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Order Preparation Processes for an Online Retail Store

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Master Thesis

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Dream big. Start small. Act now.

Abstract

The present dissertation covers the analysis of alternative processes for the expansion of a decentralized order preparation for an online channel of a Portuguese grocery omni-channel company. E-commerce offers customers the convenience of a shop available 24 hours a day, 7 days a week. For this reason, customers' expectations and demands increase, seeking innovative and differentiated buying experiences. On the other hand, retailers want to offer distinct services that enable them to reduce costs but still reach more customers. Services like Click and Collect, allows the collection of orders placed on an online channel through a pick-up location. However, for these services to be considered a plus point, either to consumers or to retailers, the processes associated with them must be simple, efficient and fast. Operations for order preparation has the orders prepared on a determine location (operation location) and delivered to pick-up location for the customer to collect them. This represents high distribution costs and complex logistic movements.

This project addresses the need of expansion by turning the pick-up locations autonomous on the order preparation and order delivery. Facing the challenge of growth and demand, it was identified the need of scaling the grocery retailer's business and growth with its order preparation operations. This is a change made in order to succeed in the market and offer the customer an improved order preparation service. The goal of this project is to analyse and suggest operational processes for order preparation on the pick-up locations. The main objectives of these processes are to eliminate the distribution costs the orders carry now and enlarge the comprehensiveness of their service.

It was made a background on e-commerce, covering diverse topics, such as, grocery e-commerce, e-fulfillment and its challenges, centralize and decentralized operation and online orders delivery. All these subjects are related to the order preparation processes analysis.

In order to suggest order preparation processes it was made a study in great detail of the 'As-Is' model of order preparation the retailer works by. All the processes involving an online order were analyzed with field work and active participation. These are the processes studied: order placement, order preparation and order delivery. This analysis made it easier to identify the needs and challenges of the suggested smaller operational model of order preparation.

The proposed processes have in consideration the challenges and its needed requirements. The limitations were identified and with that a new operational model was drawn with its optimized process. Since the expected operational model launch date matched a different timing to the project, the implementation stage could not be met. Although, the measurements and needs of the project were mapped out. The conclusions and future work were also address in this project.

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Table of Contents

List of Figures

List of abbreviations

AE	Availability Effect
AR	Action Research
B2B	Business-to-Business
B2C	Business-to-Consumer
C&G	Click&Go
CBD	Continente Bom Dia
CC	Contact Center
CDL	Centro de Distribuição de Lisboa
CM	Continente Modelo
COL	CONTINENTE Online
DPH	Detergents, Perfumery and Hygiene
ERP	Enterprise Resource Planning
GS	Grey Store
KPI	Key Performance Indicator
OMS	Order Management System
PMO	Project Manager Office
SKU	Stock Keeping Unit
TR	Top Rotation

1 Introduction

This project was developed within the scope of the dissertation in the Master's in Service Engineering and Management of the Faculty of Engineering of the University of Porto. E-commerce development has been a major focus addressed in the past 10 years. Technology and fast changes imply that organizations have to adapt themselves to these changes in order to success in the market. For this reason, this project is a lever to this adaptation, and it was developed on the Operations team of CONTINENTE Online (COL). My goal is to present alternative processes for the expansion of decentralized order preparation in-stores with Click&Go (C&G) delivery service. This will enlarge the comprehensiveness of the service and consequently the COL presence in Portugal.

1.1 Project Background

The present master thesis is a project integrated in the 'Call for solutions' program of SONAE. 'Call for Solutions' is the master thesis project program that SONAE designed to receive students performing a curricular project when finishing the graduation degree, and it was in this framework this project was developed. SONAE challenges its trainees to face problems that deserve scientific research to be solved. The program brings theory to practice since the solutions presented by the students have real impact on the company's performance.

The project was carried out on the E-commerce Operations Team of SONAE MC and lasted for 4 months.

1.2 Problem Description, Objectives and Research Questions

This study was developed on the operation's team of COL. This team is responsible for the preparation and delivery of customer's online orders. The team deals with the store's operation for orders picking, the key performance indicators (KPI's) of the process and the booking of delivery slots, making sure the customer gets his order on time and correctly.

Today, after the customer makes an order on COL, a complex process starts both on the back-office and in-store. This process includes the order processing, order preparation, storage on the back-store, distribution and delivery to the customer at the chosen delivery slot. For total customer's satisfaction the delivery slot chosen should be fulfilled with the right products and perfect conditions. Once the team deals directly with the customer, any occurrence of incidents may influence their satisfaction and it can affect their perception of the service.

COL has fifteen operations spread in Portugal covering as much postal addresses as possible. These operations work in Gaia Shopping, Gaia Jardim, Coimbra, Seixal, Guia, Maia, Montijo, Valongo, Braga, Guimarães, Leiria, Nacional, Cascais, Viseu, Covilhã and Lisbon Distribution Center (CDL). These locations serve as preparation locations for home-delivery and pick-up locations. These pick-up locations are called Click&Go and are present on 101 locations inside CONTINENTE, CONTINENTE Modelo (CM) and CONTINENTE Bom dia (CBD) format stores. These orders are prepared in operations and distributed on optimized routes to the C&G stores.

The name of the project is 'Order Preparation Processes for an Online Retail Store' and studies order preparation alternative process to turn the pick-up locations autonomous at the preparation and delivery of C&G orders. COL identify the need to scale the business in a sustainable way and by so, suggested the store's autonomy in the preparation and delivery of orders. The main difference between the current processes and the suggested one is the preparation location. My challenge deals with the problem of preparing in one store and moving to another for delivery. Although the customer pays for the service, it does not cover the costs each order carries. The main promoters for this new model of order preparation are:

- The increasing demand of online grocery e-commerce has been a true challenge for COL. For this reason, it is much needed the release of space on the current operation locations to focus on the preparation of home delivery orders. These have a huge representation of the COL revenue and represent a bigger average basket;
- The project will deal with the stockouts perception problem. Today, when a customer gets to a store to collect his order, he does not know it was prepared in a different location. Sometimes items on the order are stockouts but they are available at the pick-up location. Since the customer does not know the processes he complains about this fact. With the decentralized picking, the items on the customer's order are the ones available at the pick-up locations promoting a better customer service;
- Today, the stores only receive a fee for each order delivery on C&G. With this project the store will receive the total value of the order since the stock and the selling products belong to the store. Consequently, the store will have the will to promote this service since this can promote cross selling and increase the store traffic;
- Today, C&G is in 101 locations but with this project we can enlarge the coverage of the service;
- The costs of distribution (5,17€ per order) will be eliminated. The only cost that COL will have with this decentralized preparation order for C&G is the preparation one;
- Lastly, the last promoter is the minimization of lead times. Today orders have at least half a day of lead time from the customer order online until he receives it. With the decentralized picking, orders can be quicker prepared and delivered quicker to the customer.

Having these promoters identified it became clear what were the main topics to approach during the proposal for implementation. The project should address how COL wants to meet the customer demand, how they will address the directory for the service, stockouts and unavailable products, and what are the stores' processes for order preparation. The research questions that will guide this study, and the dependent objectives related to each question are presented next:

RQ1: Which will be the product range available in the service?

The question is how the directory on the website should be adapted to meet the less stockouts and products unavailable.

RQ2: How should we address the order preparation in-store?

This second research question is related to the preparation. The challenge is to map out a process to make the store's team capable of order preparation and delivery.

When identifying these motivations and research questions it was important to firstly understand the background of the involving topics. By so, it was made a background analyses on topics like grocery e-commerce, e-fulfilment and types of order fulfilment. Understanding specially the way retailers can fulfil their order, gives the project support and scientific acknowledgement.

1.3 Methodology

Having in mind two main objectives, an Action Research (AR) methodology was used. The objective is to suggest a practical operational process within an organization by covering the identified gap and try to draw conclusions on what the processes should be. This methodology was implemented, in order to comprises iterative cycles of gathering data, analyzing the data, planning action and taking action, leading to further data gathering and so on. Although e-commerce has been around for many years, there is still challenges regarding the optimization of processes on an online grocery operation. To AR is generally about change within organizations and involves a real problem of both research and managerial interest (Coughlan & Coghlan, 2002), making it appropriate for COL undergoing experience. As described by Coughlan and Coghlan (2002), AR distinguishes itself from the traditional methodologies for focusing on research on action, rather than about action, which means that, in AR, the author participates in the making, rather than just observing it. Given the case of the Operations team from COL project, AR seemed to be a suitable approach to a real problem with the intervention of the author of the dissertation, while theoretical knowledge is hopefully being shaped. The aim of the investigation is to give some hints on how changing processes should be addressed.

Throughout the study, it was necessary to learn, until a final decision on what the different matters could be made. An example can be given regarding the operational processes that will have to be defined with the intervention of different stakeholders, and that will likely have to be refined until a compromising solution can be found. For an action researcher, data gathering is accomplished through its involvement in the daily activities of an organization, such as any other step of the cycle. Planning was achieved with the definition of requirements, the establishment of goals, the involvement of different stakeholders and the design of the ‘To-Be’ processes.

To answer the studied questions, we opted for this strategy and the data collection was made essentially based on two instruments: active observation and documental analyses. The observation was active and formalized during the period of the project. Most of our time was spent in the offices but we also made many visits to the operation locations to study and understand the current processes. We visited the operations in Gaia Jardim, Gaia Shopping, Cascais, CDL and Maia Jardim. In this way, it was possible to make contact with the reality of the organization, with particular regard to the processes performed and services rendered. These visits proved to be essential to understanding of all processes associated with logistics, from the picking of our online orders on the operations, orders consolidations and the orders deliveries.

The main activities carried out within this scope focused on the critical analysis of the process associated with the order making, preparation, delivery and respective tools. With these activities we started the definition of all processes and necessities for its proper functioning, such as the definition of directory for the service, the processes for picking an order, picking equipment and delivery slots.

The accomplishment of this project also allowed access to internal documents of the interest for the work development, such as process definition documents, equipment prices and needs, service reports, among others. Data from these documents was analyzed and used in the study, providing a distinct source of information and thus increasing the variety of information available, as well as the variety of analysis perspectives.

Throughout the project there was also great collaboration from all the colleagues involved and a great willingness to help and clarify any point relevant to the project. In this sense, and in the different phases of the project, feedback was also collected from e-commerce operation colleagues in order to involve the different perspectives of the actors in the study.

1.4 Report outline

The dissertation is organized in six chapters.

Chapter 1 includes the introduction to the project's motivation, scope and goals, as well as the applied methodology.

Chapter 2 incorporates the definition of grocery e-commerce and statistics regarding the subject, as well as a literature review on several topics of interest for the project: models of e-fulfillment and its challenges, centralization and decentralized operations, and delivery processes.

Chapter 3 presents the discussion case and thus includes the description of the 'As-Is' operation of COL. This also includes the company presentation, the cost analysis of the operation and a brief explication on the form of data gathering.

Chapter 4 describes the studied processes, covering three main topics: the product range, the IT equipment and the picking process.

Chapter 5 describes the alternative suggested previously studied. This also includes, a cost analysis of the new proposal.

The key conclusions and remarks on future work are described in Chapter 6.

2 Background

Multi-channel shopping has revolutionized the retail operations and traditional retailers have found growing importance in online sales (Hübner, Holzapfel, & Kuhn, 2015). Regarding this project we found that traditional grocery retailers fell the need to cope with online and brick-and-mortar requirements in a multi-channel strategy. This is because retail sales have often grown by up to 3 to 4 per cent over the last few years and annual growth rates in e-commerce were this year 14 per cent (DataReportal, 2019). Therefore, the online retail is gaining a considerable market share due to the new shopping patterns (Hübner et al., 2015). Giving the scope of this project, the topics addressed in this chapter were chosen due to its importance to the project's challenge. The need to comply with a hybrid operation, a strategy that spans both centralized and decentralized operations, made the understanding of both of these strategies crucial. The topics address the experience faced by retailers on e-fulfilment models and gives a background study on the topics addressed later on the project.

2.1 Grocery E-commerce

Since internet has appeared, society has modified their habits and ways of dealing with the new tech era. According to the Digital report of 2019, today Portugal has a 78 per cent of internet users and they spend on average six hours and thirty-eight minutes per day using the internet (DataReportal, 2019). The percentage of population aged 15 or more that report to make online purchases is 35 per cent and the category of food & personal care represents $240.0 million spent per year (DataReportal, 2019). This is 14% more than the previous year (DataReportal, 2019). Considering this growth, many national companies are addressing their omni-channel presence. The internet explosion has sparked many new ways of doing business and has enabled companies to do business around the globe with the click of a mouse.

The grocery e-commerce business is a challenge since it requires dedicated operations, capital, delivery costs, fulfillment costs, and price transparency (Bacos et al., 2014). E-commerce is growing very rapidly due to the proliferation of refined online trading tools and techniques (Kumar, Eidem, & Noriega, 2012). This multichannel approach assumes a presence on an online and physical sales channel. The online presence is an additional service from companies, that provided additional value to the customer by adding commodity and simplicity to a different shopping experience (Nguyen, de Leeuw, & Dullaert, 2018). This approach represents a major turnaround on the retail industry since it brings special value to the customers and extra revenue to the companies (Bayles, 2002). It is a major advantage when retailers know how to deal with it and can integrate smoothly their online and offline channels, bringing a true multichannel experience to the customers (Murphy, 2003). In what concerns e-commerce strategy for a company to implement its online business, James Bacos (Bacos et al., 2014) presents three characteristics that are decisive when investing in the grocery e-commerce:

- Population density that affects directly the cost of the order delivery. If it is a very concentrated population, the delivery costs will dramatically decrease because it can serve more customers in less time. This is specially justified by economies of scale: the more deliveries the company has for the route the less spent per order;
- The overall population because the customer may be close, but the retailer needs to have a high volume of demand to make the business profitable;

- Market price levels since gross margins should be enough high to compensate the level of workforce needed for the online order operation.

The focus of an online grocery retailer should always be the customer more than the business model approach. Online shoppers felt that reduced assortments, higher prices, and additional fees had driven them back to supermarkets (Kumar et al., 2012). The convenience of shopping for groceries online is alluring but consumers who have not tried yet grocery shopping online yet said their biggest concern is not being able to see or touch the actual products before buying (Nguyen et al., 2018). For all of this, having an omni-channel business approach requires an efficient operation.

2.2 E-Fulfillment

E-fulfillment can be defined as the integration of people, processes and technology to ensure customer satisfaction before, during and after the online buying experience (Bayles, 2002). Order fulfillment is the process of storing inventory, picking products, and shipping online orders to customers. This process can be completed in-house by the e-commerce company or outsourced to a third-party logistics provider (Ricker & Kalakota, 1995). The models of e-fulfilment pretend to achieve the maximum satisfaction of the customer, for all moments of the online order placement until the order delivery. The physical components of an e-fulfilment process are similar to a traditional fulfilment process (Tarn, Razi, Wen, & Perez, 2003). However, latest technology needs to be adopted in the process along with operational and information systems procedures to support the unique nature of e-business. There is big difference between providing boxes of goods to its retail stores and fulfilling individual order online (Krueger, 2000).

The presence of two distribution channels, one relying on traditional stores and the other associated with internet order through a website or app, raises considerable challenges, such as the ability to order immediately and buy online with the consequent need of real-time visibility of product availability (Kumar et al., 2012). The main goal of an online channel is to minimize stockouts in an order. This requires mutual coherence between supplier stock inventory levels and the sales channels, and thus a need for information transparency and back-office data integration throughout the supply chain (Hovelaque, Soler, & Hafsa, 2007).

As e-commerce and bricks-and-mortar are merged into multichannel retailing, customers gain more opportunities to buy what, where, when and how they want (Hübner, Kuhn, & Wollenburg, 2016). Cross-channel optimization offers a number of advantages and opportunities allowing improvement of the supply chain performance, especially relevant on grocery e-commerce (Hübner et al., 2016).

The processes for e-fulfillment must require bridging the gap between a customer browsing an e-commerce website and actually purchasing and receiving an ordered product. The first requirement should be a user friendly website, to be able to communicate with the customer and inform which products are available for sale (Tarn et al., 2003). The feeling of secure web environment must be passed onto the customer in order for him to shop and enjoy the service to its full potential. The activities associated to e-fulfillment model are the less glamorous but the most critical since they ensure the customer gets what he wants when he wants (Bayles, 2002). In fact, the costs of an e-fulfillment model are one of the most expensive and the

operations associated are the most critical for internet sellers (Agatz, Fleischmann, & van Nunen, 2008).

E-commerce order fulfillment can be applied to business-to-business (B2B) orders - where large quantities of products are shipped to big-box retailers - as well as business-to-consumer (B2C) orders that are shipped directly to a single shopper's home or pick up points (Ricker & Kalakota, 1995). After the customer completes their purchase on an online channel, the fulfillment process begins. The fulfillment workflow includes receiving inventory, warehousing products, picking and packing items, and shipping orders (Lopienski, 2019):

- Receiving: before fulfilling an online order, the business should calculate the inventory needed for the operation. If it is an in-store order fulfil them the store should provision having in mind the online orders. If it is a dark store, then the study of stocks should be carefully done (Lopienski, 2019);
- Inventory Storage: this is how the organization will storage their products. If they are in-store operations, then the products will be allocated on the shelves. If it is an operation on a dark store, then the products will be allocated in an optimized shelves location. Proper inventory storage will keep the products secure, protected and help to give visibility into what is available to ship to the customers (Lopienski, 2019);
- Order Processing: this starts once the order has been submitted. This process involves picking the items from where they are stored, packing, and getting the order ready to ship. This also includes instructions on how to properly pack an online delivery to assure the best presentation and conditions to the customer when opening the plastic grocery bags. Lastly on this process the order should be consolidated and invoiced (Lopienski, 2019);
- Shipping: Once the order has been processed and ready to send it is placed on an optimized truck route and distributed. This may involve a home or store delivery.

E-commerce order fulfillment requires a strong strategy behind it to maximize the customer expectations (Lopienski, 2019). A good planning and study of the operation is necessary to secure the infrastructure, systems, processes, and teams. The location of the operation should be strategic to ensure minimized time deliveries and distances. Although, we are working with an online channel the physical location still matters in e-commerce. Since affordable and fast shipping options are important to consumers, optimizing the fulfillment operation based on where your customers reside will help reaching the most people in the most cost-efficient manner (Tarn et al., 2003). The more fulfillment locations near common shipping destinations, the more ground shipping can be leveraged (Lopienski, 2019).

Software that integrates seamlessly with e-commerce platforms can help manage orders across sales channels without any special requirement. This means that as soon as an order is placed online, fulfillment staff can quickly be alerted to pick, pack, and ship the items to the customer. Making the right choice for how you fulfill orders will depend on several factors, including the order volume and products availability.

2.3 E-Fulfillment Challenges

With more companies entering the online channel, the competition has increased. In an online order operation there is an absence of pricing power and shirking operating margins that will

lead companies to fail or success based on their efficiency of their fulfillment strategies (Ricker & Kalakota, 1995). An accurate measure for competitive strength may be the company's processes for rapidly and efficiently translate order into fill-rates that satisfy and exceed customer expectations (Ricker & Kalakota, 1995).

The online channel brought companies new and advanced logistics systems due to the high number of order expeditions (Kumar et al., 2012). In e-commerce fulfillment there are some challenges since this is not always as straight forward as it may look. Unexpected challenges may arise that can prevent a business from scaling and orders from getting out on time. The main e-fulfillment challenges are:

- Lack of fulfillment expertise in-house: very few businesses have their distribution network as a core competency or have built out their own supply chain. With all the complexities of shipping, understanding the ins and outs of it can be overwhelming. Many e-commerce teams find that they do not want to be setting up and running operations in a warehouse (Lopienski, 2019);
- Peaks of demand: times like holidays the company should be ready to ramp up operations. However, it can be challenging to keep up with unprecedented demand. As more orders are placed, more people are required to help ship them out. From scaling the workforce to managing a greater number of returns, changes in volume are challenging (Lopienski, 2019);
- Return items (also known as reverse logistics): this is one of the most complex process on e-commerce. Most times e-businesses do not have a customer support service and customers are not sure where they can ask help for the return process.

Other challenges of an online order fulfilment are the high amount of customers' information, high expectations of service quality, fast deliveries and visibility of the supply chain (Bayles, 2002). Offering fast and affordable shipping options to your customers helps prevent any surprises at checkout. Yet, without the proper order fulfillment process in place, e-commerce businesses will not be able to deliver the best outcome. The reality is if consumers cannot get the shipping speed and price they want from you, they will look elsewhere. To meet customer expectations, the company must understand the overall e-commerce order fulfillment process, which fulfillment model makes the most sense for its business and how to be strategic in its operation (Tarn et al., 2003).

2.4 Centralize, Decentralize and Hybrid Operations

An average shopping basket for an online order for home delivery has between 50 and 55 items and for a click & collect service between 18 and 25 items. This number directly affects the picking and packing procedure so this operation should be carefully studied (Hovelaque et al., 2007). The framework for e-commerce fulfillment strategies is based on two dimensions: the structure and the operation of fulfillment strategies (Tarn et al., 2003). On the structure dimension, the strategies can be classified as centralized or distributed. In a centralized structure, all warehousing, pick-up, packing, and shipping are operated in a central location, such as a central distribution center. In a distributed structure, warehousing, pick-up, packing, and shipping or delivery are operated at different locations. On the operation dimension, the fulfillment strategies are either self-operated or outsourced. There are three fulfillment strategies that will be discussed below (Ricker & Kalakota, 1995).

Decentralized

Decentralized delivery centers are operations distributed on different locations and self-operated. In-store picking spread around urban areas are on the rise as they allow companies to quickly and affordably ship to customers in big cities or to deliver orders in-store (Boyer & Hult, 2006). Picking in-store is a low investment option, because the operation is attached to a support store where the picking is done directly from the shelves and usually orders are picked from a location near the delivery address (Bacos et al., 2014). This model has easier and quicker implementation because stores are already familiarized with operational tasks, such as inventory management, replenishment and provision of goods (Murphy, 2003). The picking of the order is done by the store staff and it is totally manual with the help of some electronic equipment. This is usually the primary option for a brick-and-mortar retailer who wants to enter the online channel. This entry model allows the retailers to offer a full range within the existing structures, enabling them to expand fast without investing in new logistic facilities while future demand is still uncertain (Hübner, Kuhn, et al., 2016). This model minimizes upfront investments, can be quickly set up and it is prompt delivery since it allows the shortest transport distance to customer or shorter lead times for pick-up locations service. However, there might be problems like additional staff to the store, adaptation of the back-store, replenishment for online volume to store, store space restrictions, regular customer can get in the way of pickers, it is hard to keep track of inventory transparency and there can be problems with the rules of packaging an online order (Hübner, Kuhn, et al., 2016). These factors are mostly caused by store layout being designed for displaying products and not for picking efficiency. Typically, this model is adopted by brick-and-mortar retailers, especially at launch.

Partner fulfillment operations are also decentralized operation sites but, in this case, they are partner operated. In this model individuals contracted through a third-party pick orders directly from the shelves, just as an in-store customer would do. This means the company has no inventory, no shops and no product brands. This minimizes up-front investment, has less operational responsibility, flexible and low delivery arrangement to customers (Krueger, 2000). However, it is a service limited by a partnership, has low overall efficiency and high inventory costs and management complexity (Bacos et al., 2014).

Normally companies that start online operations use existing stores network, picking orders in-store and only after growing in scale shift to a dark store (a large retail facility that resembles a conventional supermarket but is not open to the public, housing goods used to fulfil orders placed online) (Hübner et al., 2016).

Centralized

The dedicated fulfillment centers are centralized self-operated operation. The orders are picked from a purpose built warehouse or dark store. Dark Stores are warehouses laid out more like stores to complete shelf replenishment processes (Bacos et al., 2014). Picking at dark store avoids mainly the interaction between pickers and shoppers in-store since products are displayed similarly like in a grocery store (Hübner et al., 2015). There are also other advantages, first order picking can be done more efficiently as the centres are especially designed for picking online orders and are easier to scale-up for larger volumes (Hübner, Kuhn, et al., 2016). Second, it is easier to keep track of inventory transparency and simpler to provision reducing order stockouts (Hübner et al., 2015). However, this model brings high fixed costs for setting

an additional location, high up-front investment and has low or unpredictable sales volume, bringing in high inventory-carrying costs (Agatz et al., 2008). This model can also bring longer average distances to customer and an adjustment of picking system is required (Hübner, Holzapfel, & Kuhn, 2016). Usually this model is adopted by online-only retailers, bricks-and-mortar retailers who want to add a centralized operation in a strategic location and bricks-and-mortar stores that use third-party warehouses from the beginning to minimize upfront investment yet take advantage of picking efficiencies (Tarn et al., 2003). Depending upon the service levels required by customers, multiple fulfillment centers may be necessary to minimize delivery time. Often, companies invest in a dark store model but still work in picking by store model in other stores, because it is a huge investment and must only be made when there is a population density and high level of demand on the proximity locations.

The third-party fulfillment centers are centralized operations but third-party operated. This means companies leases the skills and facilities needed for order fulfillment rather than owning them. This strategy takes least investment, no learning curve and minimized operational impacts (Tarn et al., 2003). This often occurs when the company spends too much time packing and shipping orders, has run out of space to store their inventory, needs more time for strategic projects, and has no interest in managing their own distribution infrastructure (Tarn et al., 2003). Third-party fulfillment companies offer flexibility in accommodating wide swings on demand over short periods. However, there is still few options available and problems can happen with the strategic alliances. The quality of the service can also be compromised.

Hybrid Operation

Hybrid operation is a strategy that spans both centralized and decentralized operations. The customized model is an emerging fulfillment center strategy that extends beyond the traditional framework and adopts an integrating or boundary-spanning perspective (Tarn et al., 2003). This allows the operation to have no stock inventory and controlled fulfillment. A fundamental requirement of fulfillment logistics is the dedicated collaboration of all supply chain trading partners to eliminate the costs associated with inefficient movement of goods, redundant processes, and excess inventory (Tarn et al., 2003).

One of the most recurrent pattern on e-fulfillment is the combination of ‘bricks-and-clicks’, the integration of online sales into a portfolio of multiple alternative distribution channels (Hübner, Holzapfel, et al., 2016). This is the more traditional retailers’ approach since they add the service later than the opening of the businesses. This is a more recent model that have been growing in the past years. On the other hand, there are also the ‘pure-play’ internet retailers, that open physical stores for online fulfilling or are collaborating with existing retailers (Agatz et al., 2008). For the models of ‘brick-and-click’, the multichannel distribution offers the opportunity of serving new customer segments, explore economies of scale and create synergies between different communication channels (Bacos et al., 2014). Despite the advantages, these opportunities should only be explored if there is a careful design of their e-fulfillment model, and, in particular, the multi-channel distribution system.

The important factors that the retailer has to consider when choosing the operational model are the trade-off between picking efficiency in each store, delivery distances, delivery times, and delivery costs (Hübner, Kuhn, et al., 2016). The choice of picking location is driven by shopping behaviour and geographical conditions within the country (Hübner, Kuhn, et al., 2016). Hence, different delivery preferences and geographical and population density can impact the choice

of picking locations. Regions with a higher population density, like metropolis, and higher market potential reach break-even for centralized fulfillment centres. The hybridization of operational concepts, with both in-store and centralized picking, will continue in the light of demographic changes as a greater choice for online grocery customers' increased expectations (Kervenoael, Yanık, Bozkaya, Palmer, & Hallsworth, 2016).

2.5 Online Orders Delivery

The decision about the delivery mode for an online order depends on the geographic distribution of the online operation and the coverage of the service. The delivery part is the only situation where an online customer comes into personal contact with the retailer (Hübner, Kuhn, et al., 2016). Therefore, this plays an important role on the customer relationship management and channel selection. Some of the decision factors for delivery channel decision are the accessibility by car and availability in terms of opening hours of a store (Hübner, Kuhn, et al., 2016). It is also compatible to use a mix of delivery models at the same time.

Home delivery is when the business provides the customer with a front door delivery service. In this case the order is transported on an owned or outsourced fleet of vans and delivery drivers. Attended home delivery means that the customer has to be at the point of reception within a selected timeframe to accept a delivery (Hübner, Kuhn, et al., 2016). The conventional shopping experience is when the consumer works as a picker for his own order and takes it home. A retailer with an online channel that offers home delivery service does not only need to cope with picking online orders but he also has additional expenses with distribution (Agatz et al., 2008). Retailers' objectives include maximizing vehicle use and minimizing distribution costs, while maintaining a certain level of customer service and satisfaction rates (Hübner, Kuhn, et al., 2016). Time savings in online shopping are perceived by customers mostly as the time not spent travelling to and from the store, rather than a decrease in actual shopping time so the home delivery concept can provide additional customer satisfaction (Hübner, Kuhn, et al., 2016). This requires dynamically assigning delivery time slots as new orders arrive as well as dynamically creating and adjusting delivery routes (Agatz et al., 2008). The home delivery implies an extensive operation of routes planning, because de relation cost-efficiency of goods with low value as in grocery e-commerce can be challenging.

Click&Collect is the other dominant delivery mode in online grocery retailing. These are strategic points where customers collect pre-picked orders from the chosen location. These pick-up locations can be attached or not to a store. Either way, the goods are ordered via the online channel and then either picked from a dark store or in-store (Tarn et al., 2003). The main advantage on this delivery mode is that customer takes the full cost of fulfillment, reducing costs mainly on the model of in-store picking. From the retailer's perspective, in-store pick-ups offer additional possibilities to cross-sell products and increase store's traffic (Hübner, Kuhn, et al., 2016). This is a model mostly used by brick-and-mortar retailers.

Delivery time plays an important role in terms of customer convenience, service and satisfaction since the main goal of a retailer should be to minimize the time that customers wait to receive a delivery while reducing distribution cost and increasing security (Hübner, Holzapfel, et al., 2016). Customer satisfaction and days until delivery after ordering are negatively correlated (Hübner, Kuhn, et al., 2016). By so the retailer should not expect customer satisfaction to be high when customers receive their groceries more than one day after the order (Tarn et al.,

2003). Time slots are when a retailer offers a specific delivery window for the service. The main challenge on this time slots is how to manage the high demand for certain time slots, travel time uncertainties for the trucks and narrow time slots which might complicate on-time delivery (Agatz et al., 2008). By pricing the time slots differently, retailers can create more cost-effective schedules. In terms of capacity management and delivery efficiency, retailer should balance demand during prime time by charging a demand-based delivery-fee (Hübner, Kuhn, et al., 2016).

This theme has been approached by some authors in an attempt to define models that increase the efficiency of the distribution models to be used by the organizations. However, to date, no models have been presented that consider transport choices specifically for multichannel organizations, and which justify the choice between home delivery or pick-up locations (Agatz et al., 2008).

When distribution is not a core competence of the company, the outsourcing can be a viable solution to guarantee efficiency by totally focusing on intern operations and its growth. The quality of the service is assured by a third parties specialized on logistics and fulfillment, this way the company obtains the maximum quality to a lows price compared to the investment necessary when planning the logistics on the root. However, using this strategy can make the company lose part of the process, and consequently hardly influence the net promoter score of a company (Bayles, 2002). The drop-shipping model, allows to expedite the order delivery to the customer process, saving cots to the company. The company that sells the product and charges the customer only unleashes the order to the 'mother operation', and never takes possession of the product, supporting the delivery costs to the customer. Although this seems a good methodology, drop-shipping carries some risks, especially if it is the only strategy adopted by the e-commerce company.

2.6 Business Process Modelling

Business Process Modelling is widely used within organizations as a method to increase awareness and knowledge of business processes, and to deconstruct organizational complexity (Dumas et al., 2018). It is an approach for describing how businesses conduct their operations and typically includes graphical descriptions of the companies' activities, events, and control flow logic that constitute a business process. This representation can be used to translate the understanding of the process to relevant stakeholders, as well as to test and explore alternative scenarios and clarify assumptions, objectives and surroundings (Dumas et al., 2018). Business process models can be used to document how the process looks and works today (As-Is model), as well as the improved version of it (To-Be model). There is a common difficulty when approaching the most appropriate level of detail of business process model. When designing an overly detailed, the model may become too difficult to understand, but if it is designed very generic, it may omit relevant aspects of the process. The most effective way to handle with this problem is to consider hierarchical modelling levels each one with a different level of detail (Dumas et al., 2018). Regardless, business process modelling should stop when value is no longer extracted from a given detail level (Dumas et al., 2018).

Companies often use Business Process Modelling to get competitive advantages among competitors. In fact, if done well, there are several motivations for companies to model their processes, such as (Dumas et al., 2018):

- Formalize existing process and spot needed improvements. Process modelling give companies the opportunity to rethink and formalize their understanding of current processes. Usually, people running the business spot potential improvements that must be taken into consideration.
- Facilitate automated, efficient process flow. Modelling allows to identify and understand the activities of a certain process. Identifying the flow of these activities allows the company to reduce the time between them to achieve a better performance. Plus, process modelling support process parallelism, so that independent processes can be performed at the same time in isolation with their results merged latter in the flow.
- Increase productivity and decrease headcount. With process modelling it is possible to identify opportunities to make work more effective, increasing customer satisfaction while reducing cost with personal.
- Simplify regulations and compliance issues. Business Process Modelling helps businesses build auditable processes that help organizations comply with various regulatory requirements.
- Process over People. Process modelling creates a standardized way to do work that can be perceived by anyone. Companies are not dependent on their workers anymore as the way of doing things is registered and can be easily transmitted.

Business Processes can be modeled through a large number of methods and techniques. Depending on the Business Process Modelling Methodology, a preferred diagrammatical method may be used. The selection of the most appropriate one depends on the characteristics of the process being analyzed as well as the purpose of the model. Nevertheless, any process model always highlights the work to be executed (*tasks*), the sequence of execution (*workflow*) and who executes it (*actors*) (Dumas et al., 2018). It is important for leadership and management to understand that there is no finish line for the improvement of business processes. It must be understood as an end-to-end organizational view that must be maintained over time. To be successful, business process modelling also requires a great deal of common sense throughout the organization (Dumas et al., 2018).

3 Case study - Operations and Processes

This chapter explores the current situation of the operations through the C&G delivery service, in an effort to understand the relevance of the proposed solution and to identify the challenges of the new processes. In this chapter we can also find a detailed presentation of SONAE group and its biggest e-commerce business – COL.

COL works on a centralized and decentralized model of order preparation. However, most of order preparations are done in a decentralized model, meaning there are distributed in several operation locations. After identifying the need of growth, especially on the orders in the format C&G, this project will cover the processes and associated requirements for an expansion. On this chapter, it will be addressed the 'As-Is' model of order preparation in order to understand and map out the needs and challenges of enlarging the decentralized operation.

COL is an e-commerce model based on the grocery business of CONTINENTE, extending the value proposition of the company to the online world. The problem is that e-commerce customers' needs and expectations are different the traditional customer of a hypermarket.

3.1 CONTINENTE Online

SONAE was founded on 1959 and it started as an industrial company whose core business was the production of decorative thermos laminates. With continuing growth of the sector and the will of expansion it opened its first hypermarket in 1985 forming SONAE Investments, SGPS, SA. The opening of the first Portuguese hypermarket marked the beginning of SONAE distribution activity in the country and the companies first experience in food retail. Today, it is a company with a much diversified portfolio of businesses mostly focused on retail, such as, real state, mall management, health clubs, health care, telecommunications and financial services, as seen on Figure 1. SONAE is now present in 91 countries and has 901 physical stores in Portugal.

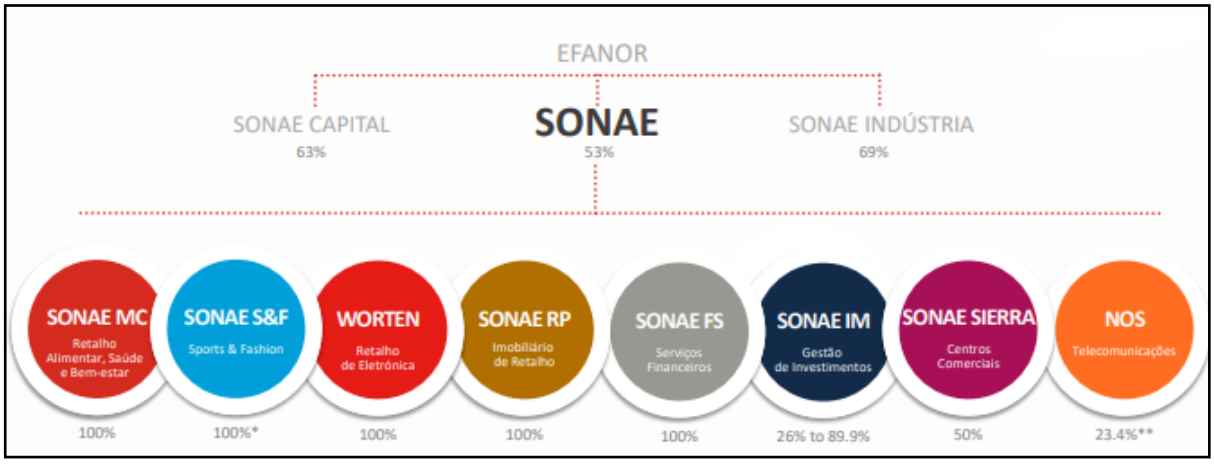

Figure 1: SONAE Companies' Portofolio

Today, the holding is called EFANOR and owns equity in three different companies with completely different core business comprising a role model in most of them and employing

around 40.000 people. SONAE itself, owns equity in six different companies being the major shareholder in four of them.

SONAE MC is a grocery retailer leader in Portugal, including the omni-channel. The business has over 697 stores and over 30000 workers. It was founded in 1985 and it is still a brand reference in the grocery retail market. SONAE MC has a revenue of EUR 4.1 million and an EBITDA of EUR 303 million. CONTINENTE has 99 per cent of brand recognition and 85% of Portuguese families use its company fidelity card. The company manages a diversified portfolio of businesses with a distinct range of products whose main value proposition is to offer the best quality at the best prices. The businesses within SONAE MC range from hypermarkets, convenience stores, franchising businesses, cafeterias and restaurants, book stores & stationary stores, healthcare and wellness and pet food. The Figure 2 represents the range of businesses belonging to SONAE MC and the number of stores within.

Figure 2: SONAE MC Range of Business

In 2001, CONTINENTE launched an online channel called CONTINENTE Online with the main value proposition of selling food products and providing the delivery to the customer's own home from Monday to Sunday. By this year, Portugal was still adopting internet habits and only 2% of the population had access to it. By 2006, COL was already reaching 75.000 registered customers and a wide range of available products.

Last year, COL prepared 718128 different orders and has grew 18% when compared to 2017. The percentage of orders delivery in-store by the C&G service represents 7% of the total amount of prepared orders. COL is the market leader with 70% of market share. Currently, COL counts regularly with over 50.000 different products available on the platform and has over 500 000 registered customers. The online channel has the same prices, promotions and loyalty card benefits as the physical store. COL is comprised in seven different teams:

- Offer: This team is responsible for managing the businesses contents on the web pages;
- Business Analytics: The team prepares the necessary reports for business analysis. These reports are a crucial role for work of other teams since it gives insight of what was done before and what should be addressed in the future;
- Business Development & Mobile: This team is responsible for managing the apps and developing new ones;

- Operations: This team is responsible for all the logistics related with online purchases, starting when the order is made, going through the picking in the stores and finishing in the delivery of the order;
- Customer Care: This team is responsible for enhancing the user experience throughout the whole customer journey. For this purpose, they manage the multimedia content of the website;
- Projects: Also known as Project Manager Office (PMO). This team is responsible for managing the different projects of the E-commerce business: innovation, granted projects, continuous improvement projects, systems or other project that suits the business goals;
- Acquisition & Loyalty: This marketing team encompasses the areas of acquisition, loyalty and advertising. Their main objective is the acquisition of new customers for the business, its development, and maintenance of active customers. They also manage, explore and develop advertising space on the website.

COL works mainly under a B2C e-commerce business model in the sense that the goods and services are sold directly to the end user. The service provided by the online platforms enables COL customers to make their purchases and receive them in one of three ways:

- Home delivery: this is when customers make their purchases on COL's and receive them at their own front door. The home delivery service has a cost dependent of the house location and the coverage of the service;
- Click&Go: this is when customer uses the online channels to make the purchase and collect it at strategic points distributed all over the country. These points are generally inside CONTINENTE stores and are now present in 101 locations. This delivery has a cost of one euro during the weekend and its free during the week;
- Click&Go Drive: is the drive points, where customers collect an order outside the store, in the comfort of their car.

COL operation can carry out all the process inherent in a business online, such as managing the online platform, the processing of orders, invoice and customer service. The operational procedure in order to give answer to the customer's request is based on a picking in-store method or a 'Dark-Store' fulfillment. Today, COL has 15 operations spread in Portugal covering as much postal addresses as possible. These locations serve as preparation locations for home-delivery and pick-up locations. The picking process can also be done at the 'Dark Store' located in Lisbon which consists in a centralized operation specially designed to fulfil the online' orders. This order preparation location was raised due to the population density and demand on the Portuguese Capital.

The global process of order preparation starts after the customer places an order on the website or app. This order enters the back-office of the operation where the postal address is indexed to. On the operation location the pickers start picking, packaging and storing the order. The transport team sends the routes, with the allocated orders, for an operation location. The drivers are in charge of transporting the orders from the operation to the place of delivery (home or pick-up location). In case of doubt, both during the product selection process on site, and during delivery, the customer can contact the Contact Center (CC). These processes will be addressed on the next chapters in order to understand the 'As-Is' processes and develop de 'To-Be' model.

3.2 Order Placement

The main processes of the order placement can be seen on Figure 3.

Figure 3: Order Placement Process

In the first order placed on COL the customer is asked to register or log in, define the return policy and set a primary address in order to automatically index his address' postal code to one of the operation locations. After this, the directory on the website is automatically updated. On COL the directory presented to the customer represents the range of items found on the operation locations. For example, if a customer makes an order for a home delivery in Espinho or a C&G on CBD Espinho they can see the range of items found on the Gaia Shopping operation location where the order is prepared. Although the customer can fill their cart in an anonymous way, when he checks out, he chooses the delivery location and his cart will be updated with the available range on the operational location his order is allocated at.

Defining the substitution policy is important in case of stockouts in some item order. If he chooses the "Replace with an alternate product suggested by CONTINENTE", the item will be replaced using the substitution rules. If, on the other hand, he chooses "Do not make any replacement" policy, the item is not replaced, and the customer is contacted to see if he wants any replacement. On the COL, the items are grouped by family of products. When selecting an item, it is possible to leave a comment about the same. This allows the employee who collects the products to comply with the customer preferences, providing the most personalized service possible.

Following the steps indicated on the website, the customer must choose the form of payment and the intend pick-up location, as well as check the delivery slots available. The C&G location can be chosen by checking the nearest store regarding the postal code or city, as seen on Figure 4.

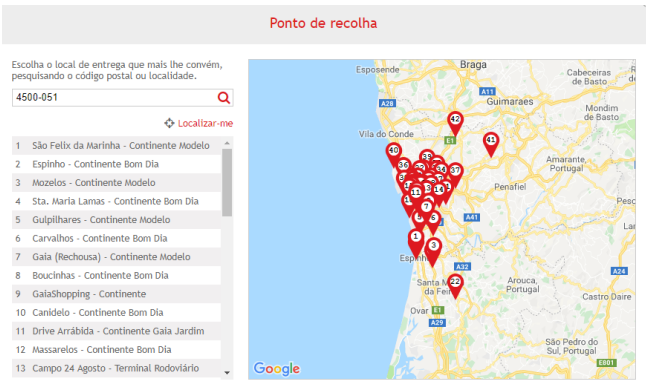

Figure 4: Click&Go Available Points

When choosing the time slots available (Figure 5), COL provides several delivery windows which cover over two hours and are dependent on the location. The price of the delivery windows for home deliveries varies according to the demand of that slot. On the case of C&G, the service is free during the week and has a fee of 1€ during the weekend.

Figure 5: Click&Go Delivery Windows

The Contact Center is available at any time during the process to support both the customer and the operation or the drivers. Regarding the order placement it was drawn a process map found on the Appendix A.

3.3 Picking Process

As James Bacos stated, picking in-store is a low investment option, because the operation is attached to a support store where the picking is done directly from the shelves (Bacos et al., 2014). By this reason, COL still operates in physical CONTINENTE's stores distributed all over Portugal. Because of the needed low investment, these operations were mostly prepared after the inauguration of the stores. For this reason, online operations back store area was adapted and made to fit in the already existing back store. They have different space allocations taking into consideration each available space on the store. This back store has quick and easy access to distributing vans in order to facilitate the expedition process, as seen on Figure 6.

Figure 6: COL Back Store

The process of picking is the one that carriers more value on the preparation of the orders, since it ensures the customers get their items order on the right quantities and perfect conditions. All the core processes associated to the picking process can be seen of Figure 7.

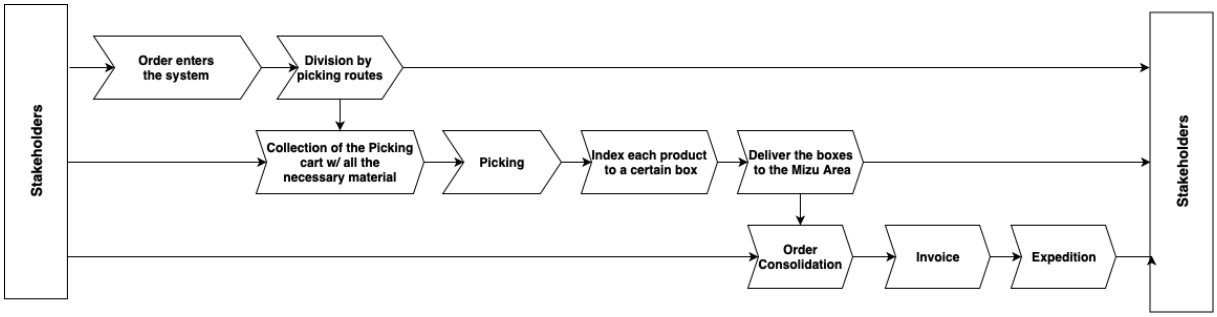

Figure 7: Picking Process

By the moment the operation receives the order, it is divided on the back-office by optimized picking routes that represent different store areas. Those optimized picking routes have in consideration each store layout. On Figure 8, it is represented a board with the lines done by each picker on the different picking routes. On the columns we can see the different routes present on this operation, for example, grocery, wines, bio and healthy area, detergents and hygienic products, pet area, and counter services. On the lines, there is the name of the pickers and the lines they did on a certain route.

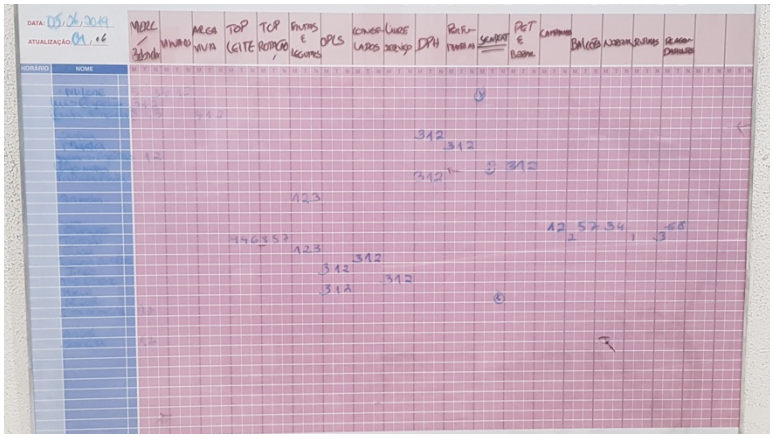

Figure 8: Picking lines done per Picker

The picking routes are adapted for each store operation in order to achieve the most productive picking. Depending on the rotation of each area there can be used different picking forms, such as:

- Multi-Order Picking: This form of picking is when the same car carries different orders on the same picking route. For example, if the car has six ‘chep’ boxes and goes to grocery picking route, it can collect as many as six different orders at the same time. The picker only needs to travel to the picking location for that specific SKU once, in order to fill the multiple orders. This method minimizes the pickers’ distance covered, which increases productivity. This is the main form of picking used today on COL orders preparation;

- Single Order Picking: This form of picking is when there are not picking routes on the store, instead the picker collects the order on a single route. He can pick every category and usually the cart for this form of picking only carries two boxes. This is done mostly to exclusive customers, like hotels, that need a quicker delivery or specific items;
- Aggregated Picking: In this form of picking the picker collects the necessities for a number of orders without knowing the order associated to which item. The items are then put to order and attributed to the correspondent order on the back-store. On COL this form of picking is done on the wine and spirit drinks area, bio area and frozen items. This facilitates the picking and on the frozen items it minimizes temperature losses.

The picking is initiated with a specialized picking cart, that disposes all the components necessary for the process, like tablets, scanners, empty 'chep' boxes, plastic bags, packing material (bubble wrap, tape, etc.) and labels, as seen on Figure 9. 'Chep' boxes are specialized retail boxes used to transport all kind of products sold on CONTINENTE stores, they are green and make part of every store asset.

Figure 9: Specialized Picking Cart

The packing material serves to condition the fragile items. The plastic bags used are the ones from the store inventory. There are specialized thermal sheaths to use with the temperature-controlled items. These covers are already adapted to be used on the 'chep' boxes and prevent problems with losing temperature on temperature-controlled items, as seen on Figure 10.

Figure 10: Specialized Thermal Sheaths

The picking cart is already adapted to carry a maximum of 6 orders and has specialized places for each of the materials the picker has to carry. The tablet has its own support next to the handle, to keep the picker hand's free. The goal of the operation is to carry out the orders with at least half a day in advance. First, the picker enters the system through a tablet, logging in with his user. The tablet shows on the main screen the possible picking routes to work on. The picker has his daily assignments on a board placed on the back store, as seen on Figure 11. This board has the picking route assigned for each picker. This means, on the columns there is the different picking routes, and on the lines the name of the pickers. The yellow squares mean the picker is currently doing that picking route. If it was a green square it meant the picker was assigned to the picking route but did not started it yet, and a red square that the picking route was finished. This method of working follows a dynamic process, this means, the assignments of each picking route can change due to pick hours or certain needs, like less pickers working.

Figure 11: Picker Daily Assignments

The picking cart must carry the 'chep' boxes with the labels to index each item to a certain box. Labels are generated automatically and printed by the picker, as show on Figure 12. The scanner connected to the tablet serves to scan the label and the code bars from the items. A general way to identify the boxes is to use the picking route number, which starts the count at the beginning of each shift. This is the most visible number on the label, and the shift is represented with a letter before the number. The label contains (by order of appearance): Slot of delivery; the first bar code represents the picking route; the letter represents shift (N= *noite*) and the sequential number of the order (this number is the same for different picking route from the same order); the second bar code represents the box number, the one the pickers have to index to the item bar code; the next number is the extended version of the order number or shipment; the picking route also appears as a word for easier reading and the last is the date of delivery and typology (Ambient, Cold- and Cold+).

Figure 12: Order Label

The picker starts the picking route by choosing it on the tablet. These picking routes appear on the tablet by sequential order of delivery. Meaning, even if the systems receives an order to the next day it will still prioritize the order received for that day. The picker should then start looking for the product and verifies the expiration date in order to ensure a minimum of three days after the picking date. The picker must scan the bar code on the item with the scanner attached to the tablet and scan the bar code on the label. If the item is the right one, then the tablet sends a green message confirming the choice. On the other hand, if the item does not correspond to the right one then the tablet sends a red message alerting the picker for the error. This ensures that each item is indexed to the correct box order. Depending on the product concerned, there are some packing rules:

- Food products must be in a box with only food products items, since it is not acceptable for consumable items to be stored next to items of the type Detergents, Perfumery and Hygiene (DPH);
- Fragile items should be wrapped in an air bubble to protect them and avoid any damage when delivered to the customer;
- DPH bottles should be taped on the lid to prevent pouring;
- Items that are larger than boxes are counted as item ‘avulso’ and the label is attached to them. Examples of these items are brooms or larger water bottles,

The method of picking is reproduced for all the items until the boxes are filled or the items for the order on that picking route are totally picked. By the time the six boxes are complete the picker must deliver them to an intermediated space for the ‘Mizusumashi’ to collect them, as seen on Figure 13.

Figure 13: ‘Mizusumashi’ Space

In this space the picker should complete the packaging of the products by putting them on plastic bags. Then he starts the process of picking again, starting by replenishing the picking car. The ‘Mizusumashi’ area exists between the store and the back-store operation, serving as the interface between the pickers and the COL warehouse. There is a dedicated shift worker, concentrated on the waste, that carries the empty boxes, labels and packaging material. By so, the pickers do not need to go to the back-store operation at the end of each picking route. Whenever an item is on stockout (does not exist on the store stock), a substitution is made

according to the rules defined by the COL. If the customer does not want a substitution the picker has to register the stockout of the item.

After the boxes of all picking routes are collected then it is time to consolidate all the picking routes into the order. This means gathering all the boxes from each picking route and join them into a pile that represents one order. This is done using the picking route number and the different temperatures of the boxes. The order boxes are placed on top of skates to facilitate the movements. Orders are identified with labels and distributed in three shifts: morning, afternoon and night, which encompasses all delivery windows that the customer has chosen. Each shift corresponds to three to four delivery slots with different price tags.

With operation locations with less storage space, there is only one shift. The organization in this type of warehouse is more critical than where there is a space dedicated to the three shifts. Due to the growth of certain locations where we operate, we are also dividing the shifts into more to satisfy larger capacity. When it concerns the storage of temperature-controlled items, the operations have two temperature-controlled storages. One for storage temperature below 4 ºC, cold positive, with the cool items; and another with frozen items that covers temperatures lower than -18 ºC, negative cold. Also, here the orders are divided by shifts and identified with labels. Per reasons of quality of the items, this type of boxes should be the last to sealed as well as being taken out to be loaded in the vans.

There are also items, which at the time of the picking is carried out are not available at the store stock. As a rule, the picking of the items is delayed at least one shift from the slot the customers choose. This depends on the demand of the operation and the quantity of orders per slot. Because of this delay, the stock of the store could already be reestablished, so a picker must check if any of the items he had stockout before is already on the store stock. Then a round of stockouts items is made, with all items being checked for the orders still on the storage. In the case of the first picking has been replaced and, on the second round, the item has been found, when returning to the operation, the employee must place the product required by the customer in the box. Although this second round is a rework, it is a company must have rule to ensure fully satisfaction to its customers.

Both the items in stockout and the substitutions made to customers' order with policy of "No substitution" are immediately sent to the CC. They contact the customer informing him of the existing changes so he can authorize them. The CC informs the store of customer information regarding replacements in order to keep the items or remove them. Regarding the picking process it was drawn a process map found on the Appendix B.

3.4 Warehouse Process

On the warehouse the processes are: collection of the top rotation, sampling, invoicing, storage of the orders and expedition. In the warehouse there is a space called Top Rotation (TR), as seen on Figure 14. This is a micro-supermarket within the COL warehouse, supplied by the same store. The replacement here is made by consumption. The items presented on the TR, are those items that combine three factors: large quantities, frequency of sales and the dimension of the item. This means, it is not enough to be a high selling item but also has to belong to several orders. The items are on pallets and the number of items arranged in the TR vary with the space that is available. There are mainly water bottles, toilet paper and milk. This picking route is done by single order and it is consolidated with the rest of the order.

Figure 14: Top Rotation Space

The sampling is a free offer that COL puts in every order. This bag is distributed with the order and identified by specialized plastic bags, as seen on Figure 15. The sampling may be segmented or generalized. The segmented sampling is when the customer buys something and has the chance to get a related item. The generalized one is when suppliers give commercial revenue to distribute a certain item on COL. This promotes the supplier brand and gives COL's customers an extra care.

Figure 15: Sampling Specialized Bag

The invoice is the process that involves the release of the invoice. This process is mostly manual with the help of a back-office platform. The invoice contains every detail of the order like the volumes associated to it, the total items and the form of payment. This document is always attached to an order and is delivered one copy to the customer and another one is signed and duplicated for archive purposes.

About an hour and a half before the vans leave the operation begins with the separation of orders per van route. The time in advance in which this process happens depends on the lead time the operation could arrange on the intern processes. The routes are sent by the distribution team and can include home deliveries, C&G deliveries, 'domicilios' (when a customer purchase his order on the physical store and asks for home delivery on the cash register) and rescheduling of orders. A route is allocated to each van.

When receiving the order, the customer may not be satisfied and may require the exchange of an item. Despite the quality care mentioned above, it can occur some missing on the process, and the customer may not be completely satisfied with it. In those cases, the customer contacts the CC and gives his reasons. Then, the CC, contacts the operation and the exchange is established as follows: the operation performs the collection and storage of the products that the customer wants to exchange, these orders correspond to rescheduling; when the driver delivers these products to the customer, then he must deliver the items he does not want to the driver. These items, if possible, are returned to the store, if it is not the case then they are set as waste.

COL considers a rescheduling when a customer asks to change an item of an order, asks to collect an item which he is unsatisfied with, the distribution company needs to do another payment because of some error with the mobile terminal, or COL wants to try a second attempt because the customer was not home. This rescheduling is always supported by the CC.

3.5 Order Delivery Process

The Click&Go service is one of the order delivery method available on COL. The customers purchase their order and can choose this method of order delivery at checkout with the stores available on the service. The orders delivered outside the store where we have operation represented 35% of total orders on 2018. These are distributed by the same vans that make home order deliveries on the store's area.

There are now 101 C&G pick-up locations. The process considers two main actors: the customer and the store workers. The C&G application is a mobile app develop to support the process of order reception and order delivery to the customer. In this platform, the store can check the orders they should receive and the orders to delivery on a certain date. Here the store should also verify the customer's data regarding its order, scan the dispenser ticket and acknowledge the returning of shopping bags. First, in what concerns the store process, the van delivers the order on the discharge dock. The receptionist should verify the temperature on both the compartments of the van and register them for quality control purposes. After this, the store has to enter the C&G app in order to acknowledge the receipt of the order by checking the volumes received. One volume represents one 'chep' box with a label associated to. Each label on the box should be scanned on the app in order to register any divergences. Second, the order should be stored on the shopping cart to facilitate the deliver to the customer. The temperature-controlled items should be kept on the specific storages until the customers' arrival. When the customer arrives at the store, he will head to a ticket dispenser to take a ticket, as seen on Figure 16.

Figure 16: Ticket Dispenser

On the screen the customer should type the order number and wait for the delivery. This ticket dispenser will automatically send an alarm sound to the C&G app phone for the worker to know he has a deliver to make. The delivery is also done on the C&G app where the workers scans the customers' ticket to check the order details such as name of the customer, invoice and delivery date. He can also register if the customer delivered any plastic bag. This makes part of a COL sustainable action where the customers can deliver the previous order bags, just one or even more, and receive their bags' money back on the loyalty cart. Since the moment the customer takes a ticket on the ticket dispenser until the workers deliver the order should not pass the five-minutes mark. This is an action to assure good customer service. The workers should later ask for the customer signature on the paper invoice in order to archive this document and ensure the delivery.

In case the customers do not show on time to collect his order, he can still do it by the hour of closing of the store. The contact center can also contact the customer and understand why he did not collect or if he wants to reschedule a new delivery. If the order is not delivered to the customer, the store should contact the call center and request a return of the items to the operation that supplies that store. The process map of the Click&Go reception and deliver can be checked on the Appendix C.

3.6 Click and Go Information

In the year of 2018 COL prepared 74.079 orders and served 23.207 customers. It has an average basket of 52,9€ and an average 20,5 items per order. There were 27.404 orders delivered outside the operation locations and the growth rate for this type of orders is 14%. The penetration per category on the C&G basket is: 28% Non-Sparkling Waters; 25% Pasta; 25% Conserved Vegetables; 23% Fish Cans; 21% Rice and 18% bananas.

3.7 Stock Management

The stock management on COL is done on RETEK and OMS. The RETEK is the Enterprise Resource Planning (ERP) from SONAE groups where the product range, prices and provision is managed. The OMS is the order management system where COL manages the all order life cycle, by keeping track of the customer details, condition of the product, order date, place of delivery, total amount, identification of the preparation location, etc. The back-office process begins with the purchase of the customer on the website, and this information is made available to the OMS that manages the entire order cycle. At the end, the invoice is sent to RETEK, ensuring that the stock is properly associated to the shipping store. Since RETEK only has visibility of the order on an invoice format, at the end of its life cycle, the replenishment of the preparation store is done reactively and not ideally pro-active, as seen on Figure 17.

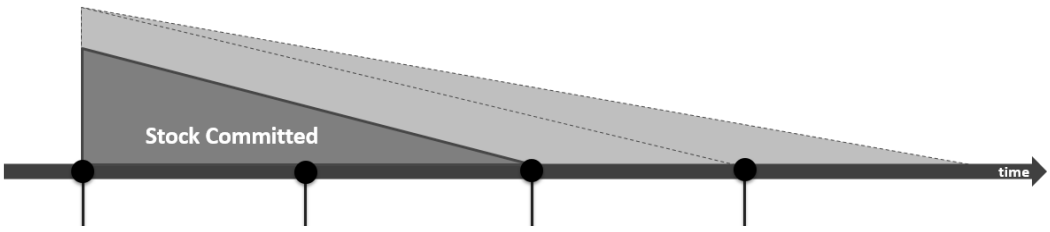

Figure 17: Stock Committed

The reservation of stock is done on RETEK by the calculation of stock committed. The stock committed is the sum of sales orders of COL that are on the open or pending payment state and which delivery date is inferior or equal do the next delivery date of the item.

In addition, the stock visibility for the website disregards all the stock that is captive and has already been sold in COL orders, giving visibility of the stock position above to what can potentially be sold.

3.8 Cost Analysis

Today, C&G orders that are delivered outside the operation location represented 35% of the total C&G orders last year. These orders imply the existence of preparation and distribution costs while the other 65% only carry the preparation costs.

The preparation costs take in consideration staff costs, that imply all costs the company has with its staff. Also, there are general expenses for example consumables such as printers, tonners and paper. Plus, there are fees payed for the store's replacement of items, dependent of the total volume sales, fees related to space rental and co-participation on the general store expenses. The total preparation cost of an order is 11,57€.

The distribution costs carry a cost with fixed fleet and kilometres travelled. This cost per order is 5,17€.

3.9 Data Gathering

There is a constant data gathered by the COL different teams in order to analyse and consequently suggest improvements. Every data is exported and measured in KPI's daily. This data is used to measure productivity, stockouts and incidents. To ensure the best quality of picking, a daily KPI analysis report is shared with the operations teams in order to implement the necessary changes.

The productivity is measured by the number of items the picker collects in a certain amount of time, in this case the lines per hour. A line represents the number of times a certain item is ordered, this means, on the same order one SKU (Stock Keeping Unit) is considered a line independent of its quantity but two different orders with the same SKU are counted as two lines. The average productivity rate the operations have now is forty-five lines per hour.

The stockouts report is sent to acknowledge the items that are not available on the store in order to update the information on the website. There is also an incident report to analyses the problems the operation faces daily, like missing, damaged or over quantity of items.

4 Analysis of Order Preparation Alternative Process

The goal of these alternative processes is changing the actual operation by replicating adapted store operations distributed through the C&G pick-up locations. In order to address the two research questions, we found processes that needed to be study and analyze regarding each of them. As Hübner state, the important factors that the retailer has to consider when choosing the operational model are the trade-off between picking efficiency in each store and delivery costs (Hübner, Kuhn, et al., 2016). For this reason, COL wants to turn the stores autonomous on the preparation and delivery of COL orders. This will decrease delivery costs with a satisfying picking efficiency.

Today, the customer's orders are automatically index to the nearest operation location. After the preparation, the order is distributed to the C&G pick-up locations. These points are 101 while operations are only fifteen. With this proposed preparation model, the order should be prepared on the store of delivery, turning these 101 pick-up locations into preparation locations too. The Figure 18 represents the main differences on the actual and the suggested process of an online order.

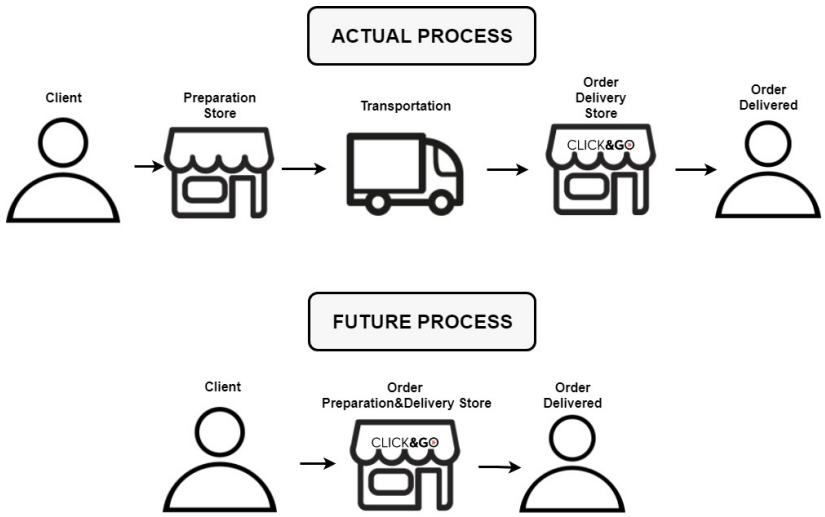

Figure 18: Actual and Future Suggested Process

There will be presented an analysis on the changing of directory, the IT solution and the picking process.

4.1 Product Range Analysis

Regarding the first research question, it was identified the need of analyze the possible website directories solutions in order to suggest the most appropriated one for this project. The goal of this analysis is to condense in a unique solution the product range avoiding an extensive number of directories. The COL website and application contains different products range (directory) according to the store allocated to the home delivery address or C&G pick-up location. This data base is extensive and cannot carry as much stores as the ones we want to implement with decentralized operations. The analysis was based on the creation of a unique directory named Grey Store (GS) to serve all the project's preparation locations. This will be a back-office store that will feed the website with items for this order preparation model. The directory should

follow an algorithm of availability of products on the GS. The configuration of slots for delivery should be centralized on this back-office store and the invoices should also be done based on it.

Analysis Assumptions

First, on the back-office we gathered the SKU's sold on C&G during 2018: 33.000 SKU's. Them we focused on the product range available in each insignia's store of the company (CONTINENTE, CM and CBD). To evaluate the impact of the solution on the product range level we analyzed the effect of Availability (AE). The AE is when we measure the SKU's ordered on a certain pick up point store that was actually available on that store, as seen of Figure 19. This means the measurement of range reduction comparing the items available on the delivery store with the ones historically ordered for that exact pick-up location. For the first two scenarios the SKU was only considered available if it existed in at least 50% of the insignia's stores.

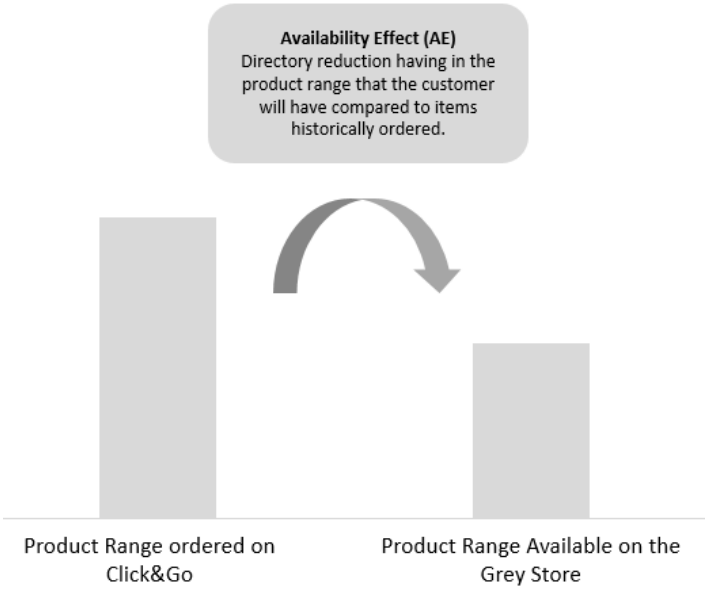

Figure 19: Availability Effect

First Scenario

The first scenario is having a directory per insignia. One directory for CONTINENTE, one for CM and one for CBD. This way we would minimize the unavailable items on each insignia. In this scenario, 74% of items ordered on C&G to CBD were actually available on the store. This would be the range of SKU's available on the directory of CBD on the grey store. In case of CM, these had a better match of SKU's delivered to the ones available, so this would have 92% of the directory available on the grey store. The best matching directory would be the CONTINENTE, because 97% of the items ordered would match the ones available on the store.

The average percentage of SKU's shared by each insignia is showed on Figure 20. Each column represents a store of the insignia and the percentage of matching available products on the store comparing to the ones ordered for that location.

Figure 20: First Scenario Analysis

Second Scenario

This scenario consists on having a unique directory representing the SKU's available on the insignia CBD. In this scenario, in CONTINENTE, the directory available on the GS would only represent 55% of the total directory sold on that insignia, and on the case of CM this would have a match of 91%. In this case the value proposition would be degraded on the insignia CONTINENTE because the customer would not have available almost half of the SKU sold on the store to order online.

The percentage of SKU's shared by each insignia is showed on Figure 21. Each column represents a store of the insignia and the percentage of matching available products on the store comparing to the ones ordered for that location.

Figure 21: Second Scenario Analysis

Third Scenario

In this scenario the SKU was only considered if it was available on 100% of the insignia's stores. Also, three GS directories were studied, one for each insignia. The worst case was the insignia CBD because this type of store format carries a lot of items targeted to the geographic localization and customer. In this case, the grey directory for CBD would only carry 37% of the total product range available on those stores. In CM it would be 67% and in CONTINENTE 97%. In this case the customer would have a significant downgrade of product range on the CBD, having more than half of its directory not available online.

The percentage of SKU's shared by each insignia is showed on Figure 22.

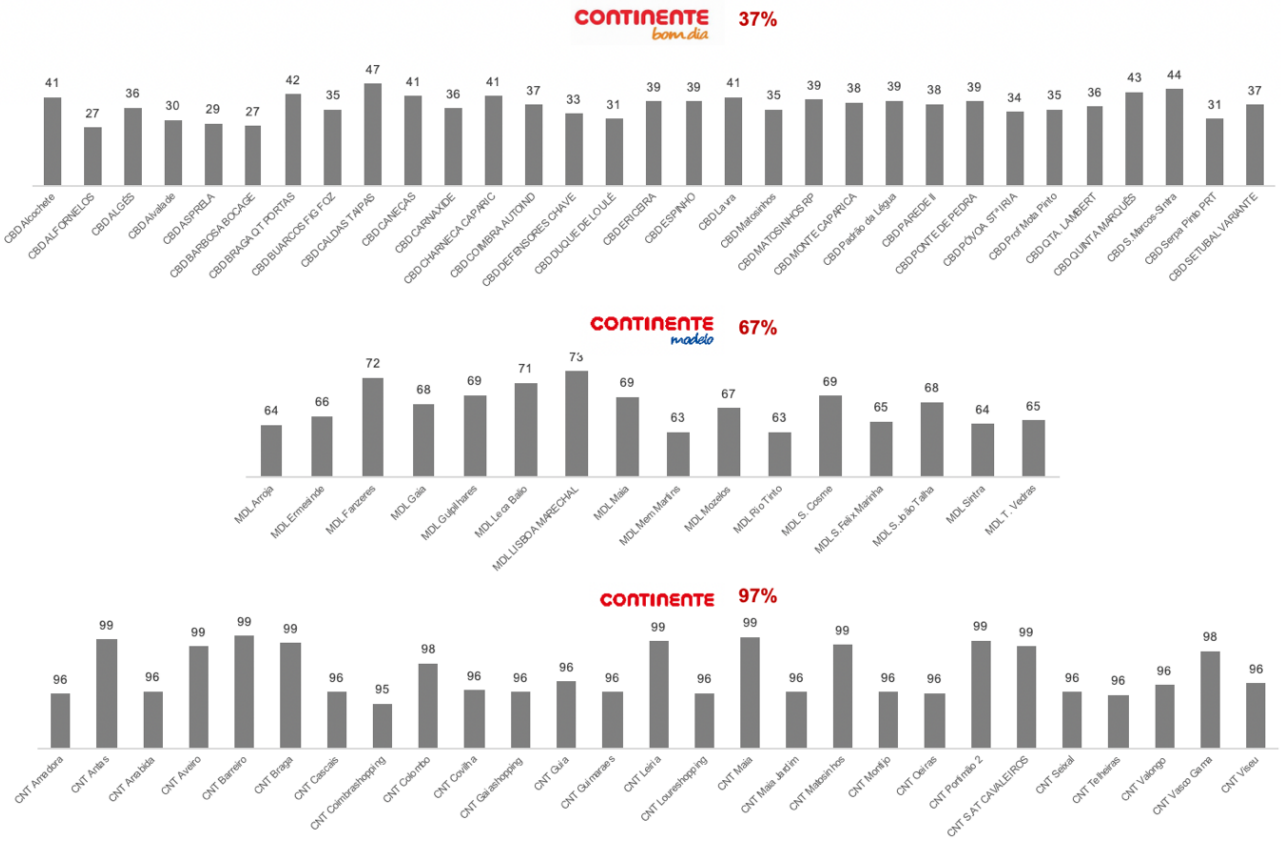

Figure 22: Third Scenario Analysis

4.2 IT Equipment Analysis

Regarding the second research question, it was identified the need of analyze the different IT equipment options for picking. This was identified after understanding that the actual application of picking is adapted for bigger and complex operations. Although this is a fully develop solution, there is another option on the market. This innovative application option can be easier to handle since is a simplified interface designed for picking on a smartphone. Having two different applications it was important to understand both their advantages and disadvantages. These topics will be explored in this chapter.

Existing Picking Application

The first analysis considers a tool that is currently presented on the COL operations. This is an existing application that is installed on a tablet. There are several tablets in each operation location. Each picker has a tablet indexed to his picking cart. This tablet presents the orders already divided by picking routes, as seen on Figure 23. This is already adapted for multi-order picking and the picker can automatically choose a picking route to prepare. The order he will see on the picking route follows the rule of orders to delivery on the nearest future. Different picking routes may have different orders on this screen. Meaning, while a picker is doing the picking route of grocery for a certain order another picker can be doing simultaneously the counter service picking route for the same order. When preparing by single order the picker should go to the search item on the top bar in order to see the whole order characteristics.

Figure 23: Existing Picking Application

On the search bar the picker can search the order by the shipping number. The search by picking route represents a specific picking route for a certain order. On this screen (Figure 24) he will see the full items for an order instead of seeing it divided by each picking routes.

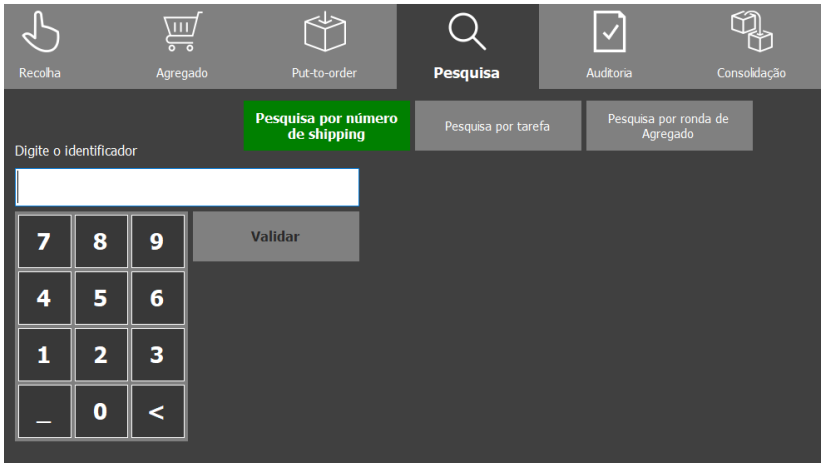

Figure 24: Search Tab

On the audit tab (Figure 25) it is where the responsible for the operation can verify an order or the content of a box. This should be done random mode on certain orders.

Figure 25: Audit Tab

On the picking tab (Figure 26) we can see the items of an order looking like a shopping list.

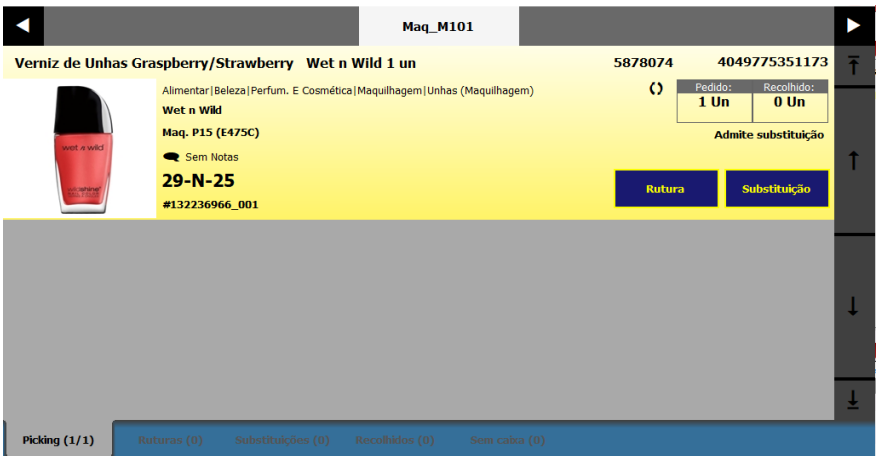

Figure 26: Picking Tab

There is the name of the product, the brand, the category, the order identification number, the total amount of each product and the amount that was already picked up. The picker can open a stockout of a certain product or proceed to a substitution. On the stockout products tab we can check the items out of stock and on the substitution tab the ones that were substitute. On the collected items tab we can check the items that moved from the picking tab to the already collected tab and on the non-box items we can check the items that cannot be indexed to a box by matters of size or at the time the picker did not had any labels on the boxes to associate the item with.

Regarding the advantages of this IT solution, this is a quicker model of implementation because it requires less investment and it uses the already existent infrastructure.

Regarding the disadvantages, this is not a responsive interface as it should be. This is due to the fact that the tablet does not send messages to alarm the reception of a received order. With this model the store should receive reports dependent on the slots available with the daily orders or should receive an alarm on the C&G phone in order to inform the placement of an order. This model requires another equipment for the store and specialized training.

Dedicated Picking Application

The second IT model is a dedicated application. In this model, the suggestion would be the development of a picking application. There are already some examples in the market, as shown on Figure 27. This example was actually developed for a partner of our online operation. SENDEAT is an online platform for convenient deliveries, such as, CONTINENTE groceries and meals. This application is used by our pickers to collect the SENDEAT customer's orders. There is a smartphone allocated to a picker that when receives an order should start preparing. This service has a shorten lead time, so this is a prioritized preparation order. After the picking, the order is delivered to the courier at the front store to be delivered to the customer's home. This application is prepared to notify the entrance of a new order, picks the product by scanning the code bar and can also have substitution items or stockouts.

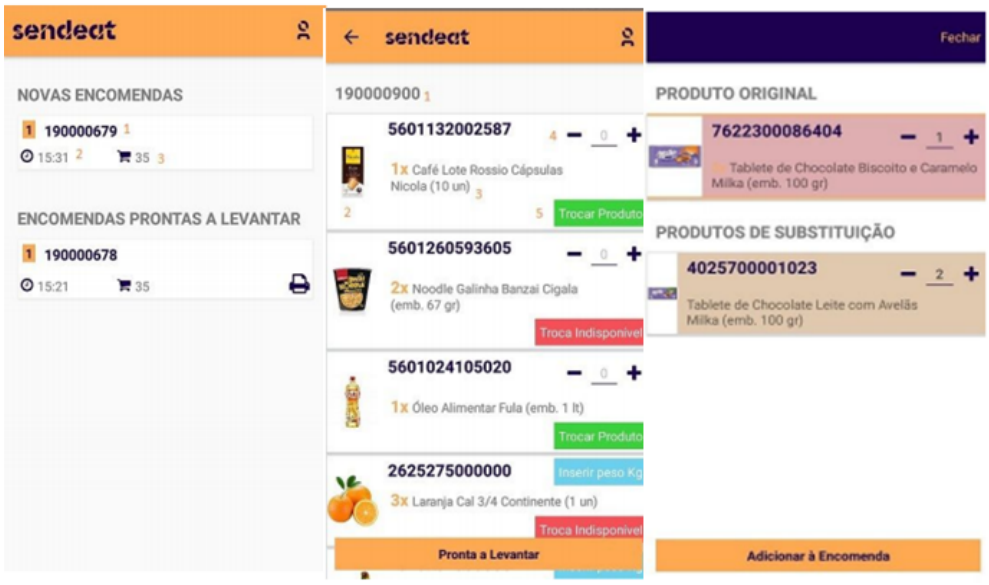

Figure 27: SENDEAT Picking Application

The main advantage of this application would be the specialized purpose of it and the development regarding all the picking necessities. Also, this could be a smartphone application minimizing the store's equipment turning the process easier to operate. However, this development would require an integration of information systems, the development of an easy to use interface and a time frame of four months. The cost of this development was evaluated in 230.000€ by the team responsible for IT developments and integrations on the COL. This is a specialized department shared by all the SONAE companies.

4.3 Picking Process Analysis

Today, COL operations use a specialized cart drawn for the purpose of picking. By replicating the picking on a huge number of small stores it would carry this fixed expense. However, there is a cheaper alternative that is using the common shopping carts that the stores already have. In order to answer the second research question, we study the equipment necessary and tried to understand the best way to pick orders having in consideration costs, usability, main advantages and disadvantages.

Specialized Cart

A specialized cart (Figure 28) can carry as much as six 'chep' boxes. Meaning, it can do as much as six orders per route. This car has a plastic handle, a support for the tablet, a cup for the scanner and a hook for the plastic bags, bubble wrap and other packing accessories. The cost of each car is 263,13€.

Figure 28: Specialized Picking Cart

In order to evaluate the space taken by this equipment we decided to study the requirements for a capacity of 4 order per day. Normally, a C&G order contains 4 ambient boxes, half a box of cold minus and one for cold plus. The boxes can be stacked to a maximum of 7 boxes. By this study, we would need 1,2 square meters on the ambient storage, 2,4 square meters on temperature-controlled storages and 0,6 square meters for the storage of the picking cart. This means that with this specialized cart we would need 4,2 square meters on the back-store for storage. Each box is identified with a label, facilitating the moment of collecting the boxes dispersed on the different temperature storages.

The main advantages of using this cart, such as, there are already boxes specialized for the temperature-controlled items usage on these carts and it is easier to organize since each item is indexed to a box. This organization prevents losses, damages and facilitates orders audits. Also, this cart has banners publicizing COL, this can be used as a promoter of the service.

The disadvantages of using this cart is the need of transport the orders to a normal shopping cart. All C&G orders should be delivered to the customer on a store shopping cart and this movement can take up to two minutes. This specialized cart also takes a lot of space on the aisles and specially on small stores it can cause discomfort to the store customers.

Store Shopping Cart

The store shopping cart (Figure 29) can be another equipment to consider since it is a store existing asset. This cart is not prepared for the tablet but can be easily adapted. Regarding the temperature-controlled items, a specialized bag or box that can fit on the car has to be studied. This cart would have zero cost since it is already part of the store.

In order to evaluate the space taken by this equipment we decided to study the requirements for a capacity of 4 order per day. In this case, the picker would put all the different category items on the cart and pack them in plastic bags according to food safety rules. Preparing four orders per day would represent the space of four cars on the back store. Regarding the storage of temperature-controlled items, they should be stored on ‘chep’ boxes on the frozen cabinets.

The boxes can be stacked to a maximum of seven boxes. By this study, we would need 2,8 square meters on the ambient storage and 2,4 square meters on temperature-controlled storages. Each box is identified with a label, facilitating the moment of collecting the boxes dispersed on the different temperature storages. This would represent a total of 5,2 square meters’ necessity on the back-store.

Figure 29: Store Shopping Cart

The main advantage of using this car is that it is already an asset from the store. Another advantage is the elimination of the plastic bags movement from the boxes to the shopping cart.

The disadvantages are that this car is not adapted to picking and needs development for the temperature-controlled items. The major difficulty here can be the separation of items through the plastic bags fulfilling the food safety rules. Also, in this case the picker can be easily interrupted by customers since they are wearing a stores' uniform and a shopping cart. This is a frequent thing since customers identify the pickers as store workers asking for help in finding items on the shelves, making the picker's work harder and slow.

5 Proposal of New Processes

The goal of this project is to implement a new process of order preparation for COL. To fulfill the objective more efficiently it was necessary to analyze the data, identify the necessities and requirements. As the COL works in several operations, this will be a generic proposal of processes, which the proposal should be rolled out for the remaining locations. This means, the methodology should be replicated for all the locations where we have the C&G Service.

Having the background on the addressed topics, such as models of order preparation, this project studied a hybrid model of order preparation. As stated on the background chapter, hybrid operation is a strategy that spans both centralized and decentralized operations. This customized model is an emerging fulfillment center strategy that extends beyond the traditional framework and adopts an integrating or boundary-spanning perspective (Tarn et al., 2003). By so, these new processes address the needs of requirements of this model.

In the beginning it was important to know how the operations worked, that is the reason why they were described in Chapter 3. Subsequently, it was important to obtain the information, study the models and identify the most critical issues and processes in Chapter 4.

This chapter describes the suggested of processes and all its requirements for the expansion of order preparation locations for orders of C&G pick-up locations.

5.1 Comparative analysis of the existing processes and reasons for the choice of new processes

Today COL prepares orders on specific locations and distributed them through its pick up points (Click&Go). The stores which receive the orders to deliver the customer only have to guarantee its correct deliver. The main difference between the existing processes and the suggested one is that the stores of pick up will have to be able not only to deliver but also to prepare the customer's order. The chosen process was made based on the preference of the operations team, having the short lead time for the project. After understanding the way that the operation successfully works, the path was to multiply operations with it constrains and adaptations. The main suggested processes are shown on Figure 30:

Figure 30: Proposed Order Preparation Process

The customer should enter the COL website and make an order, following the steps previously presented. The directory seen will be already adapted in order to ensure the visibility of product range found on the chosen delivery store. The picker will receive an alarm or a report with the order preparation necessity. He should immediately collect the picking cart with all its necessary material. On the tablet, the order should be pulled completely in order to prepare it by a single picking route. The picker should start the picking and when finishing it, he should storage the order in its specialized places, the temperature-controlled items on the specialized storage and the ambient temperature ones on the shopping cart. Them, the picker should proceed to the invoice. Regarding the delivery process, the picker should follow the process previously presented.

The suggested processes were totally mapped out and presented on Appendix D.

5.2 Order Placement

For the decentralized order preparation, there were three scenarios of directories previously studied. The most convenient and chosen one is having three directories called Grey Stores, one for each insignia. Also, we should guarantee that the SKU exists on at least 50% of the insignia's stores. Moreover, this solution will be the less unpleasant solution for the customer, having a directory matching more than 70% of the store's product range.

In this suggested model, the customer will still follow mostly of the processes presented previously. The main difference here is that when he chooses the C&G pick-up location his order preparation will be automatically indexed to the store he chooses for delivery. If he wants a store of the insignia CBD he will check the directory previously studied for this insignia. On these preparation stores the customer will also see the items grouped by family of products and when he selects an item, he can also leave a comment about the same. This allows the employee who collects the products to achieve the customer preferences, providing the most personalized service possible.

Regarding the delivery slots, the customer will choose the ones available on his store of preference. The slots of delivery represent the window of delivery the customer chooses on the order made on COL. After analysing past behaviour, the value proposition should be three delivery slots on the urban area and two slots on the non-urban areas. The capacity of each store should be adjusted daily having in consideration the availability of the store's physical resources. The minimum capacity per slot should be two orders. The slot closes its capacity at least two hours before the start of the delivery window in order to give time to the store to prepare the order.

In conclusion, the main difference between the used processed and the suggested ones is the directory available on the website.

5.3 Picking Process

The stores for order preparation will be 101 stores all over Portugal. These operations will be equipped with the necessary items for the picking and will be trained by the company. The picking cart chosen for the suggested process was the specialized one with only two 'chep' boxes, as shown on Figure 31.

Figure 31: Proposed Picking Cart

This was the chosen equipment since it is already adapted for the picking, meaning it already carries the temperature-controlled boxes, it has a support for the tablet and it can allocate all the components necessary for the process. Being chosen the small version of a specialized cart, it will not need as much space as the one with six 'chep' boxes and it is easier to handle.

Regarding the consumables and equipment, the store will need, there are already some in the store which can be shared and others that should be asked by the store manager. The chosen application of picking was the one already used on the operations. This allows a quicker implementation and has no costs associated. The tablet with the application has its own support next to the handle of the cart, to keep the picker's hand free. The tablet will have the order not divided by picking routes, which means the picker will automatically choose the option of viewing the full order at once. The picker responsible for each shift must check the daily orders assigned to him. The store will have to print labels also in order to identify the boxes and later

the plastic bags. This will keep the organization of the orders cleaner and visually facilitates the order collection at the moment the customer arrives. These labels should be printed on the store's printer.

Consequently, the equipment needed for the operation will be a computer, a printer, a phone with the C&G application, the picking cart, a tablet and a scanner, as seen on Figure 32. The consumables the store will need are bubble wrap, the sampling bags, the 'strapex' tape, paper for the order identification labels and the thermal sheath for the temperature-controlled boxes. This will be a starter kit and all the consumables should be ordered when finished the first round. All these expenses should be covered by the store in return of the sales.

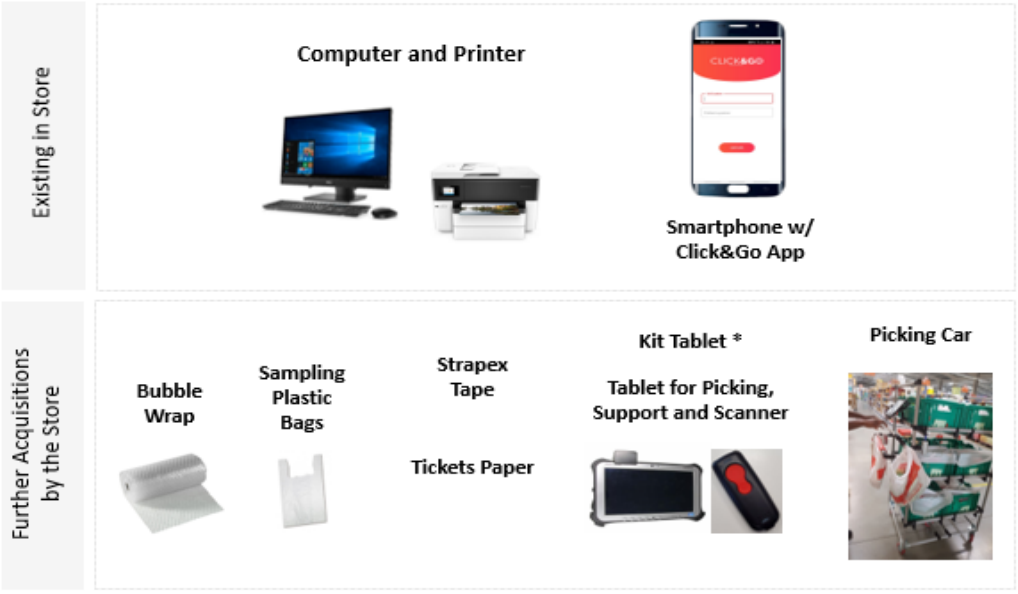

Figure 32: Consumables and Equipment

The picker starts the process of picking by choosing the order. This means, he will start the picking by collecting the first order for the next delivery slot. The rules of picking and packing are exactly the same ones presented previously. Each item should also be picked and scanned to guarantee no errors on the order. Since these stores are mostly in urban areas and smaller the suggestion is a picking by single order, this means, there will be no optimized picking routes and the order will be picked at once. This form of picking is when there are not divided areas on the store and the picker collects the order on a single route. This will allow the picker to follow an optimized route defined by the store's current traffic and his knowledge of the store. The only rule is to pick first the ambient items, then the temperature-controlled ones. This minimizes safety food problems.

Regarding the counter service, such as, meat, cheeses, charcuterie, fish and baked goods the picker should let a sheet of paper with the necessities for a determine delivery window at each counter (Figure 33). The picker must deliver these necessities by the beginning of the order picking and at least two hours before the closing of the time slot. When the picker has the vocal confirmation that the order is ready, he should collect the items and storage them in the appropriated environment at the back store.

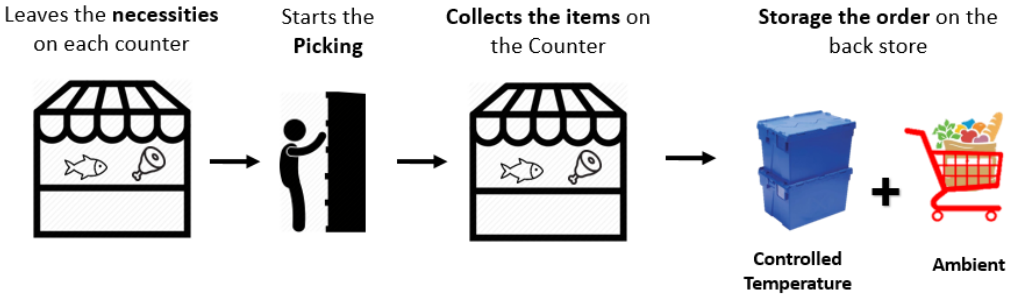

Figure 33: Counter Service

Regarding the stockouts process, there will not be stockout collection routes for orders collected on the delivery day. In case the picking was done with at least a day in advance, then a picker should verify if there is any substitution or stockout in order to complete the order (Figure 34). The round of stockout picking is a verification of items done by a single order picking route preparation. The invoices should only be done at the day of delivery to the customer to guarantee the correct items, avoiding substitutions and stockouts.

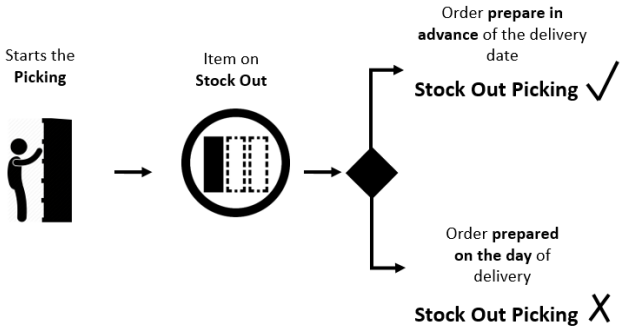

Figure 34: Stockout Collection Routes

The method of picking should be reproduced for all the items until the order is fulfilled. In this case there will not exist a space for the ‘Mizusumashi’. Instead, every time the picker collects the full order, he should pack it and storage it on the back-store. Consequently, the picker will be responsible for the organization of the boxes on the back store and every warehouse process. In this case, there is no need for consolidation of orders since the picking was done by preparing the whole order at once.

5.4 Warehouse Process

Since the stores for the decentralized model operation have small back stores, the operations should not be big neither complex. Here the picker will need to prepare the sampling, the invoice and the storage of the orders.

The sampling should be prepared on the back store after the picking and before the storage of the order. The invoice will be done on the store's computer and the platform to it will be available at the store. It is quite easy and intuitive to use. This document should always be attached to an order and a copy is delivered to the customer and another one is signed and duplicated for archive purposes.

Regarding the storage of the items, the plastic bags should be identified with the remaining labels. They should be attached to each bag in order to visually facilitate the order's identification. All the ambient temperature bags should be kept stored on the shopping car, as seen on Figure 35. This minimizes the lead time of delivery for when the customer arrives. However, the temperature-controlled items should be kept on the specialized storages until the customers' arrival.

Figure 35: Click&Go Orders

5.5 Order Delivery Process

The C&G delivery service will not have much changes at all. The main difference here is that the store will not need to verify the boxes received because the order is already ready to deliver the customer. When the customer arrives at the store, he will head to a ticket dispenser to take a ticket, typing the order number and wait for the delivery in a specialized place. This place is clearly identified as seen on Figure 36.

Figure 36: Click&Go Delivery Spot

The system of the ticket dispenser will send an alarm to the picker with the customer's arrival. The picker should go to the back-store and collect the supermarket cart with the order. The identification of the cart can be easily done by checking the labels attached to the plastic bags or the cart. This cart should also carry the invoice to deliver to the customer, as shown on Figure 37.

Figure 37: Identified Shopping Cart

The delivery should be done with the help of the C&G application where the workers scan the customers' ticket to check the order details, such as, the name of the customer, invoice and delivery date. After this the picker should close the order and return to the store's work.

5.6 Stock Management and Cost Analysis

Regarding the stock, this will be a responsibility of the store. Each sale will be available on OMS and the stock will be managed on RETEK. In this process there is no intervention from COL or stock committed since the store will have to be able to predict and maintain their stocks in consideration to their sales on COL.

Regarding the cost analysis, we have chosen the store to support all the investment cost on the picking's material in return of the total revenue of the sales. Regarding the consumables, the store will have an average cost of 0,19 € per order. This includes the bubble wrap, the labels,

the sampling bags and the 'strapex'. Regarding the equipment, the store will need: the tablet, the thermals sheets and the picking specialized cart. The tablet will cost the store 800€, with the support and the scanner included. The cart has a cost of 263,13€ and is only needed one. The thermals sheets for at least 4 orders a day (2 per order) will cost a total of 270€. The total investment in equipment will be around 1333,13€. This investment has only in consideration new acquisitions, ensuring that the store already has a computer, a printer and a C&G phone with the application installed.

This cost analysis was made on a non-solid data gathering but it was found important to demonstrate. The preparation cost previously presented was 11,57€. This cost had in consideration several fees (replacement of items, space rental and co-participation on the general store expenses) and staff costs (both dedicated and shared staff). This is a complex calculation which cannot distinguish C&G orders from home deliveries (which may carry a different average number of lines). So, we analyzed what would be the cost of an order preparation on a decentralized model. We know that we have a cost per line of 0,35€ on the current operations. This cost is less them the general one since it only has in consideration the costs with specialized staff and general expenses (equipment and consumables). On C&G order there are on average 21,5 items per order and the quantity per item is 1,7. The average lines per order are 12,65. Here we can conclude a cost per order of 4,42€. This is a half reduction of cost which can be considered a plus having in mind we have already eliminated the distribution costs.

To evaluate the situation, it was found important to understand and have in consideration the store managers' opinion. They are the ones who will carry the order preparation and delivery processes and it is important to understand how available they are for the change. Now that the stores only receive a fee for each delivery, they are not motivated to promote the service neither the COL platform. When asked about the change in processes, the possibility of preparing and consequently receive the total revenue of the COL orders' prepared, the stores showed interested and motivation for the implementation. They consider this can be the extra reward for their work when preparing an order. This change can also promote their store's traffic, promoting sales and cross selling.

5.7 Productivity

To ensure the quality of customer service, on this decentralized model there will data gathering in order to measure the daily KPI's. This data will be used to measure productivity, stockouts and incidents.

Regarding productivity, we analyse the average order preparation in order to understand the feasibility of the project. While the operations have dedicated staff to work on, in these alternative processes we will use staff from the store. When suggesting the processes, it was important to consider the time and physical resources constrains the stores constantly face. For this calculation, we used internal data of a live experience made in the beginning of 2018 on CONTINENTE store. The picker was asked to prepare orders, by single order picking. He did an average of 45 lines per hour. This gives 0,75 lines per minute. Having in consideration the lines per C&G order he could state if the picking of an order would take more or less than 10 minutes. This does not include the invoice making, the sampling and the storage of the order. Having in consideration that most of the store that will have this capability of order preparation

are smaller CONTINENTE stores, like CBD, we can conclude this time can still be improved. In conclusion, we believe this is a feasible task for the stores to do.

5.8 Implementation

It was identified some time constrains regarding the lead time needed for the company to start a pilot of these alternative processes, by so, it was not possible to evaluate the implementation of the processes. However, this implementation will occur in September. COL is going to start the implementation with 35 stores. This implementation is motivated by the constant growth and customer demand on the online channel of CONTINENTE.

6 Discussion and Conclusion

The study of the alternative processes finished by the end of the fourth-month project, allowed an overview of the different needs and requirements the implementation phase will face. Unfortunately, the implementation of the processes, its evaluation, and the operational experience was not able to be completed by the end of this project. Yet, the contribution of the project was accomplished, satisfying the practical goals in the beginning, which are described in section 6.1. The limitations of such contribution are also clarified in section 6.2, and the future work perspectives are pursued in section 6.3.

6.1 Contributions

By analysing the online grocery operation process, through the observation and work field, enabled the constant suggestion of alternative process and the development of a new model of order preparation. The lack of knowledge on these working field made this project a learning and explorative experience. The project required a learning period allowing on-spot investigation in order to understand a picker's life and all the process involved a grocery e-commerce business. This involvement on the company made a learning expedition as rewarded as learning can be.

COL launched its platform on 2001 and has grown side to side with internet users' own growth. What was in a past an almost unknown form of sharing and communication can now be considered a universal platform with demanding users. Services and products are launched every day and users look for differentiation and innovation. In an effort to match this demand and differentiation, COL works daily in order to develop new operational models or improved old ones. This project faced a challenge identified by this need of serving the customer better every day. The current operational model is a true success and has been multiplied various times to accomplish coverage of order deliveries. However, the lead time between the order placement and the order delivery, and distribution costs have been a focus of improvement in order to achieve better margins and better customer service. Since C&G allows customers to collect their order on an extended time window and has proved to be a successful service, the company focus on the development of this service, making sure the service level is not compromised. This project was based on the customer appreciation of convenience associated with the C&G service.

In order to understand the topics addressed on this project, it was made a background analyses on a more theoretical format to understand the topics addressed on the project. As seen on several articles, the location of the operation should be strategic to ensure minimized time deliveries and distances. By so, the choice of picking location should be driven by customer demands and search for innovation and differentiation. As stated on the background chapter, the hybridization of operational concepts, with both in-store and centralized picking, will continue in the light of demographic changes as a greater choice for online grocery customers' increased expectations (Kervenoael, Yanık, Bozkaya, Palmer, & Hallsworth, 2016). For this reason, COL identified the need of scaling the business and address the expansion of this hybrid model.

To approach the needs and expectations from the people involved on this implementation, it was asked the store's managers how much they look for this new service. Their answer was quite positive and accepting, since this implementation can bring them extra revenue for the

store, promote cross selling and increase the store's traffic. Although the calculation of the order preparation costs cannot be considered wise due to the non-certainty of the data gathered, the store does not consider it a pivotal point for the implementation motivation.

In order to explore the first research question, it was made a data analysis by studying the directories COL presented to the customer and the ones available on the stores. Since the C&G is growing monthly, this had only in consideration the stores that had this service already at the beginning of the project. All this data belongs to an extensive data base worked by a specialized team on COL, business intelligence. We conclude that almost every item ordered on each insignia store was available on that store. It was a first-time analysis and had interesting outputs for this project and for the team. In conclusion having only one directory would be an unsatisfied product range solution, but three directories (one per each insignia) would represent a pleasant service for the customer. Although the customer has to face unavailable products, especially on CBD, the directory represents a large number of items guaranteeing first need items, presence of the most common brands, and a large range of distinctive category items.

In order to explore the second research question, it was made an extensive work field and a process gathering. This was a need since the proposed process had to emerge and be studied after understanding what was already being done. After mapping the 'As-Is' process map, the task of develop a new order preparation process was quicker and intuitive. This process faced some choices regarding an IT solution and the picking process. These challenges were identified by the need of mapping out more effective solutions which could turn stores' life easier. Each analysis was made by identifying the main advantages and disadvantages of each solution.

The first challenge was related to an IT solution. Although the currently used application was already developed and ready to use, we identify another solution. This new application would turn the picking process more intuitive and handier, since it requires a smaller and common equipment as a smartphone. However, this solution would take time and development and the daily customer' demand made the tablet choice obvious. The tablet solution allows a quicker and non-development implementation.

Regarding the picking process, in order to cut costs with implementation, it was made a study on a changing of picking cart. Since the stores already have a cart as an asset, this was compared to a specialized picking cart. This analysis was based on its usability, cost, main advantages and disadvantages. The shopping cart solution would carry no cost with equipment, however the specialized cart was ready for the order preparation needs, such as consumables and equipment. The chosen cart was based on the current process, ensuring a uniformity of the operational model of COL. This cart also simplifies the identification of the picker, avoiding interruptions by the customer. Since this specialized cart is also identified with COL banners, it can also work as a marketing strategy.

After concluding this analysis, the different processes were map out and explain in order to achieve the final operational model. This order preparation has a group of processes the store should follow – 'To Be' model – in order to achieve the outcome expected, a happy customer with a complete order. This model comprises the simplified processes the store should follow when preparing an order. This 'To-Be' model should be rigorously follow in order to meet the regular customers known expectation.

In conclusion, the 'As-Is' process gathering, and the operational model understanding made the task of development the 'To-Be' model interesting and feasible. This project turned out to be demanding and reward by contributing to a new and wanted operational model.

6.2 Limitations

During the project there were several limitations that restricted its' path and some decision making. When working with a big company spread in multiple services, development of especially IT solutions can be hard, expensive and time-consuming. This project was considered a priority for the COL team, however the cost and lead time made the optimal solution unattainable. This made the project step back and study less time consumable solutions compromising the output. Cost and time are such a valuable asset to the company that its use is well studied and limited.

Having only four months and so much to learn can be hard for a correct project time management. The time constraint had the greatest impact on the project development. The lack of knowledge in the organization on the time and depth this project would need made it hard to develop and conclude on this time frame. The operation team on COL can be consider its heart and its face to the customer. If anything goes wrong with the orders, the team needs to step front and assume fault. The need of monitoring and controlling a huge number of workers with very different profiles, make the team life busy and unstoppable. This project needed time and more people dedicated and focus on its development.

Since this was only a study and not implemented in practical terms, the study is naturally limited, and the conclusions withdrawn from it might be, after the implementation stage, reviewed.

6.3 Future Work

The future work will be focused on closing the loop, by implementing and evaluating the new process, and on starting a new one, by planning on action again and so on. To systematize and prioritize future affairs, a roadmap was created, to be employed as soon as the operational model started running stable. Improving the customer service, facilitating the store process and implement futuristic trends are the main goals.

The first future work suggestion is to develop fully this project. In the future, the stores will need a quicker and intuitive picking application in order to facilitate their job, ensure a quicker order picking and reduce costs per store opening. Also, this investment would probably make stores increase their order preparation capacity, consequently, increase orders delivery and revenue.

Another possibility is related to the customer service when colleting an order. With this project it was made a suggestion of time slots similar to the ones available today, with several hours of lead time since the order placement and the order deliver. The suggestion is having express time slots by allowing the customer to collect his order on shorten lead times, like one-hour delivery window. This mean, the customer can be at home, make his order on the website, go running some errands for about an hour and finishing by collecting his order. This gives customers' convenience and solution for emergency needs.

Another suggestion would be having screens on the store, making the customer able to order an extended product range on the chosen delivery location. For example, the customer may need something he could not order online or forget to do it and when arriving the store, he could do it. This service would be available on an easy digital platform, like a tablet on the front store, and schedule the delivery for the exact same store for few hours later. On this case, the store would need to order the item in a near store with the available product and arrange a deliver to the customers chosen time.

The success seen on services like UberEats or Glovo made companies aware that customer look for convenience service on food quick front door deliveries. This can be an opportunity for the grocery e-commerce business. This project makes every CONTINENTE store able to prepare an online order, but the idea is to have motorcycles or even bikes for near home delivery with a restricted number of items. This allows customers to receive their favorite grocery products as quicker as they now receive food deliveries. In summary, COL should exploit the never-ending opportunities that an operational model has fostered, learning from innovation, while taking advantage of its own expertise.

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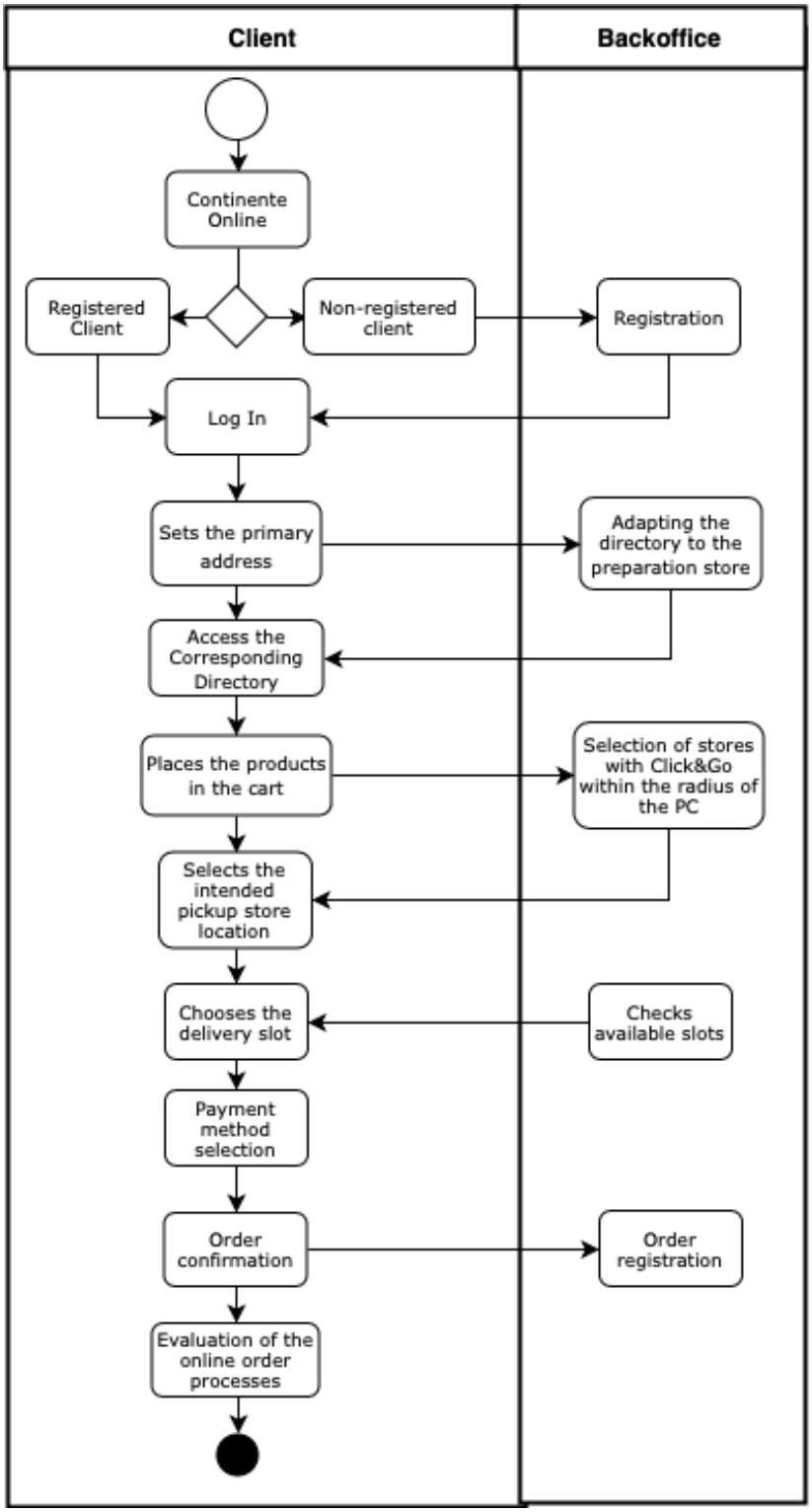
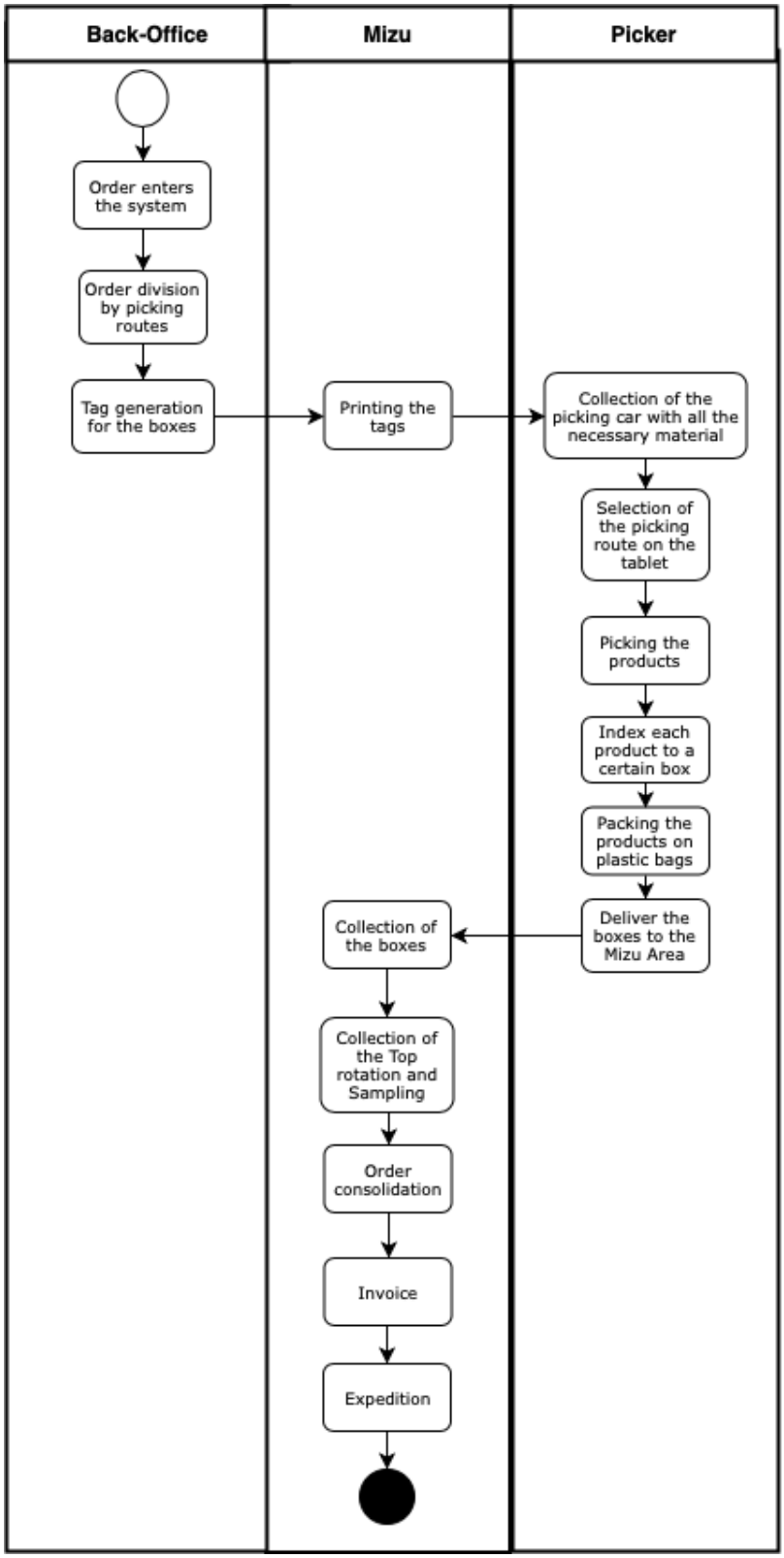
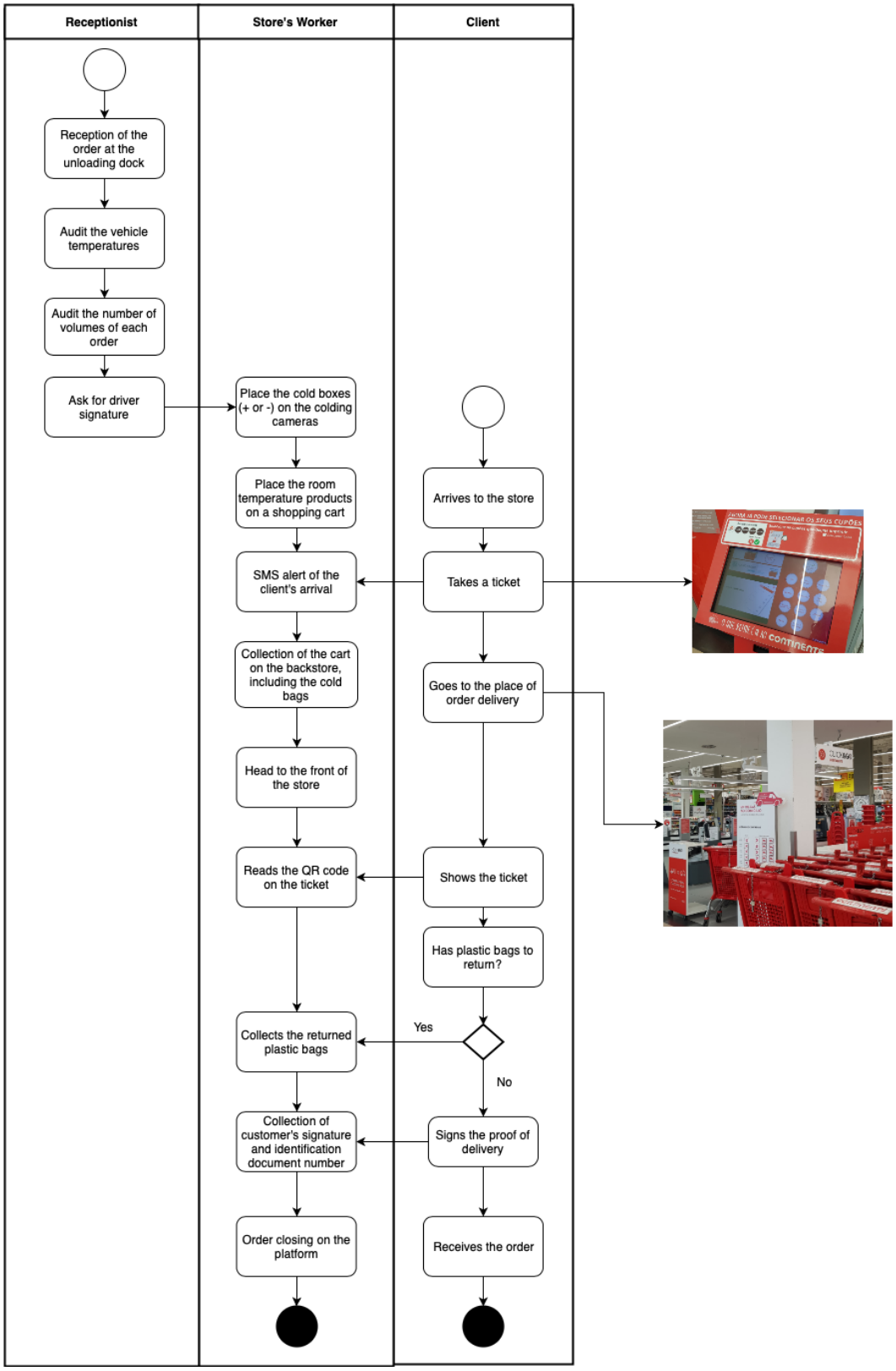
APPENDIX A: Order Placement Process Map



APPENDIX B: Picking Process Map



APPENDIX C: Click&Go Order Reception and Deliver Process Map



APPENDIX D: 'To-Be' Process Map