32 + A.M. KG.	4W3A1						10080
5006	MARMELADA EXTRA AVO MARIA 450g	4W3A2	4W3D1					18528
9081	MARMELADA 5,5 Kg.	4W3C2						2720
2033	AMENDOA CHO. LEITE AVO MARIA 150	4W6A4						11520
2035	AMENDOA CHO. NEGRO AVO MARIA 150	4W2A1						1908
6553	SEL.AMENDOA SICILIANA 150 GR.	4W2A5						1908
6554	SEL.AMENDOA CHOC.BR.MORANGO 150 GR	4W2A6						1908
6556	SEL.AMENDOA SORT.CHOC.FRUTAS 150 GR	4W2A7						1908
6558	SEL.OVINHOS CHOC.PRALINE COCO 150 GR	4W2A8						1908
6559	SEL.AMENDOA PÓ CACAU TIRAMISU 150 GR	4W2A9						1908
6560	SEL.FRUTOS SECOS CHOC.LEIT/BR. 150 GR	4W2A10						1908
6561	SEL.AMENDOA CHOC.AMARETTI 150G.	4W2A11						1908
7181	SEL.AMENDOA CHOC.BR.COCO 150 GR	4W2A12						1908
7624	SEL.NOZ COB/CHOCOLATE 100 GR	4W2A13						1908
7625	SEL.CEREJA COB/CHOC.ESCURO 150 GR	4W2A14						1908
4173	DRAG.CHOC.CORACAO COR FORTE 200G	4W11A1						5520
4174	DRAG.CHOC.CORACAO COR SUAVE 200G	4W11A2						5520
4175	DRAG.CHOC.COR FORTE 200GR	4W11A3						5520
4176	DRAG.CHOC.COR SUAVE 200G	4W11A4						5520
4177	LENTILHAS CHOC. 200GR	4W11A5						5520
4691	SAQ.OVINHOS CHOC.F/AÇUCAR A.M. 200	4W11A6						5520
10246	Pack Past.Wrig.Sortido 3x15	3W12D7						10464
8390	Past.Wrig.Juicy Fruit (32x8x15)	3W12D6						10464
8391	Past.Wrig.Spearmint (32x8x15)	3W12C1						9792
8392	Past.Wrig.Big Red (32x8x15)	3W12C2						9792
8601	Past.Wrig.Doublemint (32x8x15)	3W12C3						9792
2385	PIPOCAS MILHO CARAMELO 100 G	4W5D2						7776
3082	PIPOCAS DE MILHO MICROONDAS C.P 100G.	4W11B2	4W11C1					21888
3308	BOLACHA BIOSAN CALCIO S/AC.180GR	4W6D4						3888
3309	BOLACHA BIOSAN ACTIVA S/AC.180GR	4W6D1						7776
3310	NOVA FORMA CHIPS 110 GR	4W6C5						1950

Code	Description	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Qty
3465	BOLACHA BIOSAN SOJA 180 GR	4W6C3	4W6D5					5513
3731	TULIPAS PARA GELADO	4W6B4						1539
5971	B~SAN ACTIVA C/OMEGA 360 GR.	4W6D2						3888
5972	B~SAN SOJA 360 GR.	4W6C2						2665
5973	B~SAN CALCIO 360 GR.	4W6C4						2600
10032	Drop´s Frutas Sol Dooble Doypack 500 g.	4W5A1						8160
10033	Drop´s Frutas Sol Super Ácidos 500 g.	4W5A2						8160
10034	Drop´s Frutas Sol BlandoMix 500 g.	4W5A3						8160
10035	Drop´s Frutas Sol Gajos Doypack 500 g.	4W5A4						8160
249	Drop´s Peques kg	4W6D3						3888
262	Drop´s Mix Sortido Frutas kg	4W6C1						1690
10036	Drop´s Fruit Mix s/açucar 90 G.	4W6B1						1368
10037	Drop´s RedFruits s/açucar 90 G.	4W6B2						1368
10038	Drop´s Melon & Watermelon s/açucar 90 G.	4W6B3						1368
9609	JellyZoom Gelatina de Frutas	4W10A2	4W10A1					24800
10183	GELADO POLARETTI TROPICAL PIRATA 400 ML	3W12A1						
10184	GELADO SENSOFREDO 400 ML	3W12B1						8448
10188	POLARETTI MAGICMILK CHOCOLATE 5 UNID.	4W5B1						3848
10189	POLARETTI MAGICMILK MORANGO 5 UNID.	4W5B2						3848
4383	GELADO POLARETTI FRUIT 10 UNID.	3W7A2	3W8A1	3W8A3	3W9A3	3W1A2	3W10A2	83616
7007	Gelado Maxi Polaretti Ind.50ml 120un	3W5A5						13440
1	Whisky Cutty Sark 0,7L X 40%	3W15C1						4608
5	Whisky Cutty Sark 0.05 L X 40%	3W14A1						6720
7	W.Emerald´s 0.05 L 12 Anos ***	3W17A2						6720
5477	VODKA KLIMAT WHITE 0.7 38%	3W14C1						15360
7417	VODKA KLIMAT LEMOM 0.7 20%	3W14B3						9600
7418	VODKA KLIMAT MELON 0.7 20%	3W14B2						4800
7419	VODKA KLIMAT STRAWBERRY 0.7 20%	3W14C3						15360
5486	VODKA BALKAN 0.7 38%	3W15B1						9600
7421	VODKA BALKAN MELAO 0.7 20%	3W14B1						9600
7422	VODKA BALKAN MORANGO 0.7 20%	3W14B4						4800
6801	GIN CHESTER 0.7 37,5%	3W14C2						15360
5473	RUM OLDMOOR WHITE 0.7 38%	3W15A1						13920
7118	WIT.BISC.CHOC.300G. 57000	4W5D1						7776
7119	WIT.BISC.CHOC.NEGRO 300G. 57010	4W5A5						11520
9848	WIT.BomBom Mousse Fond.136g. 34807/47	4W2A2						10224
9849	WIT.BomBom Mousse Leite136g. 34817/57	4W2A4						10224
9853	WIT.Crema La Fondente 360g. 34947/31677	4W6A2						5760
9857	WIT.Crema Nocciola 360g. 34937/31687	4W6A3						5760
10002	WITOR(15190)MINI.OVETTI CREME AVELÃ 125GR	4W4A1						768
10003	WITOR(15200)MINI.OVETTI CREME LEITE 125GR	4W4A2						768
6872	WITOR(40350/40220) MAXI OVO LEITE 270 GR	4W4A3						768
6873	WITOR(40360/40280) MAXI OVO AVELÃ 270 GR	4W4A4						768
6875	WITOR(34150/34090) OVO C/CER.LEITE 150	4W4A5						768
6876	WITOR(34140/34100)OVO CER.LEITE/PRAL.150	4W4A6						768
6877	WITOR MAXI OVO CHOC.LEIT.SORT.500 GR.	4W4A7						768
6878	WITOR(40630)MAXI OVO LEIT/NE.SORT.500	4W4A8						768
6879	WITOR(18610) MINI-OVI.CR.AVELÃ SAQ.150	4W4A9						768
6880	WITOR(18620) MINI-OVI. CR.AVELÃ 150	4W4A10						768
6881	WITOR(18670) MINI-OVI. CR.LEITE 150	4W4A11						768
6882	WITOR(40380/18000) MINI-OVI.CR.AVELÃ 500	4W4A12						768
6883	WITOR MINI-OVINHOS CR.LEITE 500GR.	4W4A13						768
6885	WITOR MINI-OVINHOS CR.LEITE 1000GR.	4W4A14						768
6886	WITOR MINI-OVINHOS CR.AVELÃ 1000GR.	4W4A15						768
6887	WITOR MAXI OVO CHOC.LEITE 1000GR.	4W4A16						768
8163	WITOR(40050) MINI-OVI.LEIT.CER.120	4W4A17						768
8193	WITOR(40060) MINI-OVI.AVELÃ CER.120	4W4A18						768
8194	WITOR(15040) MINI-OVINHOS MIX 200 G.	4W4A19						768
8614	WITOR(15120) MINI-OVI.WITI SORT.125	4W4A20						768
8928	WITOR(15080)OVETTI MIX (MINI & MAXI) 450	4W4A21						768
8929	WITOR(15090)OVETTI MIX 600	4W4A22						768
9534	WITOR(15180)OVI. CARAMELO 120GR	4W4A23						768
9535	WITOR 15210 SAQ FEC MINI OVETTI AVEL 125	4W4A24						768
9536	WITOR 15220 SAQ FEC MINI OVETTI LEITE 125	4W4A25						768
9537	WITOR 15350 OVETTI SMILEY 70	4W4A26						768
9538	WITOR 15270 OVETTI LEITE E CER 250	4W4A27						768
9539	WITOR 15290 OVETTI LEITE E AVELA 250	4W4A28						768
9540	WITOR 15330 OVETTI CARAMELO 250	4W4A29						768
9541	WIT. OVO SMILEY 150	4W4A30						768
6946	PÃO TOSTADO C/ALHO 150 G.	4W4B2						15744
6947	PÃO INTEGRAL TOSTADO C/ALHO 150 G.	4W4B3						15744
9082	CREDIN BAGE CREMIN 15 KG	4W8B2						1860
9547	CREDIN CREMIN 10 KG	4W7C2						2610
9093	CREDIN CREDICREM LIMÃO 3 KG	4W7B2						1054
9098	CREDIN CREMA 10 KG	4W7B3						1426
9104	CREDIN CREME DE OVO 6 KG	4W7B1						2480
9125	CREDIN CREDI PASTE BRANCO 1 KG	4W5C1						1078
9126	CREDIN CREDI PASTE PRETO 1 KG	4W5C2						1078
9127	CREDIN CREDI PASTE CASTANHO 1 KG	4W5C3						1078
9128	CREDIN CREDI PASTE AZUL 1 KG	4W5C4						1078
9129	CREDIN CREDI PASTE VERDE 1 KG	4W5C5						1078

9130	CREDIN CREDI PASTE VERMELHO 1 KG	4W5C6						1078
9131	CREDIN CREDI PASTE ROSA 1 KG	4W5C7						1078
9133	CREDIN CREDI PASTE AMARELO 1 KG	4W5C8						1078
9171	CREDIN CREDIGEL PRONTO 6 KG	4W7B4						1240
9173	CREDIN CREDIGEL CHOCOLATE 6 KG	4W7A1						8400
9174	CREDIN CREDIGEL CARAMELO 6 KG	4W7A2						8400
9182	CREDIN BISCUIT CHOC. 15 KG	4W8A1						6300
9194	CREDIN SOFTCAKE NEUTRO 15 KG	4W8B1						3720
9204	CREDIN SOFTCAKE MEL & CANELA 5 KG	4W7D3						2400
9206	CREDIN SOFTCAKE CENOURA 5 KG	4W7C6						2610
9904	CREDIN SOFTCAKE CHOC. E AVELÃ 10 KG	4W7C5						2610
9988	CREDIN SOFTCAKE IOGURTE-FRUTOS VERM.10 KG	4W7C4						2610
9226	CREDIN BERLINER 15 KG	4W7D2						6400
9237	CREDIN CHOUX 10 KG	4W7C1						2610
9241	CREDIN PASTAROMA LARANJA 1 L	4W5C9						441
9242	CREDIN PASTAROMA LIMÃO 1 L	4W5C10						441
9256	CREDIN FAST MOLHO PIZZA 2,95 L	4W2A3						20448
9287	CREDIN 7 GRÃOS 15 KG	4W8D1						7680
9598	CREDIN PÃO BORGONHA 15 KG	4W7C3						2610
9307	CREDIN CERTA FOLHADOS PLACAS 2 KG	4W7D1						4800
9340	Café Cap.Smooth N.Dia 10x5g	1W6C1						3382
9341	Café Cap.Intense N.Dia 10x5g	1W6C3						3382
9342	Café Cap.Descafeinado N.Dia 10x5g	1W6C2						3382
9346	Café Cap.DG Chocolate 16 unid.	1W12D3	1W9B2					20592
9350	Café Cap.DG Café Cortado 16 unid.	1W13D2	1W9B1					25632
9351	Café Cap.DG Café Cappuccino 16 unid.	1W12C3						7704
9352	Café Cap.DG Café Descafeinado 16 unid.	1W12C2	1W3B1					22392
9353	Café Cap.DG Extra Intenso 16 unid.	1W12D1						10080
9354	Café Cap.DG Intenso 16 unid.	1W12C1						7704
9355	Café Cap.DG Longo 16 unid.	1W13D1						10080
9878	Café Cap.DG Colombia 16 unid.	1W12D4						10080
9879	Café Cap.DG Café Cortado Descaf. 16 unid.	1W13D3						10080
9880	Café Cap.DG Leite 16 unid.	1W12D2						5040
9330	Café Lote Fundador Kg	1W4C3						12768
9356	Café Lote Elite Kg	1W6B1						8000
9357	Café Lote Selec.Ouro Kg	1W6D1						1752
9332	Café Lote Chavena Grão Kg	1W6B2						8000
9334	Café Lote Sup. Grão Moagem Normal 250 g	1W6C4						2091,5
9335	Café Lote Sup. Grão Moagem Fina 250 g	1W6C5						2091,5
9336	Café Lote Chávena Grão 250 g	1W6D3						1752
9337	Café Lote Cháv. Moagem Normal 250 g	1W6C6						2091,5
9338	Café Lote Cháv. Moagem Fina 250 g	1W6D2						1752
9339	Café Descafeinado Moído 250 g	1W6B3						8000
9376	Vinho Pinta Negra Tinto 2013 0,75 L	**1W2B2**	1W4B2	1W5C3				46104
9377	Vinho Pinta Negra Branco 2014 0,75 L	1W4C1	1W5C1					22848
9378	Vinho Pinta Negra Rosé 2014 0,75 L	1W3B2						14688
9379	Vinho Pinta Negra Tinto 2013 BID 3L	1W2D2						9984
9380	Vinho Pinta Negra Tinto 2013 BID 5L	1W2D3						9984
9381	Vinho Pinta Negra Branco 2014 BID 3L	**1W3A1**						12480
9382	Vinho Pinta Negra Branco 2014 BID 5L	1W3C1						10944
9383	Vinho Dory Tinto 2013 0,75 L	1W1C1	1W5C2					58176
9386	Vinho Dory Reserva Branco 2013 0,75 L	1W6E4						7968
9400	Vinho Dory Reserva Tinto 2012 0,75 L	1W1B1						11136
9406	Vinho Dory Branco 2014 0,75 L	1W3B3						14688
9391	Vinho Tinto Merlot 0,75 L	1W6D4						1898
9395	Vinho Branco Sauvignon Blanc 0,75 L	1W6E3						7968
9457	Vinho Branco Viosinho 2013 0,75 L	1W6D5						1898
9830	Q.L. Vinho Tinto Selection 0,75 2013	1W3C3						10944
9831	Q.L. Vinho Branco Selection 0,75 2015	1W3C2	1W4B1					23328
10171	Q.L. Vinho Branco Alvarinho 0,75	1W2C9	1W2B1					10406,4
10172	Q.L. Vinho Branco Sauvignon Blanc 0,75	1W2C8						2246,4
9832	Q.L. Vinho Tinto Reserva Syrah 0,75 2013	1W2C2						2246,4
9833	Q.L. Vinho Tinto Reserva Merlot 0,75 2014	1W2C5						2246,4
9834	Q.L. Vinho Tinto Reserva Cabernet Sauvignon 0,75 2014	1W2C4						2246,4
9835	Q.L. Vinho Tinto Reserva Touriga Nacional 0,75 2012	1W2C3						2246,4
10178	Q.L. Vinho Branco Nana 0,75	1W2D1						9984
10179	Q.L. Vinho Rose Nana 0,75	1W4C2						12768
9836	Q.L. Vinho Tinto Nana Reserva 0,75 2012	1W2C1						2246,4
9837	Q.L. Vinho Tinto Reserva 0,75 2012	1W2C7						2246,4
9838	Q.L. Vinho Branco Reserva 0,75 2015	1W2B3						8160
9839	Q.L. Vinho Tinto Reserva S.T.D´Ávila 0,75 2013	1W2C6						2246,4
9841	Q.L. Vinho Espumante Bruto Nature Reserva 0,75 2012	1W6E1						3984
9842	Q.L. Vinho Espumante Bruto Rosé Reserva 0,75 2013	1W6E2						3984
10007	Crackies Arroz Integral c/sal 130 gr.	4W3D2						8448
10010	Crackies Milho Choc.Preto 90,4 gr.	4W3C8						1904
10011	Feijão Branco Fidalgo Coz. Caçarola 540 g.	3W12D1						2092,8
10012	Feijão Encarnado Coz. Caçarola 540 g.	3W12D2						2092,8
10013	Feijão Manteiga Coz. Caçarola 540 g.	3W12D3						2092,8
10014	Grão Bico Coz. Caçarola 540 g.	3W12D4						2092,8
10015	Feijão Frade Coz. Caçarola 540 g.	3W12D5						2092,8
10057	Azeitona Maçanelha 3 Kg.	3W12B2						1372,8

Code	Description	Loc1	Loc2	Loc3	Value
10058	Azeitona Preta Ox.181/200 3 Kg.	3W12B3			1372,8
10060	Azeitona Preta Fatiada 1.56 Kg.	3W12B4			1372,8
10062	Azeitona Verde 181/200 3 Kg.	3W12B5			1372,8
10063	Azeitona Verde Fatiada 3 Kg.	3W12B6			1372,8
10065	Azeitona Verde Recheada 3 Kg.	3W12B7			1372,8
10191	Óleo Vaqueiro 1 L	3W13B2			11424
10192	Óleo Vaqueiro 3 L	3W13C4			2433,6
10199	Azeite Gallo Subtil garrafão 3 L	3W13C5	3W8A2		21379,2
10203	Azeite Gallo Virgem Ext.Class. garrafa 0.75 L	3W13C2	3W13B1		16478,4
10204	Azeite Gallo Virgem Ext.Suave garrafa 0.75 L	3W13B3			5712
10213	Azeite Gallo Virgem Ext.Class. garrafa 0.25 L	3W13C1			7488
10217	Vinagre Gallo V.Branco 0.25 L	3W13B4			5712
10228	Piri-Piri Gallo 0.05 L	3W13C3			1310,4
7638	SH. FRUCTIS CAB.NORMAIS 250	3W7D1			10848
7639	SH. FRUCTIS CAB.NORMAIS 2 EM 1 250	3W7D2			10848
7644	SH. FRUCTIS HYDRA LISO 250	3W8D1			10848
8219	SH. FRUCTIS ADEUS DANOS 250	3W8D3			10848
8966	SH. FRUCTIS CRESCE FORTE 250	3W7D3			10848
9474	SH. FRUCTIS CRESCE FORTE FINE HAIR 250	3W9D1			10848
7640	SH. FRUCTIS ANTICASPA 250	3W9D2			10848
7641	SH. FRUCTIS ANTICASPA 2 EM 1 250	3W8D2			10848
7655	SH. FRUCTIS AC AZUL 2 EM 1 250	3W9C1A			682,5
8720	SH. FRUCTIS FORÇA BRILHO 725	3W11B1A			4200
8721	SH. FRUCTIS ADEUS DANOS 725	3W11B4A	3W16B3		9396
8722	SH. FRUCTIS FORÇA BRILHO 2 EM 1 725	3W11B3A	3W18C2		14958
8968	SH. FRUCTIS CRESCE FORTE 725	3W11B2A			2100
7664	AMA. FRUCTIS CABELOS NORMAIS 200	3W10D1			5424
7665	AMA. FRUCTIS HIDRA CARACOIS 200	3W10D2			5424
7666	AMA. FRUCTIS HIDRA LISO 200	3W10D4			5424
8135	AMA. FRUCTIS NUTRI REPAIR 200	3W11D1			5424
8220	AMA. FRUCTIS ADEUS DANOS 200	3W11D2			5424
8591	AMA. FRUCTIS DENSO & ABUND. 200	3W16D1			4272
8967	AMA. FRUCTIS CRESCE FORTE 200	3W10D3			5424
9622	AMA. FRUCTIS NUTRI REPAIR 3 BUTTER 200	3W10D5			5424
7670	CREME PENTEAR FRUCTIS HYD.CARACOIS 200	3W1C2			2263
8370	MASCARA FRUCTIS HIDRA-CARACOIS 300	3W11C2A			568,75
7678	GEL FRUCTIS EXTRA-FORTE 200	3W11C3A			520
7679	GEL FRUCTIS HARD CEMENT 200	3W11C4A			520
7681	GEL FRUCTIS SURVIVOR 200	3W11C5A			520
7682	GEL FRUCTIS WET LOOK 200	3W11C6A			520
7684	GEL FRUCTIS ENDURANCE 24h. 200	3W10B1A			840
9679	CERA FRUCTIS STYLE BRILHO 75 ML	3W11C7A			601,25
7693	MOUSSE FRUCTIS CARACOIS 200	3W11C8A			325
7695	MOUSSE FRUCTIS WET SHINE 200	3W11C9A			455
7696	MOUSSE FRUCTIS XXL VOLUME 200	3W11C10A			455
10229	SH. U.SUAVE ÁGUA DE COCO 250	3W1D3			3780
10233	SH. U.SUAVE LEITE DE COCO 250	3W2D1			4644
7699	SH. U.SUAVE CRIANÇAS ALPERCE 250	3W3D5			4644
7700	SH. U.SUAVE CRIANÇAS CEREJA 250	3W3D6			4644
7701	SH. U.SUAVE CRIANÇAS MAÇÃS VERDES 250	3W3D2			4644
7702	SH. U.SUAVE ABACATE/KARITÉ 250	3W2D4			4644
7704	SH. U.SUAVE MANGA/TIARE 250	3W4D3			5940
7708	SH. U.SUAVE COCO CACAO 250	3W2D3			4644
7709	SH. U.SUAVE CAMOMILA 250	3W2D5			4644
7710	SH. U.SUAVE 5 PLANTAS 250	3W4D2			5940
8168	SH. U.SUAVE G.MARAVILHOSA 250	3W3D1			4644
8560	SH. U.SUAVE TRÉSOR MIEL 250	3W3D3			4644
8565	SH. U.SUAVE SOLAR MONOI E NEROLI 250	3W16B2			7296
8703	SH. U.SUAVE TESOUROS MEL 250 LT3	3W9C2A			650
8851	SH. U.SUAVE AZEITONA MIT. 250	3W2D2			4644
9492	SH. U.SUAVE DELICADEZA AVEIA 250	3W4D1			5940
9909	SH. U.SUAVE LIMÃO E ARGILA 250	3W3D4			4644
9911	SH. U.SUAVE SEIVA REPARADORA 250	3W1D2			3780
10230	SH. U.SUAVE ÁGUA DE COCO 400	3W8B3			2520
10234	SH. U.SUAVE LEITE DE COCO 400	3W8B4			2520
7711	SH. U.SUAVE LEITE VEGETAL 400	3W4B1			2328
7712	SH. U.SUAVE ABACATE/KARITÉ 400	3W5B2			2328
7713	SH. U.SUAVE CAMOMILA 400	3W4B3	3W9B3A		4165,5
7714	SH. U.SUAVE CRIANÇAS ALPERCE 400	3W4B4	3W9B4A		4165,5
7715	SH. U.SUAVE CRIAN.MAÇÃS VERD.400	3W4B5			2328
7716	SH. U.SUAVE CACAU E COCO 400	3W4B6			2328
7718	SH. U.SUAVE MANGA TIARE 400	3W4B7	3W9B5A		4165,5
8564	SH. U.SUAVE G.MARAVILHOSA 400	3W4B2			2328
8588	SH. U.SUAVE TRÉSOR MIEL 400	3W4B8			2328
9221	SH. U.SUAVE AZEITONA MIT. 400	3W4B10			2328
9493	SH. U.SUAVE DELICADEZA AVEIA 400	3W4B9	3W6B3	3W8C1A	10540
9910	SH. U.SUAVE LIMÃO E ARGILA 400	3W5B3	3W6B2		9240
9912	SH. U.SUAVE SEIVA REPARADORA 400	3W5B1	3W9B2A		3588
10231	AM. U.SUAVE ÁGUA DE COCO 200	3W6C5			6612
10235	AM. U.SUAVE LEITE DE COCO 200	3W5C1			7432,8
7720	AM. U.SUAVE BIO AMENDOA E LOTUS 200	3W6B1			5472

Code	Description	Loc1	Loc2	Loc3					Value
7721	AM. U.SUAVE ABACATE/KARITÉ 200	3W5C5							7432,8
7722	AM. U.SUAVE CAMOMILA 200	3W5C4							7432,8
7724	AM. U.SUAVE COCO CACAO 200	3W6C1							6612
7727	AM. U.SUAVE MANGA/TIARÉ 200	3W5C2							3716,4
8167	AM. U.SUAVE G.MARAVILHOSA 200	3W5C3							7432,8
8561	AM. U.SUAVE TRÉSOR MIEL 200	3W6C3							6612
8852	AM. U.SUAVE AZEITONA MIT. 200	3W6C2							6612
9494	AM. U.SUAVE DELICADEZA AVEIA 200	3W6C6							6612
9913	AM. U.SUAVE SEIVA REPARADORA 200	3W6C4							6612
10232	AM. U.SUAVE ÁGUA DE COCO 400	3W8B6							2730
10236	AM. U.SUAVE LEITE DE COCO 400	3W8B2	3W8B5						5460
9070	AM. U.SUAVE TRÉSOR MIEL 400	3W11D4							10848
9495	AM. U.SUAVE DELICADEZA AVEIA 400	3W5B7	3W9A5						10584
9624	AM. U.SUAVE CAMOMILA 400	3W5B8							2328
9625	AM. U.SUAVE ABACATE/KARITÉ 400	3W5B4							2328
9626	AM. U.SUAVE AZEITONA MIT. 400	3W5B5							2328
9914	AM. U.SUAVE SEIVA REPARADORA 400	3W5B9							2328
7731	CREME PENTEAR U.SUAVE ABACATE 200	3W10C11A	3W10B2A						1343,75
8169	OLEO U.SUAVE G.MARAVILHOSA 150	3W5B6							2328
8854	CREME U.SUAVE AZEITONA MIT. 200	3W10C10A	3W8C7A						1023,75
9916	CREME U.SUAVE SEIVA REPARADORA 200	3W10C9A							503,75
10237	MASCARA U.SUAVE LEITE DE COCO 300	3W9C3A							1267,5
7732	MASCARA U.SUAVE MANGA/TIARÉ 300	3W10C8A							633,75
7733	MASCARA U.SUAVE ABACATE/KARITÉ 300	3W10C6A							633,75
8230	MASCARA U.SUAVE GAMA MARAVILHOSA 300	3W10C7A							633,75
8562	MASCARA U.SUAVE TRÉSOR MIEL 300	3W10C5A							633,75
8566	MASCARA U.SUAVE SOLAR MONOI E NEROLI 300	3W10C1A							633,75
8853	MASCARA U.SUAVE AZEITONA MIT. 300	3W10C4A							633,75
9496	MASCARA U.SUAVE DELICADEZA AVEIA 300	3W10C3A							633,75
9497	LEITE U.SUAVE DELICADEZA AVEIA 150	3W8C3A							455
9915	MASCARA U.SUAVE SEIVA REPARADORA 300	3W10C2A							633,75
7752	MOUSSE GRAFIC O&C 200	3W8C4A							455
8674	GEL GRAFIC AQUAGEL EXT.F.150+33% (200)	3W11C1A	3W8C2A						1040
8683	GEL GRAFIC FORTE150+33% (200)	3W8C6A							520
7763	NUTRISSE Nº36	3W1B1							3298
7764	NUTRISSE Nº40	3W1B2							3298
7765	NUTRISSE Nº43	3W1B3							3298
7767	NUTRISSE Nº50	3W1B4							3298
7768	NUTRISSE Nº53	3W1B5	3W9B8A						4190,5
7769	NUTRISSE Nº54	3W1B6	3W2B1	3W9B6A					5888
7770	NUTRISSE Nº60	3W2B2							3395
7771	NUTRISSE Nº70	3W2B3							3395
7772	NUTRISSE Nº73	3W2B4							3395
7773	NUTRISSE Nº80	3W2B5	3W9B7A						4287,5
7775	NUTRISSE Nº90	3W2B6							3395
7776	NUTRISSE Nº100	3W2B7							3395
7778	DESCOLORANTE NUTRISSE	3W2B8							2134
7780	NUTRISSE U.COLOR 4.15	3W3B3							1697,5
7781	NUTRISSE U.COLOR 5.25	3W3B5							3395
7782	NUTRISSE U.COLOR 5.62	3W3B6							3395
7783	NUTRISSE U.COLOR 2,0 SOFT BLACK E/P	3W3B1							1697,5
7784	NUTRISSE U.COLOR 2,10 ICE BLACK E/P	3W3B2							1697,5
7785	NUTRISSE U.COLOR 6,60 VERM.BRILH. E/P	3W3B7							3395
7788	NUTRISSE U.COLOR 4.26 CASTANHO VIOLINO	3W3B4							3395
8173	OLIA COL.PER.S/AMON. 3,0 CAST.ESC.	3W11C1B							991,25
8180	OLIA COL.PER.S/AMON. 5,3 CAST.DOUR.	3W11C2B							991,25
8183	OLIA COL.PER.S/AMON. 6,3	3W11C3B							991,25
8184	OLIA COL.PER.S/AMON. 6,6 VERM.INT.	3W11C4B							991,25
8185	OLIA COL.PER.S/AMON. 7,0 LOURO	3W11C5B							991,25
8191	OLIA COL.PER.S/AMON. 10,1 LOURO CLARO	3W10C1B							991,25
8589	OLIA COL.PER.S/AMON. 7,40 INTENSE COPPER	3W10C2B							991,25
10314	SKIN FACE ÁGUA MICELAR MINI 100 ML	3W9C2B							390
7827	SKIN FACE CREME ULTRALIFT DIA	3W7C10B							455
7828	SKIN FACE CREME ULTRALIFT NOITE	3W7C9B							455
7830	SKIN FACE CREME ULTRALIFT SPF15 50ml	3W7C8B							455
9428	SKIN FACE ÁGUA MICELAR 125	3W9C7B							780
9706	SKIN FACE ÁGUA MICELAR OLEO 400 ML	3W9B1B							2100
10265	SKIN FACE BB CREAM SPF 50	3W9C3B	3W9C6B						1722,5
7840	SKIN FACE BB APERFE.SUB CLARO 50 ml	3W7C7B							536,25
7841	SKIN FACE BB APERFE.SUB MED. 50 ml	3W7C5B							536,25
7842	SKIN FACE BB OIL FREE MÉDIO 40 ml PT/ES	3W7C4B							536,25
8192	SKIN FACE BB ANTI IDADE MED. 50 ml	3W8C3B							422,5
9768	SKIN FACE BB OLEO FREE CLARO 40 ml	3W7C6B							536,25
7847	EXFOLIANTE PURE 3 EM 1 150 ml	3W7C3B							520
7856	LEITE DESMAQUILHANTE ESSENCIALS 200 ml	3W7C2B							487,5
7857	TONICO LIMPEZA ESSENCIALS 200 ml	3W7C1B							357,5
7860	*TOALHITAS ESSENCIALS SENSITIVE 25 UN	3W8C4B							1056,25
8737	TOALHITAS SKIN ESSENTIAL PNM 2 X 25 UN	3W9B1A	3W8B7						4830
9501	SKINACTIVE HYDRA BOMB NOITE 50 ML	3W9C5B							650
9504	SKINACTIVE PURE MICELLAR WATER 400 ML	3W9C1B							650
9588	SKINACTIVE HYDRA BOMB DIA 50 ML	3W9C4B							585

9989	SKINACTIVE MASCARA TECIDO AZUL PD 32 ML	3W8C1B						585
9990	SKINACTIVE MASCARA TECIDO ROSA PSS 32 ML	3W8C2B						585
9505	U.SUAVE AZEITONA MÍT.LEITE NUTR. 250 ML	3W7B2B						2992,5
9506	U.SUAVE AZEITONA MÍT.ÓLEO SECO 150 ML	3W8C5A						65
9507	U.SUAVE DELIC.AVEIA LEITE HID.250 ML	3W7B1B						997,5
9508	U.SUAVE ÓLEO MARAV.HID.DUCHE 200 ML	3W7C8A						552,5
9510	U.SUAVE DELIC.AVEIA BÁLSAMO MULTI. 200ML	3W7C2A						1300
9511	U.SUAVE DELIC.AVEIA LEITE HID.400 ML	3W7C6A						650
9512	U.SUAVE ÓLEO MARAV.LEITE HID. 250 ML	3W7B4B						997,5
9601	U.SUAVE LEITE REP.TESOUROS MEL 250 ML	3W7B3B						997,5
9602	U.SUAVE LEITE REP.TESOUROS MEL 400 ML	3W7C4A						1300
9603	U.SUAVE MANTEIGA CORP.REP.TESOUROS MEL 200 ML	3W7C5A						650
9604	U.SUAVE ÓLEO MARAV.LEITE HID. 400 ML	3W7C1A						1950
9991	U.SUAVE CORPO SEIVA REPARADORA LEITE 400 ML	3W7C7A						650
9992	U.SUAVE CORPO SEIVA REPARADORA LEITE 250 ML	3W7C3A						650
10020	U.SUAVE SHOWER ÓLEO ROSA 500 ML	3W7B2A						1365
10023	U.SUAVE SHOWER ÓLEOS MARAVILHOSOS 500 ML	3W7B4A						1365
10024	U.SUAVE SHOWER DELICADEZA AVEIA 500 ML	3W8B1						2730
10025	U.SUAVE SHOWER TESOUROS MEL 500 ML	3W7B3A						1365
10026	U.SUAVE SHOWER SABÃO PINHO MARÍTIMO 250 ML	3W7B1A						1155
10027	U.SUAVE SHOWER LIMÃO 500 ML	3W7B5A						1365
7878	DEO NARTA ROLL ON INVISIVEL 50	3W2C1						4015
7879	DEO NARTA ROLL ON SEDA 50	3W2C2						4015
7880	DEO NARTA ROLL ON BIO EFICÁCIA 50	3W2C3						4015
7881	DEO NARTA ROLL ON TOQUE DE NÁCAR 50	3W2C4						4015
7883	DEO NARTA ROLL ON F.PROTECTION 5 50	3W1C4						4015
8865	DEO NARTA ROLL ON P.ALUM.M.ÓLEOS 50	3W2C5						2007,5
9765	DEO NARTA ROLL ON DRY SENSATION 50	3W1C3						4015
7885	DEO NARTA SPRAY INVISIVEL 200	3W3C6						1058,5
7887	DEO NARTA SPRAY TOQUE NACAR 200	3W3C1						1058,5
7888	DEO NARTA SPRAY F.PROTECTION 5 200	3W3C4						1058,5
8616	DEO NARTA SPRAY FRESHISSIME 200	3W3C8						1058,5
8866	DEO NARTA SPRAY P.ALUM.M.ÓLEOS 200	3W3B8						1406,5
9763	DEO NARTA SPRAY DRY SENSATION. 200	3W3C9						2117
7889	DEO NARTA MEN ROLL ON INVISIMAX 50	3W4C1						4015
7890	DEO NARTA MEN ROLL ON ICEMAX 50	3W4C2	3W4A6					10735
7891	DEO NARTA MEN ROLL ON PED.ALUME 50	3W4C3						2007,5
7892	DEO NARTA MEN ROLL ON PROTECTION 5 50	3W4C4						2007,5
8916	DEO NARTA MEN ROLL ON IMPECÁVEL 50	3W4C5						4015
9767	DEO NARTA MEN ROLL ON DRY RESIST 50	3W4C6						2007,5
7894	DEO NARTA MEN SPRAY INVISIMAX 200	3W3C5						2117
7895	DEO NARTA MEN SPRAY ICEMAX 200	3W3C3						2117
9467	DEO NARTA MEN SPRAY PROTECTION 5 200	3W3C7						2117
9766	DEO NARTA MEN SPRAY DRY RESIST 200	3W3C2						2117
10131	A.SOLAIRE ADV. LEITE IP50 400ml	3W16C1						3132
10132	A.SOLAIRE BB SUN IP50 50ml	3W17B1						1459,2
10135	A.SOLAIRE SPRAY IDEAL BRONZE IP20 200	3W16C4						2523
10136	A.SOLAIRE SPRAY IDEAL BRONZE IP30 200	3W16C3						1261,5
10137	A.SOLAIRE OLEO PROT IP30 150	3W16C2						1131
10138	A.SOLAIRE BB SUN LEGS 150ML	3W16C8						1305
8064	A.SOLAIRE LEITE HID.KIDS IP50+ FL200	3W16C7						1348,5
8072	A.SOLAIRE SPRAY PROT. IP30 200	3W17C1						1261,5
8073	A.SOLAIRE SPRAY PROT. IP50 200	3W17C2						1261,5
8078	A.SOLAIRE LEITE IP20 200	3W17C5						1261,5
8079	A.SOLAIRE LEITE IP30 200	3W16C10						1348,5
8081	A.SOLAIRE SPRAY HID.IP30 300	3W17C6						1261,5
8083	A.SOLAIRE STK LABIOS IP20 4,7	3W16C11						1348,5
8084	A.SOLAIRE OLEO BRONZ.COCO 2 200	3W17C7						1261,5
8085	A.SOLAIRE OLEO PROT IP10 150	3W17C10						1261,5
8086	A.SOLAIRE OLEO PROT IP20 150	3W16C12						1348,5
8087	A.SOLAIRE LEITE NATURAL BRONZER 150	3W17C9						1261,5
8259	A.SOLAIRE SENS.KIDS SPRAY 50+	3W16C5						1305
8260	A.SOLAIRE SENS.KIDS TUBO 50+	3W17C4						1261,5
8646	A.SOLAIRE WET SKIN FP200 IP20 200	3W17B2						1459,2
8994	A.SOLAIRE OLEO SS.AD.NUT.PROT. IP50 150	3W17C3						1261,5
8996	A.SOLAIRE AFTERSUN OLEO 150	3W17C8						1261,5
9583	A.SOLAIRE WET SKIN CRIANÇAS IP50 200	3W16C9						1435,5
9584	A.SOLAIRE SENS.ADV.ROSTO IP50+ 50ML	3W16C6						1479
9015	MIXA Bebé Creme Hid.Protector 100 mi	1W11C1						2649,6
9016	MIXA Bebé Leite Limpeza 400 ml	1W11C2						2649,6
9018	MIXA Bebé Gel Corpo/Cabelo 250 ml	1W11C3						2649,6
9020	MIXA Bebé Shampo Reg. 250ml	1W11C4						2649,6
9021	MIXA Leite Corpo Antirresseq. 250 ml	1W11C5						2649,6
9022	MIXA Leite Corpo Antirresseq. 400 ml	1W11C6						2649,6
9023	MIXA Balsamo Corpo 200 ml	3W1C1						1679
9024	MIXA Leite Corpo Apaziguante 250 ml	1W11C7						2649,6
9025	MIXA Leite Corpo Cold Cream 250 ml	1W11C8						2649,6
9026	MIXA Leite Corpo Surgras 250 ml	1W11C9						2649,6
9027	MIXA Balsamo Corpo Surgras 300 ml	1W11C10						2649,6
9028	MIXA Leite Corpo Reafirmante 250 ml	1W11C11						2649,6
9029	MIXA Leite Corpo Reparador 250 ml	1W11C12						2649,6

Code	Description	Loc1	Loc2	Loc3	Loc4			Value
9030	MIXA Leite Corpo Reparador 400 ml	1W11C13						2649,6
4308	S.LINE GEL PURE WET 150 ML	2W6D1						784
45	S.LINE GEL FX MUITO FIX.(FUSING)	2W6D3						784
4940	S.LINE GEL INDESTRUCTIBLE 150ML	2W6D4						784
5418	CERA S.LINE MODELANTE REMIX 150	2W6D5						906,5
587	S.LINE GEL F.X. U.FIXANTE(FUSING	2W6D2						784
49	S.LINE MOUSSE CURL POWER VOL 200	2W6D7						686
5746	CERA ST.LINE INDESTRUCTIBLE 75ML	2W6D6						759,5
19	ELNETT SATIN F.F. 300ML	3W16D2	3W16A1					17712
20	ELNETT SATIN F.N. 300ML	3W16D4						8544
21	ELNETT SATIN FIX.EX.FOR.300ML	3W16A2	3W16D3					17712
5125	ELNETT LACA CAB.SECOS 300ML	2W1C1						2200
5126	ELNETT LACA CAB.PINTADOS 300ML	3W11D3						10848
6098	ELNETT SATIN VOLUME 300ML	3W10C3B						1007,5
8279	ELNETT LACA LISSIMO 200ML	2W1C2						2200
8410	ELNETT VAPO VOLUME 170ML	2W5D5						952
8411	ELNETT VAPO PROTECT.CALOR 170ML	2W5D4						952
8552	ELNETT LACA 75ML	3W10C5B						390
8667	ELNETT LACA VOLUME XS 200ML	3W10C4B						503,75
9471	ELNETT MOUSSE VOLUME 200ML	2W5C1						1026
9472	ELNETT MOUSSE CARACOIS 200ML	2W5D6						952
9473	ELNETT MOUSSE EXT-FORTE 200ML	2W5C2						1026
9924	ELNETT MOUSSE ONDAS 200ML	2W5D3						952
9925	ELNETT SPRAY BRILHO SUBLIME 200 ML	2W1C3						2200
9926	ELNETT SPRAY ONDAS GLAM 200 ML	3W10C6B						503,75
30	ELVIVE SH.COLOR VIVE 250ML	2W3E1						4992
3798	ELVIVE SH A.CASPA PURIFICANTE 250ML	2W4E1						9984
6353	SH.TOTAL REPAIR ELVIVE 250 ML	2W3E3						9984
7188	SH.ELV.CRYSTAL N-GLOSS 250ml	2W4E2						4992
7193	SH.ELV.ARGININA X3 250ml	2W3E4						4992
8545	ELVIVE SH.FIBRALOGY 250ML	2W3E2						4992
8842	ELVIVE SH.OLEO EXT.CAB.NORM.250ML	2W8D2						5328
8846	ELVIVE SH.OLEO EXT.CAB.SEC.250ML	2W8D3						5328
9476	SH.ELV.ARGILA NORMAL 250ml	2W4E3						4992
9479	SH.ELV.ARGILA A.CASPA 250ml	2W4E4						4992
9483	SH.ELVIVE CARACOIS NUT. 250ML	2W4E5						4992
9931	ELVIVE SH.PHYTOCLEAR NORMAL 250ML	2W8D1						5328
9932	ELVIVE SH.PHYTOCLEAR OLEOSO 250ML	2W5D1						1204
9933	ELVIVE SH.PHYTOCLEAR SENSIVEL 250ML	2W5E5						8448
10239	ELVIVE SH.OLEO EXTR.COCO 400ML	2W6E7						2808,96
1094	ELVIVE SH.FILTRO U.V 400ML	2W6E2	3W1D1					11448,96
7057	SH.ELVIVE TOTAL REPAIR 5 - 400ML	2W7E9	3W2A5					9528,96
8323	ELVIVE SH.LISO KERATINA 400ML	2W6E8						2808,96
8324	ELVIVE SH.ARGININA RESIST 3 400ML	2W7E4						2808,96
8546	ELVIVE SH.FIBRALOGY 400ML	2W7E5						2808,96
8595	SH.ELV.CRYSTAL N-GLOSS 400ml	2W5E3						4224
8730	SH.ELV.MULTIVITAMINAS FRESH 400ML	2W7E7						2808,96
8845	ELVIVE SH.OLEO EXT.CAB.NORM.400ML	2W6E1						2808,96
8847	ELVIVE SH.OLEO EXT.CAB.SEC.400ML	2W7E2						2808,96
9776	ELVIVE SH.CARACOIS NUTRIDOS 400ML	2W7E8	3W2A6					9528,96
9777	ELVIVE SH.ARGILA A.CASPA 400ML	2W5D2	2W6E5					4264,96
9810	ELVIVE SH.ARGILA NORMAL 400ML	2W5E2						4224
8771	ELVIVE SH.COLOR VIVE 700ML	3W4A7	3W16A3	3W9A4	3W18B1			42896
8772	ELVIVE SH.TOTAL REPAIR 5 700ML	3W7A1	3W18A1	1W9C1				45024
8773	ELVIVE SH.ARGININA 700ML	3W18C3	3W18B2	3W18C1	1W10C2			50784
9408	ELVIVE SH.OLEO EXT.SEC.MUITO SECO 700ML	3W14A2						6720
9478	ELVIVE SH.ARGILA NORMAL 700ML	3W1A3	3W18A2	1W10C3				41952
9811	ELVIVE SH. OLEO EXTRAORDINARIO P/SECAS 700ML	3W17A1	3W18B3	3W18A3	1W9C2			53088
9937	ELVIVE SH.PHYTOCLEAR NORMAL 700ML	1W9C3						12192
9940	ELVIVE SH.LOW POW COLOR VIVE 400ML	2W5C6						1083
9941	ELVIVE SH.LOW POW CARACÓIS NUT. 400ML	2W3C6						1083
9942	ELVIVE SH.LOW POW ÓLEO ESTRAORDINÁRIO 400ML	2W3C2						1083
8408	ELVIVE AM.ARGININA RESIST 3 400ML	2W6E4						2808,96
8440	ELVIVE AM.TOTAL REPAIR 5 400ML	2W6E6	3W16B1					10104,96
8441	ELVIVE AM.COLOR VIVE 400ML	2W5E4						4224
8548	ELVIVE AMA. FIBRALOGY 400ML	2W5E1						4224
8596	AMA.LISO KERATINA ELVIVE 400ml	2W7E1						2808,96
8844	ELVIVE AMAC.OLEO EXT.CAB.SEC.400ml	2W6E3						2808,96
9482	ELVIVE AM.ARGILA NORMAL 400ML	2W7E3						2808,96
9486	ELVIVE AM.CARACOIS NUT. 400ML	2W7E6						2808,96
35	ELVIVE AMAC.FILTRO U.V 200ml	2W1D4						9984
6354	AMA.TOTAL REPAIR ELVIVE 200 ML	2W1D1						9984
7194	AMA.ARGININA X3 ELVIVE 200 ML	2W1D2						4992
8153	AMA.LISO KERATINA ELVIVE 200ml	2W1D3						4992
8547	ELVIVE AMAC.FIBRALOGY 200ml	2W3E5						4992
8843	ELVIVE AMAC.OLEO EXT.CAB.SEC.200ml	2W2D3						9984
9481	AMA.ARGILA NORMAL ELVIVE 200 ML	2W2D1						9984
9485	AMA.ELVIVE CARACOIS NUT. 200ML.	2W2D2						9984
10240	MASCARA ELV.OLEO EXT.COCO 300 ML	2W7D3						980
6342	MASCARA ELV. TOTAL REPAIR 300 ML	2W7D5						1421
6456	MASCARA ELVIVE COLOR VIVE 300 ML	2W7D2						980

7196	MASCARA ELV.ARGININA X3 300 ML	2W7D4						980
8549	ELVIVE MASCARA FIBRALOGY 300ML	2W7D7						1421
8848	MASCARA ELV.OLEO EXT.300 ML	2W7D1						980
9487	MASCARA ELV.CARACOIS NUT. 300 ML	2W7D6						1421
9938	ELVIVE PRÉ-MASCARA PHYTOCLEAR 150ML	2W3C5						1054,5
8409	OLEO EXTRA PINTADOS 100ml	2W5D7						952
8551	OLEO EXTRAORDINÁRIO CAB.FINOS 100ml	2W5D10						952
9365	OLEO EXTRAORDINÁRIO CREME NOR/SEC 150ml	2W5D9						952
9488	CREME PENTEAR ELVIVE CARACOIS NUT. 200	2W5D8						952
9943	Botanicals Sh. Coentro 400 ml	2W4C10						1083
9944	Botanicals Sh. Gerânio 400 ml	2W3C3						1111,5
9945	Botanicals Sh. Açafrão 400 ml	2W4C11						1083
9946	Botanicals Sh. Camelina 400 ml	2W4C9						1083
9947	Botanicals Am.Coentro 200 ml	2W4C7						940,5
9948	Botanicals Am.Gerânio 200 ml	2W4C6						940,5
9949	Botanicals Am.Açafrão 200 ml	2W4C8						940,5
9950	Botanicals Am.Camelina 200 ml	2W4C5						940,5
9951	Botanicals Masc.Coentro 200 ml	2W4C1						1254
9952	Botanicals Masc.Gerânio 200 ml	2W4C2						1254
9953	Botanicals Masc.Açafrão 200 ml	2W4C3						1254
9954	Botanicals Masc.Camelina 200 ml	2W4C4						1254
9956	Botanicals Vinagre Gerânio 150 ml	2W3C4						826,5
9957	Botanicals Creme Nut. Açafrão 100 ml	2W4C13						769,5
9958	Botanicals Creme Pentear Discip.Camelina 100 ml	2W4C12						769,5
5085	CASTING CREME GLOSS 316	2W4D10						1008
5086	CASTING CREME GLOSS 400	2W4D9						1008
5087	CASTING CREME GLOSS 415	2W4D8						1008
5088	CASTING CREME GLOSS 426	2W4D7						1008
5089	CASTING CREME GLOSS 500	2W4D6						1008
5092	CASTING CREME GLOSS 600	2W4D3						1008
5093	CASTING CREME GLOSS 645	2W4D2						1008
5751	CASTING CREME GLOSS 535- FC SAR	2W4D4						1008
8665	CASTING C.GLOSS SUNKISS JELLY 01	2W2C5						2640
8911	CASTING CREME GLOSS 530	2W4D5						1008
8912	CASTING CREME GLOSS 700	2W4D1						1008
6295	EXCELLENCE 5.15 CAST.CEN.ACAJOU	2W1C4						2145
72	Excellence Nº 1 Preto	2W1C13						2145
73	Excellence Nº 3 Castanho Escuro	2W1C11						2145
74	Excellence Nr.4 Castanho	2W1C10						2145
76	Excellence Nº 4,54 Cast.Acaj.Aco	2W1C8						2145
77	Excellence Nº5 Castanho Claro	2W1C7						2145
78	Excellence Nº 5,3 Cast.Cla.Dour.	2W1C6						2145
79	Excellence Nr.5,5 Cast.Cla.Acaj.	2W1C5						2145
8149	Excellence Nº 6,41 AVELÃ	2W2C9						2145
82	Excellence Nº 6 Louro Escuro	2W2C1						2145
8294	Excellence Nº 4,03 Cast.Radiante	2W1C9						2145
85	Excellence Nr.7 Louro	2W2C8						2145
87	Excellence Nº 7,3 Louro Dourado	2W2C7						2145
89	Excellence Nº 8 Louro Claro	2W2C6						2145
8915	Excellence Nr.8.3	2W2C4						2145
90	Excellence Nº 8,1 Lou.Cla.Cen.	2W2C5						2145
91	Excellence Nr.10 Lou.Clar.Acla.	2W3C7						2166
9517	EXCELLENCE INTENSE 1.1 P.BLACK	2W3D11						819
9518	EXCELLENCE INTENSE 2.16 DARK VIOL.	2W3D12						819
9519	EXCELLENCE INTENSE 4.26 PURP RED	2W3D10						819
9520	EXCELLENCE INTENSE 5.52 M AUBURN	2W3D9						819
9521	EXCELLENCE INTENSE 6.13 COOL DARK	2W2C10						2145
9522	EXCELLENCE INTENSE 6.66 INT RED	2W2C11						2145
9523	EXCELLENCE INTENSE 7.43 GOLD COP	2W3D8						819
9570	Excellence Age Perfect 10.13 Louro M.Claro Rad.	2W3C1						1111,5
9571	Excellence Age Perfect 9.13 Louro Claro Bege	2W3D1						819
9572	Excellence Age Perfect 8.31 Louro Dourado	2W3D2						819
9573	Excellence Age Perfect 7.32 Louro Esc.Dour.Pérola	2W3D3						819
9574	Excellence Age Perfect 6.03 Cast.M.Claro Rad.	2W3D6						819
9575	Excellence Age Perfect 5.03 Cast.Claro Dour.Subtil	2W3D7						819
9576	Excellence Age Perfect 6.13 Cast.M.Claro Frio Dour.	2W3D5						819
9577	Excellence Age Perfect 6.23 Cast.Clarissimo Dour.	2W3D4						819
9920	Excellence Creme Nº2 Preto Ébano	2W1C12						2145
9921	Excellence Creme Nº6.35 Chocolate	2W2C13						2145
9548	Magic Retouch Color. 1 Preto	2W10C2						812,5
9549	Magic Retouch Color. 2 Moreno	2W10C4						812,5
9550	Magic Retouch Color. 3 Castanho	2W10C6						812,5
9551	Magic Retouch Color. 4 Louro	2W10C3						812,5
9552	Magic Retouch Color. 5 Louro Claro	2W10C5						812,5
9922	Magic Retouch Color. 6 Acajou	2W10C1						812,5
9923	Magic Retouch Color. 7 Castanho Frio	2W10C7						552,5
9959	Colorista Spray 1 Hotpinkhair 75 ml.	2W9C7						812,5
9960	Colorista Spray 2 Pastelbluehair 75 ml.	2W9C5						812,5
9961	Colorista Spray 3 Minthair 75 ml.	2W9C4						812,5
9962	Colorista Spray 4 Pinkhair 75 ml.	2W9C3						812,5
9963	Colorista Spray 6 Greyhair 75 ml.	2W9C6						812,5

9964	Colorista Spray 7 Turquoisehair 75 ml.	2W9C8						812,5
9965	Colorista Sh.Washout 1 Peachhair 80 ml.	2W8C4						1235
9966	Colorista Sh.Washout 2 Pinkhair 80 ml.	2W8C11						1267,5
9967	Colorista Sh.Washout 3 Dirtypink/Rosegold 80 ml.	2W8C7						1235
9969	Colorista Sh.Washout 6 Bluehair 80 ml.	2W8C6						1235
9970	Colorista Sh.Washout 7 Indigohair 80 ml.	2W8C12						1267,5
9971	Colorista Sh.Washout 10 Turquoisehair 80 ml.	2W8C10						1267,5
9972	Colorista Sh.Washout 11 Burgundyhair 80 ml.	2W8C9						1267,5
9973	Colorista Sh.Washout 12 Redhair 80 ml.	2W8C8						1235
9974	Colorista Sh.Washout 13 Orangehair 80 ml.	2W8C5						1235
9983	Colorista Sh.Fader 200 ml.	2W9C2						1235
9976	Colorista Hairpaint 2 Beigeblonde 160 ml.	2W9C13						1235
9977	Colorista Hairpaint 4 Strawberryblonde 160 ml.	2W9C12						1235
9978	Colorista Hairpaint 7 Bronzehair 160 ml.	2W9C11						1235
9979	Colorista Hairpaint 10 Blueblack 160 ml.	2W8C3						1202,5
9980	Colorista Hairpaint 12 Marsala 160 ml.	2W8C2						1202,5
9981	Colorista Hairpaint 13 Violet 160 ml.	2W8C1						1202,5
9982	Colorista Hairpaint 14 Mulberry 160 ml.	2W9C14						1235
10313	Revitalift Cica-Cream 40 ml	2W11F7A						315
152	Plen.Revitalift Dia Boiao	2W11D1						540
153	Plen.Revitalift Olhos Boiao	2W11D2						540
154	Plen.Revitalift Noite Boiao	2W11D3						540
8251	REVITALIFT SERUM LASER X3 30ml	2W11D5						468
8252	REVITALIFT CREME DIA LASER X3 50ml	2W11D6						522
8266	REVITALIFT OLHOS LASER X3 15ml	2W11D7						522
8556	REVITALIFT LASER NOITE 50ml	2W11D8						522
8759	REVITALIFT CR.ROSTO DIA SPF30 50ML	2W11C3						540
9425	Revitalift Filler Dia 50 ml	2W11E1	2W11F6					1092
9499	Revitalift Filler Noite 50 ml	2W11F5A						315
1622	Plen.Age Perfect Dia Rehid 50ml	2W11D9						522
1623	Plen. Age Perfect Noite 50ml	2W11E8						630
3362	Plen.Age Perfect Olhos 15ml	2W11E7						756
8553	AGE PERFECT REN.CELULAR DIA 50 ML	2W11E6						630
8554	AGE PERFECT REN.CELULAR NOITE 50 ML	2W11E5						630
8555	AGE PERFECT REN.CELULAR SERUM 30 ML	2W11D4						468
9498	Plen.Age Perfect Golden Age 50 ml	2W11E2						630
8914	OLEO EXTRAORDINÁRIO CREME DIA 50 ml	2W11C2						360
9366	OLEO EXTRAORDINÁRIO CREME MASC.NOITE 50ml	2W11F4A						315
9444	COFFRET OLEO EXTRA. DIA + NOITE	2W5C5						1282,5
9605	Active Anti-Rugas Dia 35+ 50ml	2W11E3						924
9606	Active Anti-Rugas Dia 55+ 50ml	2W11E4						630
9801	MASC.ARGILA PURA EXFOLIANTE VERMELHA 50 ml	2W11F1A						315
9802	MASC.ARGILA PURA EXFOLIANTE PRETA 50 ml	2W11F2A						315
9803	MASC.ARGILA PURA EXFOLIANTE VERDE 50 ml	2W11F3A						315
4613	TR.HYDRA ENERGETIC MEN EXPERT.50	2W11F12B						346,5
4614	TR.HIDR.STOP RIDES MEN EXPERT.50	2W11F8B						346,5
4615	TRAT.HIDR. VITA LIFT MEN EXPERT	2W11F11B						346,5
4616	AFT.SHAVE BALSAMO HID.MEN EXPERT	2W11F6B						304,5
6182	MEN HYDRA SENSITIVE CREME DIA 50	2W11F4B						346,5
6183	MEN HYDRA SENSITIVE BALSAMO 100	2W11F9B						325,5
6465	MEN EXP.AFT.SHAVE BALS.ENERG.100	2W11F2B						304,5
8943	MEN EXP.AFT.SHAVE H.SENS. 75 ML	2W11F13B						325,5
9513	MEN EXP.PURE POWER HID. A.IMP. 50ML	2W11F1B						346,5
9514	MEN EXP.AFT.SHAVE HYD.POWER 125	2W11F10B						273
9515	MEN EXPERT HYD.POWER HID.REFRESC. 50ML	2W11F7B						304,5
9516	MEN EXP. PURE POWER GEL EXFOLIANTE 150ML	2W11F3B						336
9854	Coffret Men Expert Energy 2016	2W5C3						1596
9919	GEL LIMPEZA C/BARBA MEN EXPERTISE 150ML	2W11F5B						346,5
7156	DEO ROLL ON MEN EXP.CARB.C.FRESH 50 ML	2W10C14						747,5
7190	DEO ROLL ON MEN EXP.CARB.INT.ICE 50ML	2W9C10						1430
2372	PASTA COUTO	2W5C6						2109
9617	DEO ROLL ON COOL POWER 50 ML	2W9C1						1560
9634	DEO ROLL ON MEN CLEAN POWER 50 ML	2W10C13						910
9917	DEO ROLL ON MEN EXP.INVINCIBLE SPORT 50ML	2W9C9	2W10C15					1527,5
7157	DEO SP.MEN EXP.CARB.INT.ICE 200 ML	2W10C16						1495
9040	DEO SP.MEN EXP. SHIRT PROTECT 150 ML	2W10C12						910
9041	DEO SP.MEN EXP. THERMIC RESIST 150 ML	2W10C8						910
9618	DEO SP.MEN EXP.COOL POWER 150 ML	2W10C10						910
9762	MEN EXP.CLEAN POWER SPRAY 150	2W5C4	2W10C9					1708
9918	DEO SP.MEN EXP.INVICIBLE SPORT 150 ML	2W10C11						910
9927	MEN EXP.HYDRA ENERGETIC GEL BANHO 300ML	2W9D5						5328
9928	MEN EXP.CARBON PROTECT GEL BANHO 300ML	2W9D4						5328
9929	MEN EXP.HYDRA SENSITIVE GEL BANHO 300ML	2W8D4						5328
9930	MEN EXP.COOL POWER GEL BANHO 300ML	2W8D5						5328
10308	FZ711815 FRIT. ACTIFRY SNACKING BLACK 1 KG.	1W5B2						15264
7416	YV960120 FRIT. ACTIFRY 2 EM 1	1W13B2						10464
9371	FZ750020 FRIT. ACTIFRY EX 1 KG.	2W5B5						2320
9445	FZ751020T. ACTIFRY SNACK	2W10A2						7200
10269	FR516110 FRITADEIRA FILTRA PRO PREMIUM 4L.	2W4B4						4988
8921	XA701072 CESTO FRIT. ACTIFRY	2W3B5						1392
6653	TG800012 GRELHADOR FAMILY FLAVOR GRILL	2W1A1						4902

Code	Description	Loc1	Loc2	Loc3	Loc4	Loc5	Value
6725	GC205012 GRELHADOR PLACAS MINUTE GRILL	2W1A5					4386
8374	CB500512 GRELHADOR	2W4B6					2842
9449	BG901D12 GRELHADOR INOX	2W1B7					4292
9739	GC712DLR OPTIGRILL + LR	2W10B2					3510
6630	TT570030 Torradeira Toast Light #	2W5B1					1914
9847	KI431D10 JARRO COMPACT KETTLE 1,2 L	2W4A3					2838
10017	FV1542E1 FERRO VAPOR ACCESS EASY	3W1A1					13440
9524	FV4880E0 FERRO A VAPOR ULTRAGLISS	2W10B3					3870
7065	GV7255E0 GER VAPOR EXPRE. A/CALC. ExC	2W3A3	1W13A3				10812
7271	GV5225E0 GERADOR VAP.(FERRO/CALD.)	2W3A2					3741
8675	GV5245E0 GERADOR VAP.EASY PRESSI	2W2B4					1682
8838	GV4630E0 GERADOR VAP.OPTIMO	2W8A3					9600
7056	PP1200V0 BAL.WC ATLANTIS PREMIUM SILVER	1W13C4	2W2B8				5554,8
9736	XD900100 Limpa-Bases Ferros Tefal	3W10A1					16512
2898	DM510 FERRO V.PRECISION #	2W3A6					3096
6328	DA1510F1 FERRO VIAGEM	2W10A4					7200
7146	FS3010E0 FERRO SECO ROMA	2W5B3					1682
7630	DW5120D1 FERRO VAPOR MARINHA	2W3A4					4257
8464	DW5125D1 FERRO VAPOR FOCUS FASHION	2W2B9					1102
8768	DW5121D1 FERRO VAPOR FOCUS	2W3A1					5805
8770	DW8112D1 FERRO VAPOR PRO MASTER	2W5A6					4128
9775	DW1120D1 FERRO FAVOR EFFECTIVE	1W12C5					5136
9821	DW2130D1 FERRO VAP.EFFECTIVE COMF.	2W5A1					3999
10273	DG8962F0 GERAD.VAP.SILENCE STEAM	2W1B4					1624
7155	DG5035F0 CENTRO PLANCHADO ExC	2W5A5					4902
8856	IS6300D1 GERAD.VAP.MASTER VALET	2W4B1					2204
9827	DG8531FO Geradora Perfect Steam Centro Plan	2W5B8					1508
8919	SO2330FO TERMOVENTILADOR INSTANT CONFORT COMP 2400	2W2B7					2146
9886	SO2210FO TERMOVENTILADOR CLASSIC	2W1A6					4386
9887	SO5115F2 TERMOVENTILADOR SILENCE COMFORT	2W4A1					3612
9891	SO2320F2 TERMOVENTILADOR INSTANT CONFORT 2000	2W4B7					2146
9892	SO6510F2 TERMOVENTILADOR AQUA	2W1B3					1450
9893	SO9265F0 TERMOVENTILADOR MINI EX.ECO SAFE	2W3B3					1856
9731	VU2630F0 VENT.TURBO SILENCE EXTREME 30 CM	1W5B1	1W7B1				30816
XXXX	D68961 (3121040057001	2W3B7					1624
8824	RO6743EA ASP.ERGO FORCE CYCLONIC	2W11A2					19200
9053	RU5053EH ASPI.WET & DRY 30 L	2W2C2					4400
9669	RO3753 ASPIRADOR SB	2W8A4	2W9A3	2W11A1	2W11A3	2W6A2	88080
9759	RO5295EA ASPIRADOR COMPAC. ERGO ANIM CARE	2W5A4					7611
9760	RO3786EA ASPIRADOR S/S	1W9A2					11520
9884	RY7535WH ASPIRADOR CLEAN STEAM	2W2B5					1334
9901	RO6843EA ASPIRADOR C/B X-TREM POWER	1W10A1					5760
6641	AC476901 MINI ASP.CYCLONIC 7.2V	1W13A1					14400
8828	AC232001 MINI ASP.EXTENSO 3,6V	2W2B6					1566
10047	CV7812E0 SECADOR SIGNATURE PRO AC	3W5A6					13440
10052	CV8730E0 SECADOR INFINI PRO ELITE	2W1A9					3999
8344	CV5012F0 SECADOR POWERLINE ELITE	1W12B2					6540
8348	CV5062F0 SECADOR POWERLINE ELITE 2300	1W13A2					7200
8349	CV5090F0 SECADOR POWERLINE + 2300	1W12B1					3924
8477	CF7352E0 ALISADOR WET & DRY ELITE	2W3B6					2088
8147	TN7510E4 APARADOR SMOOTH WET & DRY	2W3A5					3354
9460	TN1410F0 APARADOR NOMAD	2W4A4					2064
9582	TN5140F0 APARADOR CAB.WET & DRY NEGRO	2W11B3					2158
8335	EP9014E0 DEPILADORA AQUAPERFECT BASIC	2W11B2					1992
XXXX	RH9051	1W12C4					5136
10130	BS1060 BALANÇA C.BANHO PREMISS	2W11B6					2614,5
3729	FEM241 TORRAD.BACK E CHROME #	2W4A2					4386
3936	GVX242 MOINHO CAFE MOS EXP.BLACK CHROME	2W3B4					1914
8598	FDK4.52 SANDWICHEIRA CLASSIC	2W1A8					1999,5
9769	KM442D10 CAFETEIRA FILTRO CONT.LINE	2W3B2					1450
8297	XP562010 MÁQ.EXPRESSO EXPERT PRO INOX	3W2A1	1W10A2				19200
9876	XP344010 MÁQ.EXPRESSO EXPERT COMPACT	3W6A1					13440
10006	KP3505P4 DOLCE GUSTO CAFET. DROP RED Pack	1W10A3					11520
10031	KP1201P4 DOLCE GUSTO MINI ME BRANCA Pack	1W13C1					5136
10046	KP3501P4 DOLCE GUSTO DROP BRANCA PACK	1W13C3					3466,8
10249	KP1108P5 DOLCE GUSTO OBLO Preta Pack lata	1W13C7	3W11A4	2W6A1			20918,4
8862	KP1105IB DOLCE GUSTO OBLO VERMELHA	2W10A1					14400
9042	KP1201P2 DOLCE GUSTO MINI ME BRANCA Pack	1W13C2					5136
9987	KP600EP3 DOLCE GUSTO MOVENZA SILVER Pack	1W13C6					5136
8831	EA810870 EXPRESSO FULLY AUTO. ROMA	2W1B2	1W13B1				12204
5696	XN5005PO NESP LE CUBE TITAN #	1W12A1					1800
6015	XN5000P0 NES LE CUBE IMAC #	1W12A2					1800
6129	XN7006P0 NESPRESSO CITIZ.RED	1W12A3					1800
6130	XN7106P0 NESPRESS CITIZ.MILK RED	1W12A4					1800
6131	XN7505P0 NESP ITIZ.CO GREY #	1W12A5					1800
6585	XN7001P0 NESPRESSO CITIZ. TITANIUM	1W12B3					2092,8
6736	XN700210 NES CITY METAL ALUMI #	1W12B4					2092,8
6963	XN3006P0 NESPRESSO PIXIE ELECTRIC RED	1W12B5					2092,8
6964	XN3009P0 NESP PIXIE ELECTRI. #	1W12B6					2092,8
7448	XN3008P0 NESPRESSO PIXIE DARK BROWN	1W12B7					2092,8
7612	XN2501P0 NESPRESSO PULSE BRANCO	1W12B8					2616

Code	Description	Loc1	Loc2	Loc3				Value
8242	XN2140P4 NESPRES.ESSENZA	1W12B9						2616
8531	XN1001P040 NESPRESSO INISSIA BRANCA PACK	1W12B10						2616
8671	XN1005P040 NESPRESSO INISSIA VERMELHA PACK	1W12B11						2616
8931	XN100FP040 NESPRESSO INISSIA LARANJA PACK	1W13B3						2616
5040	ZX700041 EXPREMEDOR CITRINOS P	1W13B4						2616
6526	KX700032 MAQ.PÃO EXPERT #	1W13B5						2616
6689	10008 P.CÁPS NESP.FIXO 40 UN #	1W13B6						2616
7314	VB5120ES TIR.CERVEJA BEERTENDER	2W8A2						9600
8678	F054001B Descalcificador Univ.Maq.Café	2W11C1						576
7636	QA201110 MAQ.COZINHA MASTERCHEF COMPACT	2W4B3						1450
8619	FP513110 Robot Coz MC5000 Branco	2W5A2						3483
9446	MK8121 ROBOT MAXICHEF	2W11B5						2739
9640	FP648H10 Robot Masterchef 8000 Grey	2W1B1						2262
9641	CE701010 ROBOT MULTI-COZEDURA COOKEO	1W13C5						3466,8
9642	QA5001B1 MAQ.COZINHA MASTERCHEF GOURMET	2W10B4						2790
9644	QA600HB1 MAQ.COZINHA MASTERCHEF GOURMET + METAL	2W1B5						2204
10309	DD655810 Varinha Quickchef c/acessorios	1W8B1						15552
6829	DD300141 Var.Oveo 700 Pé Plástico #	2W5B4						1334
6985	DD407G71 VARINHA HAPTO ACES #	2W5B6						1508
7204	DD853810 Var.Slim Force 700W pé inox c/aces. 4 lam.	2W1A7						3225
7245	DD411G41 VARINHA HAPTO 4 LAMINAS ACES.	2W4B2						1508
7597	DD410141 VARINHA HAPTO 4 LAMINAS	2W2B1						1450
9410	DD726010 VARINHA PREPLINE	2W5A3						4386
9844	DD830810 Varinha Optitouch	2W9A1	2W7A3					20640
9877	DD833810 Varinha Optitouch 2 Acessorios	2W9A2						14400
6832	ABM11A30 Batedeira Easy Max 200w	2W5B7						1218
6833	HM410131 Batedeira Prepline 450w	2W2B3						1798
6834	HM412131 Batedeira Prepline 450w c/Taça	2W10A5	1W10C1					19392
8325	LM310E10 LIQUID. FACICLIC VIDRO	2W8A1						19200
8298	AF135D10 Fritadeira MX Uno M Inox	2W7A1						6240
8922	AF123111 Fritadeira MX Uno Branca	2W7A2						6240
9650	AM322070 Fritadeira Compact Pro 2L	2W11B4						2407
9651	AM338070 Fritadeira Easy Pro 3L	2W11B1						2282,5
10018	OW220830 MAQ.PÃO PLAISIR	2W4B5						1914
10320	LT340811 Torrad.Subito4 Fendas	2W1B6						2030
8400	LT160111 Torrad.MX Principio 2 Fendas	2W4A5						3999
6860	A40106 Passevite Inox	2W2B2						1218
6839	DJAC41 Faca Elect Secanto Congelados	2W3B8						1508
8247	LM903121 Maquina de Sopa Moulinex	2W3B1						2320
9055	A32804 TAÇA LIQUIDIFICADORA COMPLETO	2W5B2						2088
9653	OX464810 FORNO OPTIMO 33 L	2W1A4						5805
10140	C6204605 CAÇAROLA ASAS EXPERTISE 24 CM	3W9A1						8256
10141	C6202805 CAÇAROLA CABO EXPERTISE 16 CM	2W9B3						2700
10143	K3081214 TAÇA TERMICA NEGRA 0,5L	3W4A3	2W8B6A					3408
10144	K3033212 JARRA TERMIÇA AZUL MAMBO 1,5L	3W4A3						3360
10145	K3031212 JARRA TERMIÇA NEGRA MAMBO 1,5L	3W4A2						2688
10146	K3032112 JARRA TERMIÇA VERDE MAMBO 1L	3W3A4	2W8B9A	2W8B4B				4890
10147	K3030112 JARRA TERMIÇA ROJA MAMBO 1L	3W4A5						2688
10148	K3028812 CLIPandCLOSE PLAST RECTAN 2X0,6 L	3W3A1	2W8B8A					4170
10149	K3022312 CLIPandCLOSE PLAST REDON 0.85 L	3W4A1	2W8B10A					2688
10150	K3022112 CLIPandCLOSE PLAST CUAD 0.85 L	2W8B2B						1575
10151	K3021512 CLIPandCLOSE PLAST RECTAN 2.3 L	3W4A4	2W8B7A					3723
10152	K3010412 CLIPandCLOSE CRISTAL RECTAN 1.3 L	3W5A1	2W8B5B					4440
10153	K3010312 CLIPandCLOSE CRISTAL CUAD 0.9 L	2W8B3B						900
10154	K3010212 CLIPandCLOSE CRISTAL RECTAN 0.5 L	3W5A3	2W8B1B					4170
10156	P2530737 SECURE 5 NEO S/CESTO V2 6 L	2W10A3						7200
10157	B1320514 SARTÉN DELICIO INDUC 26 CM	3W2A3	2W9D2					8497,2
10158	B1320414 SARTÉN DELICIO INDUC 24 CM	3W10D1						3796,2
10159	B1320314 SARTÉN DELICIO INDUC 22 CM	3W2A4	2W10D3					7964,4
10160	B1320214 SARTÉN DELICIO INDUC 20 CM	3W2A2						4368
10161	D5033002 CAÇAROLA SO INTENSIVE 20 CM	3W11A1						5572,8
10162	D5032802 CAÇAROLA SO INTENSIVE 16 CM	2W10D4						3130,2
10163	D5033302 FRIGID. SO INTENSIVE SALTEAR 26 CM	2W9D3	2W10D6					21312
10164	D5034602 TACHO SO INTENSIVE + TAMPA 24 CM	2W9D1						7459,2
10165	D5031902 WOK SO INTENSIVE INDU. 28 CM	3W9A2						8256
10166	D5030702 FRIG.SO INTENSIVE 30 CM	3W10A3	2W10D7					13584
10167	D5030602 FRIG.SO INTENSIVE 28 CM	3W10A4						8256
10168	D5030502 FRIG.SO INTENSIVE 26 CM	2W10D2						3596,4
10169	D5030402 FRIG.SO INTENSIVE 24 CM	3W11A2						5572,8
10170	D5030202 FRIG.SO INTENSIVE 20 CM	3W11A3	2W10D5					8083,8
10177	K3043214 JARRA TERMIÇA SOFT GRIP NEGRA 1,5L	3W5A4						3360
10181	K3032014 JARRA TERMICA CAMPO NEGRA 1L	3W3A2						3360
10252	K3021712 CLIPandCLOSE PLAST CUAD 1.75 L	3W3A5						3360
10253	K3041114 JARRA TERMIÇA SOFT GRIP VERDE 1L	3W3A8						3360
10254	K3089314 TAÇA TERMICA 0,2L 12PZ	3W3A6						3360
10255	K3063314 TERMO SENATOR INOX 0.7L	3W3A7						3360
10268	K3089114 TAÇA TERMICA 0,36L 12PZ	3W5A2						3360
10311	K3010612 CLIPandCLOSE CRISTAL RECTAN 3 L	2W8B5A						2340
10312	K3021812 CLIPandCLOSE PLAST RECTAN 0.8 L	2W8B4A						1890
7075	C6520402 FRIG.PRIVILEGE PRO IND.24	2W8B8B						2497,5
7079	C6524022 FRIG.GRILL PRIVILEGE PRO IND.	2W9B8						2700

7470	A6060714 ENVY FRIG 30 CM	2W9B4						3150
7471	JO340114 FORMA CARS FAISCA MCQ	2W9B2						1440
7496	A6052814 CAÇAROLA ENVY 16 CM.	2W9B7						1215
8366	A2600422 FRIG.ONLY 24 CM.	2W2C12						877,5
8367	A2600222 FRIG.ONLY 20 CM.	2W9B9						2160
8520	E4400202 FRIG.IND.TALENT 20 CM	2W9B6	2W8B7B					4860
8689	C9350505 FRIG.CERAMIC CONTROL 26 CM	2W8B2A						517,5
8762	E4404002 FRIG.IND.GRILL TALENT 26X26	2W9B5						2160
8840	D0750202 FRIG. 20CM SO TASTY NEGRA	2W8B1A						495
9037	B1009DISP40 Pack Frig.20 cm + Frig.24 cm	1W1B2	1W9A3					22656
9794	C6200605 FRIG.EXPERTISE 28 CM	2W9B1						3240
9798	C4000202 FRIG.CERAMICA METEOR 20 CM	2W8B3A						945
9799	C4000402 FRIG.CERAMICA METEOR 24 CM	2W8B6B						1215
9800	C4000702 FRIG.CERAMICA METEOR 30 CM	2W10B1						5130
9720	ESFREGÃO MOUSSE CJ. 6 BRUMAR	1W11A3						15360
9721	ESFREGÃO SALVA UNHAS CJ. 4 BRUMAR	1W11A1						15360
9722	PANO MULTI USOS CJ. 3 BRUMAR	1W11B3						8991
9723	ESPONJA DE COZINHA BRUMAR	1W11B2						5994
9724	ESFREGÃO AÇO INOX CJ 3 BRUMAR	1W11B1						8991
9725	PANO ESPONJA CJ. 3 BRUMAR	1W11B4						8991
9726	ESFREGONA TIRAS AZUL BRUMAR	1W10B1						6804
9727	CABOS ESFREGONAS 1,20 M BRUMAR	1W11B5						2997
9790	LÃ DE AÇO 125 gr.	1W11A2						15360
9791	LÃ DE AÇO 250 gr.	1W9A1						11520

APPENDIX 6 – Total distance between each shelf and the expedition area

Shelf Location	Height of each shelve (in meters)	Distance between each rack and the Expedition Area (in meters)	Shelf Location	Height of each shelve (in meters)	Distance between each rack and the Expedition Area (in meters)	Shelf Location	Height of each shelve (in meters)	Distance between each rack and the Expedition Area (in meters)
1W1A	1,3	120,22	2W6A	1,30	129,70	3W11C	0,65	34,27
1W1B	1,16	3,22	2W6B	0,58	129,70	3W11D	1,13	34,27
1W1C	1,67	3,22	2W6C	0,50	24,70	3W12A	1,35	148,47
1W2A	1,30	120,22	2W6D	0,49	24,70	3W12B	0,88	136,47
1W2B	0,85	108,22	2W6E	0,88	24,70	3W12C	1,02	31,47
1W2C	0,78	3,22	2W7A	1,30	132,43	3W12D	1,09	31,47
1W2D	1,04	3,22	2W7B	0,58	132,43	3W13A	1,35	139,20
1W3A	1,30	109,22	2W7C	0,50	27,43	3W13B	1,19	34,20
1W3B	1,53	4,22	2W7D	0,49	27,43	3W13C	0,78	34,20
1W3C	1,14	4,22	2W7E	0,88	27,43	3W14A	1,40	144,12
1W4A	1,50	111,33	2W8A	2,00	125,16	3W14B	1,00	39,12
1W4B	1,29	6,33	2W8B	0,90	125,16	3W14C	1,60	39,12
1W4C	1,33	6,33	2W8C	0,65	20,16	3W15A	1,45	146,84
1W5A	1,50	113,79	2W8D	1,11	20,16	3W15B	1,00	41,84
1W5B	1,59	8,79	2W9A	1,50	122,43	3W15C	1,60	41,84
1W5C	1,05	8,79	2W9B	0,90	122,43	3W16A	1,40	149,57
1W6A	1,30	125,18	2W9C	0,65	17,43	3W16B	0,76	149,57
1W6B	1,00	113,18	2W9D	1,11	17,43	3W16C	0,87	44,57
1W6C	0,89	8,18	2W10A	1,50	119,71	3W16D	0,89	44,57
1W6D	0,73	8,18	2W10B	0,90	119,71	3W17A	1,40	152,29
1W6E	0,83	8,18	2W10C	0,65	14,71	3W17B	0,76	152,29
1W7A	1,20	112,54	2W10D	1,11	14,71	3W17C	0,87	47,29
1W7B	1,62	7,54	2W11A	2,00	116,98	3W17D	0,89	47,29
1W7C	0,58	7,54	2W11B	0,83	11,98	3W18A	1,70	152,90
1W7D	0,47	7,54	2W11C	0,36	11,98	3W18B	1,16	47,90
1W8A	1,20	122,20	2W11D	0,36	11,98	3W18C	1,23	47,90
1W8B	1,62	5,20	2W11E	0,42	11,98	4W1A	1,00	145,03
1W8C	1,27	5,20	2W11F	0,42	11,98	4W2A	2,13	43,27
1W9A	1,20	120,50	3W1A	1,40	139,27	4W2B	1,40	43,27
1W9B	1,62	3,50	3W1B	0,97	34,27	4W3A	1,05	150,99
1W9C	1,27	3,50	3W1C	0,73	34,27	4W3B	0,62	45,99
1W10A	1,20	120,22	3W1D	0,90	34,27	4W3C	0,68	45,99
1W10B	1,62	3,22	3W2A	1,40	142,00	4W3D	0,88	45,99
1W10C	1,27	3,22	3W2B	0,97	37,00	4W4A	1,70	48,72
1W11A	1,60	108,22	3W2C	0,73	37,00	4W4B	1,64	48,72
1W11B	1,11	3,22	3W2D	0,90	37,00	4W5A	1,20	156,44
1W11C	0,96	3,22	3W3A	1,40	144,72	4W5B	0,74	51,44
1W12A	1,50	120,12	3W3B	0,97	39,72	4W5C	0,49	51,44
1W12B	1,09	108,12	3W3C	0,73	39,72	4W5D	0,81	51,44
1W12C	1,07	3,12	3W3D	0,90	39,72	4W6A	1,20	159,17
1W12D	1,05	3,12	3W4A	1,40	147,45	4W6B	0,57	54,17
1W13A	1,50	121,14	3W4B	0,97	42,45	4W6C	0,65	54,17
1W13B	1,09	109,14	3W4C	0,73	42,45	4W6D	0,81	54,17
1W13C	1,07	4,14	3W4D	0,90	42,45	4W7A	1,05	146,23

1W13D	1,05	4,14	3W5A	1,40	150,17	4W7B	0,62	41,23
2W1A	1,29	128,98	3W5B	0,97	45,17	4W7C	0,87	41,23
2W1B	0,58	116,98	3W5C	1,63	45,17	4W7D	0,80	41,23
2W1C	1,10	11,98	3W6A	1,40	152,90	4W8A	1,05	148,27
2W1D	1,04	11,98	3W6B	1,20	47,90	4W8B	0,62	43,27
2W2A	1,29	131,71	3W6C	1,45	47,90	4W8C	0,87	43,27
2W2B	0,58	119,71	3W7A	1,72	162,17	4W8D	0,80	43,27
2W2C	1,10	14,71	3W7B	1,05	150,17	4W9A	1,80	45,99
2W2D	1,04	14,71	3W7C	0,65	45,17	4W9B	0,92	45,99
2W3A	1,29	134,43	3W7D	1,13	45,17	4W9C	0,80	45,99
2W3B	0,58	122,43	3W8A	1,72	159,45	4W10A	2,10	48,72
2W3C	0,57	17,43	3W8B	1,05	147,45	4W10B	0,79	48,72
2W3D	0,42	17,43	3W8C	0,65	42,45	4W10C	0,80	48,72
2W3E	1,04	17,43	3W8D	1,13	42,45	4W11A	1,15	159,56
2W4A	1,29	137,16	3W9A	1,72	156,72	4W11B	1,21	54,56
2W4B	0,58	125,16	3W9B	1,05	144,72	4W11C	1,07	54,56
2W4C	0,57	20,16	3W9C	0,65	39,72	4W12A	1,20	169,19
2W4D	0,42	20,16	3W9D	1,13	39,72	4W12B	1,35	64,19
2W4E	1,04	20,16	3W10A	1,72	154,00	4W12C	1,14	64,19
2W5A	1,29	139,88	3W10B	1,05	142,00	4W13A	1,67	62,99
2W5B	0,58	127,88	3W10C	0,65	37,00	4W13B	1,67	62,99
2W5C	0,57	22,88	3W10D	1,13	37,00	4W14A	1,67	60,27
2W5D	0,56	22,88	3W11A	1,72	151,27	4W14B	1,67	60,27
2W5E	0,88	22,88	3W11B	1,05	139,27			

APPENDIX 7 – Analyzed families

Analyzed Families			
Amendoas Chocolate	Drop's	Grafic	Rosto
Anitin	Elnett Mousse	Higiene	Rowenta
AVULSO KG.	Elnett Satin	Krup's	Rum
Azeite e Óleos	Elvive Amaciador	Legumes Cozidos	Solares
Azeitonas	Elvive Sh. S/Água	Limp. Face	Studio Line
Bol.S/Açucar	Elvive Shampoo	Magic Retouch	Tefal Electro
Botanicals	Elvive Tratamento	Marmelada	Tefal Menage
Café	Excellence	Men Exp.Dermo	Trat. Face
Cartonagens	F Secos Balde	MEN EXP.DESOD.ROL ON	Ultra Suave Amac.
Casting	Fructis Amaciador	MEN EXP.DESOD.SPRAY	Ultra Suave Body
Coloração	Fructis Coiff.	Men Exp.Gel Banho	Ultra Suave Shampo
Colorista	Fructis Shampo	MIXA	Ultra Suave Shower
Confeitos de Chocola	Fructis Tratamento	Moulinex	Ultra Suave Tratam.
Crackies	FS Culinária	Nozes	Vinho
Deo Narta	FS Saquetas	Ovos	Vodka
DERMO	Gama Permanente	Panificação	Whisky Novo
Dermo Tratamento	Gela.Polaretti	Pastelaria	Whisky Velho
Diversos	Gin	Pipocas	Wrigley's Original

APPENDIX 8 – Example of forecasts to Avulso Kg. Family

Table 1 - Forecast Through Moving Averages Technique of Avulso Kg. Family

Orders 2016/2017 (y)	Month (x)	Forecast	Error	Error
16	1			
18	2			
28	3			
16	4	21	-4,67	4,67
23	5	21	2,33	2,33
26	6	22	3,67	3,67
15	7	22	-6,67	6,67
15	8	21	-6,33	6,33
23	9	19	4,33	4,33
15	10	18	-2,67	2,67
21	11	18	3,33	3,33
34	12	20	14,33	14,33
	13	23		
	14	28		
	15	34		
	16	28		
	17	30		
	18	31		
	19	30		
	20	30		
	21	30		
	22	30		
	23	30		
	24	30		

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,274152289
R Square	0,075159477
Adjusted R Square	-0,01732457
Standard Error	6,215103042
Observations	12

ANOVA

	df	SS	MS	F	Significance F
Regression	1	31,39160839	31,39160839	0,812675002	0,388526847
Residual	10	386,2750583	38,62750583		
Total	11	417,6666667			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	17,78787879	3,8251315	4,650265955	0,000907675	9,264954678	26,3108029	9,264954678	26,3108029
Month (x)	0,468531469	0,519733026	0,901484888	0,388526847	-0,689505879	1,626568817	-0,689505879	1,626568817

Figure 1 – Linear Regression Output for Avulso Kg. Family

Table 2 – Forecast Through Linear Regression Technique of Avulso Kg. Family

Time period	Actual	Forecast	Error	|Error|
Month	Orders 2016/2017	Forecast	Error	Error
1	16	18	-2,26	2,26
2	18	19	-0,72	0,72
3	28	19	8,81	8,81
4	16	20	-3,66	3,66
5	23	20	2,87	2,87
6	26	21	5,40	5,40
7	15	21	-6,07	6,07
8	15	22	-6,54	6,54
9	23	22	1,00	1,00
10	15	22	-7,47	7,47
11	21	23	-1,94	1,94
12	34	23	10,59	10,59
13		**24**		
14		**24**		
15		**25**		
16		**25**		
17		**26**		
18		**26**		
19		**27**		
20		**27**		
21		**28**		
22		**28**		
23		**29**		
24		**29**		

Appendix 9 - Forecasts through the Moving Averages and Linear Regression Techniques

Family	Orders from 2016/2017	MA Forecast	LR Forecast	MA MAD	LR MAD	MA MAPE	LR MAPE	MA MSD	LR MSD	Selected Technique	Forecast
Amendoas Chocolate	265	0	- 560	22,56	29,89	36,38%	11,28%	4.579	10.719	MA	0
Anitin	299	262	**312**	8,85	8,40	3,90%	2,81%	705	847	LR	312
AVULSO KG.	250	354	**317**	5,37	4,78	2,86%	1,91%	260	274	LR	317
Azeite e Óleos	2	0	**1**	0,44	0,30	22,22%	15,25%	2	1	LR	1
Azeitonas	15	0	- 18	1,67	1,36	13,89%	9,09%	25	22	MA	0
Bol.S/Açucar	245	200	**204**	9,33	7,20	5,10%	2,94%	784	622	LR	204
Botanicals	48	0	**12**	10,22	6,81	22,72%	14,19%	940	557	LR	12
Café	1.313	1.500	**977**	31,41	25,19	3,46%	1,92%	8.878	7.617	LR	977
Cartonagens	149	579	**663**	13,78	13,55	9,91%	9,09%	1.708	2.203	LR	663
Casting	357	370	**581**	10,52	9,13	3,47%	2,56%	996	1.001	LR	581
Coloração	1.200	1.280	**1.929**	44,85	30,40	4,47%	2,53%	18.105	11.091	LR	1.929
Colorista	73	0	**6**	14,19	9,32	20,56%	12,76%	1.811	1.042	LR	6
Confeitos de Chocola	235	**4**	- 576	21,19	26,67	68,34%	11,35%	4.039	8.533	MA	4
Crackies	32	0	- 32	2,67	2,79	11,59%	8,73%	64	94	MA	0
Deo Narta	1.542	964	**2.136**	65,74	51,36	5,05%	3,33%	38.897	31.659	LR	2.136
DERMO	15	20	**16**	1,93	1,37	16,05%	9,16%	33	23	LR	16
Dermo Tratamento	492	811	**1.477**	20,74	11,39	4,52%	2,31%	3.872	1.556	LR	1.477
Diversos	133	350	**342**	13,11	12,41	13,38%	9,33%	1.547	1.849	LR	342
Drop's	101	189	**392**	16,00	12,58	17,02%	12,46%	2.304	1.900	LR	392

Elnett Mousse	12	17	**45**	1,78	1,36	14,81%	11,32%	28	22	**LR**	45
Elnett Satin	780	800	**1.707**	35,11	23,75	5,06%	3,04%	11.095	6.766	**LR**	1.707
Elvive Amaciador	1.400	1.207	**2.276**	48,00	35,03	4,06%	2,50%	20.736	14.729	**LR**	2.276
Elvive Sh. S/Água	1	0	- 2	0,22	2,00	22,22%	14,76%	0,44	0,26	**MA**	0
Elvive Shampoo	2.161	1.961	**3.766**	68,00	50,27	3,68%	2,33%	41.616	30.329	**LR**	3.766
Elvive Tratamento	450	486	**1.164**	24,96	15,38	5,94%	3,42%	5.608	2.837	**LR**	1.164
Excellence	1.009	1.258	**2.407**	62,41	43,23	6,78%	4,28%	35.052	22.425	**LR**	2.407
F Secos Balde	284	**210**	350	8,52	8,83	3,46%	3,11%	653	936	**MA**	210
Fructis Amaciador	596	544	**880**	19,70	13,89	3,92%	2,33%	3.494	2.315	**LR**	880
Fructis Coiff.	448	471	**944**	16,67	12,39	4,15%	2,77%	2.500	1.842	**LR**	944
Fructis Shampo	901	788	**1.381**	31,70	23,93	4,23%	2,66%	9.046	6.873	**LR**	1.381
Fructis Tratamento	279	313	**557**	8,00	5,09	3,36%	1,83%	576	311	**LR**	557
FS Culinária	1.171	2.147	**3.279**	48,19	33,07	4,60%	2,82%	20.896	13.123	**LR**	3.279
FS Saquetas	2.332	2.762	**4.150**	48,41	39,54	2,42%	1,70%	21.089	18.762	**LR**	4.150
Gama Permanente	14	4	**20**	1,59	1,24	12,25%	8,85%	23	18	**LR**	20
Gela.Polaretti	90	12	**33**	13,74	9,82	15,79%	10,91%	1.699	1.156	**LR**	33
Gin	40	40	**80**	1,70	1,16	4,73%	2,91%	26	16	**LR**	80
Grafic	125	149	**290**	5,37	3,80	4,75%	3,04%	260	173	**LR**	290
Higiene	273	280	**357**	24,81	19,20	11,76%	7,03%	5.542	4.424	**LR**	357
Krup's	89	140	**201**	5,33	3,90	7,11%	4,38%	256	182	**LR**	201
Legumes Cozidos	7	0	- 5	0,85	0,67	14,20%	9,58%	7	5	**MA**	0
Limp. Face	193	251	**548**	8,74	5,74	4,88%	2,97%	688	395	**LR**	548
Magic Retouch	152	161	**270**	7,67	6,06	5,60%	3,99%	529	440	**LR**	270
Marmelada	177	132	**143**	2,67	2,64	1,96%	1,49%	64	84	**LR**	143
Men Exp.Dermo	237	389	763	12,93	9,37	5,62%	3,95%	1.504	1.053	**LR**	763
MEN EXP.DESOD.ROL ON	245	134	**390**	16,26	15,23	7,04%	6,22%	2.379	2.785	**LR**	390
MEN EXP.DESOD.SPRAY	285	237	**528**	17,22	15,89	6,43%	5,58%	2.669	3.030	**LR**	528
Men Exp.Gel Banho	49	0	- 9	8,44	5,84	17,59%	11,91%	642	409	**MA**	0
MIXA	132	122	**299**	7,78	5,64	6,32%	4,27%	544	382	**LR**	299
Moulinex	423	545	**603**	16,33	9,27	4,76%	2,19%	2.401	1.031	**LR**	603
Nozes	27	**133**	162	2,48	3,19	9,19%	11,82%	55	122	**MA**	133
Ovos	625	**14**	- 1.389	54,00	68,95	41,86%	11,03%	26.244	57.044	**MA**	14
Panificação	87	87	**89**	2,04	1,41	3,13%	1,63%	37	24	**LR**	89
Pastelaria	807	901	**1.022**	10,59	9,09	1,74%	1,13%	1.010	992	**LR**	1.022
Pipocas	398	416	**446**	7,56	6,06	2,47%	1,52%	514	440	**LR**	446
Rosto	85	79	**92**	5,67	3,60	7,76%	4,23%	289	155	**LR**	92
Rowenta	530	641	**789**	13,59	10,13	3,13%	1,91%	1.663	1.232	**LR**	789
Rum	55	16	**69**	4,11	3,35	8,75%	6,10%	152	135	**LR**	69
Solares	841	465	**1.117**	79,78	67,59	9,49%	8,04%	57.280	54.822	**LR**	1.117
Studio Line	561	605	**1.173**	24,04	17,17	4,91%	3,06%	5.200	3.537	**LR**	1.173
Tefal Electro	144	166	**209**	5,41	3,62	4,47%	2,51%	263	157	**LR**	209
Tefal Menage	87	54	**63**	12,56	8,17	15,13%	9,39%	1.419	800	**LR**	63
Trat. Face	333	408	**766**	11,48	8,62	3,78%	2,59%	1.186	892	**LR**	766
Ultra Suave Amac.	937	749	**1.813**	46,33	34,00	5,55%	3,63%	19.321	13.874	**LR**	1.813
Ultra Suave Body	293	128	**400**	21,85	14,81	8,34%	5,05%	4.298	2.631	**LR**	400
Ultra Suave Shampo	1.808	1.779	**3.584**	64,33	46,30	4,06%	2,56%	37.249	25.728	**LR**	3.584
Ultra Suave Shower	21	0	**9**	4,59	3,03	21,87%	14,45%	190	111	**LR**	9
Ultra Suave Tratam.	609	653	**1.477**	26,93	18,68	4,84%	3,07%	6.525	4.186	**LR**	1.477
Vinho	830	844	**772**	35,00	23,80	5,36%	2,87%	11.025	6.798	**LR**	772
Vodka	220	66	**131**	14,00	11,80	8,19%	5,37%	1.764	1.672	**LR**	131
Whisky Novo	55	51	**63**	1,07	0,85	2,50%	1,54%	10	9	**LR**	63
Wrigley´s Original	2.291	1.914	**1.771**	30,33	18,54	1,76%	0,81%	8.281	4.123	**LR**	1.771
Whisky Velho	-	-	**-**	----	----	----	----	----	----	**MA**	0
Total	**32.765**										**52.660**

M.A. should be read as Moving Averages and LR as Linear Regression.

APPENDIX 10 – ABC Analysis (considering the 72 families toguether)

Family	Number of SKUs	Forecasted Orders	Forecasted Orders Weight (%)	Forecasted Orders Cumulative Weight (%)	Number of Items	Number of Items (%)	Number of Items (cumulative %)	ABC Classific.
FS Saquetas	19	4.150	7,88%	7,88%	1	1,39%	1,4%	A
Elvive Shampoo	34	3.766	7,15%	15,03%	1	1,39%	2,8%	A
Ultra Suave Shampo	33	3.584	6,81%	21,84%	1	1,39%	4,2%	A
FS Culinária	10	3.279	6,23%	28,06%	1	1,39%	5,6%	A
Excellence	34	2.407	4,57%	32,64%	1	1,39%	6,9%	A
Elvive Amaciador	16	2.276	4,32%	36,96%	1	1,39%	8,3%	A
Deo Narta	23	2.136	4,06%	41,01%	1	1,39%	9,7%	A
Coloração	27	1.929	3,66%	44,68%	1	1,39%	11,1%	A
Ultra Suave Amac.	20	1.813	3,44%	48,12%	1	1,39%	12,5%	A
Wrigley´s Original	5	1.771	3,36%	51,48%	1	1,39%	13,9%	A
Elnett Satin	11	1.707	3,24%	54,72%	1	1,39%	15,3%	A
Dermo Tratamento	23	1.477	2,80%	57,53%	1	1,39%	16,7%	A
Ultra Suave Tratam.	14	1.477	2,80%	60,33%	1	1,39%	18,1%	A
Fructis Shampo	13	1.381	2,62%	62,96%	1	1,39%	19,4%	A
Studio Line	7	1.173	2,23%	65,18%	1	1,39%	20,8%	B
Elvive Tratamento	12	1.164	2,21%	67,39%	1	1,39%	22,2%	B
Solares	24	1.117	2,12%	69,51%	1	1,39%	23,6%	B
Pastelaria	27	1.022	1,94%	71,46%	1	1,39%	25,0%	B
Café	23	977	1,86%	73,31%	1	1,39%	26,4%	B
Fructis Coiff.	9	944	1,79%	75,10%	1	1,39%	27,8%	B
Fructis Amaciador	8	880	1,67%	76,78%	1	1,39%	29,2%	B
Rowenta	42	789	1,50%	78,27%	1	1,39%	30,6%	B
Vinho	30	772	1,47%	79,74%	1	1,39%	31,9%	B
Trat. Face	12	766	1,45%	81,19%	1	1,39%	33,3%	B
Men Exp.Dermo	14	763	1,45%	82,64%	1	1,39%	34,7%	B
Cartonagens	4	663	1,26%	83,90%	1	1,39%	36,1%	B
Moulinex	32	603	1,14%	85,05%	1	1,39%	37,5%	B
Casting	11	581	1,10%	86,15%	1	1,39%	38,9%	B
Fructis Tratamento	2	557	1,06%	87,21%	1	1,39%	40,3%	B
Limp. Face	5	548	1,04%	88,25%	1	1,39%	41,7%	B
MEN EXP.DESOD.SPRAY	6	528	1,00%	89,25%	1	1,39%	43,1%	B
Pipocas	2	446	0,85%	90,10%	1	1,39%	44,4%	B
Ultra Suave Body	13	400	0,76%	90,86%	1	1,39%	45,8%	B
Drop's	9	392	0,74%	91,60%	1	1,39%	47,2%	B
MEN EXP.DESOD.ROL ON	5	390	0,74%	92,34%	1	1,39%	48,6%	B
Higiene	10	357	0,68%	93,02%	1	1,39%	50,0%	C
Diversos	2	342	0,65%	93,67%	1	1,39%	51,4%	C
AVULSO KG.	11	317	0,60%	94,27%	1	1,39%	52,8%	C
Anitin	2	312	0,59%	94,86%	1	1,39%	54,2%	C
MIXA	14	299	0,57%	95,43%	1	1,39%	55,6%	C
Grafic	3	290	0,55%	95,98%	1	1,39%	56,9%	C
Magic Retouch	7	270	0,51%	96,49%	1	1,39%	58,3%	C
F Secos Balde	2	210	0,40%	96,89%	1	1,39%	59,7%	C
Tefal Electro	21	209	0,40%	97,29%	1	1,39%	61,1%	C
Bol.S/Açucar	8	204	0,39%	97,68%	1	1,39%	62,5%	C
Krup's	34	201	0,38%	98,06%	1	1,39%	63,9%	C
Marmelada	2	143	0,27%	98,33%	1	1,39%	65,3%	C
Nozes	1	133	0,25%	98,58%	1	1,39%	66,7%	C
Vodka	7	131	0,25%	98,83%	1	1,39%	68,1%	C
Rosto	5	92	0,17%	99,01%	1	1,39%	69,4%	C
Panificação	3	89	0,17%	99,18%	1	1,39%	70,8%	C
Gin	1	80	0,15%	99,33%	1	1,39%	72,2%	C
Rum	1	69	0,13%	99,46%	1	1,39%	73,6%	C
Tefal Menage	54	63	0,12%	99,58%	1	1,39%	75,0%	C
Whisky Novo	2	63	0,12%	99,70%	1	1,39%	76,4%	C
Elnett Mousse	4	45	0%	99,78%	1	1,39%	77,8%	C
Gela.Polaretti	6	33	0,06%	99,85%	1	1,39%	79,2%	C
Gama Permanente	1	20	0,04%	99,88%	1	1,39%	80,6%	C
DERMO	3	16	0,03%	99,91%	1	1,39%	81,9%	C
Ovos	30	14	0,03%	99,94%	1	1,39%	83,3%	C
Botanicals	15	12	0,02%	99,96%	1	1,39%	84,7%	C
Ultra Suave Shower	6	9	0,02%	99,98%	1	1,39%	86,1%	C

Colorista	23	6	0,01%	99,99%	1	1,39%	87,5%	C
Confeitos de Chocola	6	4	0,01%	100,00%	1	1,39%	88,9%	C
Azeite e Óleos	8	1	0,00%	100,00%	1	1,39%	90,3%	C
Amendoas Chocolate	12	-	0,00%	100,00%	1	1,39%	91,7%	C
Crackies	2	-	0,00%	100,00%	1	1,39%	93,1%	C
Men Exp.Gel Banho	4	-	0,00%	100,00%	1	1,39%	94,4%	C
Azeitonas	6	-	0,00%	100,00%	1	1,39%	95,8%	C
Legumes Cozidos	5	-	0,00%	100,00%	1	1,39%	97,2%	C
Elvive Sh. S/Água	3	-	0,00%	100,00%	1	1,39%	98,6%	C
Whisky Velho	1	-	0,00%	100,00%	1	1,39%	100,0%	C
Total	**904**	**52.660**			**72**			

APPENDIX 11 – ABC Analysis (separating families that need to be stored in the controlled temperature warehouse)

Table 1 – Families stored in the 1st, 2nd and 3rd Warehouses

Family	Number of SKUs	Forecasted Orders	Forecasted Orders Weight (%)	Forecasted Orders Cumulative Weight (%)	Number of Items	Number of Items (%)	Number of Items (cumulative %)	ABC Classif.
Elvive Shampoo	34	3.766	8,8%	8,80%	1	1,6%	1,6%	A1
Ultra Suave Shampo	33	3.584	8,4%	17,18%	1	1,6%	3,3%	A1
Excellence	34	2.407	5,6%	22,81%	1	1,6%	4,92%	A1
Elvive Amaciador	16	2.276	5,3%	28,13%	1	1,6%	6,56%	A1
Deo Narta	23	2.136	5,0%	33,12%	1	1,6%	8,20%	A1
Coloração	27	1.929	4,5%	37,63%	1	1,6%	9,84%	A1
Ultra Suave Amac.	20	1.813	4,2%	41,87%	1	1,6%	11,48%	A1
Wrigley´s Original	5	1.771	4,1%	46,01%	1	1,6%	13,11%	A1
Elnett Satin	11	1.707	4,0%	50,00%	1	1,6%	14,75%	A1
Dermo Tratamento	23	1.477	3,5%	53,45%	1	1,6%	16,39%	A1
Ultra Suave Tratam.	14	1.477	3,5%	56,90%	1	1,6%	18,03%	A1
Fructis Shampo	13	1.381	3,2%	60,13%	1	1,6%	19,67%	A1
Studio Line	7	1.173	2,7%	62,87%	1	1,6%	21,31%	B1
Elvive Tratamento	12	1.164	2,7%	65,59%	1	1,6%	22,95%	B1
Solares	24	1.117	2,6%	68,20%	1	1,6%	24,59%	B1
Café	23	977	2,3%	70,49%	1	1,6%	26,23%	B1
Fructis Coiff.	9	944	2,2%	72,70%	1	1,6%	27,87%	B1
Fructis Amaciador	8	880	2,1%	74,75%	1	1,6%	29,51%	B1
Rowenta	42	789	1,8%	76,60%	1	1,6%	31,15%	B1
Vinho	30	772	1,8%	78,40%	1	1,6%	32,79%	B1
Trat. Face	12	766	1,8%	80,19%	1	1,6%	34,43%	B1
Men Exp.Dermo	14	763	1,8%	81,97%	1	1,6%	36,07%	B1
Moulinex	32	603	1,4%	83,38%	1	1,6%	37,70%	B1
Casting	11	581	1,4%	84,74%	1	1,6%	39,34%	B1
Fructis Tratamento	2	557	1,3%	86,04%	1	1,6%	40,98%	B1
Limp. Face	5	548	1,3%	87,32%	1	1,6%	42,62%	B1
MEN EXP.DESOD.SPRAY	6	528	1,2%	88,56%	1	1,6%	44,26%	B1
Pipocas	2	446	1,0%	89,60%	1	1,6%	45,90%	B1
Ultra Suave Body	13	400	0,9%	90,54%	1	1,6%	47,54%	B1
Drop's	9	392	0,9%	91,45%	1	1,6%	49,18%	B1
MEN EXP.DESOD.ROL ON	5	390	0,9%	92,36%	1	1,6%	50,82%	B1
Higiene	10	357	0,8%	93,20%	1	1,6%	52,46%	C1
Diversos	2	342	0,8%	94,00%	1	1,6%	54,10%	C1
Anitin	2	312	0,7%	94,73%	1	1,6%	55,74%	C1
MIXA	14	299	0,7%	95,43%	1	1,6%	57,38%	C1
Grafic	3	290	0,7%	96,10%	1	1,6%	59,02%	C1
Magic Retouch	7	270	0,6%	96,73%	1	1,6%	60,66%	C1
Tefal Electro	21	209	0,5%	97,22%	1	1,6%	62,30%	C1
Bol.S/Açucar	8	204	0,5%	97,70%	1	1,6%	63,93%	C1
Krup's	34	201	0,5%	98,17%	1	1,6%	65,57%	C1
Marmelada	2	143	0,3%	98,51%	1	1,6%	67,21%	C1
Vodka	7	131	0,3%	98,81%	1	1,6%	68,85%	C1
Rosto	5	92	0,2%	99,03%	1	1,6%	70,49%	C1

Gin	1	80	0,2%	99,21%	1	1,6%	72,13%	C1
Rum	1	69	0,2%	99,37%	1	1,6%	73,77%	C1
Tefal Menage	54	63	0,1%	99,52%	1	1,6%	75,41%	C1
Whisky Novo	2	63	0,1%	99,67%	1	1,6%	77,05%	C1
Elnett Mousse	4	45	0,1%	99,77%	1	1,6%	78,69%	C1
Gela.Polaretti	6	33	0,1%	99,85%	1	1,6%	80,33%	C1
Gama Permanente	1	20	0,0%	99,90%	1	1,6%	81,97%	C1
DERMO	3	16	0,0%	99,93%	1	1,6%	83,61%	C1
Botanicals	15	12	0,0%	99,96%	1	1,6%	85,25%	C1
Ultra Suave Shower	6	9	0,0%	99,98%	1	1,6%	86,89%	C1
Colorista	23	6	0,0%	100,00%	1	1,6%	88,52%	C1
Azeite e Óleos	8	1	0,0%	100,00%	1	1,6%	90,16%	C1
Men Exp.Gel Banho	4	-	0,0%	100,00%	1	1,6%	91,80%	C1
Crackies	2	-	0,0%	100,00%	1	1,6%	93,44%	C1
Azeitonas	6	-	0,0%	100,00%	1	1,6%	95,08%	C1
Legumes Cozidos	5	-	0,0%	100,00%	1	1,6%	96,72%	C1
Elvive Sh. S/Água	3	-	0,0%	100,00%	1	1,6%	98,36%	C1
Whisky Velho	1	-	0,0%	100,00%	1	1,6%	100,00%	C1
Total	**779**	**42.780**			**61**			

Table 2 – Families Stored in the 4th Warehouse

Family	Number of SKUs	Forecasted Orders	Forecasted Orders Weight (%)	Forecasted Orders Cumulative Weight (%)	Number of Items	Number of Items (%)	Number of Items (cumulative %)	ABC Classif.
FS Saquetas	19	4.150	42,0%	42,00%	1	9,1%	9,09%	A2
FS Culinária	10	3.279	33,2%	75,19%	1	9,1%	18,18%	A2
Pastelaria	27	1.022	10,3%	85,53%	1	9,1%	27,27%	B2
Cartonagens	4	663	6,7%	92,25%	1	9,1%	36,36%	B2
AVULSO KG.	11	317	3,2%	95,46%	1	9,1%	45,45%	C2
F Secos Balde	2	210	2,1%	97,58%	1	9,1%	54,55%	C2
Nozes	1	133	1,3%	98,92%	1	9,1%	63,64%	C2
Panificação	3	89	0,9%	99,82%	1	9,1%	72,73%	C2
Ovos	30	14	0,1%	99,96%	1	9,1%	81,82%	C2
Confeitos de Chocola	6	4	0,04%	100,00%	1	9,1%	90,91%	C2
Amendoas Chocolate	12	-	0,0%	100,00%	1	9,1%	100,00%	C2
Total	**125**	**9.880**			**11**			

APPENDIX 12 – COI Analysis

Family	Number of SKUs	Forecasted Orders	Occupied Volume (in m³)	COI
Studio Line	7	1.173	5.488	4,68
Fructis Coiff.	9	944	4.756	5,04
Fructis Tratamento	2	557	2.832	5,08
Grafic	3	290	2.015	6,96
Men Exp.Dermo	14	763	5.849	7,66
Ultra Suave Tratam.	14	1.477	11.992	8,12
Dermo Tratamento	23	1.477	13.694	9,27
FS Culinária	10	3.279	32.888	10,03
Elvive Tratamento	12	1.164	13.046	11,21
Trat. Face	12	766	8.925	11,66
MEN EXP.DESOD.SPRAY	6	528	6.843	12,96
Limp. Face	5	548	7.251	13,23
MEN EXP.DESOD.ROL ON	5	390	6.175	15,85
Magic Retouch	7	270	5.428	20,12
Casting	11	581	12.720	21,89
Excellence	34	2.407	56.006	23,27
FS Saquetas	19	4.150	106.039	25,55
Wrigley´s Original	5	1.771	50.304	28,41
Solares	24	1.117	34.499	30,87
Deo Narta	23	2.136	67.111	31,42
Rosto	5	92	3.055	33,37

Diversos	2	342	11.520	33,69
Ultra Suave Body	13	400	13.753	34,36
Elnett Satin	11	1.707	63.021	36,91
Coloração	27	1.929	72.278	37,47
Ultra Suave Shampo	33	3.584	141.611	39,51
Elvive Amaciador	16	2.276	97.494	42,83
Fructis Amaciador	8	880	42.240	48,00
Cartonagens	4	663	39.744	59,94
DERMO	3	16	945	60,95
Ultra Suave Amac.	20	1.813	117.526	64,84
Pipocas	2	446	29.664	66,46
Nozes	1	133	10.080	76,01
Pastelaria	27	1.022	86.684	84,82
Fructis Shampo	13	1.381	118.121	85,54
Elnett Mousse	4	45	3.956	87,46
Anitin	2	312	31.488	101,06
AVULSO KG.	11	317	32.818	103,37
Elvive Shampoo	34	3.766	396.087	105,18
Drop's	9	392	42.322	108,10
MIXA	14	299	36.124	120,75
Bol.S/Açucar	8	204	29.819	146,02
Marmelada	2	143	21.248	148,31
Panificação	3	89	15.090	170,49
Whisky Novo	2	63	11.328	181,10
Gin	1	80	15.360	191,33
Café	23	977	187.829	192,22
Rum	1	69	13.920	202,93
F Secos Balde	2	210	47.094	224,61
Moulinex	32	603	162.057	268,86
Higiene	10	357	100.368	281,08
Rowenta	42	789	296.300	375,63
Vinho	30	772	332.294	430,66
Vodka	7	131	69.120	526,09
Tefal Electro	21	209	131.524	627,93
Krup's	34	201	170.875	848,94
Ultra Suave Shower	6	9	9.345	992,08
Gama Permanente	1	20	24.800	1.237,40
Botanicals	15	12	15.504	1.319,69
Ovos	30	14	23.040	1.672,20
Gela.Polaretti	6	33	126.160	3.869,77
Tefal Menage	54	63	250.124	3.949,17
Colorista	23	6	25.903	4.292,07
Confeitos de Chocola	6	4	33.120	8.167,03
Azeite e Óleos	8	1	71.938	72.444,20
Amendoas Chocolate	12	-	32.508	----
Crackies	2	-	10.352	----
Men Exp.Gel Banho	4	-	21.312	----
Azeitonas	6	-	8.237	----
Elvive Sh. S/Água	3	-	3.249	----
Legumes Cozidos	5	-	10.464	----
Whisky Velho	1	-	6.720	----
Total	**904**	**52.660**	**4.121.385**	

APPENDIX 13 – Dedicated Storage (ABC analysis): allocation of families in the storing area, per shlef

Family	Occupied Volume (in m³)	Weight (%)	Forecasted Orders	Distance between each rack and the expedition area (in meters)	Total Travelled Distance (in meters)	ABC Classif.
FS Saquetas	**106.039**	**100%**	**4.150**		**174.597**	**A**
4W2A	44.209	42%	1.730	43,27	74.850	
4W7B	16.740	16%	655	41,23	27.006	
4W7C	23.490	22%	919	41,23	37.895	
4W7D	21.600	20%	845	41,23	34.846	
Elvive Shampoo	**396.087**	**100%**	**3.766**		**12.102**	**A**
1W10B	52.488	13%	499	3,22	1.607	
1W10C	41.148	10%	391	3,22	1.260	
1W11B	35.964	9%	342	3,22	1.101	
1W11C	31.104	8%	296	3,22	952	
1W12C	34.668	9%	330	3,12	1.028	
1W12D	34.020	9%	323	3,12	1.009	
1W1B	37.584	9%	357	3,22	1.151	
1W1C	54.108	14%	514	3,22	1.656	
1W2C	25.272	6%	240	3,22	774	
1W2D	33.696	9%	320	3,22	1.032	
1W9B	16.035	4%	152	3,50	533	
Ultra Suave Shampo	**141.611**	**100%**	**3.584**		**15.298**	**A**
1W8B	52.488	37%	1.329	5,20	6.913	
1W8C	11.521	8%	292	5,20	1.517	
1W9B	36.453	26%	923	3,50	3.226	
1W9C	41.148	29%	1.042	3,50	3.642	
FS Culinária	**32.888**	**100%**	**3.279**		**141.872**	**A**
4W2A	24.803	75%	2.473	43,27	106.997	
4W2B	8.085	25%	806	43,27	34.875	
Excellence	**56.006**	**100%**	**2.407**		**9.966**	**A**
1W13C	34.668	62%	1.490	4,14	6.169	
1W13D	21.338	38%	917	4,14	3.797	
Elvive Amaciador	**97.494**	**100%**	**2.276**		**10.143**	**A**
1W3B	49.572	51%	1.157	4,22	4.882	
1W3C	36.936	38%	862	4,22	3.637	
1W4B	10.986	11%	256	6,33	1.624	
Deo Narta	**67.111**	**100%**	**2.136**		**13.522**	**A**
1W4B	30.810	46%	981	6,33	6.208	
1W4C	36.300	54%	1.155	6,33	7.314	
Coloração	**72.278**	**100%**	**1.929**		**12.692**	**A**
1W7B	42.651	59%	1.138	7,54	8.578	
1W8C	29.627	41%	791	5,20	4.115	
Ultra Suave Amac.	**117.526**	**100%**	**1.813**		**14.414**	**A**
1W5B	3.037	3%	47	8,79	412	
1W6C	24.030	20%	371	8,18	3.030	
1W6D	19.710	17%	304	8,18	2.485	
1W6E	26.892	23%	415	8,18	3.391	
1W7B	9.837	8%	152	7,54	1.143	
1W7C	18.792	16%	290	7,54	2.184	
1W7D	15.228	13%	235	7,54	1.770	
Wrigley´s Original	**50.304**	**100%**	**1.771**		**14.972**	**A**
1W4C	6.792	14%	239	6,33	1.514	
1W5B	43.512	86%	1.532	8,79	13.459	
Elnett Satin	**63.021**	**100%**	**1.707**		**20.455**	**A**
2W1C	29.700	47%	805	11,98	9.640	
2W1D	33.321	53%	903	11,98	10.815	
Dermo Tratamento	**13.694**	**100%**	**1.477**		**12.976**	**A**
1W5C	13.694	100%	1.477	8,79	12.976	
Ultra Suave Tratam.	**11.992**	**100%**	**1.477**		**6.113**	**A**
1W13D	11.992	100%	1.477	4,14	6.113	
Fructis Shampo	**118.121**	**100%**	**1.381**		**18.250**	**A**
2W11B	22.410	19%	262	11,98	3.138	
2W11C	9.720	8%	114	11,98	1.361	
2W11D	9.720	8%	114	11,98	1.361	
2W11E	11.340	10%	133	11,98	1.588	

2W11F	11.340	10%	133	11,98	1.588	
2W2C	29.700	25%	347	14,71	5.105	
2W2D	23.891	20%	279	14,71	4.107	
Studio Line	**5.488**	**100%**	**1.173**		**10.304**	**B**
1W5C	5.488	100%	1.173	8,79	10.304	
Elvive Tratamento	**13.046**	**100%**	**1.164**		**10.227**	**B**
1W5C	13.046	100%	1.164	8,79	10.227	
Solares	**34.499**	**100%**	**1.117**		**16.432**	**B**
2W10C	17.550	51%	568	14,71	8.359	
2W10D	16.949	49%	549	14,71	8.073	
Pastelaria	**86.684**	**100%**	**1.022**		**44.217**	**B**
4W2B	37.276	43%	439	43,27	19.014	
4W8B	16.740	19%	197	43,27	8.539	
4W8C	23.490	27%	277	43,27	11.982	
4W8D	9.179	11%	108	43,27	4.682	
Café	**187.829**	**100%**	**977**		**17.540**	**B**
2W10D	19.015	10%	99	14,71	1.455	
2W3C	15.390	8%	80	17,43	1.396	
2W3D	11.340	6%	59	17,43	1.028	
2W3E	33.696	18%	175	17,43	3.056	
2W4C	15.390	8%	80	20,16	1.614	
2W4D	11.340	6%	59	20,16	1.189	
2W4E	28.144	15%	146	20,16	2.951	
2W9C	17.550	9%	91	17,43	1.591	
2W9D	35.964	19%	187	17,43	3.261	
Fructis Coiff.	**4.756**	**100%**	**944**		**8.298**	**B**
1W5B	4.756	100%	944	8,79	8.298	
Fructis Amaciador	**42.240**	**100%**	**880**		**17.736**	**B**
2W8C	17.550	42%	366	20,16	7.369	
2W8D	24.690	58%	514	20,16	10.367	
Rowenta	**296.300**	**100%**	**789**		**22.307**	**B**
2W5C	15.390	5%	41	22,88	937	
2W5D	15.120	5%	40	22,88	921	
2W5E	28.512	10%	76	22,88	1.737	
2W6C	13.500	5%	36	24,70	888	
2W6D	13.230	4%	35	24,70	870	
2W6E	28.512	10%	76	24,70	1.875	
2W7C	13.500	5%	36	27,43	986	
2W7D	13.230	4%	35	27,43	966	
2W7E	28.512	10%	76	27,43	2.082	
3W12C	33.048	11%	88	31,47	2.769	
3W12D	35.316	12%	94	31,47	2.959	
3W13B	38.556	13%	103	34,20	3.510	
3W13C	19.874	7%	53	34,20	1.809	
Vinho	**332.294**	**100%**	**772**		**28.195**	**B**
3W10C	17.550	5%	41	37,00	1.508	
3W10D	36.612	11%	85	37,00	3.145	
3W11C	17.550	5%	41	34,27	1.397	
3W11D	36.612	11%	85	34,27	2.913	
3W1B	26.190	8%	61	34,27	2.084	
3W1C	19.710	6%	46	34,27	1.568	
3W1D	29.160	9%	68	34,27	2.320	
3W2B	26.190	8%	61	37,00	2.250	
3W2C	19.710	6%	46	37,00	1.693	
3W2D	29.160	9%	68	37,00	2.505	
3W3B	26.190	8%	61	39,72	2.416	
3W3C	19.710	6%	46	39,72	1.818	
3W3D	27.950	8%	65	39,72	2.578	
Trat. Face	**8.925**	**100%**	**766**		**11.257**	**B**
2W2D	8.925	100%	766	14,71	11.257	
Men Exp.Dermo	**5.849**	**100%**	**763**		**15.381**	**B**
2W8D	5.849	100%	763	20,16	15.381	
Cartonagens	**39.744**	**100%**	**663**		**29.733**	**B**
4W3B	16.740	42%	279	45,99	12.844	
4W3C	6.263	16%	104	45,99	4.805	
4W8D	16.742	42%	279	43,27	12.084	
Moulinex	**162.057**	**100%**	**603**		**24.365**	**B**
3W14B	32.400	20%	121	39,12	4.714	
3W14C	51.840	32%	193	39,12	7.542	
3W15B	32.400	20%	121	41,84	5.042	
3W15C	45.417	28%	169	41,84	7.068	

Casting	**12.720**	**100%**	**581**		**23.080**	**B**
3W9C	12.720	100%	581	39,72	23.080	
Fructis Tratamento	**2.832**	**100%**	**557**		**11.235**	**B**
2W4E	2.832	100%	557	20,16	11.235	
Limp. Face	**7.251**	**100%**	**548**		**11.044**	**B**
2W4E	2.720	38%	206	20,16	4.143	
2W8D	4.531	62%	342	20,16	6.901	
MEN EXP.DESOD.SPRAY	**6.843**	**100%**	**528**		**20.980**	**B**
3W9D	6.843	100%	528	39,72	20.980	
Pipocas	**29.664**	**100%**	**446**		**17.728**	**B**
3W9D	29.664	100%	446	39,72	17.728	
Ultra Suave Body	**13.753**	**100%**	**400**		**16.988**	**B**
3W4B	13.753	100%	400	42,45	16.988	
Drop's	**42.322**	**100%**	**392**		**16.618**	**B**
3W4C	19.710	47%	182	42,45	7.739	
3W4D	22.612	53%	209	42,45	8.879	
MEN EXP.DESOD.ROL ON	**6.175**	**100%**	**390**		**16.297**	**B**
3W15C	6.175	100%	390	41,84	16.297	
Higiene	**100.368**	**100%**	**357**		**15.505**	**C**
3W16C	23.490	23%	84	44,57	3.724	
3W16D	22.716	23%	81	44,57	3.602	
3W8C	17.550	17%	62	42,45	2.650	
3W8D	36.612	36%	130	42,45	5.529	
Diversos	**11.520**	**100%**	**342**		**14.514**	**C**
3W4B	11.520	100%	342	42,45	14.514	
AVULSO KG.	**32.818**	**100%**	**317**		**14.600**	**C**
4W3C	12.098	37%	117	45,99	5.382	
4W3D	20.721	63%	200	45,99	9.218	
Anitin	**31.488**	**100%**	**312**		**13.898**	**C**
3W4D	6.548	21%	65	42,45	2.750	
3W5B	24.940	79%	247	45,17	11.148	
MIXA	**36.124**	**100%**	**299**		**13.513**	**C**
3W5C	36.124	100%	299	45,17	13.513	
Grafic	**2.015**	**100%**	**290**		**9.904**	**C**
3W13C	2.015	100%	290	34,20	9.904	
Magic Retouch	**5.428**	**100%**	**270**		**12.024**	**C**
3W16D	5.428	100%	270	44,57	12.024	
F Secos Balde	**47.094**	**100%**	**210**		**9.643**	**C**
4W9A	47.094	100%	210	45,99	9.643	
Tefal Electro	**131.524**	**100%**	**209**		**9.724**	**C**
3W5C	16.688	13%	27	45,17	1.200	
3W6B	38.880	30%	62	47,90	2.966	
3W6C	21.794	17%	35	47,90	1.662	
3W7C	17.550	13%	28	45,17	1.262	
3W7D	36.612	28%	58	45,17	2.634	
Bol.S/Açucar	**29.819**	**100%**	**204**		**9.657**	**C**
3W17C	23.490	79%	161	47,29	7.608	
3W17D	6.329	21%	43	47,29	2.050	
Krup's	**170.875**	**100%**	**201**		**12.875**	**C**
1W11A	45.745	27%	54	108,22	5.831	
3W17D	22.507	13%	27	47,29	1.254	
3W18B	37.584	22%	44	47,90	2.121	
3W18C	39.852	23%	47	47,90	2.249	
3W6C	25.186	15%	30	47,90	1.421	
Marmelada	**21.248**	**100%**	**143**		**15.490**	**C**
1W12B	21.248	100%	143	108,12	15.490	
Nozes	**10.080**	**100%**	**133**		**6.099**	**C**
4W9B	10.080	100%	133	45,99	6.099	
Vodka	**69.120**	**100%**	**131**		**14.264**	**C**
1W12B	14.068	20%	27	108,12	2.891	
1W13B	27.512	40%	52	109,14	5.708	
1W2B	27.540	40%	52	108,22	5.665	
Rosto	**3.055**	**100%**	**92**		**3.130**	**C**
3W13C	3.055	100%	92	34,20	3.130	
Panificação	**15.090**	**100%**	**89**		**4.071**	**C**
4W9C	15.090	100%	89	45,99	4.071	
Gin	**15.360**	**100%**	**80**		**8.768**	**C**
1W3A	15.360	100%	80	109,22	8.768	

Rum	**13.920**	**100%**	**69**		**7.492**	**C**
1W3A	13.920	100%	69	109,22	7.492	
Tefal Menage	**250.124**	**100%**	**63**		**7.205**	**C**
1W3A	12.840	5%	3	109,22	355	
1W4A	48.600	19%	12	111,33	1.370	
1W5A	48.600	19%	12	113,79	1.400	
1W6B	27.000	11%	7	113,18	774	
1W7A	38.880	16%	10	112,54	1.108	
2W11A	58.544	23%	15	116,98	1.734	
2W1B	15.660	6%	4	116,98	464	
Whisky Novo	**11.328**	**100%**	**63**		**6.796**	**C**
1W11A	6.095	54%	34	108,22	3.642	
1W13B	5.233	46%	29	109,14	3.154	
Elnett Mousse	**3.956**	**100%**	**45**		**1.797**	**C**
3W9C	3.956	100%	45	39,72	1.797	
Gela.Polaretti	**126.160**	**100%**	**33**		**3.918**	**C**
1W12A	48.600	39%	13	120,12	1.509	
1W1A	42.120	33%	11	120,22	1.309	
1W2A	35.440	28%	9	120,22	1.101	
Gama Permanente	**24.800**	**100%**	**20**		**2.399**	**C**
2W10A	24.800	100%	20	119,71	2.399	
DERMO	**945**	**100%**	**16**		**136**	**C**
1W5C	945	100%	16	8,79	136	
Ovos	**23.040**	**100%**	**14**		**634**	**C**
4W9B	14.760	64%	9	45,99	406	
4W9C	8.280	36%	5	45,99	228	
Botanicals	**15.504**	**100%**	**12**		**1.406**	**C**
2W2B	15.504	100%	12	119,71	1.406	
Ultra Suave Shower	**9.345**	**100%**	**9**		**1.128**	**C**
2W10A	9.345	100%	9	119,71	1.128	
Colorista	**25.903**	**100%**	**6**		**722**	**C**
2W10A	14.455	56%	3	119,71	403	
2W10B	11.448	44%	3	119,71	319	
Confeitos de Chocola	**33.120**	**100%**	**4**		**198**	**C**
4W4A	33.120	100%	4	48,72	198	
Azeite e Óleos	**71.938**	**100%**	**1**		**120**	**C**
1W10A	38.880	54%	1	120,22	65	
1W9A	33.058	46%	0	120,50	55	
Amendoas Chocolate	**32.508**	**100%**	**-**		**-**	**C**
4W4A	21.960	68%	-	48,72	-	
4W4B	10.548	32%	-	48,72	-	
Crackies	**10.352**	**100%**	**-**		**-**	**C**
2W10B	10.352	100%	-	119,71	-	
Men Exp.Gel Banho	**21.312**	**100%**	**-**		**-**	**C**
1W13A	21.312	100%	-	121,14	-	
Azeitonas	**8.237**	**100%**	**-**		**-**	**C**
1W13A	8.237	100%	-	121,14	-	
Legumes Cozidos	**10.464**	**100%**	**-**		**-**	**C**
1W13A	10.464	100%	-	121,14	-	
Elvive Sh. S/Água	**3.249**	**100%**	**-**		**-**	**C**
2W11A	3.249	100%	-	116,98	-	
Whisky Velho	**6.720**	**100%**	**-**		**-**	**C**
1W8A	6.720	100%	-	122,20	-	
Total	**4.121.385**		**52.660**		**1.088.965**	
Total[1]	**4.121.385**		**52.660**		**2.177.929**	

In total[1], the total travelled distance quantifies both movements, when picking is done.

APPENDIX 14 – Dedicated Storage (COI Analysis): allocation of families in the storing area, per shlef

Family	Occupied Volume (in m³)	Weight (%)	Forecasted Orders	Distance between each rack and the expedition area (in meters)	Total Travelled Distance (in meters)	COI
Studio Line	**5.488**	**100%**	**1.173**		**3.659**	**4,68**
1W12C	5.488	100%	1.173	3	3.659	
Fructis Coiff.	**4.756**	**100%**	**944**		**2.947**	**5,04**
1W12C	4.756	100%	944	3	2.947	
Fructis Tratamento	**2.832**	**100%**	**557**		**1.739**	**5,08**
1W12C	2.832	100%	557	3	1.739	
Grafic	**2.015**	**100%**	**290**		**904**	**6,96**
1W12C	2.015	100%	290	3	904	
Men Exp.Dermo	**5.849**	**100%**	**763**		**2.381**	**7,66**
1W12C	5.849	100%	763	3	2.381	
Ultra Suave Tratam.	**11.992**	**100%**	**1.477**		**4.607**	**8,12**
1W12C	11.992	100%	1.477	3	4.607	
Dermo Tratamento	**13.694**	**100%**	**1.477**		**4.608**	**9,27**
1W12D	13.694	100%	1.477	3	4.608	
FS Culinária	**32.888**	**100%**	**3.279**		**135.183**	**10,03**
4W7B	16.740	51%	1.669	41	68.809	
4W7C	16.148	49%	1.610	41	66.374	
Elvive Tratamento	**13.046**	**100%**	**1.164**		**3.632**	**11,21**
1W12D	13.046	100%	1.164	3	3.632	
Trat. Face	**8.925**	**100%**	**766**		**2.465**	**11,66**
1W1B	8.925	100%	766	3	2.465	
MEN EXP.DESOD.SPRAY	**6.843**	**100%**	**528**		**1.648**	**12,96**
1W12D	6.843	100%	528	3	1.648	
Limp. Face	**7.251**	**100%**	**548**		**1.764**	**13,23**
1W1B	7.251	100%	548	3	1.764	
MEN EXP.DESOD.ROL ON	**6.175**	**100%**	**390**		**1.254**	**15,85**
1W1B	6.175	100%	390	3	1.254	
Magic Retouch	**5.428**	**100%**	**270**		**869**	**20,12**
1W1B	5.428	100%	270	3	869	
Casting	**12.720**	**100%**	**581**		**1.871**	**21,89**
1W1B	9.805	77%	448	3	1.442	
1W1C	2.915	23%	133	3	429	
Excellence	**56.006**	**100%**	**2.407**		**7.751**	**23,27**
1W1C	51.193	91%	2.200	3	7.085	
1W2C	4.812	9%	207	3	666	
FS Saquetas	**106.039**	**100%**	**4.150**		**177.223**	**25,55**
4W2A	69.012	65%	2.701	43	116.843	
4W2B	8.085	8%	316	43	13.688	
4W7C	7.343	7%	287	41	11.845	
4W7D	21.600	20%	845	41	34.846	
Wrigley´s Original	**50.304**	**100%**	**1.771**		**5.702**	**28,41**
1W2C	20.460	41%	720	3	2.319	
1W2D	29.844	59%	1.051	3	3.383	
Solares	**34.499**	**100%**	**1.117**		**3.598**	**30,87**
1W11B	34.499	100%	1.117	3	3.598	
Deo Narta	**67.111**	**100%**	**2.136**		**6.878**	**31,42**
1W10C	41.148	61%	1.310	3	4.217	
1W11C	25.963	39%	826	3	2.661	
Rosto	**3.055**	**100%**	**92**		**295**	**33,37**
1W2D	3.055	100%	92	3	295	
Diversos	**11.520**	**100%**	**342**		**1.101**	**33,69**
1W10B	11.520	100%	342	3	1.101	
Ultra Suave Body	**13.753**	**100%**	**400**		**1.289**	**34,36**
1W10B	13.753	100%	400	3	1.289	
Elnett Satin	**63.021**	**100%**	**1.707**		**5.766**	**36,91**
1W10B	27.216	43%	737	3	2.374	
1W9B	35.806	57%	970	3	3.392	

Coloração	**72.278**	**100%**	**1.929**		**7.403**	**37,47**
1W8B	14.448	20%	386	5	2.007	
1W9B	16.682	23%	445	3	1.557	
1W9C	41.148	57%	1.098	3	3.840	
Ultra Suave Shampo	**141.611**	**100%**	**3.584**		**18.065**	**39,51**
1W3B	49.572	35%	1.255	4	5.293	
1W3C	36.936	26%	935	4	3.944	
1W4B	41.796	30%	1.058	6	6.697	
1W4C	13.307	9%	337	6	2.132	
Elvive Amaciador	**97.494**	**100%**	**2.276**		**12.840**	**42,83**
1W7B	18.306	19%	427	8	3.220	
1W8B	38.040	39%	888	5	4.621	
1W8C	41.148	42%	961	5	4.999	
Fructis Amaciador	**42.240**	**100%**	**880**		**3.643**	**48,00**
1W13C	34.668	82%	722	4	2.990	
1W13D	7.572	18%	158	4	653	
Cartonagens	**39.744**	**100%**	**663**		**28.688**	**59,94**
4W2B	37.276	94%	622	43	26.906	
4W8B	2.469	6%	41	43	1.782	
DERMO	**945**	**100%**	**16**		**48**	**60,95**
1W12C	945	100%	16	3	48	
Ultra Suave Amac.	**117.526**	**100%**	**1.813**		**14.145**	**64,84**
1W6C	24.030	20%	371	8	3.030	
1W6D	19.710	17%	304	8	2.485	
1W6E	5.583	5%	86	8	704	
1W7B	34.182	29%	527	8	3.972	
1W7C	18.792	16%	290	8	2.184	
1W7D	15.228	13%	235	8	1.770	
Pipocas	**29.664**	**100%**	**446**		**2.825**	**66,46**
1W4C	29.664	100%	446	6	2.825	
Nozes	**10.080**	**100%**	**133**		**5.737**	**76,01**
4W8B	10.080	100%	133	43	5.737	
Pastelaria	**86.684**	**100%**	**1.022**		**45.414**	**84,82**
4W8C	23.490	27%	277	43	11.982	
4W8D	25.920	30%	306	43	13.221	
4W9A	37.274	43%	439	46	20.211	
Fructis Shampo	**118.121**	**100%**	**1.381**		**14.118**	**85,54**
1W13D	26.448	22%	309	4	1.280	
2W11B	22.410	19%	262	12	3.138	
2W11C	5.867	5%	69	12	822	
2W1C	29.700	25%	347	12	4.159	
2W1D	33.696	29%	394	12	4.719	
Elnett Mousse	**3.956**	**100%**	**45**		**146**	**87,46**
1W11C	3.956	100%	45	3	146	
Anitin	**31.488**	**100%**	**312**		**2.738**	**101,06**
1W5B	31.488	100%	312	9	2.738	
AVULSO KG.	**32.818**	**100%**	**317**		**14.600**	**103,37**
4W3B	16.740	51%	162	46	7.447	
4W3C	16.078	49%	156	46	7.153	
Elvive Shampoo	**396.087**	**100%**	**3.766**		**64.459**	**105,18**
2W10C	17.550	4%	167	15	2.454	
2W10D	35.964	9%	342	15	5.028	
2W11C	3.854	1%	37	12	439	
2W11D	9.720	2%	92	12	1.107	
2W11E	11.340	3%	108	12	1.292	
2W11F	11.340	3%	108	12	1.292	
2W2C	29.700	7%	282	15	4.152	
2W2D	33.696	9%	320	15	4.711	
2W3C	15.390	4%	146	17	2.550	
2W3D	11.340	3%	108	17	1.879	
2W3E	33.696	9%	320	17	5.584	
2W4C	15.390	4%	146	20	2.949	
2W4D	11.340	3%	108	20	2.173	
2W4E	33.696	9%	320	20	6.457	
2W5C	15.043	4%	143	23	3.272	
2W8C	17.550	4%	167	20	3.363	
2W8D	35.964	9%	342	20	6.891	

2W9C	17.550	4%	167	17	2.908	
2W9D	35.964	9%	342	17	5.960	
Drop's	**42.322**	**100%**	**392**		**3.319**	**108,10**
1W5C	21.013	50%	194	9	1.708	
1W6E	21.309	50%	197	8	1.611	
MIXA	**36.124**	**100%**	**299**		**6.845**	**120,75**
2W5D	15.120	42%	125	23	2.865	
2W5E	21.004	58%	174	23	3.980	
Bol.S/Açucar	**29.819**	**100%**	**204**		**1.794**	**146,02**
1W5B	20.028	67%	137	9	1.205	
1W5C	9.791	33%	67	9	589	
Marmelada	**21.248**	**100%**	**143**		**3.539**	**148,31**
2W6C	13.500	64%	91	25	2.248	
2W6D	7.748	36%	52	25	1.290	
Panificação	**15.090**	**100%**	**89**		**4.071**	**170,49**
4W3C	2.282	15%	13	46	616	
4W3D	12.808	85%	75	46	3.455	
Whisky Novo	**11.328**	**100%**	**63**		**1.470**	**181,10**
2W5E	7.508	66%	41	23	949	
2W6D	3.820	34%	21	25	521	
Gin	**15.360**	**100%**	**80**		**1.983**	**191,33**
2W6E	15.360	100%	80	25	1.983	
Café	**187.829**	**100%**	**977**		**29.850**	**192,22**
2W6E	13.152	7%	68	25	1.690	
2W7C	13.500	7%	70	27	1.926	
2W7D	13.230	7%	69	27	1.888	
2W7E	28.512	15%	148	27	4.068	
3W12C	33.048	18%	172	31	5.411	
3W12D	35.316	19%	184	31	5.782	
3W13B	38.556	21%	201	34	6.859	
3W13C	12.515	7%	65	34	2.226	
Rum	**13.920**	**100%**	**69**		**2.351**	**202,93**
3W1B	13.920	100%	69	34	2.351	
F Secos Balde	**47.094**	**100%**	**210**		**9.643**	**224,61**
4W3D	15.704	33%	70	46	3.215	
4W9A	11.326	24%	50	46	2.319	
4W9B	20.064	43%	89	46	4.108	
Moulinex	**162.057**	**100%**	**603**		**21.254**	**268,86**
3W11C	17.550	11%	65	34	2.237	
3W11D	36.612	23%	136	34	4.667	
3W1C	19.710	12%	73	34	2.512	
3W1D	29.160	18%	108	34	3.717	
3W2B	26.190	16%	97	37	3.604	
3W2C	19.710	12%	73	37	2.712	
3W2D	13.125	8%	49	37	1.806	
Higiene	**100.368**	**100%**	**357**		**13.503**	**281,08**
3W10C	17.550	17%	62	37	2.310	
3W10D	36.612	36%	130	37	4.819	
3W2D	16.035	16%	57	37	2.110	
3W3B	26.190	26%	93	40	3.701	
3W3C	3.981	4%	14	40	563	
Rowenta	**296.300**	**100%**	**789**		**33.255**	**375,63**
3W3C	15.729	5%	42	40	1.663	
3W3D	29.160	10%	78	40	3.083	
3W4B	26.190	9%	70	42	2.959	
3W4C	19.710	7%	52	42	2.227	
3W4D	29.160	10%	78	42	3.295	
3W5B	26.190	9%	70	45	3.149	
3W5C	41.837	14%	111	45	5.031	
3W8C	17.550	6%	47	42	1.983	
3W8D	36.612	12%	97	42	4.137	
3W9C	17.550	6%	47	40	1.856	
3W9D	36.612	12%	97	40	3.871	
Vinho	**332.294**	**100%**	**772**		**32.838**	**430,66**
3W13C	12.758	4%	30	34	1.013	
3W14B	32.400	10%	75	39	2.943	
3W14C	51.840	16%	120	39	4.708	

Assessment of S.A.R. Warehousing Activities: A Proposal for Improvements

3W15B	32.400	10%	75	42	3.148	
3W15C	51.840	16%	120	42	5.036	
3W16C	23.490	7%	55	45	2.431	
3W16D	28.836	9%	67	45	2.984	
3W17C	23.490	7%	55	47	2.579	
3W17D	21.078	6%	49	47	2.315	
3W7C	17.550	5%	41	45	1.841	
3W7D	36.612	11%	85	45	3.840	
Vodka	**69.120**	**100%**	**131**		**6.293**	**526,09**
3W6B	38.880	56%	74	48	3.540	
3W6C	30.240	44%	57	48	2.753	
Tefal Electro	**131.524**	**100%**	**209**		**13.620**	**627,93**
1W11A	37.348	28%	59	108	6.437	
3W18B	37.584	29%	60	48	2.867	
3W18C	39.852	30%	63	48	3.040	
3W6C	16.740	13%	27	48	1.277	
Krup's	**170.875**	**100%**	**201**		**21.978**	**848,94**
1W12B	35.316	21%	42	108	4.498	
1W13B	35.316	21%	42	109	4.540	
1W2B	27.540	16%	32	108	3.511	
1W3A	42.120	25%	50	109	5.419	
1W4A	30.583	18%	36	111	4.011	
Ultra Suave Shower	**9.345**	**100%**	**9**		**323**	**992,08**
3W1B	9.345	100%	9	34	323	
Gama Permanente	**24.800**	**100%**	**20**		**2.255**	**1.237,40**
1W7A	24.800	100%	20	113	2.255	
Botanicals	**15.504**	**100%**	**12**		**1.308**	**1.319,69**
1W4A	15.504	100%	12	111	1.308	
Ovos	**23.040**	**100%**	**14**		**634**	**1.672,20**
4W9C	23.040	100%	14	46	634	
Gela.Polaretti	**126.160**	**100%**	**33**		**3.780**	**3.869,77**
1W5A	48.600	39%	13	114	1.429	
1W6B	27.000	21%	7	113	790	
1W7A	14.080	11%	4	113	409	
1W8A	36.480	29%	9	122	1.152	
Tefal Menage	**250.124**	**100%**	**63**		**7.582**	**3.949,17**
2W10A	48.600	19%	12	120	1.473	
2W10B	24.300	10%	6	120	737	
2W11A	64.800	26%	16	117	1.919	
2W1B	15.660	6%	4	117	464	
2W2B	15.660	6%	4	120	475	
2W3B	15.660	6%	4	122	485	
2W9A	48.600	19%	12	122	1.507	
2W9B	16.844	7%	4	122	522	
Colorista	**25.903**	**100%**	**6**		**725**	**4.292,07**
1W12A	25.903	100%	6	120	725	
Confeitos de Chocola	**33.120**	**100%**	**4**		**198**	**8.167,03**
4W4A	33.120	100%	4	49	198	
Azeite e Óleos	**71.938**	**100%**	**1**		**119**	**72.444,20**
1W12A	22.698	32%	0	120	38	
1W1A	42.120	59%	1	120	70	
1W2A	7.120	10%	0	120	12	
Amendoas Chocolate	**32.508**	**100%**	**-**		**-**	**----**
4W4A	21.960	68%	-	49	-	
4W4B	10.548	32%	-	49	-	
Crackies	**10.352**	**100%**	**-**		**-**	**----**
3W5C	10.352	100%	-	45	-	
Men Exp.Gel Banho	**21.312**	**100%**	**-**		**-**	**----**
1W2A	21.312	100%	-	120	-	
Azeitonas	**8.237**	**100%**	**-**		**-**	**----**
1W11A	8.237	100%	-	108	-	
Elvive Sh. S/Água	**3.249**	**100%**	**-**		**-**	**----**
3W17D	3.249	100%	-	47	-	
Legumes Cozidos	**10.464**	**100%**	**-**		**-**	**----**
1W2A	10.464	100%	-	120	-	
Whisky Velho	**6.720**	**100%**	**-**		**-**	**----**
1W10A	6.720	100%	-	120	-	

Total					**838.533**
Total[1]	**4.121.385**			**52.660**	**1.677.065**

In total[1], the total travelled distance quantifies both movements, when picking is done.

APPENDIX 15 – Class-Based Storage (ABC analysis): allocation of families in the storing area, per shlef

Class	Occupied Volume (in m³)	Weight (%)	Forecasted Orders	Distance between each rack and the expedition area (in meters)	Total travelled Distance (in meters)
A1	**1.205.242**	**100,0%**	**25.724**		**152.218**
1W10B	52.488	4,4%	1.120	3,22	3.607
1W10C	41.148	3,4%	878	3,22	2.828
1W11B	35.964	3,0%	768	3,22	2.472
1W11C	31.104	2,6%	664	3,22	2.138
1W12C	34.668	2,9%	740	3,12	2.309
1W12D	34.020	2,8%	726	3,12	2.265
1W13C	34.668	2,9%	740	4,14	3.063
1W13D	34.020	2,8%	726	4,14	3.006
1W1B	37.584	3,1%	802	3,22	2.583
1W1C	54.108	4,5%	1.155	3,22	3.719
1W2C	25.272	2,1%	539	3,22	1.737
1W2D	33.696	2,8%	719	3,22	2.316
1W3B	49.572	4,1%	1.058	4,22	4.463
1W3C	36.936	3,1%	788	4,22	3.325
1W4B	41.796	3,5%	892	6,33	5.647
1W4C	43.092	3,6%	920	6,33	5.822
1W5B	51.516	4,3%	1.100	8,79	9.661
1W5C	34.020	2,8%	726	8,79	6.380
1W6C	24.030	2,0%	513	8,18	4.193
1W6D	19.710	1,6%	421	8,18	3.439
1W6E	26.892	2,2%	574	8,18	4.692
1W7B	52.488	4,4%	1.120	7,54	8.441
1W7C	18.792	1,6%	401	7,54	3.022
1W7D	15.228	1,3%	325	7,54	2.449
1W8B	52.488	4,4%	1.120	5,20	5.829
1W8C	41.148	3,4%	878	5,20	4.570
1W9B	52.488	4,4%	1.120	3,50	3.917
1W9C	41.148	3,4%	878	3,50	3.071
2W11B	22.410	1,9%	478	11,98	5.730
2W11C	9.720	0,8%	207	11,98	2.485
2W11D	9.720	0,8%	207	11,98	2.485
2W11E	11.340	0,9%	242	11,98	2.900
2W11F	11.340	0,9%	242	11,98	2.900
2W1C	29.700	2,5%	634	11,98	7.594
2W1D	33.696	2,8%	719	11,98	8.616
2W2C	27.232	2,3%	581	14,71	8.547
B1	**1.214.841**	**100,0%**	**13.790**		**420.772**
2W10C	17.550	1,4%	199	14,71	2.929
2W10D	35.964	3,0%	408	14,71	6.003
2W2D	33.696	2,8%	382	14,71	5.624
2W3C	15.390	1,3%	175	17,43	3.045
2W3D	11.340	0,9%	129	17,43	2.244
2W3E	33.696	2,8%	382	17,43	6.667
2W4C	15.390	1,3%	175	20,16	3.521
2W4D	11.340	0,9%	129	20,16	2.594
2W4E	33.696	2,8%	382	20,16	7.709
2W5C	15.390	1,3%	175	22,88	3.997
2W5D	15.120	1,2%	172	22,88	3.927
2W5E	28.512	2,3%	324	22,88	7.405
2W6C	13.500	1,1%	153	24,70	3.785
2W6D	13.230	1,1%	150	24,70	3.709
2W6E	28.512	2,3%	324	24,70	7.994
2W7C	13.500	1,1%	153	27,43	4.203
2W7D	13.230	1,1%	150	27,43	4.119

2W7E	28.512	2,3%	324	27,43	8.876
2W8C	17.550	1,4%	199	20,16	4.015
2W8D	35.964	3,0%	408	20,16	8.228
2W9C	17.550	1,4%	199	17,43	3.472
2W9D	35.964	3,0%	408	17,43	7.115
3W10C	17.550	1,4%	199	37,00	7.370
3W10D	36.612	3,0%	416	37,00	15.375
3W11C	17.550	1,4%	199	34,27	6.827
3W11D	36.612	3,0%	416	34,27	14.242
3W12C	33.048	2,7%	375	31,47	11.805
3W12D	35.316	2,9%	401	31,47	12.616
3W13B	38.556	3,2%	438	34,20	14.966
3W13C	25.272	2,1%	287	34,20	9.809
3W14B	32.400	2,7%	368	39,12	14.386
3W14C	51.840	4,3%	588	39,12	23.017
3W15B	32.400	2,7%	368	41,84	15.388
3W15C	51.840	4,3%	588	41,84	24.620
3W1B	26.190	2,2%	297	34,27	10.188
3W1C	19.710	1,6%	224	34,27	7.667
3W1D	29.160	2,4%	331	34,27	11.343
3W2B	26.190	2,2%	297	37,00	10.998
3W2C	19.710	1,6%	224	37,00	8.277
3W2D	29.160	2,4%	331	37,00	12.245
3W3B	26.190	2,2%	297	39,72	11.808
3W3C	19.710	1,6%	224	39,72	8.887
3W3D	29.160	2,4%	331	39,72	13.147
3W4B	26.190	2,2%	297	42,45	12.618
3W4C	15.717	1,3%	178	42,45	7.572
3W9C	17.550	1,4%	199	39,72	7.913
3W9D	36.612	3,0%	416	39,72	16.507
C1	**1.242.198**	**100,0%**	**3.267**		**288.042**
1W10A	38.880	3,1%	102	120,22	12.292
1W11A	51.840	4,2%	136	108,22	14.753
1W12A	48.600	3,9%	128	120,12	15.352
1W12B	35.316	2,8%	93	108,12	10.042
1W13A	22.932	1,8%	60	121,14	7.306
1W13B	35.316	2,8%	93	109,14	10.136
1W1A	42.120	3,4%	111	120,22	13.316
1W2A	42.120	3,4%	111	120,22	13.316
1W2B	27.540	2,2%	72	108,22	7.838
1W3A	42.120	3,4%	111	109,22	12.098
1W4A	48.600	3,9%	128	111,33	14.229
1W5A	48.600	3,9%	128	113,79	14.543
1W6B	27.000	2,2%	71	113,18	8.036
1W7A	38.880	3,1%	102	112,54	11.506
1W9A	38.880	3,1%	102	120,50	12.320
2W10A	48.600	3,9%	128	119,71	15.299
2W10B	24.300	2,0%	64	119,71	7.650
2W11A	64.800	5,2%	170	116,98	19.935
2W1B	15.660	1,3%	41	116,98	4.818
2W2B	15.660	1,3%	41	119,71	4.930
3W16C	23.490	1,9%	62	44,57	2.753
3W16D	28.836	2,3%	76	44,57	3.379
3W17C	23.490	1,9%	62	47,29	2.921
3W17D	28.836	2,3%	76	47,29	3.586
3W18B	37.584	3,0%	99	47,90	4.734
3W18C	39.852	3,2%	105	47,90	5.020
3W4D	29.160	2,3%	77	42,45	3.255
3W5B	26.190	2,1%	69	45,17	3.111
3W5C	52.812	4,3%	139	45,17	6.273
3W6B	38.880	3,1%	102	47,90	4.897
3W6C	46.980	3,8%	124	47,90	5.917
3W7C	17.550	1,4%	46	45,17	2.085
3W7D	36.612	2,9%	96	45,17	4.349
3W8C	17.550	1,4%	46	42,45	1.959
3W8D	36.612	2,9%	96	42,45	4.087
A2	**138.927**	**100,0%**	**7.429**		**314.661**
4W2A	69.012	49,7%	3.690	43,27	159.659
4W2B	8.085	5,8%	432	43,27	18.703
4W7B	16.740	12,0%	895	41,23	36.902
4W7C	23.490	16,9%	1.256	41,23	51.782
4W7D	21.600	15,5%	1.155	41,23	47.615

B2	**126.428**	**100,0%**	**1.685**		**73.740**
4W2B	37.276	29,5%	497	43,27	21.495
4W3B	16.740	13,2%	223	45,99	10.261
4W3C	6.263	5,0%	83	45,99	3.839
4W8B	16.740	13,2%	223	43,27	9.653
4W8C	23.490	18,6%	313	43,27	13.545
4W8D	25.920	20,5%	345	43,27	14.947
C2	**193.750**	**100,0%**	**766**		**35.812**
4W3C	12.098	6,2%	48	45,99	2.200
4W3D	28.512	14,7%	113	45,99	5.185
4W4A	53.781	27,8%	213	48,72	10.359
4W9A	48.600	25,1%	192	45,99	8.838
4W9B	24.840	12,8%	98	45,99	4.517,03
4W9C	25.920	13,4%	102	45,99	4.713,43
Total					**1.285.244**
Total [1]	**4.121.385**		**52.660**		**2.570.489**

In total[1], the total travelled distance quantifies both movements, when picking is done.

APPENDIX 16 – S.A.R. allocation of families in the storing area, per shlef, considering the forecasted orders

Family	Occupied Volume (in m3)	Weight (%)	Forecasted Orders	Distance between each rack and the expedition area (in meters)	Total travelled Distance (in meters)
Amendoas Chocolate	**32.508**	**100%**	**-**		**-**
4W2A	20.988	65%	-	43,27	-
4W6A	11.520	35%	-	159,17	-
Anitin	**31.488**	**100%**	**312**		**15.178,98**
4W4B	31.488	100%	312	48,72	15.178,98
AVULSO KG.	**32.818**	**100%**	**317**		**27.212,60**
4W3B	8.990	27%	87	45,99	3.999,56
4W3C	12.308	38%	119	45,99	5.475,70
4W6A	11.520	35%	111	159,17	17.737,35
Azeite e Óleos	**71.938**	**100%**	**1**		**62,50**
3W13B	22.848	32%	0	34,20	10,78
3W13C	21.154	29%	0	34,20	9,98
3W13B	11.424	16%	0	34,20	5,39
3W8A	16.512	23%	0	159,45	36,34
Azeitonas	**8.237**	**100%**	**-**		**-**
3W12B	8.237	100%	-	136,47	-
Bol.S/Açucar	**29.819**	**100%**	**204**		**11.061,40**
4W6B	1.539	5%	11	54,17	570,89
4W6C	8.840	30%	61	54,17	3.279,21
4W6D	15.552	52%	107	54,17	5.769,04
4W6D	3.888	13%	27	54,17	1.442,26
Botanicals	**15.504**	**100%**	**12**		**232,78**
2W3C	1.938	13%	1	17,43	25,60
2W4C	13.566	88%	10	20,16	207,19
Café	**187.829**	**100%**	**977**		**17.878,68**
1W12C	23.112	12%	120	3,12	375,15
1W12D	30.240	16%	157	3,12	490,84
1W13D	30.240	16%	157	4,14	651,31
1W4C	12.768	7%	66	6,33	420,48
1W6B	24.000	13%	125	113,18	14.130,89
1W6C	16.421	9%	85	8,18	698,36
1W6D	5.256	3%	27	8,18	223,54
1W3B	14.688	8%	76	4,22	322,33
1W9B	31.104	17%	162	3,50	565,78
Cartonagens	**39.744**	**100%**	**663**		**51.499,85**
4W2A	20.448	51%	341	43,27	14.759,62
4W5A	11.520	29%	192	156,44	30.066,86
4W5D	7.776	20%	130	51,44	6.673,37
Casting	**12.720**	**100%**	**581**		**11.053,93**

2W2C	2.640	21%	121	14,71	1.773,37
2W4D	10.080	79%	460	20,16	9.280,56
Coloração	**72.278**	**100%**	**1.929**		**78.622,21**
3W10C	1.983	3%	53	37,00	1.957,47
3W11C	4.956	7%	132	34,27	4.533,21
3W1B	19.788	27%	528	34,27	18.099,01
3W2B	22.504	31%	601	37,00	22.219,87
3W3B	18.673	26%	498	39,72	19.794,77
3W2B	1.698	2%	45	37,00	1.676,07
3W9B	1.785	2%	48	144,72	6.894,54
3W9B	893	1%	24	144,72	3.447,27
Colorista	**25.903**	**100%**	**6**		**114,62**
2W8C	14.853	57%	3	20,16	69,75
2W9C	11.050	43%	3	17,43	44,87
Confeitos de Chocola	**33.120**	**100%**	**4**		**647,07**
4W11A	33.120	100%	4	159,56	647,07
Crackies	**10.352**	**100%**	**-**		**-**
4W3C	1.904	18%	-	45,99	-
4W3D	8.448	82%	-	45,99	-
Deo Narta	**67.111**	**100%**	**2.136**		**106.496,03**
3W1C	8.030	12%	256	34,27	8.759,23
3W2C	18.068	27%	575	37,00	21.275,39
3W3B	1.407	2%	45	39,72	1.778,22
3W3C	14.819	22%	472	39,72	18.735,47
3W4C	18.068	27%	575	42,45	24.409,62
3W4A	6.720	10%	214	147,45	31.538,11
DERMO	**945**	**100%**	**16**		**185,73**
2W11F	945	100%	16	11,98	185,73
Dermo Tratamento	**13.694**	**100%**	**1.477**		**19.200,19**
2W11C	900	7%	97	11,98	1.162,83
2W11D	4.644	34%	501	11,98	6.000,23
2W11E	5.292	39%	571	11,98	6.837,47
2W11F	945	7%	102	11,98	1.220,98
2W5C	1.283	9%	138	22,88	3.164,70
2W11F	630	5%	68	11,98	813,98
Diversos	**11.520**	**100%**	**342**		**54.426,64**
4W6A	11.520	100%	342	159,17	54.426,64
Drop's	**42.322**	**100%**	**392**		**52.088,49**
4W5A	32.640	77%	302	156,44	47.237,07
4W6B	4.104	10%	38	54,17	2.056,42
4W6C	1.690	4%	16	54,17	846,82
4W6D	3.888	9%	36	54,17	1.948,18
Elnett Mousse	**3.956**	**100%**	**45**		**1.034,88**
2W5C	2.052	52%	23	22,88	536,80
2W5D	1.904	48%	22	22,88	498,08
Elnett Satin	**63.021**	**100%**	**1.707**		**144.140,86**
2W1C	4.400	7%	119	11,98	1.428,13
2W5D	1.904	3%	52	22,88	1.180,27
3W10C	1.901	3%	52	37,00	1.905,64
3W11D	10.848	17%	294	34,27	10.072,15
3W16A	13.440	21%	364	149,57	54.461,28
3W16D	12.816	20%	347	44,57	15.474,09
3W16A	13.440	21%	364	149,57	54.461,28
3W16D	4.272	7%	116	44,57	5.158,03
Elvive Amaciador	**97.494**	**100%**	**2.276**		**60.934,02**
2W1D	29.952	31%	699	11,98	8.377,11
2W2D	29.952	31%	699	14,71	10.282,58
2W3E	4.992	5%	117	17,43	2.031,34
2W5E	8.448	9%	197	22,88	4.512,54
2W6E	8.427	9%	197	24,70	4.859,32
2W7E	8.427	9%	197	27,43	5.395,42
3W16B	7.296	7%	170	149,57	25.475,71
Elvive Sh. S/Água	**3.249**	**100%**	**-**		**-**
2W3C	2.166	67%	-	17,43	-
2W5C	1.083	33%	-	22,88	-
Elvive Shampoo	**396.087**	**100%**	**3.766**		**264.689,18**
1W9C	12.192	3%	116	3,50	405,27
2W3E	24.960	6%	237	17,43	4.136,10
2W4E	29.952	8%	285	20,16	5.739,28
2W5D	2.660	1%	25	22,88	578,61
2W5E	16.896	4%	161	22,88	3.675,27

2W6E	11.236	3%	107	24,70	2.638,47
2W7E	16.854	4%	160	27,43	4.394,33
2W8D	15.984	4%	152	20,16	3.062,79
3W14A	6.720	2%	64	144,12	9.207,20
3W17A	13.440	3%	128	152,29	19.458,96
3W18C	11.808	3%	112	47,90	5.377,26
3W1A	13.440	3%	128	139,27	17.795,32
3W4A	13.440	3%	128	147,45	18.839,89
3W7A	16.512	4%	157	162,17	25.457,71
2W6E	2.809	1%	27	24,70	659,62
3W16A	13.440	3%	128	149,57	19.110,78
3W18A	32.640	8%	310	152,90	47.446,78
3W18B	22.272	6%	212	47,90	10.142,47
3W1D	8.640	2%	82	34,27	2.814,99
3W2A	13.440	3%	128	142,00	18.143,51
1W10C	12.192	3%	116	3,22	373,23
1W9C	12.192	3%	116	3,50	405,27
3W18A	16.320	4%	155	152,90	23.723,39
3W18C	11.808	3%	112	47,90	5.377,26
3W9A	8.256	2%	78	156,72	12.301,08
1W1C	16.032	4%	152	3,22	490,79
1W9C	12.192	3%	116	3,50	405,27
3W1B	7.760	2%	74	34,27	2.528,28
Elvive Tratamento	**13.046**	**100%**	**1.164**		**29.436,95**
2W3C	1.055	8%	94	17,43	1.639,91
2W5D	3.808	29%	340	22,88	7.773,73
2W7D	8.183	63%	730	27,43	20.023,31
Excellence	**56.006**	**100%**	**2.407**		**34.420,67**
2W1C	21.450	38%	922	11,98	11.045,04
2W2C	21.450	38%	922	14,71	13.557,37
2W3C	3.278	6%	141	17,43	2.455,41
2W3D	9.828	18%	422	17,43	7.362,85
F Secos Balde	**47.094**	**100%**	**210**		**11.353,07**
4W10B	3.318	7%	15	48,72	719,62
4W11B	23.232	49%	103	54,56	5.643,19
4W11C	20.544	44%	91	54,56	4.990,26
Fructis Amaciador	**42.240**	**100%**	**880**		**32.612,44**
3W10D	27.120	64%	565	37,00	20.901,51
3W11D	10.848	26%	226	34,27	7.744,77
3W16D	4.272	10%	89	44,57	3.966,16
Fructis Coiff.	**4.756**	**100%**	**944**		**28.391,22**
3W10B	840	18%	167	142,00	23.684,57
3W11C	3.916	82%	137	34,27	4.706,65
Fructis Shampo	**118.121**	**100%**	**1.381**		**81.895,84**
3W11B	11.550	10%	135	139,27	18.804,21
3W7D	32.544	28%	380	45,17	17.184,49
3W8D	32.544	28%	380	42,45	16.147,79
3W9C	683	1%	8	39,72	316,90
3W9D	21.696	18%	254	39,72	10.074,06
3W16B	7.296	6%	85	149,57	12.756,47
3W18C	11.808	10%	138	47,90	6.611,92
Fructis Tratamento	**2.832**	**100%**	**557**		**19.103,25**
3W11C	569	20%	112	34,27	3.836,84
3W1C	2.263	80%	445	34,27	15.266,41
FS Culinária	**32.888**	**100%**	**3.279**		**144.681,40**
4W10B	2.054	6%	205	48,72	9.976,82
4W8C	16.922	51%	1.687	43,27	72.996,94
4W8D	7.680	23%	766	43,27	33.130,43
4W9B	2.392	7%	239	45,99	10.968,66
4W9C	3.840	12%	383	45,99	17.608,55
FS Saquetas	**106.039**	**100%**	**4.150**		**31.461,05**
4W10B	14.931	14%	584	48,72	28.463,91
4W10C	6.400	6%	35	48,72	1.717,94
4W2B	26.880	25%	9	43,27	386,76
4W4B	15.744	15%	5	48,72	255,07
4W8C	6.960	7%	2	43,27	100,14
4W9B	19.764	19%	7	45,99	302,29
4W9C	15.360	14%	5	45,99	234,93
Gama Permanente	**24.800**	**100%**	**20**		**874,75**
4W10A	16.800	68%	14	48,72	661,39
4W10A	8.000	32%	4	48,72	213,35

Gela.Polaretti	**126.160**	**100%**	**33**		**4.762,17**
3W12A	12.960	10%	3	148,47	497,23
3W12B	8.448	7%	2	136,47	297,92
3W5A	13.440	11%	3	150,17	521,55
3W7A	4.128	3%	1	162,17	172,99
4W5B	7.696	6%	2	51,44	102,30
3W8A	16.512	13%	4	159,45	680,34
3W8A	16.512	13%	4	159,45	680,34
3W9A	16.512	13%	4	156,72	668,71
3W1A	13.440	11%	3	139,27	483,69
3W10A	16.512	13%	4	154,00	657,08
Gin	**15.360**	**100%**	**80**		**3.140,14**
3W14C	15.360	100%	80	39,12	3.140,14
Grafic	**2.015**	**100%**	**290**		**11.682,86**
3W11C	520	26%	75	34,27	2.561,57
3W8C	975	48%	140	42,45	5.948,67
3W8C	520	26%	75	42,45	3.172,62
Higiene	**100.368**	**100%**	**357**		**23.170,21**
1W10B	6.804	7%	24	3,22	77,95
1W11A	46.080	46%	164	108,22	17.741,69
1W11B	35.964	36%	128	3,22	412,00
1W9A	11.520	11%	41	120,50	4.938,57
Krup's	**170.875**	**100%**	**201**		**21.548,29**
1W10A	11.520	7%	14	120,22	1.631,37
1W12A	9.000	5%	11	120,12	1.273,44
1W12B	20.928	12%	25	108,12	2.665,36
1W13B	10.464	6%	12	109,14	1.345,25
1W13C	24.011	14%	28	4,14	117,09
2W10A	14.400	8%	17	119,71	2.030,47
2W11C	576	0%	1	11,98	8,13
2W1A	2.000	1%	2	128,98	303,78
2W1B	1.740	1%	2	116,98	239,76
2W3B	3.364	2%	4	122,43	485,14
2W4A	4.386	3%	5	137,16	708,60
2W8A	9.600	6%	11	125,16	1.415,28
3W2A	13.440	8%	16	142,00	2.247,99
3W6A	13.440	8%	16	152,90	2.420,55
1W10A	5.760	3%	7	120,22	815,68
1W13B	10.464	6%	12	109,14	1.345,25
3W11A	3.302	2%	4	151,27	588,44
2W6A	12.480	7%	15	129,70	1.906,68
Legumes Cozidos	**10.464**	**100%**	**-**		**-**
3W12D	10.464	100%	-	31,47	-
Limp. Face	**7.251**	**100%**	**548**		**61.485,57**
3W7C	1.365	19%	103	45,17	4.659,32
3W8C	1.056	15%	80	42,45	3.387,92
3W9B	1.838	25%	139	144,72	20.095,36
3W8B	2.993	41%	226	147,45	33.342,96
Magic Retouch	**5.428**	**100%**	**270**		**3.967,68**
2W10C	5.428	100%	270	14,71	3.967,68
Marmelada	**21.248**	**100%**	**143**		**13.725,11**
4W3A	10.080	47%	68	150,99	10.262,02
4W3C	2.720	13%	18	45,99	843,44
4W3D	8.448	40%	57	45,99	2.619,64
Men Exp.Dermo	**5.849**	**100%**	**763**		**11.412,59**
2W11F	4.253	73%	555	11,98	6.647,66
2W5C	1.596	27%	208	22,88	4.764,93
MEN EXP.DESOD.ROL ON	**6.175**	**100%**	**390**		**6.375,66**
2W10C	1.658	27%	105	14,71	1.537,42
2W9C	3.770	61%	238	17,43	4.144,89
2W10C	748	12%	47	14,71	693,35
MEN EXP.DESOD.SPRAY	**6.843**	**100%**	**528**		**8.270,56**
2W10C	5.135	75%	396	14,71	5.828,38
2W5C	798	12%	62	22,88	1.409,29
2W10C	910	13%	70	14,71	1.032,88
Men Exp.Gel Banho	**21.312**	**100%**	**-**		**-**
2W8D	10.656	50%	-	20,16	-
2W9D	10.656	50%	-	17,43	-
MIXA	**36.124**	**100%**	**299**		**1.395,04**

1W11C	34.445	95%	285	3,22	918,52
3W1C	1.679	5%	14	34,27	476,51
Moulinex	**162.057**	**100%**	**603**		**58.767,09**
1W13C	3.467	2%	13	4,14	53,38
1W8B	15.552	10%	58	5,20	300,99
2W10A	7.200	4%	27	119,71	3.205,62
2W10B	2.790	2%	10	119,71	1.242,18
2W11B	7.429	5%	28	11,98	331,00
2W1A	9.030	6%	34	128,98	4.331,89
2W1B	6.496	4%	24	116,98	2.826,34
2W2B	4.466	3%	17	119,71	1.988,38
2W3B	3.828	2%	14	122,43	1.743,12
2W4A	3.999	2%	15	137,16	2.040,00
2W4B	4.872	3%	18	125,16	2.267,89
2W5A	7.869	5%	29	139,88	4.093,95
2W5B	6.148	4%	23	127,88	2.924,18
2W7A	12.480	8%	46	132,43	6.146,84
2W8A	19.200	12%	71	125,16	8.937,52
2W9A	28.800	18%	107	122,43	13.114,38
1W10C	12.192	8%	45	3,22	146,02
2W7A	6.240	4%	23	132,43	3.073,42
Nozes	**10.080**	**100%**	**133**		**20.022,96**
4W3A	10.080	100%	133	150,99	20.022,96
Ovos	**23.040**	**100%**	**14**		**671,21**
4W4A	23.040	100%	14	48,72	671,21
Panificação	**15.090**	**100%**	**89**		**3.740,74**
4W7C	2.610	17%	15	41,23	631,11
4W7D	4.800	32%	28	41,23	1.160,67
4W8D	7.680	51%	45	43,27	1.948,96
Pastelaria	**86.684**	**100%**	**1.022**		**72.650,36**
4W2A	20.448	24%	241	43,27	10.430,29
4W5C	9.506	11%	112	51,44	5.765,11
4W7A	16.800	19%	198	146,23	28.962,76
4W7B	6.200	7%	73	41,23	3.013,43
4W7C	13.050	15%	154	41,23	6.342,79
4W7D	8.800	10%	104	41,23	4.277,13
4W8A	6.300	7%	74	148,27	11.012,56
4W8B	5.580	6%	66	43,27	2.846,29
Pipocas	**29.664**	**100%**	**446**		**23.987,03**
4W11B	11.616	39%	175	54,56	9.535,93
4W5D	7.776	26%	117	51,44	6.018,51
4W11C	10.272	35%	155	54,56	8.432,60
Rosto	**3.055**	**100%**	**92**		**2.347,37**
3W8C	1.170	38%	35	42,45	1.488,12
3W9C	1.885	62%	22	39,72	859,25
Rowenta	**296.300**	**100%**	**789**		**84.778,61**
1W10A	5.760	2%	15	120,22	1.843,46
1W12B	10.464	4%	28	108,12	3.011,88
1W12C	5.136	2%	14	3,12	42,66
1W13A	21.600	7%	58	121,14	6.965,88
1W5B	15.264	5%	41	8,79	357,03
1W9A	11.520	4%	31	120,50	3.695,40
2W10A	7.200	2%	19	119,71	2.294,45
2W11A	19.200	6%	51	116,98	5.979,26
2W11B	6.765	2%	18	11,98	215,74
2W1A	8.385	3%	22	128,98	2.879,12
2W1B	3.074	1%	8	116,98	957,30
2W2B	6.148	2%	16	119,71	1.959,21
2W2C	4.400	1%	12	14,71	172,25
2W3A	16.512	6%	44	134,43	5.909,22
2W3B	3.944	1%	10	122,43	1.285,46
2W4A	5.676	2%	15	137,16	2.072,47
2W4B	4.350	1%	12	125,16	1.449,35
2W5A	20.640	7%	55	139,88	7.685,99
2W5B	3.190	1%	8	127,88	1.085,99
2W8A	19.200	6%	51	125,16	6.397,11
3W5A	13.440	5%	36	150,17	5.373,00
1W7B	15.552	5%	41	7,54	311,97
2W9A	14.400	5%	38	122,43	4.693,37
2W11A	19.200	6%	51	116,98	5.979,26
2W1A	10.320	3%	27	128,98	3.543,53

2W6A	24.960	8%	66	129,70	8.618,25
Rum	**13.920**	**100%**	**69**		**10.072,40**
3W15A	13.920	100%	69	146,84	10.072,40
Solares	**34.499**	**100%**	**1.117**		**61.094,00**
3W16C	18.966	55%	614	44,57	27.376,28
3W17B	2.918	8%	95	152,29	14.395,31
3W17C	12.615	37%	409	47,29	19.322,41
Studio Line	**5.488**	**100%**	**1.173**		**28.966,88**
2W6D	5.488	100%	1.173	24,70	28.966,88
Tefal Electro	**131.524**	**100%**	**209**		**23.481,62**
1W13B	10.464	8%	17	109,14	1.818,73
1W13C	3.467	3%	6	4,14	22,86
1W5B	15.264	12%	24	8,79	213,58
2W10A	7.200	5%	11	119,71	1.372,56
2W10B	7.380	6%	12	119,71	1.406,87
2W1A	9.288	7%	15	128,98	1.907,79
2W1B	4.292	3%	7	116,98	799,57
2W2B	1.682	1%	3	119,71	320,64
2W3A	7.353	6%	12	134,43	1.574,15
2W3B	1.392	1%	2	122,43	271,40
2W4A	2.838	2%	5	137,16	619,88
2W4B	7.830	6%	12	125,16	1.560,61
2W5B	4.234	3%	7	127,88	862,26
2W8A	9.600	7%	15	125,16	1.913,40
3W10A	16.512	13%	26	154,00	4.049,41
3W1A	13.440	10%	21	139,27	2.980,86
1W13A	7.200	5%	11	121,14	1.389,01
2W2B	2.088	2%	3	119,71	398,04
Tefal Menage	**250.124**	**100%**	**63**		**6.685,98**
1W1B	11.136	4%	3	3,22	9,08
2W10A	7.200	3%	2	119,71	218,24
2W10B	5.130	2%	1	119,71	155,50
2W10D	10.523	4%	3	14,71	39,18
2W2C	878	0%	0	14,71	3,27
2W8B	12.375	5%	3	125,16	392,18
2W9B	21.195	8%	5	122,43	657,08
2W9D	18.115	7%	5	17,43	79,95
3W10A	16.512	7%	4	154,00	643,87
3W11A	16.099	6%	4	151,27	616,67
3W2A	13.104	5%	3	142,00	471,16
3W3A	26.880	11%	7	144,72	985,03
3W4A	13.440	5%	3	147,45	501,79
3W5A	13.440	5%	3	150,17	511,07
3W9A	16.512	7%	4	156,72	655,27
1W9A	11.520	5%	3	120,50	351,50
2W10D	22.711	9%	6	14,71	84,56
2W8B	7.605	3%	2	125,16	241,01
2W8B	810	0%	0	125,16	25,67
2W9D	4.129	2%	1	17,43	18,22
2W8B	810	0%	0	125,16	25,67
Trat. Face	**8.925**	**100%**	**766**		**51.057,74**
3W7C	3.510	39%	301	45,17	13.598,66
3W8C	423	5%	36	42,45	1.538,13
3W9B	2.100	24%	180	144,72	26.066,74
3W9C	1.625	18%	139	39,72	5.536,07
3W9C	1.268	14%	109	39,72	4.318,13
Ultra Suave Amac.	**117.526**	**100%**	**1.813**		**109.070,36**
3W11D	10.848	9%	167	34,27	5.733,62
3W5B	11.640	10%	180	45,17	8.109,01
3W5C	33.448	28%	516	45,17	23.301,28
3W6B	5.472	5%	84	47,90	4.042,04
3W6C	39.672	34%	612	47,90	29.304,82
3W8B	5.460	5%	84	147,45	12.416,17
3W8B	2.730	2%	42	147,45	6.208,08
3W9A	8.256	7%	127	156,72	19.955,33
Ultra Suave Body	**13.753**	**100%**	**400**		**36.363,22**
3W7B	5.985	44%	174	150,17	26.157,20
3W7C	7.703	56%	224	45,17	10.125,72
3W8C	65	0%	2	42,45	80,29
Ultra Suave Shampo	**141.611**	**100%**	**3.584**		**198.500,32**
3W16B	7.296	5%	185	149,57	27.620,28

3W1D	7.560	5%	191	34,27	6.557,66
3W2D	23.220	16%	588	37,00	21.742,95
3W3D	27.864	20%	705	39,72	28.013,41
3W4B	23.280	16%	589	42,45	25.010,52
3W4D	17.820	13%	451	42,45	19.144,65
3W5B	6.984	5%	177	45,17	7.984,86
3W8B	5.040	4%	128	147,45	18.809,35
3W9C	650	0%	16	39,72	653,49
3W6B	13.824	10%	350	47,90	16.758,58
3W9B	6.773	5%	171	144,72	24.807,94
3W8C	1.300	1%	33	42,45	1.396,64
Ultra Suave Shower	**9.345**	**100%**	**9**		**1.407,04**
3W7B	6.615	71%	7	150,17	1.001,30
3W8B	2.730	29%	3	147,45	405,74
Ultra Suave Tratam.	**11.992**	**100%**	**1.477**		**68.906,80**
3W10C	6.581	55%	810	37,00	29.978,47
3W5B	2.328	19%	287	45,17	12.947,66
3W8C	455	4%	56	42,45	2.377,91
3W9C	1.268	11%	156	39,72	6.198,91
3W10B	840	7%	103	142,00	14.686,23
3W8C	520	4%	64	42,45	2.717,62
Vinho	**332.294**	**100%**	**772**		**12.853,63**
1W1B	11.136	3%	26	3,22	83,26
1W1C	48.096	14%	112	3,22	359,61
1W2B	16.320	5%	38	108,22	4.101,05
1W2C	20.218	6%	47	3,22	151,17
1W2D	29.952	9%	70	3,22	223,95
1W3A	12.480	4%	29	109,22	3.165,02
1W3B	29.376	9%	68	4,22	287,74
1W3C	32.832	10%	76	4,22	321,59
1W4C	25.536	8%	59	6,33	375,35
1W6D	3.796	1%	9	8,18	72,06
1W6E	23.904	7%	56	8,18	453,76
1W2B	8.160	2%	19	108,22	2.050,52
1W4B	40.248	12%	93	6,33	591,60
1W5C	20.160	6%	47	8,79	411,30
1W5C	10.080	3%	23	8,79	205,65
Vodka	**69.120**	**100%**	**131**		**5.188,83**
3W14B	28.800	42%	55	39,12	2.141,30
3W14C	30.720	44%	58	39,12	2.284,05
3W15B	9.600	14%	18	41,84	763,49
Whisky Novo	**11.328**	**100%**	**63**		**5.979,29**
3W14A	6.720	59%	37	144,12	5.347,73
3W15C	4.608	41%	15	41,84	631,56
whisky Velho	**6.720**	**100%**	**-**		**-**
3W17A	6.720	100%	-	152,29	-
Wrigley´s Original	**50.304**	**100%**	**1.771**		**46.084,05**
3W12C	29.376	58%	1.034	31,47	32.544,53
3W12D	20.928	42%	430	31,47	13.539,52
Total	**4.121.385**		**52.660**		**2.434.605**
Total[1]	**4.121.385**		**52.660**		**4.869.209**

In total[1], the total travelled distance quantifies both movements, when picking is done.