

Louvain School of Management
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How to optimize processes and customer satisfaction in
CTT

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Abstract

The evolution of technology over the past decades has changed the competitive landscape across markets. Postal services, in particular, underwent considerable change. In Portugal the drop of letters mailed between 2001 and 2017 is driving CTT to rethink its strategy to adapt to this new reality.

CTT's transformation must start with customer satisfaction, since without it, it is extremely challenging to remain competitive in the market place. CTT's revenues have been dropping over the past few years due to falling mail volumes and footfall. Without changes, the company's long-term future is at stake.

Consequently, CTT hired KICG to help developing a solution to help improve its processes. During this project the main areas of the company were presented together with the critical issues to be improved.

The overall project consisted on selecting a few pilot stores to analyze the problems, performing a literature review on those problems, identifying and implementing solutions, and finally verifying the results. Once satisfactory results are achieved, the solutions employed will be disseminated across all stores. All project phases were carried out according to Kaizen principles. This thesis was based on the work developed at pilot Store A and followed various steps, from the identification of the main efficiency constraints to the implementation of proposed solutions and subsequent measurement of results.

The pilot project in Store A generated significant efficiency gains as evidenced by the improvement of selected Key Performance Indicators, namely a reduction in Average Waiting Time of customers in the store of over 40%.

Keywords: Postal Services, Retail Stores, Process Optimization, Customer Service

Resumo

A evolução da tecnologia, nas últimas décadas, mudou o cenário competitivo entre os mercados. Os serviços postais são um exemplo de um setor que passou por mudanças consideráveis. Em Portugal, o envio de cartas teve uma queda acentuada entre 2001 e 2017 o que faz com que os CTT repensem a sua estratégia a esta nova realidade.

A transformação dos CTT deve começar com a satisfação do cliente, já que sem ela, será extremamente desafiante permanecer no mercado. As receitas dos CTT têm caído nos últimos anos devido à queda dos volumes de correspondência e à diminuição do tráfego. Sem mudanças, o futuro da empresa está em jogo.

Tendo isso em mente, os CTT contrataram a KICG para ajudar no desenvolvimento de uma solução que permitirá aos CTT melhorar os seus processos. Durante este projeto serão apresentadas as principais áreas da empresa e as questões críticas em que esta dissertação se baseará.

O projeto geral consiste em selecionar algumas lojas piloto para analisar os problemas, realizar uma revisão de literatura sobre eles, identificar e implementar soluções e verificar os resultados. Sendo estas satisfatórias, essas soluções serão desdobradas por todas as lojas. Tudo isso aplicando os princípios do Kaizen. Esta tese tem como piloto - loja A, e segue as várias etapas, até à implementação e medição dos resultados.

Os principais ganhos consistiram no ganho de eficiência traduzido na melhoria dos KPI's selecionados, em particular uma redução de mais de 40% no Tempo Médio de Espera dos clientes na loja.

Palavras-chave: Serviços Postais, Lojas de Retalho, Otimização de Processos, Serviço ao Cliente

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Acronyms Glossary

AST – Average Service Time

AWT – Average Waiting Time

BO – Back Office

BU – Business Unit

CDP – Centro de Distribuição Postal (Postal Centre Distribution)

CRM – Customer Relationship Management

FO – Front Office

JIT – Just in Time

KICG – Kaizen Institute Consulting Group

NPS – Net Promoter Score

OPL – One Piece Lesson

Q.C.D. – Quality, Cost and Delivery

SSTs – Self-service Technologies

TPS – Toyota Production System

VSM – Value Stream Mapping

Chapter 1 – Introduction

This chapter aims to contextualize this project and put forth its objectives, structure and methodologies.

1.1 – Problem Context

Postal services have more than four thousand years of history. Trade of information and materials has been one of the cornerstones of the development of societies. The Persians, during Emperor Darius' rule (521-486 BCE), deployed teams spread across sixteen hundred miles, fourteen-mile apart from each other, to distribute clay tablets. Later, during the Roman Civilization, official dispatches and baggage were delivered by horse-drawn carts (John, 2015).

Since these early examples, postal services evolved and became a fundamental way of communication and transportation of goods. In fact, postal services continue to provide this type of service, although client's needs have changed over the last decades.

The growth of electronic communications is the main reason behind the decrease of mail volumes, and consequently revenues. This downward pressure on mail volumes has created an enormous pressure on postal services operators to focus on their efficiency (Tochkov, 2015).

Figure 1 illustrates these trends very clearly: Internet usage (the percentage of people using internet at least once a week) has increased significantly across Europe between 2013-2017, 9% on average, while in Portugal it increased 18%. On the other end of the scope, postal services have decreased everywhere -13% on average with Portugal showing a reduction of 18% (Eurostat, 2017).

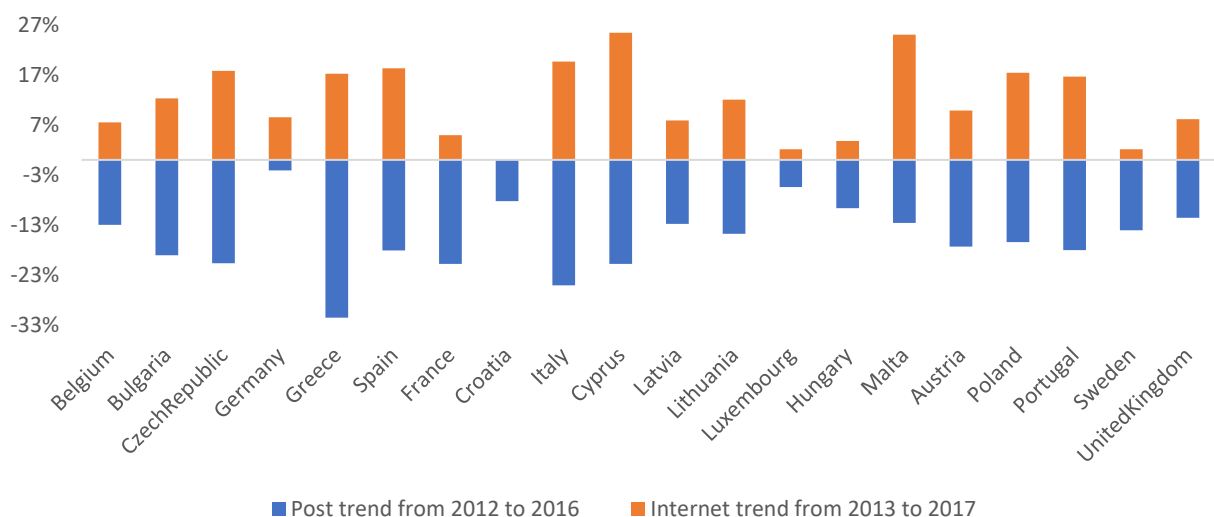


Figure 1: Post office demand and internet usage evolution in Europe

It is therefore clear that the “internet revolution” has arrived and is in fact gaining momentum. Postal services companies must adapt to this new reality and prepare themselves to take advantage of the opportunities that the internet is creating for this type of companies – for example, the delivery of packages has been growing as a consequence of the e-commerce (international packages delivered

into Portugal have increased 17,4% from 2016 to 2017), (ANACOM, 2018) and is expected to maintain this trend according to CTT annual reports from 2016 (CTT, 2018):

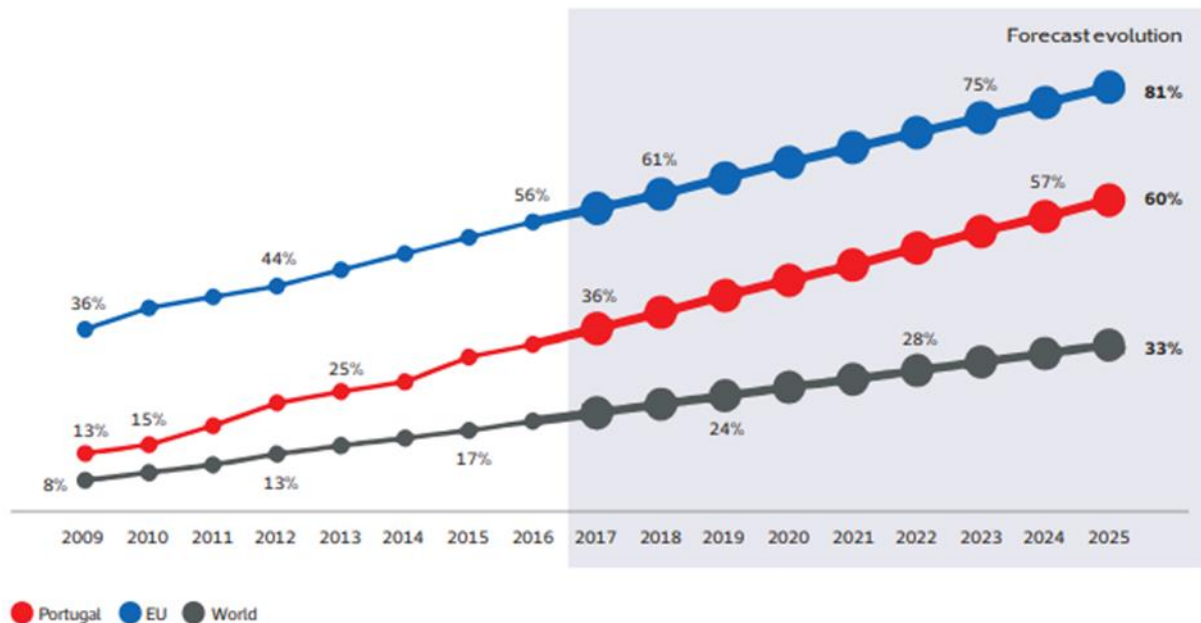


Figure 2: Evolution in % of online shoppers in Portugal, the EU and the world

The Internet has also revolutionized the way companies operate and how consumers behave. Nowadays, consumers want products delivered immediately and effortlessly and expect companies to provide top-notch service. Thus, in order to be successful, companies must adapt to be able to respond to these needs.

Furthermore, CTT no longer holds a monopoly position in Portugal and although it still boasts a market share of 92%, it has lost 2,5% over the past five years.

Finally, Portugal has been undergoing a demographic shift – its population is no longer growing and is becoming more concentrated in the main coastal cities, leaving an ageing and declining population in the interior of Portugal. This causes a further stress on CTT to be able keep some stores economically viable.

In order to overcome these challenges, CTT has entered an ambitious project to increase operational efficiency and improve client satisfaction with Kaizen Institute. The success of this project will be crucial for the company to be able to embrace new opportunities and generate value for its clients and shareholders.

1.2 – Project Objectives

The main objective of this project thesis is to improve CTT processes and increase customer satisfaction. It is about gaining efficiency and avoiding wastes, doing more and better with the same means.

The purpose of CTT is to supply the postal services across Portugal in the best way possible. This means the company must be able to receive, distribute and deliver letters, documents and parcels that customers need. These services are only available due to the large number of CTT stores and locations, which allow the CTT to reach a national and unique coverage.

Despite having a well-organized structure, CTT's main problem is the steep reduction in the number of letters sent per year, which is nowadays half of the number of letters sent in 2001. One possible solution to address falling mail volumes would be cost cutting, namely by closing some of CTT's branches. However, for regulatory reasons, service levels cannot be reduced. CTT, according to ANACOM guidelines, must provide services in a reduced time frame for a fixed price across the country. As a result, in order to offset the fall in mail volumes, CTT must expand their product offerings and increase service levels.

The main objective of this thesis is to enhance CTT's customer service by improving its clients' experience while maintaining/reducing costs. In order to do so, time for back-office operations must be reduced, increasing time available for front-office to deliver the best service to the client.

CTT stores lack organization in several processes such as cash replenishment, acknowledgement system and stock management. The initial focus of this project will be the optimization of such processes.

Another objective is to improve communication in store to the client, this will help the customer to know the products, and it will help have a better inside experience.

1.3 - Research Methodology

In this Section, the methodology adopted in this Master Dissertation is presented. In the following figure, the different steps of the Dissertation are summarized.

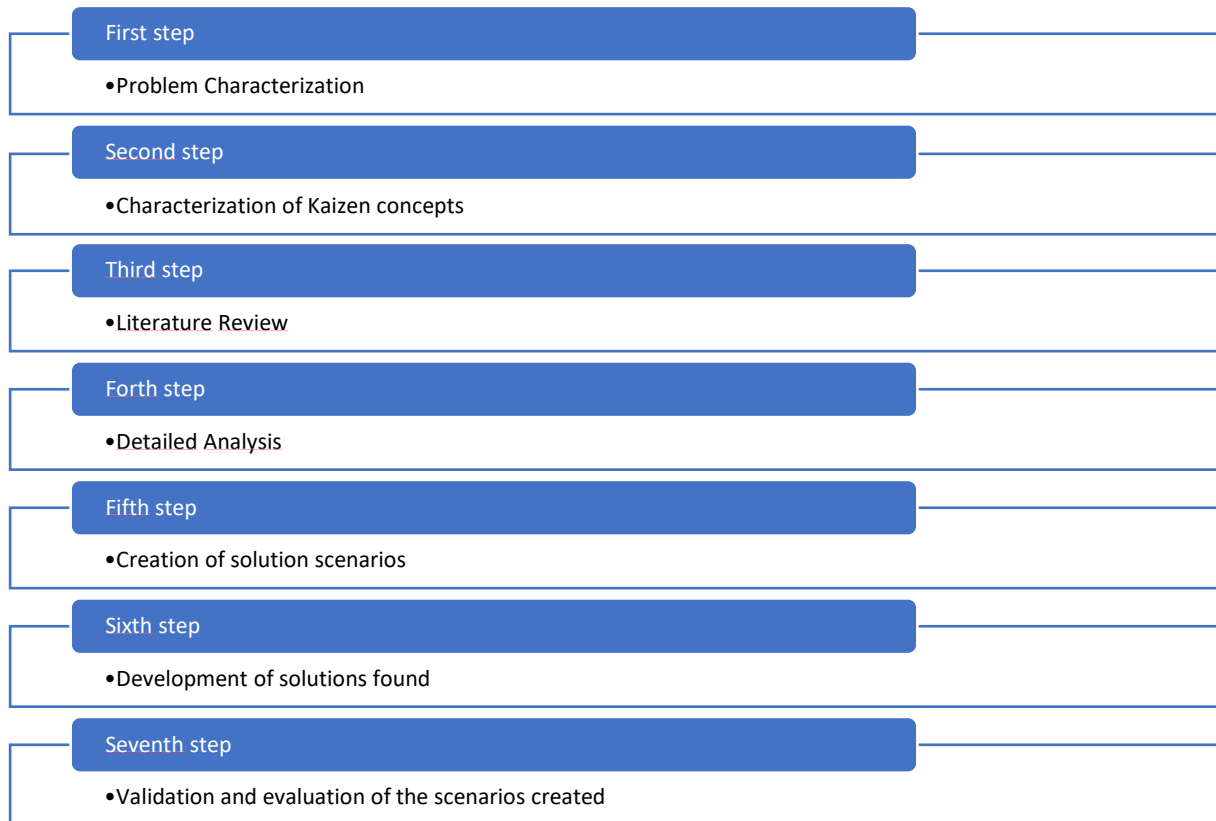


Figure 3: Research Methodology steps

First step – Problem Characterization

In this step a characterization of, the company CTT is presented. In addition to this characterization, the collection of data necessary to understand the problem is also performed.

Second step – Characterization of Kaizen concepts

This step is to deepen the knowledge about the concepts that involve the Kaizen spirit and its Lean methodologies. Within the methodologies it is necessary to understand the various pillars and the respective tools available.

Third step – Literature Review

In the third stage a Bibliographic Review is performed for the presented problems. This review considers the problems described in the previous step, focusing on customer satisfaction, and improving in-store

processes such as inventory management, cash replenishment. This review includes some lean concepts, like Kanban and 5S methodology.

Forth step – Detailed Analysis

This step consists on a deeper data analysis. These analyses had not been performed by CTT but are needed for the case under study.

Fifth step – Creation of solution

Step number four consists of identifying the main alternatives and scenarios for solving the problems. The main solutions are:

- Implementation of Daily Kaizen Level 1 – Daily Meetings
- Implementation of Daily Kaizen Level 2 – Spaces Organization
- Implementation of Daily Kaizen Level 3 – Processes Normalization
- Improve CTT communication in store

Sixth step - Implementation of solutions found

The most critical processes will be redesigned, and normalized, spaces will be reorganized to improve the flows inside the store. Daily meetings will take place to assure the engagement of the teams and close follow-up. Finally, new adaptations to the store will also be introduced to improve customer communication.

Seventh step –Evaluation of the results

In the seventh and final step, we will measure the success of the solutions implemented, by analyzing a set of KPI's.

1.4 – Thesis structure

This work thesis follows the structure outlined in figure 4:



Figure 4: Steps of the master's thesis investigation

First step –contextualizes the problem, explains how the postal service market works and presents the CTT situation.

Second step – introduces CTT, the company, and outlines the problems it is facing.

Third step – introduces the Kaizen Institute Consulting Group (KICG), - the adviser to CTT.

Forth step – contains the literature review on the topics tackled throughout this case study.

Fifth step – collects and analyses relevant data.

Sixth step – presents possible solutions to this case study.

Seventh step – conducts a robustness test to validate the solutions proposed in the previous step.

Eighth step – sets forth an explanation about all the limitations presented during the study, the final conclusions and proposes some future investigations.

Chapter 2 - Case Study Analysis

In this chapter we present: i:) the company where this thesis is based on, including its structure and core businesses; and ii) the problems it is facing and how we intend to cope with them through process mapping, opportunities identification, and root causes analysis.

2.1 – CTT

Postal services in Portugal have more than 500 years of history. They were established by King D. Manuel I in 1520. The need for a postal service was easy to understand: in the era of the Portuguese discoveries, the transmission of commercial, political and military information was vital.

Following its creation, many developments occurred, but it was in 1853 after the Queen Maria II issued the first Portuguese postage stamp (which still is a product nowadays) that the postal services gained definite recognition and importance. In 1856 the first telegraph line was inaugurated in Portugal and in 1880, the postal services integrated this new business and changed its name to “*Correios, Telégrafos e Faróis*” (mail, telegraph and lighthouses) due to a fusion of two companies - *Correios e Telégrafos* (mail and telegraphs).

Later the company also incorporated telephone services and in 1911 it became an institution with financial and administrative autonomy (*Administração-Geral dos Correios Telégrafos e Telefones*) known as CTT, name that it has kept until today (Público, 2013).

In 1969 CTT was transformed into a state-owned company and in 1992 postal and phone services were separated with CTT becoming a “*Sociedade Anónima*” and retaining only the postal services. In 1999, CTT signed a concession agreement with the Portuguese state (DL 448/99), which from then onwards was the basis for the postal services provided by CTT. Finally, in 2013, The Portuguese government decided to privatize the CTT through an IPO in the Lisbon stock market, and at the same time changed the Concession of CTT (Lei 17/2012), restricting the monopoly of CTT to some very specific areas and opening the sector to competition.

CTT is organized in business units, some of which are subsidiary companies, such as:

CTT Correio – responsible for mail distribution in Portugal and abroad. This company also integrates the retail area.

CTT Expresso – specialized in courier services, urgent mail and merchandize.

Banco CTT – CTT entered the banking activity in 2015 taking advantage of its network of stores. Banking is now considered a core business.

CTT Contacto – responsible for distributing advertising mail.

Payshop – this company allows people to make online payments of several services and utilities in more than four thousand agents (business outlets, tobacco shops, kiosks...).

CTT Mailtec – assures the written communication between suppliers and clients certifying the production of physical and hybrid mail and the electronic management of documents.

Transporta – the most recent subsidiary, it offers transportation solutions tailored to the needs of its clients.

Escrita Inteligente – provides services related to the communication and information technologies like digital receipts (CTT, 2018).

CTT has five hundred and eighty-seven stores across Portugal and more than twenty-seven hundred employees.

The main focuses of this thesis are CTT *Correio* and CTT expresso. These business units are undergoing considerable changes since they are directly affected by the internet revolution and customers' increasing demand for quality.

Three of the CTT company values, express the objective of this work:

- Work proactively to meet customers' needs
- Provide the best service with quality and efficiency
- Explore new ideas, processes and solutions to be able to adapt to the future (CTT, 2018a).

2.2 – Problem Characterization

2.2.1 – Current State Analysis and Overview

CTT enjoyed a stable and closed market for many years. However, this situation has been changing and CTT is now facing a considerable challenge. CTT needs to adapt its core business otherwise the company will not be able to remain competitive in an evolving market.

For many years the main business of CTT was mail delivery. However, the e-substitution triggered a large decrease in mail deliveries, as portrayed in section 1, a trend that is not expected to change.

CTT's revenues have been decreasing over the years, resulting in the need to close stores and client's dissatisfaction (Público,2018). Clients are used to having CTT stores across a wide range of locations and fail to understand why CTT is shutting stores. Moreover, local populations perceive the closures of CTT stores as "an abandonment of their village", which makes the closures a political issue as well. These sensitive situations need to be carefully managed in order not to avoid spreading a negative image throughout the country.

Figure 4 presents the key performance indicators of the Mail postage business unit of CTT. The volume of addressed mail deliveries has been decreasing, which influences the EBITDA and EBITDA margin. It is interesting to notice that in the period 14-16, CTT was able to maintain its EBITDA in spite of the decrease in sales. This was possible due to cost reduction initiatives and increased prices. However, in 2017 costs have increased and, because of the falling traffic, results have fallen almost 20%.

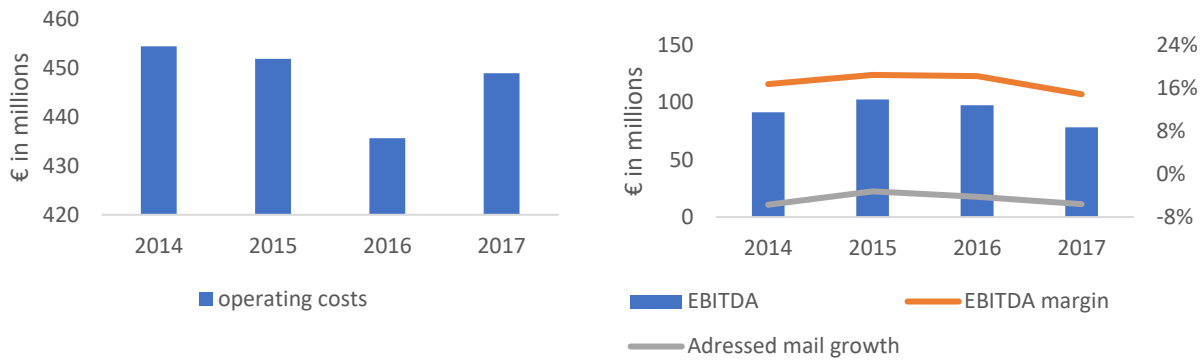


Figure 5: Post office services main KPIs

The Express and Parcels business, on the other hand present a growing tendency. This is explained by the increase in the e-commerce business, and it is visible in Figure 6 (CTT, 2018b). Unfortunately, although this business presents annual growth rates above 20%, its costs are increasing at the same rate, which results in stable results – between €1M and €5M throughout the period. CTT is not being able to extract value from its presence in this growing market.

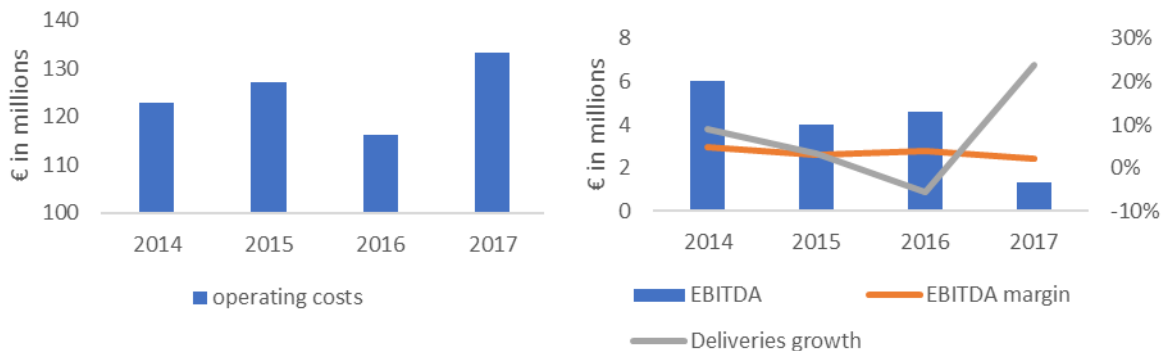


Figure 6: Express & Parcels main KPIs

From the above analysis, the need to improve efficiency and extract more value from emerging businesses is clear.

When a company like CTT has five hundred and eighty-seven stores, one of the most relevant aspects of its activity is the experience of customers when they go to the stores. A key indicator of such experience is the average waiting time (AWT) – which is of utmost importance not only for customer satisfaction, but also for regulatory reasons. Since CTT is a regulated company (by ANACOM, the National Regulatory Authority), it is required to assure minimum quality service levels, otherwise it may pay penalty fees. One of these indicators is IQS 10, which states that the average time waiting (AWT) of a client in a CTT store should be lower than 10 minutes (ANACOM,2018).

Figure 6 shows the average AWT over a period of one month in 26 stores – these were the stores that were selected by CTT to start the Kaizen project, but their names can't be shown for confidentiality

reasons. As we can see, AWT presents large differences between stores with a maximum of 28 minutes in store N and a minimum of 7 minutes in store Z.

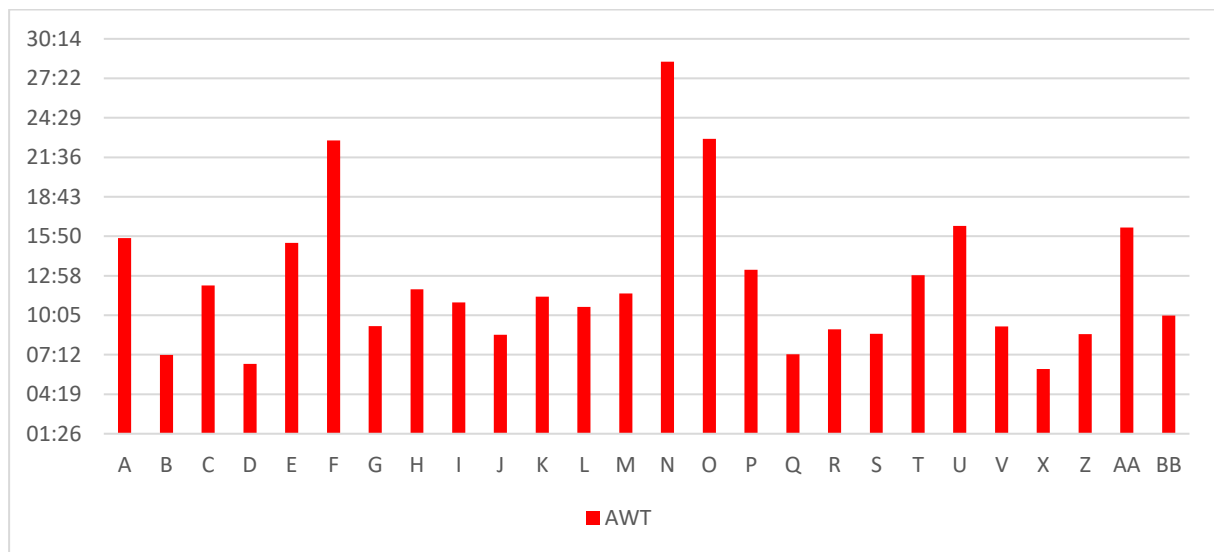


Figure 7: Average Waiting Time in a CTT store (only 26 stores)

The AWT is variable not only between stores but also throughout the day. As we can see in figure 7, in the beginning of the day in A store, the waiting time is below the regulatory limit; however, as the affluence of customers (number of tickets) starts to increase, AWT also goes up. The number of tickets peaks during the lunch time between 1 p.m. and 3 p.m. and then again by the end of day. AWT follows the same path, but it peaks between 2-3 pm, one hour later than the peak customer affluence.

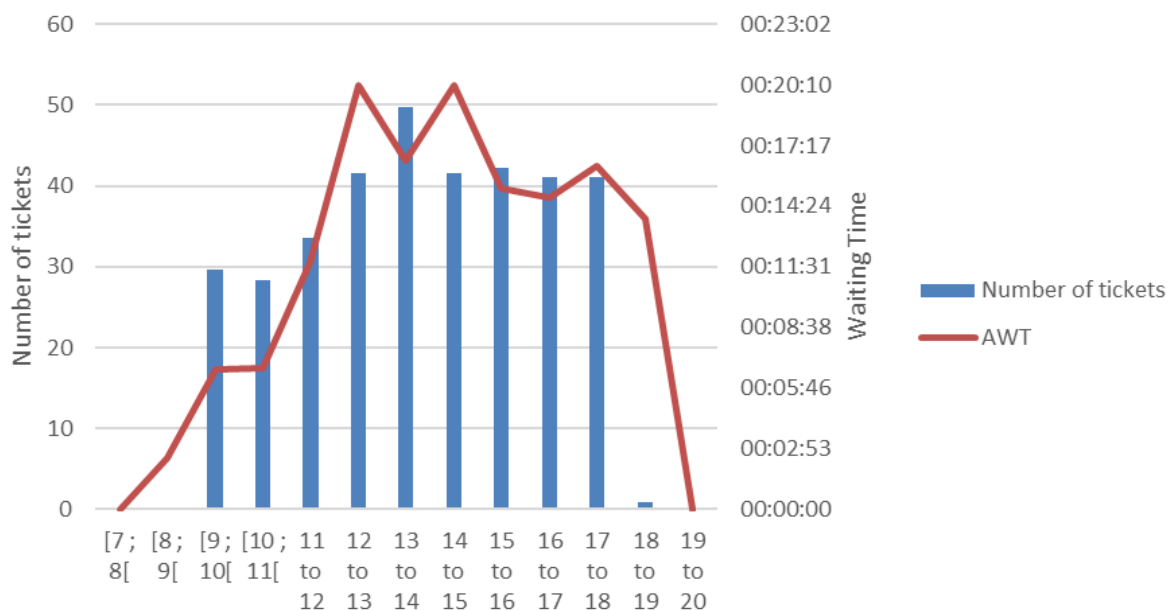


Figure 8: Average of a month of AWT during the day (A store)

So far, four stores have been investigated and they all present the same customer affluence and AWT evolution during the day as store A above.

Demonstrating the relevance of AWT in customer satisfaction is the fact that from the 2016 onwards, almost 50% of the complaints presented in store C were due to waiting time - figure 8.

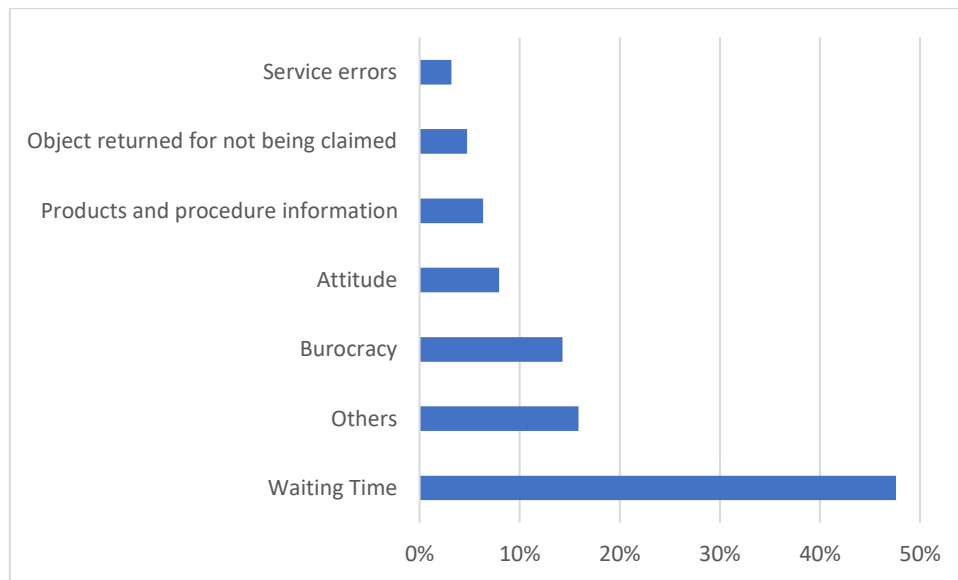


Figure 9: Reasons for complaints

2.2.2 - Process Listing Characterization

The relation between the collaborator and the customer is done in the front office (FO) and all the other activities are processed in back office (BO), as shown in figure 9. All employees perform both activities (BO and FO).

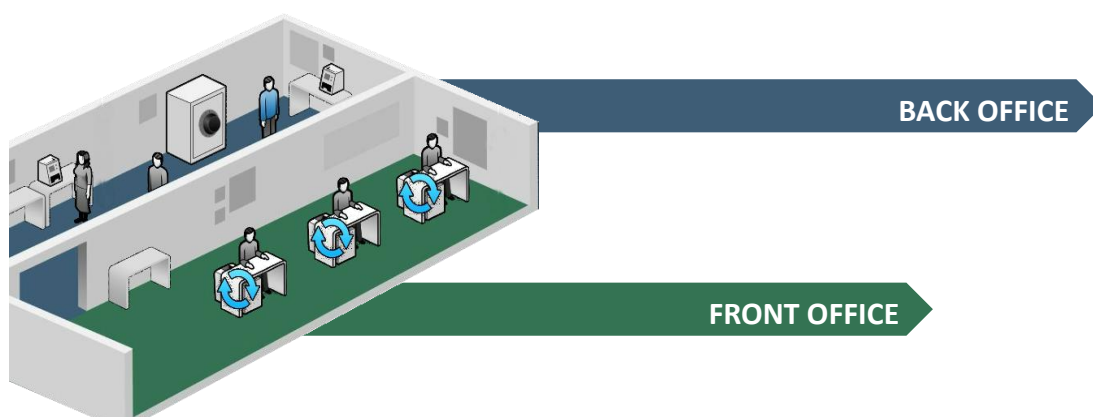


Figure 10: Back office vs Front office

We have identified three critical processes: **cash replenishment**, **acknowledgment system** and **stocks management**. These processes are directly related to the two business units of this master thesis and were considered critical since they take a lot of BO time in store thus reducing time available

for FO activities. To analyze which processes were critical we decided to do a process mapping in store A and a summary of it, it is presented in Table 1.

Table 1: Process Mapping in a CTT store (A store)

Process	Final Product	Client	Time (min)	Frequency	BO vs FO	Critical Yes/No
Cash replenishment to employee	Money	Employee	25	Daily +	BO	Yes
Store cash replenishment	Assure money in bag	OP	20	Daily	BO	Yes
Acknowledgement system	Acknowledged item availability	Employee	45	Daily	BO	Yes
Acknowledged item return	Expedition	Client	30	Daily	FO	Yes
Material reception	Material availability	Employee	60	Weekly	BO	No
In Store material replenishment	Availability to sell	Employee/ Client	90	2x a Week	BO/FO	Yes
Stock replenishment	Stocks	Store/Client	30	Weekly	BO	Yes
Documents verification	Archive	Store	30	Daily	BO	Yes
Archive	Documents management	Company	30	Monthly	BO	No
Mail Expedition	Mail sent	CDP	15	Daily	BO	No
Daily briefing	Formation/Involvement/ Information	Employee	15	Daily	BO	No
Complaints treatment	Answer to the client	Client	15	2x a Week	BO	No
Information management	Information	Employee	90	2x a Week	BO	No
Schedule management	Attendance management	Company/ Human Resources	30x Employee	Monthly	BO	No
Human resources	Tasks organization	Store/Client	10	Daily	BO	No
Vending machines	Maintenance	Store/Client	15	Monthly	FO	No
Pick&Go Contract	Allowed prod for expedition	OP	25	4x a Week	BO	No
Job conference	Closed post conferred	Company partner	12	Daily	BO	No
Store balance	Conferred stocks	Company	120	Monthly	BO	Yes
Balance treasury	Conferred stocks	Company	360	Monthly	BO	Yes

Cash replenishment comprehends two processes. The first process guarantees cash at the counter when serving clients. At least twice a day (beginning and end) employees have to meet the treasurer to receive cash needed for that day (25 minutes) or return excessive cash. If at any given time, additional

cash is needed, employees have to meet the treasurer again. There is no attempt to prepare for special days – for example days when a lot of “Vales” are discounted. The second process guarantees cash at the store. Every day the treasurer receives and returns cash (20 minutes) from the security company responsible for distributing and collecting cash at the CTT stores. Again, there is no attempt to take into consideration special days, and therefore it is often necessary to request more cash during the day. In conclusion, the cash handling process is not efficient because employees have to meet the treasurer several times a day and the security company often needs to make unplanned visits to the stores.

The **acknowledgment system**, represented in Fig.10, is the process to manage letters/parcels that the postman was not able to deliver at the destination address and the items go back to CTT store for the client to collect. It is a critical process since it takes 45 minutes to receive and verify the acknowledged items and another 30 minutes to prepare their return (if the client does not collect the good within a few days, it is returned to the CDP). Additionally, the delivery of the goods to the clients is often slow as employees normally have to search for the item and there is not an efficient system to organize those items and promote an efficient delivery. The acknowledgement system is a common process in all stores.

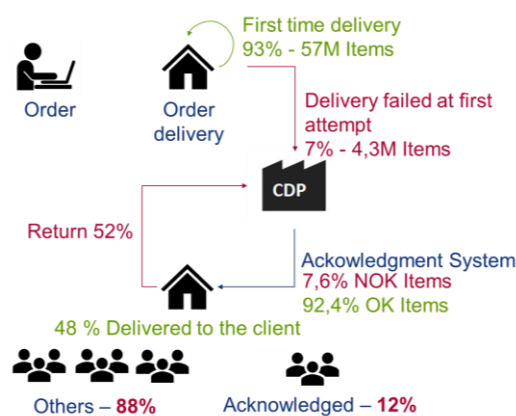


Figure 11: Acknowledgement System

The **stocks management** is another process to focus on. This activity is mainly back-office and is not fully supported by an informatic system and therefore is highly manual. As such, it is time consuming (10 hours/store/month) and it often causes stocks to be excessive or insufficient as there are no standard rules for the stock management.

2.2.3 - Critical Processes

In the next chapters, we will focus our attention on the four processes presented in figure 11. The three critical BO processes discussed before and Customer Service, whose increase is crucial for CTT's future. The figure below also shows in detail the opportunities in each process.

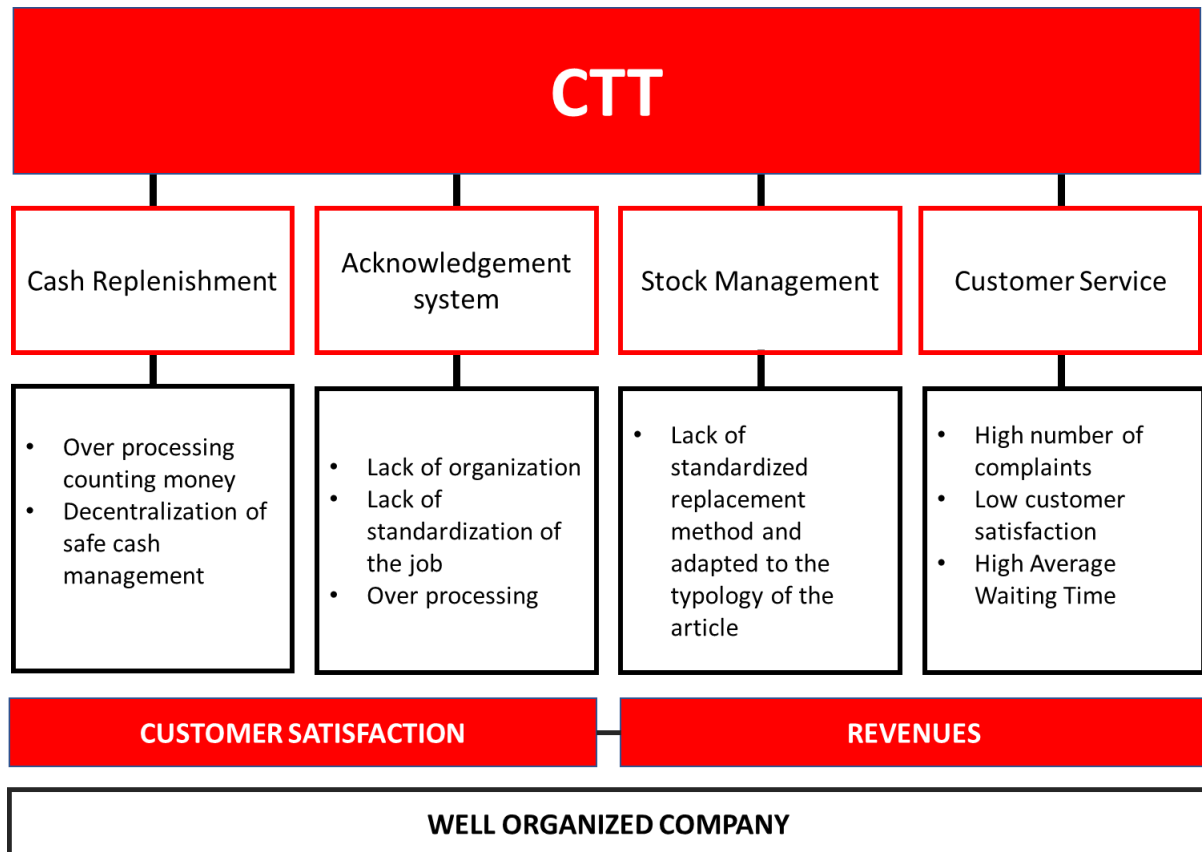


Figure 12: CTT opportunities

2.2.4 – Chapter Conclusions

CTT is one of the largest companies in Portugal and its business is facing enormous challenges but also exciting opportunities. CTT asked KICG to help the company not only to adapt to the current situation but also to work in the continuous improvement of the company.

Customer satisfaction is a crucial factor in CTT's future success. Without loyal and satisfied clients CTT will not be able to offset the expected shrinkage of its postal service business by taking advantage of the positive business prospects it has. The improvement of the service needs to be accomplished under a very strict cost control – efficiency is the key to achieve the objectives set.

CTT needs to improve processes to be able to increase sales of other goods and services, thus compensating for the loss of revenues generated through traditional postal services.

There are many limitations and characteristics that need to be factored in to improve the results in the several areas. The next step is to analyze comparable situations and see how the scientific community has been tackling the issue.

This project aims to acquire a deeper understanding of possible solutions to improve the CTT services.

Chapter 3 - Kaizen Institute Consulting Group

3.1 - Company Presentation

Kaizen Institute Consulting Group (KICG) was founded in 1985 in Zug, in Switzerland by Masaaki Imai, who is considered the founder of the continuous improvement concept.

Masaaki Imai is the creator of the Kaizen concept. Kaizen is formed from a combination of two words: 1) Kai which means change and 2) Zen which means improve.

Masaaki Imai believes that “the Kaizen strategy is that not a day should go by without some kind of improvement being made somewhere in the company”. Therefore, Kaizen is the philosophy of continuous improvement.

The Kaizen’s concept is relatively recent, since it was established after the Second World War and after Masaaki Imai (Japan, 1930), a worker of Japanese Productivity Centre in Washington DC, had visited several automotive companies in the United States to identify best practices and subsequently implement them in Toyota in Japan.

After Japan lost the Second World War, Toyota was suffering a big crisis with many inefficiencies and breakdowns in production. After Ohno’s implementations, Toyota started to be the most competitive company in the market, with their operations following Just-In-Time (JIT) policy.

After this, Toyota Production Systems (TPS) methodology was born, which is a methodology that has as its main focus the flux process, the levelling of production and the market requirements response. (Ohno,1988).

Nowadays, KICG has more than 40 offices and more than 600 employees all over the world, of which, 140 are based in Portugal. Kaizen wants to improve the world with everyone, everywhere and every day (Kaizen, 2018).

The kaizen philosophy is based on 5 fundamental principles that are fundamental for the companies to be able to face challenges:

1. **Creation of value to the client:** By identifying customer needs and improving their experience;
2. **Go to “*gemba*”:** It is necessary to go to “*gemba*” (Japanese word that means “local where value is added”) to be possible to improve processes;
3. **Visual management:** A tool to easily visualize problems and where value is created;
4. **Employees involvement:** Value is created by people’s improvement in processes and environment;
5. **“*Muda*” elimination:** Eliminate “*muda*” (Japanese word that means “waste”) is fundamental. Kaizen believes that there are seven types of waste: waiting of people, movement of people, waiting of material and information, movement of material and information, excess of production and excess of processing, mistakes that cause rejects and rework. (Kaizen, 2018a).

3.2 - Kaizen Business Model

Imai believes that only a complete model can sustain an organization. This is only possible if several variables are taken into consideration. The figure 12 shows all the variables of Kaizen Business Model:

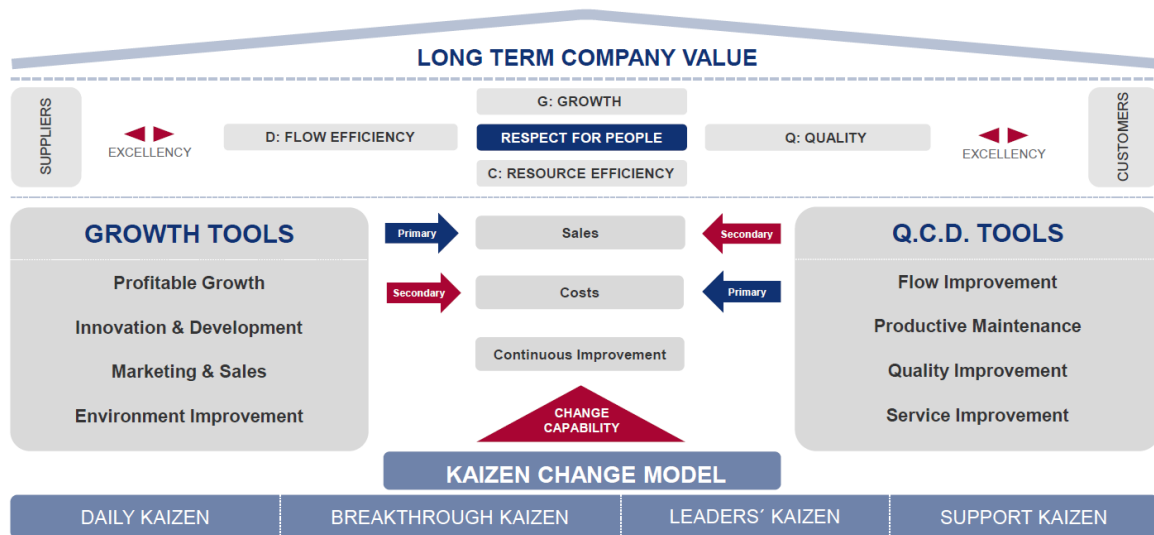


Figure 13: Kaizen Business Model constitution

If an organization wants to have a complete organization, it is fundamental to focus on:

Q.C.D. tools – Quality, cost and delivery should always be topics into consideration. Companies should focus on flow efficiency and resource efficiency to be able to deliver the best service, with quality and reducing the costs.

- **Total Service Improvement** – Kaizen is increasing their projects in the services area. It has started to be fundamental to have a pillar for this area of service. The main objective is to identify the wastes in the processes of creation, waiting and movement of the information, be it physical or dematerialized (Kaizen, 2018b).

Motivation – Companies more and more are worried about their collaborators, that's why Kaizen considers motivation a fundamental pillar here represented by "respect of people".

Growth tools – for a company to be able to compete in the long run, it must be a profitable company, concerned with innovation to fulfil clients' expectations. The main objective is to increase sales.

Daily Kaizen – This tool is fundamental to guarantee the maturity in "*gemba*" and it's composed of 4 steps: 1) assuring the formation and organization in work teams; 2) assuring the organization of work places; 3) normalization of all process inside a company; 4) giving teams total independence.

Breakthrough Kaizen – The Kaizen Project encompasses projects to transform business processes and achieve disruptive results. It seeks to implement significant improvement actions on initially identified opportunities, at a stage where all processes in the organization are mapped using Value

Stream Mapping (VSM). VSM is a tool used to map all client workflow processes and identify opportunities for improvement, in conjunction with a multidisciplinary client team.

Leaders' Kaizen – It is fundamental to assure that top managers are focused in the good practices of continuous improvement. The main objective of Leaders' Kaizen is to keep them involved in continuous improvement, starting with visual management and to make them a frequent presence in "*gemba*".

Support Kaizen – It allows Kaizen Institute's customers to obtain expert guidance. It applies at a later stage of the project and acts as an audit of the latest developments and results. Support Kaizen ensures the continuity of continuous improvement (Kaizen, 2018c).

Chapter 4 - Literature Review

This chapter contains a review of the literature used throughout the master's thesis.

Only studies that may be adapted to CTT are going to be presented.

4.1 – Customer Satisfaction

Kiumarsi et al., (2015) proposed that customer satisfaction is part of a conceptual framework including: service quality, service innovation, brand equity and service loyalty.

Service quality is a multidimensional concept which has objective quality – product, and perceived quality – user. The dimensions to measure quality are: reliability, responsiveness, tangibles, empathy and assurance. These measures are directly related to the service offered by the collaborator. To improve service quality it is necessary to improve the performance of the collaborators (Ratkovi, Pavlovi, & An, 2017).

Service innovation is the creation or improvement of a product. This can be compared with the creation of new value propositions by developing new or existing practices (Pedersen and Nysveen, 2010). Kiumarsi, Salmi Mohd Isa, Jayaraman, (2015) say that innovation in postal and courier services is essential for their survival. Hence, they need to develop an integrated strategy to combine digital and physical communications, since they complement each other.

Brand equity was defined by Keller (1993) as the incremental utility of a product or service by its brand and brand associations. Keller et al., (2006) defend that from a customer's point of view the brand equity is the attraction or repulsion to a given company's product. In the beginning, the customer only associates the brand to the product, however over time customer starts to create associations and attachments through usage experience, advertising and other activities that are not directly related to the product.

Service loyalty – Gremler et al., (1996) defined service loyalty as repeated purchasing behavior from a company provider, that includes a positive disposition toward the provider, and when there is the need of the product or the service only consider this company as the provider. Ratkovi, Pavlovi and An, (2017) say that internet is the immediate competitor of postal services and notes that if customers of postal services switch to an internet provider, they are not so loyal to postal services.

Customer satisfaction –Oliver, (1993) defines customer satisfaction as a reflection of the degree to which a consumer believes that the ownership or use of a service induces positive feelings. Basically, customer satisfaction is a business term which identifies how much customers are satisfied with the products or services, a positive feeling experienced by the customer (Delafronz et al, 2013). Customer satisfaction is essential to guarantee service loyalty.

Customer satisfaction is directly related to customer waiting satisfaction which is one of the problems of CTT. Taylor (1994) during his investigation showed that customer's waiting time in a store directly

influences his satisfaction; the higher waiting times, the lower the service evaluations. It is often not possible to reduce waiting times since processes are already stable. In fact, under these situations it is necessary to follow a different approach – distracters of waiting situations.

One way to deal with the perception of time is to add TV screens in retail stores. Borges et al., (2015) made an investigation and proved by adding TV screens they were able to reduce the perception of time. If the programs shown in TV screens were congruent with the waiting situation the results would be even better.

Another way to improve the perception of time is using self-service technologies (SSTs). Weijters et al., (2007) say that knowing the waiting time is crucial to understand the relation between technology and satisfaction, because technology can influence a lot the time perception.

Nowadays, another way to give a perception of a lower time waiting is to use self-service technologies. There are two types of self-service technologies that are gaining importance (Behzodet al., 2017):

- Self-scanning - is when the customer has the possibility to be in store scanning the items while he is doing the shopping;
- Self-checkouts - are the most common technology in retail stores and it's when the customer instead of doing the payment with a collaborator has the possibility to do the payment by itself.

Djelassi et al., (2018) did a study and proved that this type of technologies has direct impact on client's perception of time. They also show that self-scanning has a stronger impact during the trip around the store since the customer is in a constant interaction with the scanning device. This helps the customer to feel that the experience passed quicker. This means that the perception of time is different from the reality time.

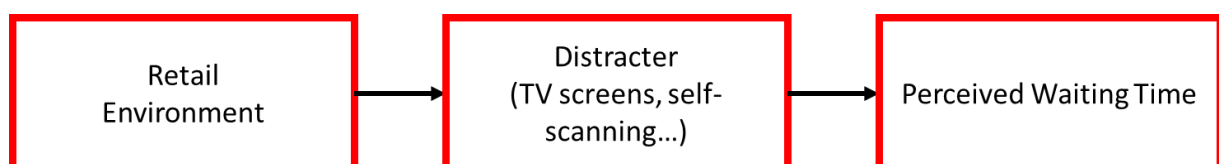


Figure 14: Perception of waiting time

All these aspects are hard to quantify. Companies normally use surveys to evaluate how they are in this metrics.

Net Promoter Score (NPS) is the most recent technic to measure loyalty and predict revenue growth. NPS was created by Reichheld, (2003), he believed that the retention measures were a poor predictor. He believes that NPS has a good advantage since the companies only need to ask one question to manage the loyalty and to predict the future growth. That question is: "how likely they are to recommend the company to a friend or a colleague".

NPS has a scale of 11 points between 0 and 10. If customer gives between 9-10 he is a promoter, if gives between 0-6 he is a detractor and between 7-8 he is neutral. Keiningham et al., (2008) say that

NPS allows to reduce the long-time waiting for survey results, and also decreases the fatigue and resources spent.

4.3 – Stock Management in Retail Services

Stock management is fundamental in a company organization. In a retail company often, the stock represents between 35% to 50% of total invested capital (Pettersson et al., 2011). An inadequate inventory control has inherent risks when dealing with large amounts of capital invested, which is why it is so important to maintain the balance between inventory investment and customer service (Rushton et al., 2011). While holding higher inventories is excessively costly, having a low inventory level might lead to sales losses.

Stocks represent a relevant use of capital. For this reason, Stock and Lambert (2001) affirm that stock management is fundamental in increasing the profitability of companies, in preventing the impact of corporate policies on the stock level and in minimizing the total cost of logistics activities. Business profits can be improved by increasing sales volume or by reducing inventory costs. Increasing sales is often possible if high levels of stock lead to higher availability of products and more consistent service levels. On the other hand, a low stock level can reduce fill rates on customer orders and result in lost sales. However, the costs associated with high levels of stock usually outweigh the benefits derived. Better stock management can increase the ability to control and predict the stock investment reaction. Stock management should determine the level of stock required to achieve a minimum total logistic cost, considering the minimum necessary objectives provided by the client. For this reason, it is crucial to have the right inventory management policies in place.

Continuous Review System and Periodic Review System

There are two well-known models to deal with inventory, the continuous review model and the periodic review model. In continuous review models there is a systematic review of stock levels while in periodic review models the inventory level is revised only at regular time intervals. According to Silver et al. (1998), continuous review models are generally costlier in terms of cost and error than periodic models. This is particularly true for fast-movers, where there are many transactions per unit of time. For slow-moving items, very small revision costs are due, since updates are made only when a transaction occurs. On the other hand, periodic review may be more effective than continuous review in detecting deterioration (or theft) of such slow rotation items, since periodic review forces an occasional review of the situation, rather than continuous review, where this review only happens when a transaction occurs.

According to Sanders (2012), all inventory systems must respond to two main decisions: when to place a replenishment order and the quantity involved. In probabilistic terms, the choice of a particular policy will depend on the type of review associated with it. Continuous review policies are termed by order level policies, and periodic review policies are referred to as order cycle policies. When policies have level and order cycle characteristics they are called mixed policies. There is a wide variety of possible

policies to be used, however, those, are the most commonly used policies., according to Silver et al. (1998).

The policy (s, Q) is a continuous review policy and, whenever the stock position reaches a certain pre-specified point s (order point), a new replenishment request, fixed quantity, is launched. It should be noted that the stock position corresponds to the stock "on hand" plus the undelivered stock, the stock that has already been requested from the supplier but has not yet been received in the stores. The order interval is variable because it depends on the pace of demand between orders. This system is often called the two-box system (Silver et al., 1998). While the demand is satisfied from one box, the quantity of the second box corresponds to the quantity of the order level. When the second box is opened, a new order is posted and when that order arrives, the second box is reloaded, and the rest is placed in the first box.

In Figure 15, the mode of operation of the policy (s, Q) for a given article is graphically illustrated:

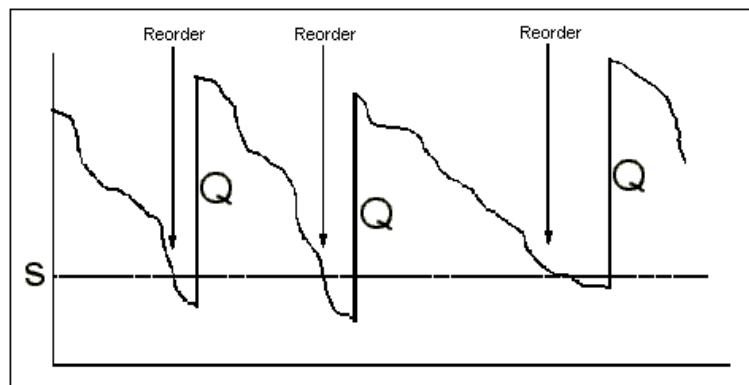


Figure 15: Continuous Review Policy (adapted from Carvalho (2010))

In this policy there is a need to calculate two parameters: the economic order quantity Q and the order point s , from which a new order is triggered. The order point is obtained by summing the demand during the delivery period plus the security stock. The calculation of the quantity to be ordered in each order will depend on the objective initially stipulated by the company: minimization of total costs or stipulation of a minimum level of service provided to the customer.

In the case of periodic review policies, such as policy (R, S) , inventory revisions are carried out at regular intervals R . What often happens is that the day of placing the order to the supplier is already predefined, either by negotiation with the supplier or by internal programming, usually with a fixed time between orders. At each review, an order is placed for units enough to raise the stock level to a predetermined maximum reference level, S . The quantity to be ordered in each review period is variable. On the day of the review, that is, on the day of placing an order, the stock position is compared to the target stock level and the quantity to be ordered will correspond to the difference between these two values. This policy is generally used when there is no fixed order cost stipulated (Bijvank and Vis, 2012).

In Figure 16 it is possible to observe an example of the stock evolution, according to a policy (R, S) :

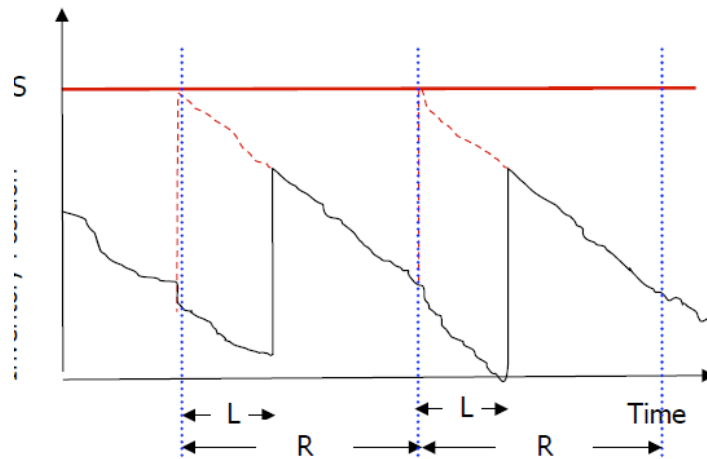


Figure 16: Periodic Review Policy (adapted from Carvalho (2010))

Since this policy is a periodic review policy, the uncertainty lies with the review period plus the period corresponding to the delivery period practiced by the supplier. In this way, the maximum stock level, S , corresponds to the demand during this set of periods plus the security stock. From here it becomes easy to arrive at the order quantity formula, which varies from order to order, corresponding to the difference between the maximum stock level and the current stock position.

If the review period can be negotiated with the supplier and not the other way around, the period between orders should be as close as possible to the economic period between orders.

ABC Analysis

An adequate inventory management system considers the relative importance of each of the company's products. In this sense, ABC analysis, a well-known and practical classification based on the Pareto principle, can be used to classify the products into three different categories based on their dollar value:

- A - inventory items that correspond to 70% of company's business but only taking up 10% of inventory, these are items that are critical for the proper functioning of the company;
- B - inventory items that correspond to 20% of company's business and taking about 20% of inventory;
- C - inventory items that correspond to 10% of company business but taking up about 70% of inventory (Ramanathan, 2007).

ABC analysis is based on one single measurement. However, this measure alone does not provide a complete tool for inventory assessment and other measures should be considered in addition.

Ng, (2006) developed a scalar score to convert criteria measures. These criteria measures included lead time, obsolescence, number of requests per year, durability and so on. According to his model, monetary value alone was insufficient to perform a comprehensive inventory management analysis. His weighted linear model is easily understood and widely used by inventory managers.

Aside from inventory classification, companies must also ensure that they have the adequate inventory management tools in place.

For centuries companies operated through a push system, whereby they would estimate demand and produce accordingly. One of the common tools used in this process was the MRP. Nevertheless, over the last decades there has been a trend towards the adoption of a pull system, very common in JIT production (Flynn, 1995). Pull inventory starts with the customer's order (Spearman et al., 1992). The information starts with customer's needs which is worked backwards in the supply chain.

Just- in-Time

Just-in-time (JIT) can be defined as a comprehensive management strategy that combines elements of JIT-Production tactical planning with JIT-Procurement to eliminate waste and optimize resource utilization along the value chain (Claycomb et al., 1999).

JIT-Production consists of identifying and eliminating all types of waste such as excess stock, unnecessary movement of materials / people, defect management and remediation mitigation (Wisner et al., 2005).

JIT-Procurement is related to the initial process of product procurement and is based on a set of techniques and concepts to eliminate waste and prevent stock creation during the procurement process (Freeland, 1991). According to Inman et al. (2011), these concepts and techniques can guarantee daily deliveries in small lots, to educate the supplier, the existence of a more premature involvement of suppliers through greater proximity to the customer and the sharing of information in both directions. All these strategies result in eliminating the greater waste of a company that is capital invested in excess stock.

Kanban

Kanban, a Japanese word that means card, is an inventory management tool. *Kanban* refers to a widely used Lean Thinking philosophy tool allowing information to be transmitted to production control through a signaling system to control production flows and to inform that the workstation needs to be supplied. *Kanban* is the most known tool for pull system. Basically, it is by the card that the information is given, to start production or to ask for materials (Balram, 2003).

Courtois et al., (1997) show many of advantages of using *Kanban* system:

- allows the information to circulate in a direct and perceptible way between the workstations;
- increases the interdependence between different jobs;
- increases responsiveness to demand changes;
- facilitates the relationship with the client when complying with previously established deadlines;
- enables a better organization of the space available for stock, decreases the average stock levels, with positive effects on the financial availability, cost of production and organization of space available;
- enables financial availability in the company and its production costs through reduction of stocks.

Kanban system is an easy system however, it can only work if top managers work for it. Otherwise without discipline, commitment and supplier participation, the system is going to fail (Rahman et al., 2013). This system is also difficult to apply in some conditions such as: unstable demand, orders with short production runs and large set ups.

4.4 – Cash Replenishment Management in Retail Services

Several studies regarding the ATM machines were done to investigate how to use the minimum resources such cash kept in ATMs, trucks for loading cash and people to do the replenishment (Ekinici et al., 2015).

ATM demand forecasting problem gained importance during a competition in England named the Artificial Neural Network and Computational Intelligence. During this competition the performance measure was the mean absolute percentage error (MAPE). Players received 2 years data from 111 ATMs from different location and the objective of the game was to predict the following 56 days using the same model for all the ATMs (Crone, 2008).

During the following years many models were developed, with the majority achieving R^2 of 55% and a MAPE of 28%, which shows the difficulty creating an accurate model. Table 4 summarizes the models for optimization of ATM machines. These models will apply the group-demand forecast.

Table 2: ATM Optimization Models

Authors	Model
Simutis, et al., (2007)	A flexible neural network for ATM cash demand forecasting
Simutis, et al., (2008)	Forecasting using neural networks and support vector regression algorithms
Coyle, et al., (2010)	Self-organizing fuzzy neural network
Wichard (2011)	Forecasting with hybrid models
Andrawis, et al., (2011)	Forecast combinations of computational intelligence and linear models
Teddy et al., (2011)	Forecasting using a local learning model of cerebellar associative memory network
Darwish (2013)	Forecasting using interval type-2 fuzzy neural network
Arora et al., (2014)	Fuzzy ARTMAP Network for simulated data
Venkatesh et al., (2014)	Forecasting by clustering and using neural networks
Ekinici, Lu and Duman (2015)	Group-demand forecasts

Ekinci, Lu and Durman recognized that to have a precise model in forecasting daily withdrawals was very challenging, and for that reason they started to think about using aggregation, since it would allow them to reduce the error. They decided to follow an example of Fisher and Rajaram (2000) where they needed to design a merchandise test. With this they decided to aggregate the stores into clusters considering location, size, sales of products and demographics.

This model delivered better results compared to the previous models, since it has a MAPE of 20% while the previous models have a MAPE between 20% and 45%. Through this study it's possible to integrate the forecasting procedure in replenishment decisions, include location and time in the model, and improving the quality by data aggregation (Ekinci et al., 2015).

4.5 – Processes Standardization

Many specialists, nowadays, believe that companies have a lot to gain with standardization (Darinet al., 2007). According to Hammer et al., (1999) the question is no longer between centralization and decentralization but rather, standardization versus process diversity. This is the real key structural issue enterprises face: should all units do the same thing the same way?

On that note, according to Míkva et al., (2016), standardization adds culture to the company, supports audits, promotes problem solving, involves team members and includes having documentation of the current processes. This leads to variability reduction, helps training new operators and represents a baseline for improvements. Therefore, through standardization businesses can both reduce their costs and free up labor for other activities.

However, thus far no literature studies have been published addressing this matter in postal services. Nevertheless, it has been proved in other areas that companies can benefit a lot from process standardization and many defend that it is, indeed, considered the basis for continuous improvement (Bayo-Moriones et al., 2009).

5S Method

To make the simplification of this system possible through standardization, Míkva et al., (2016) present 5S Method (Japanese origin) – described below – as one of the possible methodologies to be applied. This method is universal to all organizations and applied worldwide not only in production, but also in services.

The 5S Principles are recognized in many industries as a very effective tool to improve workplace organization (promoting a clean and productive work environment), identifying and eliminating waste and increasing effectiveness and efficiency. This has a positive impact in the performance of the company. Specifically, Veres et al., (2018) defend that, when done properly, the continuous implementation of this method has revealed improvements concerning the quality of products and services, maintenance and safety, sense of responsibility and teamwork and equipment reliability. Plus, there are several other advantages such as less space for storage and wasted labor time, reduced production and set-up times and cost reduction.

This methodology consists, then, in the following five sequential steps:

1. Sort (Seiri): define the items that are needed at the workplace and remove the nonessentials;
2. Stabilize (Seiton): define the exact location and organize the essential items that were left in the workplace;
3. Shine (Seiso): clean regularly equipment and workplace, identify irregularities;
4. Standardize (Seiketsu): create a standardized arrangement of the workplace, by implementing standard procedures and continuously implement the previous steps;
5. Sustain (Shitsuke): continuously maintain established procedures, integrating 5S Method into the concept of working culture.

Visual Management

The visual management is divided in several aspects, from the normalization and identification of sites to the visual tracking of performance indicators. By visual tracking, for example the placement in a prominent area of the Gemba, the graphs with the most important indicators to evaluate the problem under analysis (Melton, 2005).

Compared to the other four senses, the view collects about 83% of the information absorbed daily (Kaizen Institute, 2013d). Thus, communication in general is facilitated by an optimized visual management.

Visual management, in addition to improving communication, also makes it possible to make anomalies visible; prevent risks and represent positive / negative data / feedback.

4.6 - Chapter Conclusions

In this chapter, the state of the art on the problems of customer satisfaction, waiting time and back-office activities were analyzed. This analysis was done having in consideration its application to postal services cases and case studies in different areas with similar situations.

During this chapter it was possible to see many good practices that can be applied to CTT to improve processes and client's satisfaction. Since the problems identified in the previous sections are mainly not related between them many opportunities were found.

For client's satisfaction, the waiting time is a problem, so one way to improve that is not only reducing it by optimizing processes but also by reducing the perception of time in the store. Solutions for the perception of time are shown, but also many solutions to improve the efficiency of the back office were found such as the 5S methodology.

To prepare the next step and before proposing new alternatives further analysis will be done to improve the knowledge about the topics to be able to explore new alternative solutions for the problems identified in the 3rd chapter. After this analysis and with the help of this review the alternative proposals will be identified.

Chapter 5 - Preliminary Analysis and Planning

This chapter presents a preliminary analysis of the improvement opportunities found for the various processes performed at CTT stores. Based on this analysis, some solutions were proposed and then subsequently rolled out.

In this sense, Section 5.1 is dedicated to the collection and analysis of data obtained for the improvement process. For the purposes of this dissertation only the most relevant analysis among the several that were performed are shown. Finally, Section 5.2 presents possible solutions proposals for the improvement opportunities encountered.

5.1.1 - Collaborators Supply and Demand

AWT in store is a key driver of customer satisfaction, which thus required a thorough analysis of the topic.

Store A was selected by CTT as it was particularly affected by AWT. In fact, between January and May, the percentage of tickets with an AWT longer than 10 minutes was very high and indeed over the threshold set by the regulator: 25%.

Table 3: Tickets Percentage with an AWT > 10 minutes

Store	January	February	March	April	May	Accumulated
Store A	31.30%	35.00%	55.10%	43.20%	47.00%	43.32%

Figure 17 presents a month example of the number of tickets drawn per day in May and how many of these had waiting times above 10 minutes. In 20% of the days, the tickets with waiting times over 10 minutes account for more than 70% of the tickets served that day, which breaches the regulatory threshold. Figure 18 demonstrates that even on days with a small number of clients waiting more than 10 minutes, the AWT of these clients can be a concern. As an example, on the 18th of May, even though only 31 people waited over 10 minutes, their AWT was around 16 minutes, which is significantly above the 10-minute target.

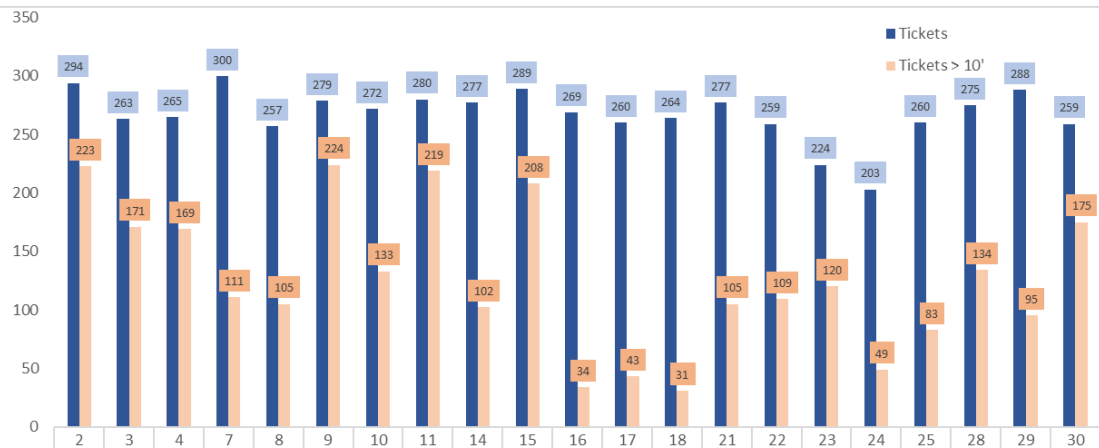


Figure 17: Total tickets and tickets with AWT >10 minutes

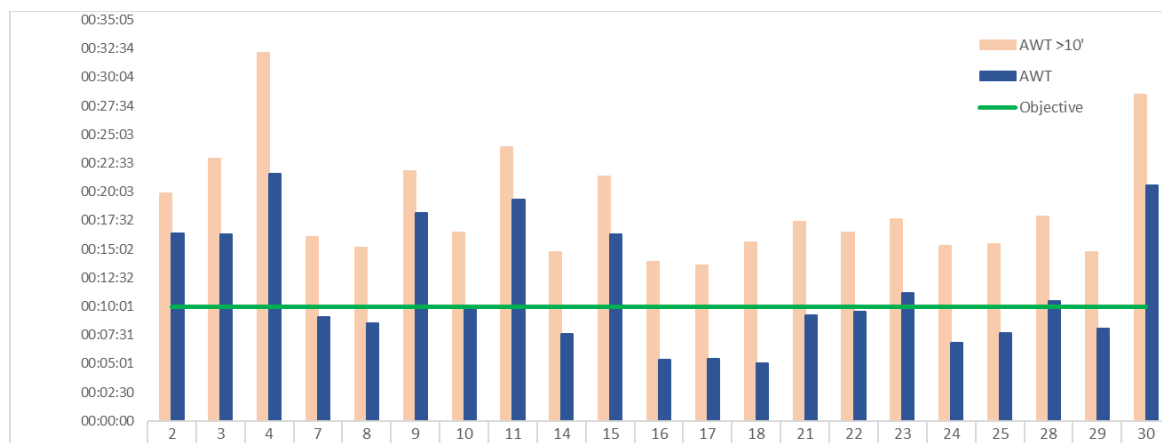


Figure 18: Ticket with AWT >10 minutes and total AWT

Figure 19 shows the average AWT and the average number of tickets throughout the day in Jun. As the green line shows, the average AWT in Jun was below 10 minutes. However, there are certain periods when the AWT time is superior to 10 minutes, namely between 1 pm and 4 pm and between 5 pm and 6 pm. According to these results, the regulatory targets are not being met (of clients with AWT lower than 10 min).

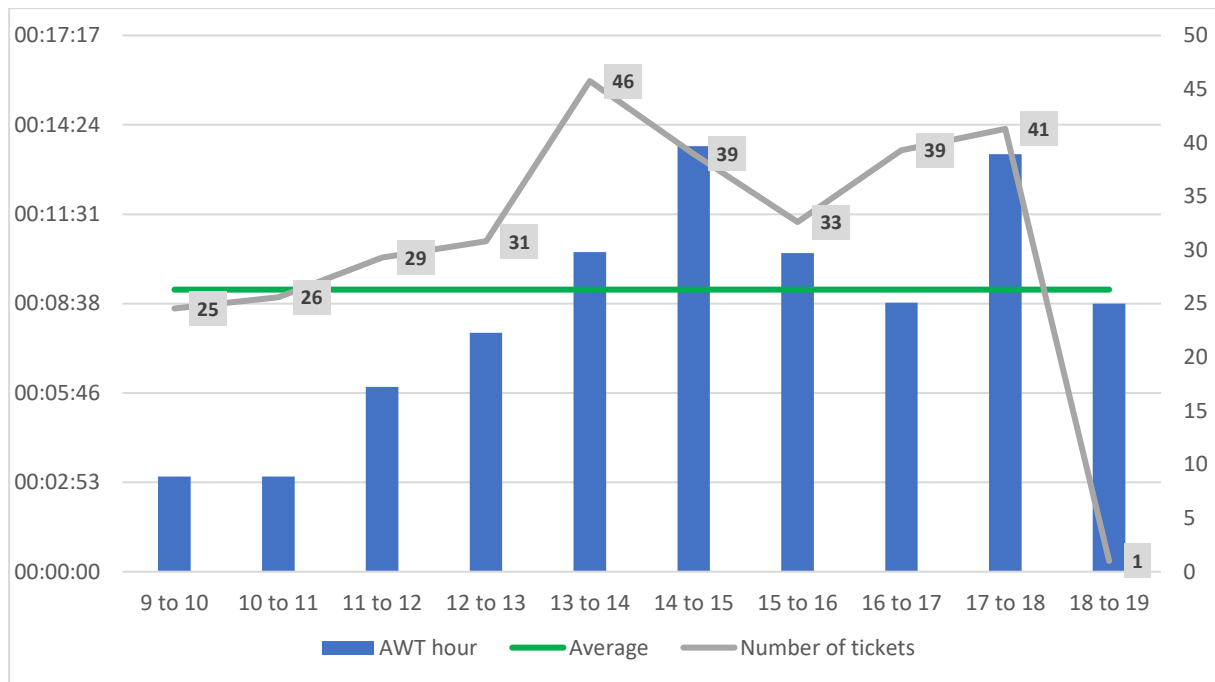


Figure 19: AWT and Number of Tickets during the day (Jun average)

The findings above are not exclusive to Jun. Figure 20 performs the same analysis for May and similar results were obtained with AWT above 10 minutes for the most critical periods of the day: around lunch time and at the end of the day.

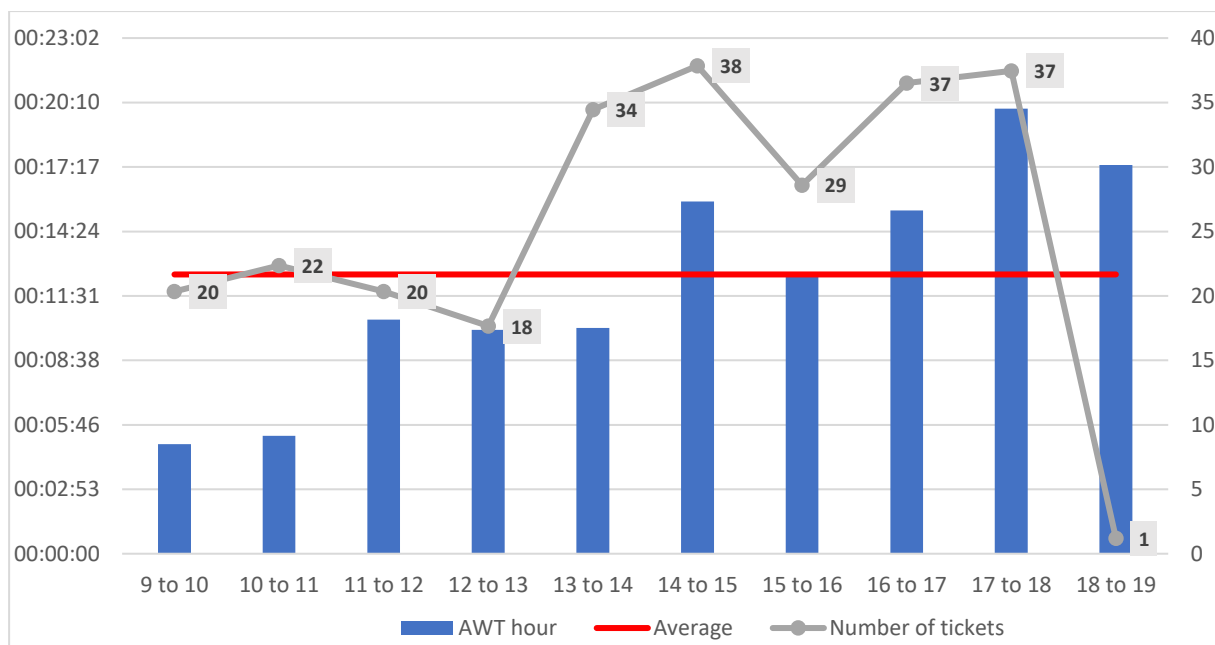


Figure 20: AWT and Number of Tickets during the day (May average)

These results showed significant intra-day variance, additional analysis were carried out to assess whether the flux of clients was constant over the month. Figure 21 shows that the first two weeks of the month have a higher flux - almost 100 clients more than the last two weeks.

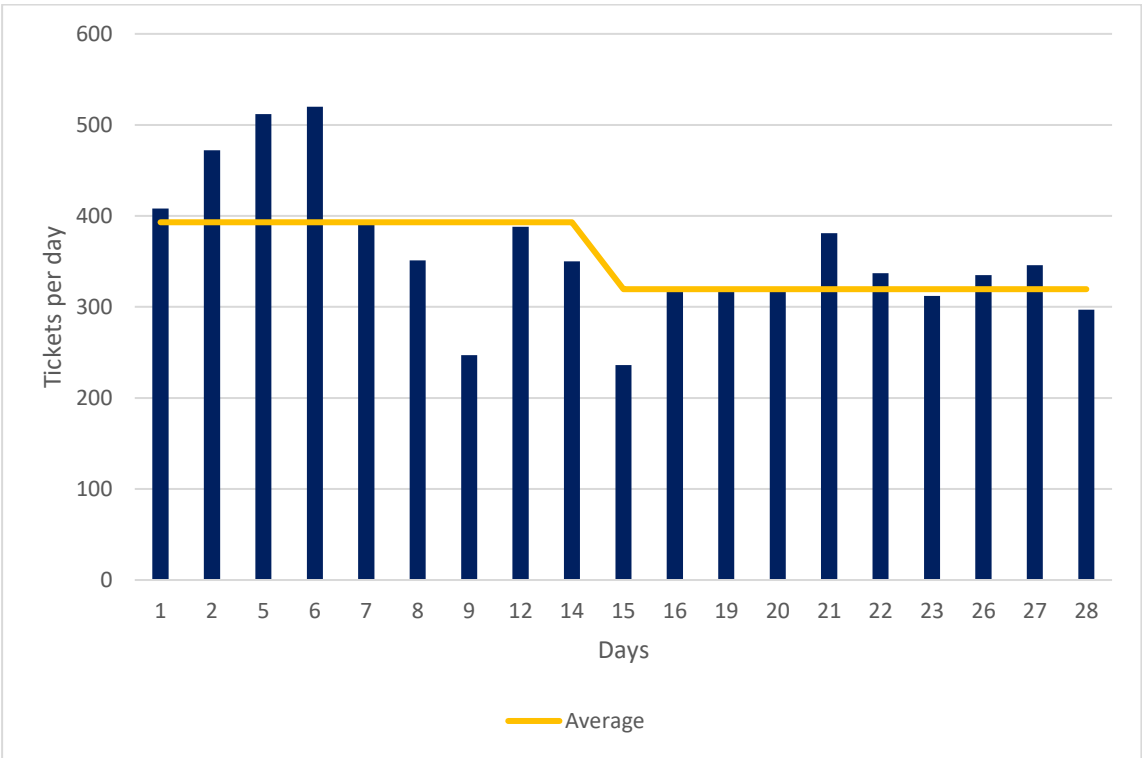


Figure 21: Number of Tickets by day in May

Consequently, AWT is expected to be higher in the beginning of the month, as confirmed by Figure 22:

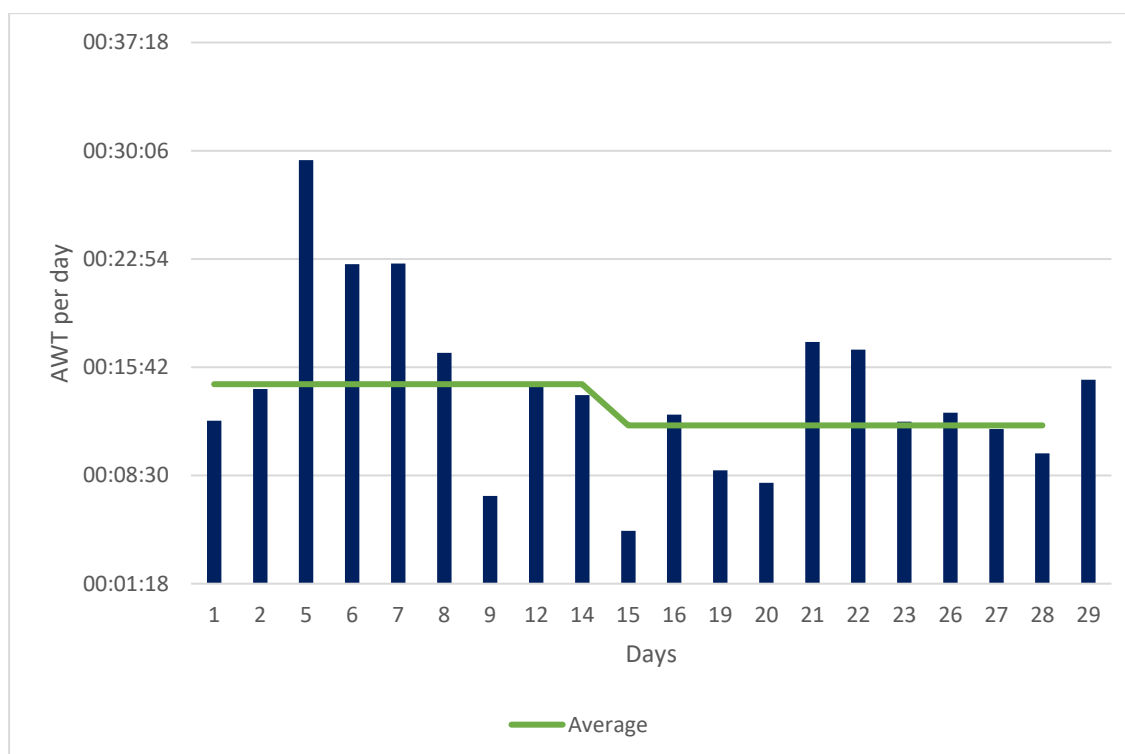


Figure 22: AWT by day in May

Following the assessment of intra-day and intra-month variance, we analyzed the collaborators' schedule (figure 23). One obvious problem is related to lunch time: collaborators often take a 2-hour break at peak client affluence periods. What is more, even though collaborators are available towards the end of the day the level of service is very poor. Another problem is that the working schedule is fixed throughout the entire month, while the flux of clients it is variable. In this context, the working schedule requires some adjustments, namely regarding the length of lunch breaks. Nevertheless, adjusting lunch hours alone will not solve the problem entirely.

Sch. N°	Service	Begin	Pause 1	Restart	Finish
H1	Store Manager	09:12	13:30	14:30	18:30
H2	Treasurer	08:45	11:30	13:30	18:45
H3	Bank Commercial	09:00	12:00	13:30	18:30
H4	Bank Commercial	09:30	13:30	14:30	18:30
H5	Postal Commercial	08:45	11:30	13:30	18:45
H6	Postal Commercial	09:45	13:30	14:30	18:45
H7	Postal Commercial	10:00	14:30	15:30	19:00

Figure 23: Collaborators Schedule

As shown in Table 4, Store A has 105 contract customers with a daily flow of more than 4,000 letters. There are clients with very high flows, such as customer 156230 who mails 300 letters per day as presented in Table 5. This particular customer often arrives in the store after 5 pm, making the allocation of preparation time to a quieter hour of the day impossible.

Table 4: Contractual Clients and mail delivery time

Number of clients	105
Total letters	4390
Delivey before 15h	920
Delivery after 15h	3470

Table 5: Clients and hours distribution

Client Number	Average number of items	Hora chegada
11020970	20	after 17h
11586180	40	after 17h
260606	50	after 17h
11259470	50	after 17h
11259340	50	after 17h
11097690	70	after 17h
55557	150	after 17h
45764	30	after 17h
10220800	60	after 17h
156230	300	after 17h
10674520	50	after 17h
1156170	160	after 17h
242578	20	after 16h
10284560	70	after 16h
11065720	20	after 16h
10991720	25	after 16h
10476570	5	after 16h
10932200	70	after 16h
83488	15	after 16h
11737140	10	after 16h

5.1.2 – High Average Service Time

CTT services did not provide us with data regarding the average service time, which is essential to perform a robust analysis, given that there are many types of services whose service times can differ significantly.

Hence, given the lack of data, we visited CTT stores and manually recorded service times of the several types of services. Table 6 shows the results obtained, and as expected service times vary greatly among the different services e.g. “Citation and Notification Acceptance” takes 4 minutes longer to serve than “Boxes”.

Table 6: AST per Service

Services	AST (minutes)
19H OPEN – CTT Expresso	4.8
Citation and Notification Acceptance «= 2 kg	5.0
National Free Acceptance «= 2 Kg	3.0
Boxes	0.9
Services Payment - NT	1.9
International Blue Mail – Unit	1.2
International Blue Mail- MULTI PRODUCT GUIDE	3.0
National Blue Mail - Unit	1.2
National Blue Mail - MULTI PRODUCT GUIDE	3.0
International Normal Mail - Unit	1.2
International Normal Mail - MULTI PRODUCT GUIDE	3.0
National Normal Mail- Unit	1.2
Pick up Registered mail	5

Results show an average of 2.7 minutes and a standard deviation of 1.3 minutes, which gives a coefficient of variation of 45% which confirms the variability in service times. The service with the highest AST deals with registered emails, one of the processes that has already been mentioned in Section 2 (acknowledgement system).

During these measurements, it was noticeable that collaborators frequently run out of cash, forcing them to stop working and head to the back office and ask for cash. Again, this has already been highlighted in Section 2.

Given the variability in service times, we decided to analyze the flux of services in store A to help establish a link between this and the AWT in that store.

CTT made available an excel called “Diário de Lançamentos” which shows the types of services and the hours in which they were requested. Based on these data, we created a dynamic table to breakdown service demand throughout the day (Table 7).

Table 7: Services distribution per hours of the day

Account Description	09	10	11	12	13	14	15	16
Citation Acceptance and Notifications «= 2 kg	0,0	0,0	2,9	8,7	6,5	5,0	4,6	1,6
National Normal Mail - Unit	0,6	3,4	4,7	8,6	6,3	9,1	8,8	16,3
National Normal Mail - Máquina de franquiar de utilização interna	0,0	0,2	0,3	0,3	0,2	0,2	0,2	0,3
National Normal Mail - Multi Product Guide	0,1	0,7	0,9	3,8	2,4	3,3	4,3	10,7
National Blue Mail - Unit	0,2	2,0	2,5	3,1	3,4	4,8	4,1	3,4
National Blue Mail - Máquina de franquiar de utilização interna	0,0	0,0	0,0	0,0	0,2	0,1	0,0	0,0
National Blue Mail - Multi Product Guide	0,0	0,2	0,5	0,2	0,3	3,0	2,8	5,5
International Normal Mail - Unit	0,2	1,8	2,4	2,9	2,7	2,6	3,6	2,8
International Normal Mail - Multi Product Guide	0,0	0,0	0,0	0,1	0,0	0,4	0,4	0,2
International Blue Mail - Unit	0,0	0,7	0,6	0,7	0,3	0,3	1,2	0,6
International Blue Mail - Multi Product Guide	0,0	0,0	0,0	0,0	0,0	0,4	0,0	0,1
National Book Acceptance «= 2 Kg	0,1	0,4	0,1	0,5	1,1	0,3	0,4	1,3
Multi-Postal Bags and Books » 2Kg National IVA included	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,3

This data allowed for the calculation of the AST through the day.

Table 8: AST per hours of the day

Period	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
AST	2.83	3.37	3.46	3.42	3.42	3.46	3.36	3.44	3.64	3.44

In addition, the distribution of contractual clients served through the day was also calculated and is depicted in Fig 24.

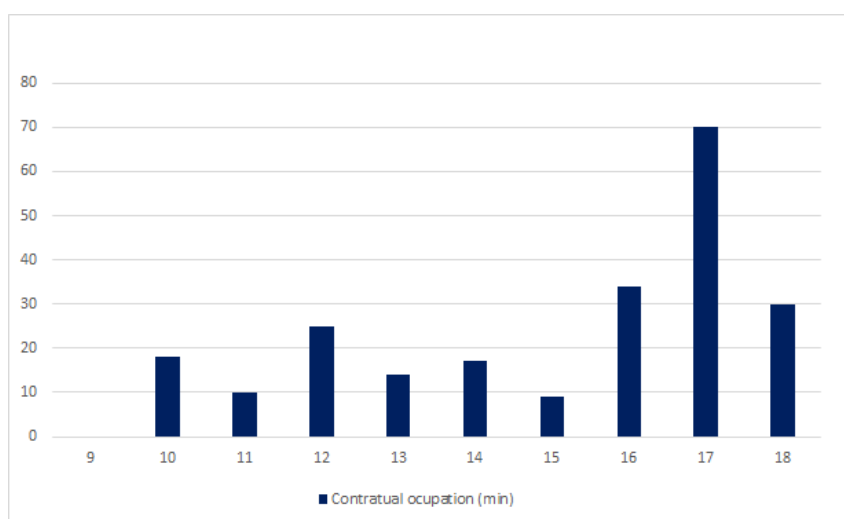


Figure 24: Contractual Occupation

In order to check whether the number of collaborators was enough to meet the demand of services, the worker schedule was converted to minutes and compared to the overall minutes required to fulfil service requests. Figure 25 shows the supply and demand in minutes over 15-minute periods throughout the day. From this analysis, it is possible to conclude that the schedule of collaborators is not tailored to the flux of services. In the morning, the flux of clients is well below the availability of collaborators, while during lunch time and at the end of the day, the availability of collaborators is insufficient to meet the flux of services requested.

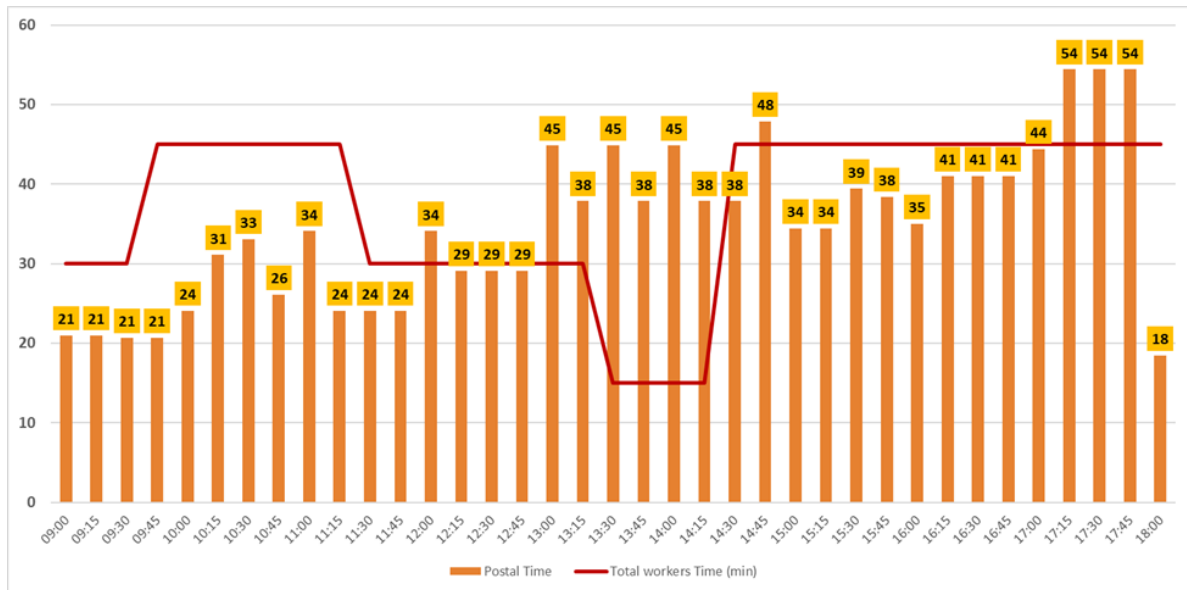


Figure 25: Supply and store demand

5.1.3 – Stocks Management analysis

According to the case study section, while some products had excess stock, other exhibited shortages. In this context, it made sense to perform a stock analysis.

We started by analyzing consumption patterns and compared them to store inventories. Table 9 shows great variability in coverage levels (number of months that existing stock is expected to serve) across different products. Stock management does not seem to follow any particular strategy, with some articles showing coverages of 19 months and others of less than a month.

Table 9: Stock Coverage (months)

Description	NOVEMBER	DECEMBER	JANUARY	Average Cons	Coverage
NATIONAL AA SEALS 20G_BOOKLETS 50 SEALS	3537	3057	3297	3297	2.4
ENV. DL NACIONAL BLUE MAIL	700	913	807	807	4.7
PADDED ENVELOPE S	290	537	309	379	1.7
PADDED ENVELOPE L	274	300	270	281	2.3
PADDED ENVELOPE M	244	267	270	260	3.0
ENVELOPE XS DL NATIONAL	286	112	175	191	19.5
ENV. S C5 NAT GREEN MAIL	335	99	130	188	13.4
PACKAGE L (13)	141	218	128	162	0.7
ENV. M C4 NAC NAC	129	192	165	162	5.1
GREEN MAIL SACHETS	135	233	111	160	1.4
PADDED ENVELOPE XL	124	156	129	136	2.4
PACKAGE M (14)	125	151	117	131	1.2
PACKAGE XS (16)	115	141	137	131	2.1
NAT M SACHETS	119	144	119	127	3.0
NAT SACHETS	110	88	139	112	4.1
PACKAGE XL	78	141	77	99	1.8
BOTTLE PACKAGE	68	97	83	83	1.7
PADDED ENVELOPE XXL	68	93	61	74	3.3
PACK 5 ENV. S C5 NAC GREEN MAIL	39	40	75	51	4.0
PACK 5 ENV. XS DL GREEN MAIL NAC	43	42	65	50	7.1
PACK 10 ENV. DL NACIONAL BLUE MAIL	31	40	71	47	4.2
BOX L NATIONAL GREEN MAIL L	17	33	54	35	3.7
BOX M NATIONAL GREEN MAIL	20	24	21	22	19.5

It is also noteworthy that Inventories are working capital and are thus an investment that is made by the company. We converted existing stocks into € amounts, and these correspond to an investment of more than €26,000.

Table 10: Money invested in stock

Description	Unit Cost	STOCK	Total
NATIONAL AA SEALS 20G_BOOKLETS 50 SEALS	€0.50	7950	€3,975.00
ENV. DL NACIONAL BLUE MAIL	€0.63	3774	€2,377.62
PADDED ENVELOPE S	€0.65	648	€421.20
PADDED ENVELOPE L	€0.95	648	€615.60
PADDED ENVELOPE M	€0.85	778	€661.30
ENVELOPE XS DL NATIONAL	€0.85	3732	€3,172.20
ENV. S C5 NAT GREEN MAIL	€1.10	2526	€2,778.60
PACKAGE L (13)	€1.10	116	€127.60
ENV. M C4 NAC NAC	€2.35	832	€1,955.20
GREEN MAIL SACHETS	€4.50	230	€1,035.00
PADDED ENVELOPE XL	€1.05	322	€338.10
PACKAGE M (14)	€0.90	157	€141.30
PACKAGE XS (16)	€0.60	270	€162.00
NAT M SACHETS	€2.90	379	€1,099.10
NAT SACHETS	€2.15	456	€980.40
PACKAGE XL	€1.95	182	€354.90
BOTTLE PACKAGE	€1.95	144	€280.80
PADDED ENVELOPE XXL	€1.15	246	€282.90
PACK 5 ENV. S C5 NAC GREEN MAIL	€5.50	204	€1,122.00
PACK 5 ENV. XS DL GREEN MAIL NAC	€4.25	357	€1,517.25
PACK 10 ENV. DL NACIONAL BLUE MAIL	€6.30	200	€1,260.00
BOX L NATIONAL GREEN MAIL L	€4.40	129	€567.60
BOX M NATIONAL GREEN MAIL	€2.60	423	€1,099.80
Total			€26,325.47

5.1.4 – Voice of the Customer

As previously mentioned CTT has performed poorly in client retention over the past few years. CTT does not have a deep visibility on clients' feedback – there is a survey available for clients to express their views, but it is very rarely responded.

Therefore, we developed our own survey and visited 15 stores to interview clients. Regarding the sampling process, the target group consisted of CTT customers. Finally, the sample size amounted to 374 respondents, superior to 100, the minimum number required for a study to assume validity (Collier and Bienstock, 2007).

Some of the questions included are shown below:

- How would you like to obtain information about CTT products and services?
- How do you rate the waiting time in the CTT store (between 1-10)?
- How do you rate the service time in the CTT store (between 1-10)?
- Did you notice the inside and outside communication?
- Do you consider CTT's store hours adequate?
- Would you like to have an estimate of the waiting time printed on your ticket?
- Would you use automatic self-service equipment?

- What CTT products do you know?
- Would you recommend CTT to your family and friends?

Below are presented some insightful conclusions stemming from the questionnaire:

i. NPS score

As shown in literature review, NPS is increasingly used to evaluate client satisfaction. Questioning “Would you recommend CTT to your family and friends?” allows us to calculate this metric. According to the results presented below, the number of detractors (0-6) is almost the same as the number of promoters (9-10).

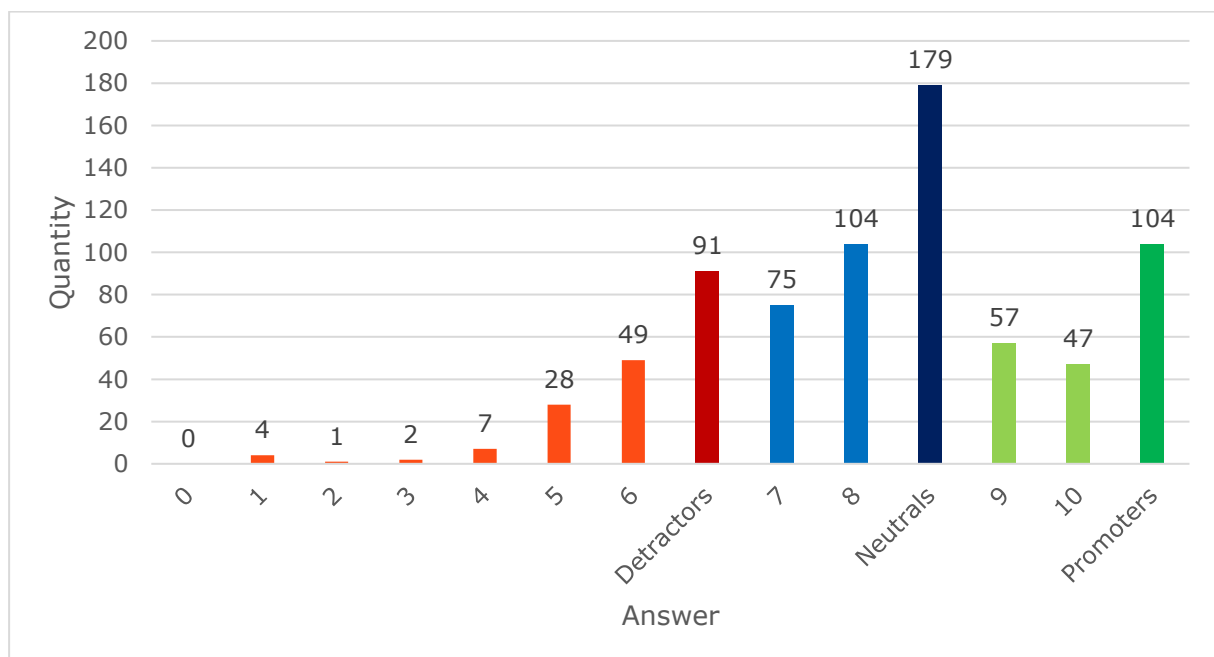


Figure 26: Answers of NPS

Using this information, we are able to calculate the NPS through the following formula (Krol et al., 2015).

$$NPS = \%promoters - \%detractors$$

CTT’s final score is 3%, considerably below the overall average for delivery companies: UPS scored 39%, Fedex 56%, Chronopost 79%, Collect Plus 37%, Dropoff 87% and TNT 67% (Customer Guru, 2018). In NPS scale CTT is in improvement zone as it is possible to see below:

- Excellence Zone - NPS between 76 and 100
- Quality Zone - NPS between 51 and 75
- Improvement Zone - NPS between 1 and 50
- Critical Zone - NPS between -100 and 0

ii. Relevance of the store

“Stores” are the preferred channel of communication for customers (50% of all replies). Interestingly the “CTT site is the second most common answer.

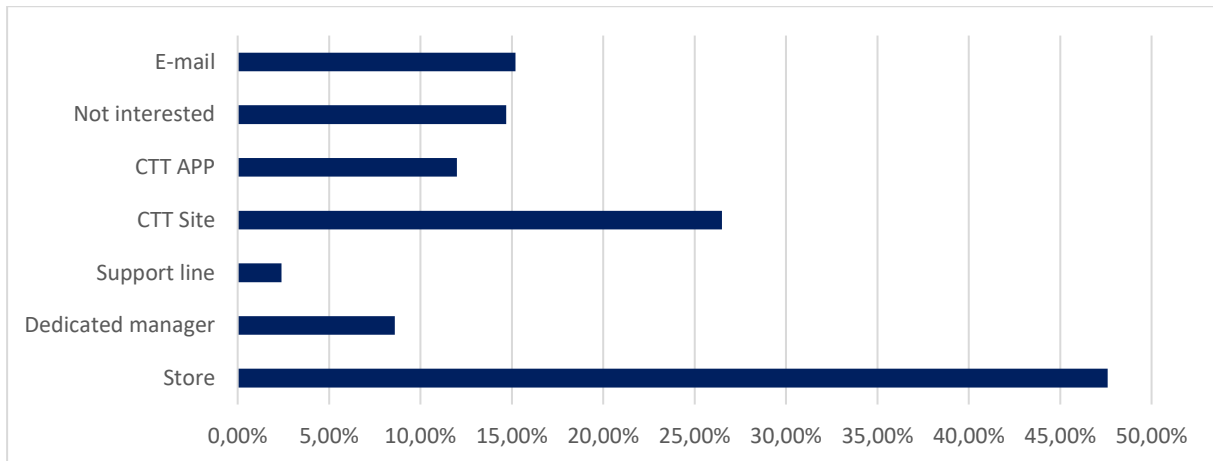


Figure 27: Answers of where to receive information

iii. Self-service equipment

One interesting result is related to the self-service equipment. Answers to the question “Would you use automatic self-service equipment?” are balanced, (in fact the “no” answer had slightly more answers), something that we had not anticipated.

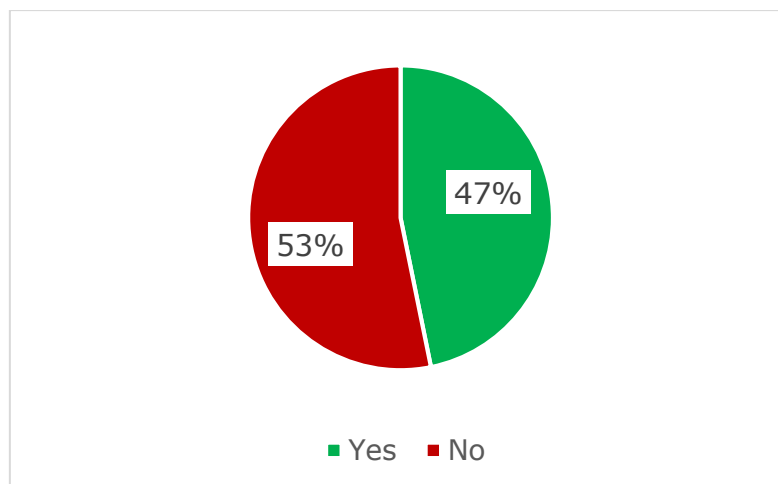


Figure 28: Results concerning “Would you use automatic self-service equipment?”

iv. Known products

Another surprising result is related to the knowledge about CTT’s products. Figure 31 demonstrates that the majority of CTT customers do not know most of the company’s products (in red – below 20%, in blue between 20% and 40%, in green – higher than 40%).

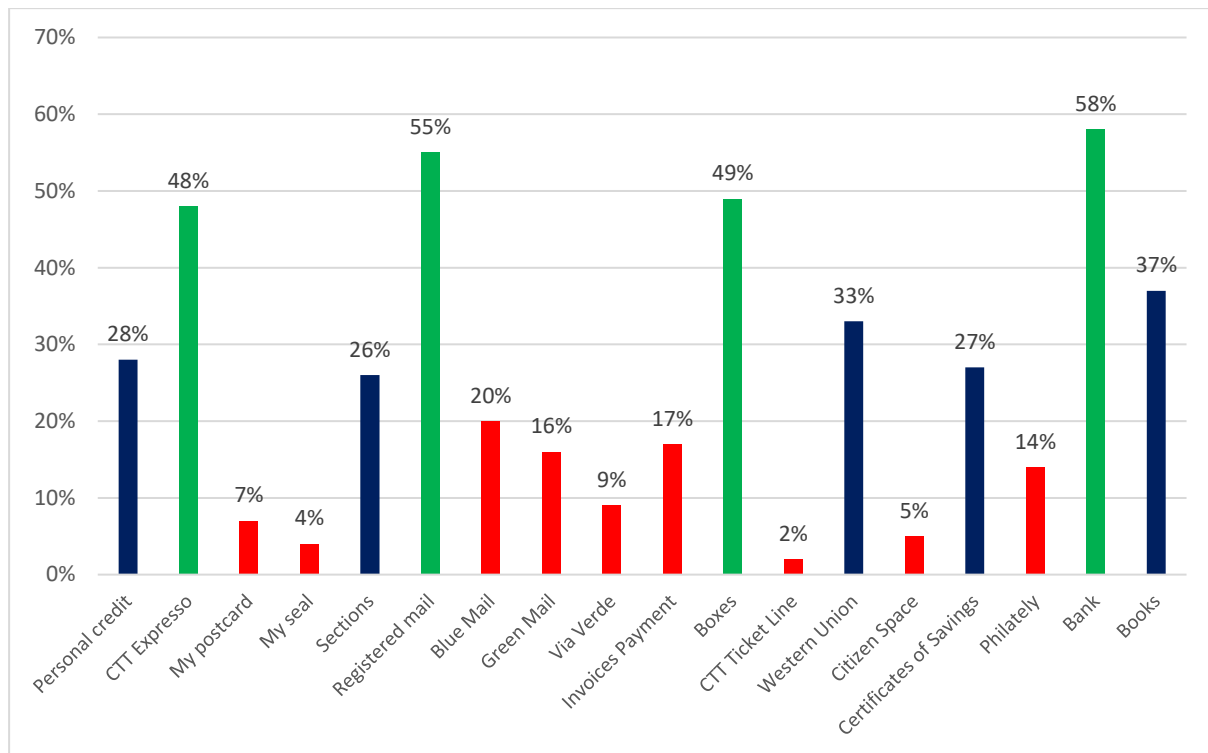


Figure 29:CTT products known by clients

5.2 – Proposal of Alternatives

In this section we discuss the approaches to improve and/or to eliminate the inefficiencies identified in the planning phase. The improvement proposals were made with the support and of the people involved in the collection and analysis of data and based on the fundamentals and tools of Kaizen Lean methodologies.

In addition, Key Performance Indicators (KPI) were defined as a performance appraisal tool for the different improvement initiatives. Below are some of the KPIs defined.

- **Average Waiting Time** - sum of the waiting time of the customers ($i=1$ to $i=k$) divided by the total number of customers (k).

$$AWT = \frac{\sum_i^k \text{Time Waiting } i}{k} \quad (5.2.1)$$

- **% Clients** - percentage of clients with an AWT superior to 10 minutes to evaluate the balance between offer of collaborators and store demand.

$$\% \text{ clients} = \frac{\text{Clients with } AWT > 10'}{k} \quad (5.2.2)$$

- **Average Time Activity** - time used during some activities, such as, the time taken to deliver the items to the client (i=1 to i=t).

$$\text{Average Time Activity} = \frac{\sum_{i=1}^t ATAi}{t} \quad (5.2.3)$$

- **Average Replenishment Requests per Day** - how many times collaborators need to ask for cash per day, where k is the collaborator and RR the number of replenishment requests.

$$\text{Average Replenishment Requests per Day} = \frac{\sum_{i=1}^k R Ri}{k} \quad (5.2.4)$$

- **Money Invested in Stock** – which is the quantity of a product (Qx) multiplied by its price (Px) was used to measure the impact of the actions on stocks.

$$\text{Stock (€)} = \sum_x^m Qx * Px \quad (5.2.5)$$

- **Net Promoter Score (NPS)** - used as measure of customer satisfaction.

$$NPS = \%promoters - \%detractors \quad (5.2.6)$$

Figure 32 aggregates the proposals in 4 groups, namely: teams and space organization, process normalization and customer orientation, which are detailed in the following section.

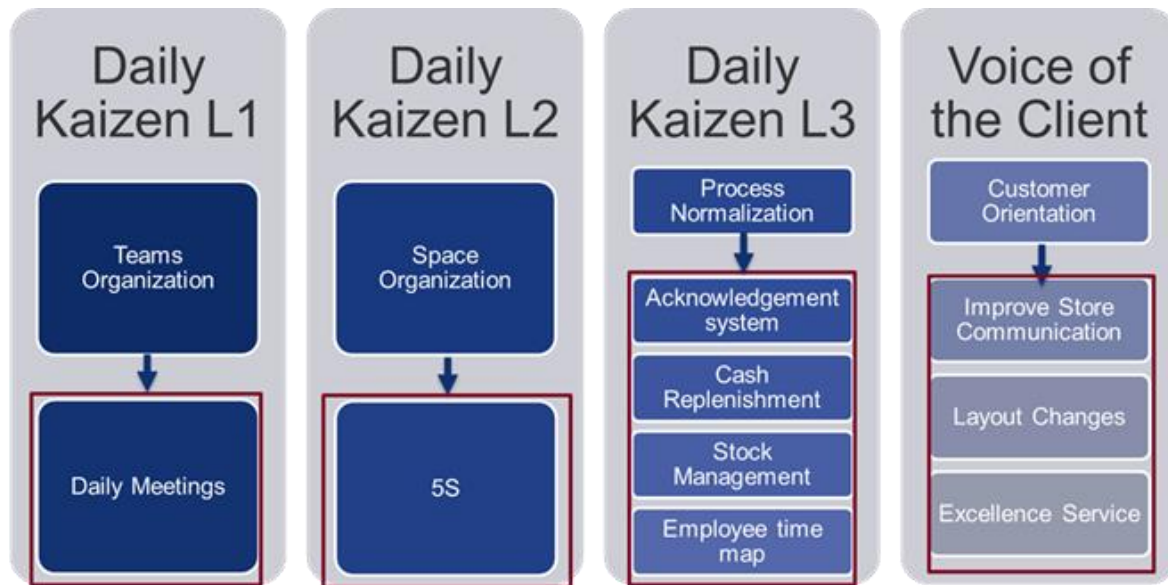


Figure 30: Schedule of Implementation of improvement proposals

5.2.1- Teams Structure

The roll out of the recommended changes in processes requires a strong commitment and involvement of all the team members, i.e. all store employees. To prepare adequately for such changes we began by assessing employee involvement in the store and their performance as a team. One of the issues identified, transversal to all stores, was the lack of communication between the various actors within the store and between the store and the headquarters - for example, the collaborators were not aware of the objectives set for the different areas of the company.

The stores did not hold regular meetings with all employees, including time dedicated to the discussion of problems/solutions and employee training. To circumvent this problem, a cultural change process will be developed through the implementation of Daily Kaizen, according to which a culture of continuous improvement in the day-to-day of the people involved in the store will be introduced. This process includes holding a daily meeting where an update on KPIs is discussed, developing of a work plan, improving cycle and scheduling meetings. Additionally, a competence matrix which includes a board with all competences needed in store and the level of knowledge of each collaborator and a training plan including internal and external formation that it will be developed for all workers in the store, which will subsequently be discussed and updated regularly.

5.2.2 - Space Organization

The Organization of Spaces, related to the movement of people and materials, will be achieved using the 5S method which encompasses redesigning of layouts to reduce wasted time. The aim is to improve the operations and flows developed in the stores through the usage of specific locations for the various materials, minimizing the distance traveled and concentrating the products with greater turnover near the employees.

Initially, none of the stores had articles organized according to an ABC logic. In fact, articles were scattered throughout the store, in different spaces, and without standardization of counters. If an employee changes from his counter to another they would always find a counter with a different organization, thus increasing the time it takes them to be prepared to perform the service. As shown in the pictures, the stores do not have standardized spaces and materials are dispersed by the various places.



Figure 31: Spaces Disorganization

With the help of 5S methodology, presented in literature review in section 4.5, it will be possible to have the spaces organized in a standard fashion and employees will be able to work efficiently from any given counter (Figure 32).



Figure 32: Counter with 5 S

5.2.3 – Process Normalization

The lack of normalized processes has already been depicted in previous sections. Taking this into consideration, one of the biggest objectives is to normalize and optimize the most critical processes, to be free up time in back office, reduce the duration of activities, and increase the availability of the front office.

- **Acknowledgement System**

Usually the items were organized alphabetically. Yet, this method is very time consuming with collaborators spending over 5 minutes between attending the customer and retrieving the item. Therefore, we propose testing an alternative method based on organizing the items by the last number on their bar code (Figure 33)



Figure 33: Example of a bar code

Henceforth items will be separated according not only to the last number on the bar code but also to their size, orders and fine warnings, and day of arrival at the store (Figure 34). Through this, we believe that the time spent doing this type of service will decrease and free up more time to perform other services.

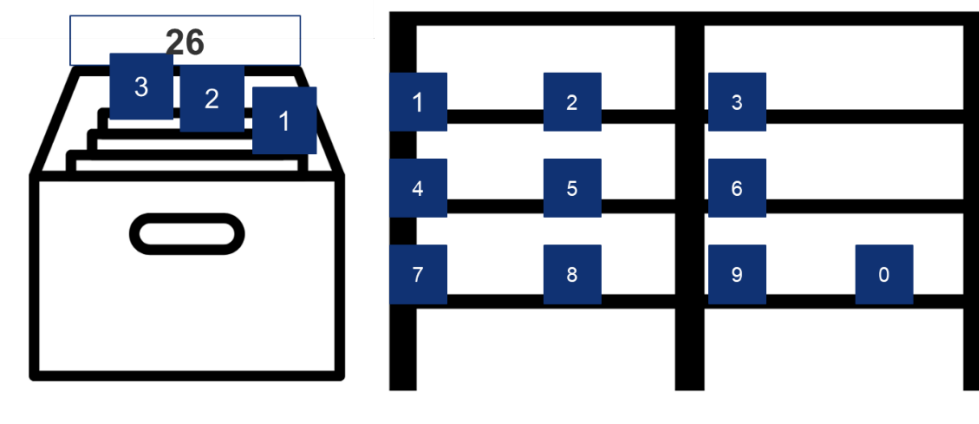


Figure 34: Organization proposal

One additional advantage of standardizing processes is that it will be easier and more productive for workers to rotate between stores, as presently each store has its specific method to arrange items.

- **Cash Replenishment**

Stores do not have a standard method of delivering cash to employees. As a result, employees must visit the treasurer 2.75 times a day on average to request for more cash, which represents a significant inefficiency.

The goal of the initiative is to reduce cash transfers between the treasurer and employees to once a day. To do so, an estimation of daily cash needs will be distributed by the treasurer and during the day, the treasurer will perform 2 verifications to check for any additional cash needs. Such policy will free up time for both, the treasures and the employees.

- **Stock Management**

The first solution created for the elimination of “*Muda*” associated with excess inventories, was to create a method to control stock levels for salable materials.

CTT did not have any standardized method for stock replenishment, and therefore a periodic review system was proposed as a first step towards a more robust solution: a continuous method.

Initially, the method aims to perform stock reviews monthly, which will include all salable products, carried out in a single day and thus concentrating the time spent with stock control in a focused way. As CTT stores did not have any method, introducing this periodic system will be simpler and a more effective way to change and gain new habits.

The method consists of setting an amount of stock target (red line in figure 35):

$$Target = Average\ Consumption\ (T + L) + SS \quad (5.2.3.1)$$

which is equal to the average consumption during the month multiplied by T, a month (since stocks checks will be performed once a month) plus L (Lead Time, which according to CTT is 15 days -0,5 months); We will then add SS (safety stock which takes in consideration the ABC analysis considering the stock rotation, A – 50%, B and C -15% of the average consumption). SS calculations are shown in the table below:

Table 11: ABC Analysis and % of SS attribution

Description	Consumption%	ABC	SS	ABC
NATIONAL AA SEALS 20G_BOOKLETS 50 SEALS	47.2%	47.2%	50%	A
ENV. DL NACIONAL BLUE MAIL	11.5%	58.7%	50%	A
PADDED ENVELOPE S	5.4%	64.2%	50%	A
PADDED ENVELOPE L	4.0%	68.2%	50%	A
PADDED ENVELOPE M	3.7%	71.9%	15%	B
ENVELOPE X S DL NATIONAL	2.7%	74.7%	15%	B
ENV. S C5 NAT GREEN MAIL	2.7%	77.3%	15%	B
PACKAGE L (13)	2.3%	79.7%	15%	B
ENV. M C4 NAC NAC	2.3%	82.0%	15%	B
GREEN MAIL SACHETS	2.3%	84.3%	15%	B
PADDED ENVELOPE XL	2.0%	86.2%	15%	B
PACKAGE M (14)	1.9%	88.1%	15%	B
PACKAGE X S (16)	1.9%	90.0%	15%	C
NAT M SACHETS	1.8%	91.8%	15%	C
NAT SACHETS	1.6%	93.4%	15%	C
PACKAGE XL	1.4%	94.8%	15%	C
BOTTLE PACKAGE	1.2%	96.0%	15%	C
PADDED ENVELOPE XXL	1.1%	97.1%	15%	C
PACK 5 ENV. S C5 NAC GREEN MAIL	0.7%	97.8%	15%	C
PACK 5 ENV. X S DL GREEN MAIL NAC	0.7%	98.5%	15%	C
PACK 10 ENV. DL NACIONAL BLUE MAIL	0.7%	99.2%	15%	C
BOX L NATIONAL GREEN MAIL L	0.5%	99.7%	15%	C
BOX M NATIONAL GREEN MAIL	0.3%	100.0%	15%	C

At the end of the month Real Stock levels will be compared with Target Stock levels and the difference will be ordered, which should then be received on day 15. The estimated evolution of product “National AA seals 20G_Booklets 50 seals” of stocks can be observed below in Figure 35:

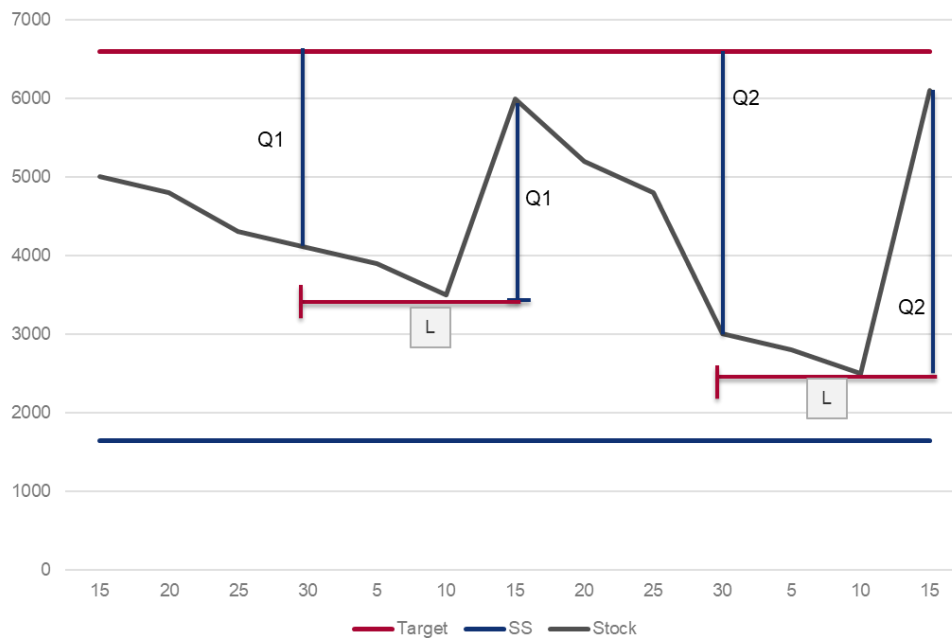


Figure 35: Estimation of stock evolution “National AA seals 20G_Booklets 50 seals”

Through the application of this method and its parameters, the average stock for item A will be equal to one-month average sales, and for items B and C, to 20 days.

For the non-salable items, a simple and very visual Kanban system will be implemented.

- **Employee Schedule**

One way to solve the lack of collaborators during some critical hours is to adapt the collaborators schedule to the tack time. In CTT stores the tack time is not constant, since there is some idle time in the beginning of the day and a clear lack of people in the front office. Changing the employee schedule, adapting them adequately to the number and type of services expected throughout the day, will allow for both: a decrease in the average waiting time and an increase client satisfaction.

Figure 36 below shows the steps to adapt the offer to store demand.

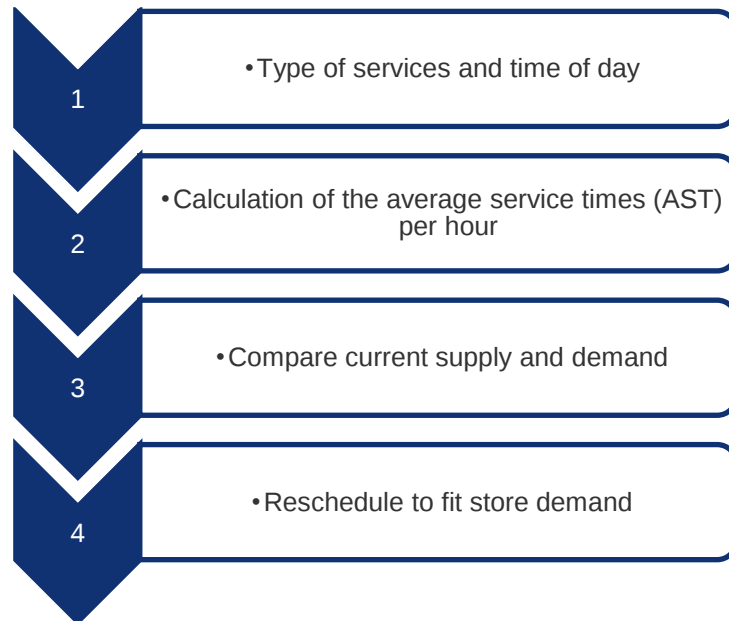


Figure 36: Steps of adapt the offer to store demand

First, it is necessary to estimate the demand for services in the store throughout the day, i.e. the number and the type of services rendered per period of time. By knowing the services flux and their duration we will be able to calculate the man-hours needed in the front office to cope with the expected demand. In addition, by estimating store demand, we can calculate how many employees are required in each period.

However, once we know how many employees we will need to have available, we need to consider the Portuguese legal labor framework and the specific conditions of CTT workers (Acordo Colectivo de Empresa), to understand whether the changes needed are feasible. As an example, Portuguese law does not allow uninterrupted working periods of more than 5 hours. As a result, under this scheme, the collaborator is entitled to two rest breaks in accordance with paragraph 5 of clause 58 of the EA.

Another consideration is adaptable basis schedule which consists of the possibility of varying, in a given reference period, the duration of the work, per day, per week, per season, according to the foreseeable service (according to Law, in the AE and in OS00062015CE, of 26-02, on Duration and Working Hours). The adaptability consists of working on average 7:48 per day over the defined period, which means that

a worker can work 8:18 hours a day for one week, if during the following week the worker works only for 7:18 hours a day. This would result in an average of 7h48 of work.

The need to implement the adaptability regime arises when it is necessary to react to periods of great oscillation in the labor market in which the company moves, that corresponds to a demand for its goods or services substantially above or below normal. In CTT the flux of clients is greater in the beginning of the month, so the necessity may arise.

To quantify, we will calculate the overall working time available and compare it to the working time required.

$$Total\ workers\ (minutes) = \#workers * 7hours\ and\ 48\ minutes \quad (5.2.3.2)$$

which will then be analyzed in periods of 15 minutes:

$$Total\ workers\ (minutes) = \#workers * 15minutes \quad (5.2.3.3)$$

After knowing the types of services rendered at each hourly period (using a dynamic table) it is possible to adapt the working schedule, (considering restrictions). In case such changes to working schedule are not possible, it may be necessary to increase the workforce to attend to such periods.

5.2.4 – Customer Orientation

As mentioned in previous sections, the lack of customer knowledge about CTT products by customers and their expectation to receive news about CTT offering while in store poses a problem.

We have developed some ideas to enhance customer awareness and trigger a purchase scale-up which we expect will also improve in-store customer experience. Some of the initiatives are listed below.

- **Altering the tops and detachable of the exhibition furniture** - to customize display furniture with more customer-focused language.
- **Setting the service (digital and manual)** - Assemble a big panel (highly visible in the store) displaying all services and products provided by CTT to increase clients' awareness.
- **Manual with exposure rules and good practices** - There are many differences between the expositions in the various stores. We will look for best practices and try to normalize them across all CTT stores.
- **A4 stand-out display (featured products)** - CTT news in the store normally lack impact, because they are not visualized by the customers. One way to try to increase their impact is by having a paper with the image or even the product placed in the counter (one of the places in the store with more visual impact for clients).
- **Attendance practices of excellence** - This includes the outfit of the collaborators and some key words to incorporate the best attendance practices.

- **Leverage of Corporate TV** - CTT has a television in all stores indicating ticket numbers. The idea is to use this television to broadcast some short movies presenting products and promoting CTT and its history – it is the oldest Portuguese company.

These initiatives combined are believed to trigger a reduction in the perception of waiting time, enhance store communication, improve the way the products are exposed and also achieve excellence in customer service. All these components together will in turn contribute for an improvement in CTT NPS.

5.3 – Chapter Conclusions

This chapter carried out a more in-depth analysis of some themes and proposed initiatives to tackle the issues identified.

The first proposal is to hold daily meetings to facilitate the involvement of the team in the process of improving the store.

The second proposal is to apply the methodology of the 5S to ensure a better flow in the store and standardize the counters.

We proposed to subsequently optimize and normalize processes and train the teams resorting to OPL (One Piece Lesson). The processes involved in this first stage of the project are the acknowledgement system, cash replenishment, stock management and employee time map.

The latter proposals aim to use the store as an effective communication tool and improve in-store customer experience.

At this moment, we have defined the initiatives and the implementation phase will subsequently follow, where we will introduce the initiatives and evaluate their success.

Chapter 6 - Implementation

In this chapter we present the implementation of the measures discussed in the previous section. One way to implement this type of projects is to start with some pilots and after obtaining consistent results, do the roll-out for the other stores. Store A was selected as the pilot to begin this project, containing 4 directions as shown in Figure 30 in Section 5.2.

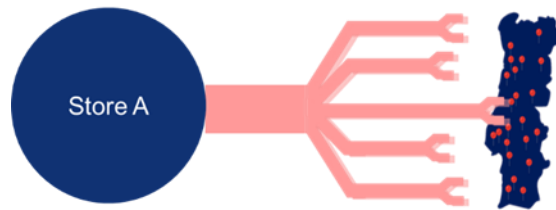


Figure 37: Implementation scheme

Initial situation in Store A:

Table 12: Initial KPIs

KPI	Begin	
	Period	Value
AWT	2017	15:42
%Clients>10'	Q4-2017	54,7%
Average Time Activity (Ack. Syst.)	March	5'
Average Replenishment Requests	March	2.75
Stock Invested	March	€ 26 325
NPS	April and May	3

6.1 – Daily Meetings

The first phase consisted in the creation of a culture of continuous improvement in all the collaborators of the CTT stores through the phases represented in Figure 38.

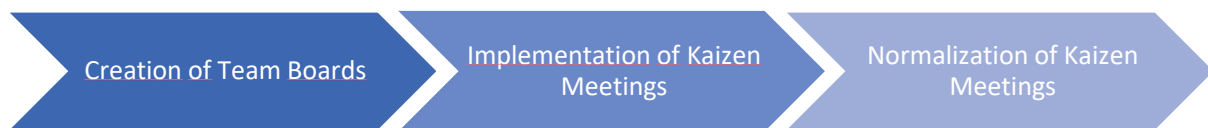


Figure 38: Daily Meeting implementation process

The establishment of standard team meetings was achieved through the implementation of the base level of the Kaizen management model (presented in Section 3.2) - Daily Kaizen (KD). The methodology starts by defining leaders who develop their teams with the goal of making them autonomous in continuous improvement - they must be able to maintain and improve their processes and work areas on a daily basis.

The Daily Kaizen is divided in four levels of sequential implementation: 1) Team management; 2) Organization of Spaces, 3) Adoption of Improved Work Practices and 4) Structured Resolution of Problems.

The first level of KD (Team Management) in CTT aims to establish the habit of holding team meetings focused on the work planning of the various collaborators of each CTT store; these are daily meetings, very focused, with a pre-defined agenda, an attendance map and a defined duration (10-15 min). In these team meetings, there is a set of metrics, including some of the indicators discussed above, that must be interpreted by everyone involved. The work plan and an improvement cycle are always discussed in these meetings. Finally, the competencies matrix and a formation cycle are also included in the agenda regularly (not daily).

The work plan is a store schedule with the various back-office activities that are necessary for the proper operation of the store. This planner was created to prevent employees from performing two or more times the same task or to prevent anyone from forgetting to do them.

The improvement cycle consists of 4 phases to help organizing the improvement actions: firstly Plan, secondly Do, thirdly Check and lastly Act. Through this methodology, collaborators are able to address improvement actions to the team when analyzing KPI deviations or when they see any problems in the store.

The Competence Matrix is a tool that helps identify the competencies of each collaborator of the CTT store through a self-assessment in themes defined by the responsible person. These topics are considered necessary for the proper functioning of the CTT store and should therefore be included in the qualifications of each person. The Competencies Matrix (Figure 40) allows detecting training needs within the team and thereby feed the Training Plan.

Problemas	Ana	José	Mariana	Dora	Elisabete	Carla	Lucília	Emília	Fernando	Luciana	Paola
W-1	SP	SI	SI	SI	SI	SI	SI	NB	SI	SI	NB
W-2	SI	NB	SI	SI	SI	SI	NB	SI	SI	SI	NB
W-3	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-4	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-5	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-6	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-7	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-8	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-9	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-10	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-11	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-12	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-13	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-14	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-15	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-16	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-17	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-18	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-19	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-20	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-21	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-22	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-23	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-24	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-25	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-26	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-27	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-28	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-29	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-30	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-31	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-32	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-33	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-34	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-35	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-36	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-37	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-38	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-39	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-40	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-41	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-42	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-43	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-44	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-45	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-46	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-47	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-48	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-49	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-50	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-51	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-52	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-53	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-54	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-55	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-56	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-57	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-58	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-59	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-60	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-61	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-62	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-63	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-64	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-65	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-66	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-67	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-68	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-69	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-70	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-71	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-72	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-73	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-74	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-75	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-76	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-77	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-78	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-79	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-80	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-81	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-82	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-83	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-84	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-85	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-86	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-87	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-88	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-89	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-90	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-91	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-92	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-93	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-94	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-95	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-96	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-97	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-98	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-99	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB
W-100	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	NB

Legenda

NB Não Sabes

SP Sabe com Dificuldade

SI Sabe Independentemente

SE Sabe para Formar

Figure 39: Competence Matrix

The Training Plan consists of scheduling the training that will be given to the collaborators. These trainings concern both internal and external content. In the first case, someone from the CTT store team will be seconded to train the other colleagues. The choice of the element is done according to its self-assessment. In the second case, the training will be performed by an entity outside the store, for example, training on a new product, or on an existing program that most of the team has difficulties using.

One of the main objectives of using these tools is to support the implementation of standards. When a new standard is created in the store, a new topic is added in the Competences Matrix, and the person who developed the standard will then be responsible for training the rest of the team. With this technique, the use of standards implemented through continuous training by the people is reinforced.

Figure 40 represents the team board standard created for store A, with the various collaborators of that store.



Figure 40: Daily Meetings Board

6.2 – Spaces Organization

Spaces organization (level 2 of KD) was considered as the first set of improvements to be implemented due to its importance in most of the processes developed in stores. Figure 41 summarizes the main tools of this phase and serves as a guide for the presentation of this section.



Figure 41: Space Organization implementation process

The implementation phase of 5S served to increase the productivity of the store by creating a line board in each of the workplaces adapted to the needs of the operations that are performed. The implementation of the 5S process began with the separation between the tools that are necessary for the execution of the tasks of those that do not add value to those operations. The second step is to define a place for each tool that adds value. The cleaning and normalization steps were subsequently carried out to ensure that the defined place is respected by all store employees. The 5S method is used not only in the front office, but also in back office, to help in all store organization concerns.

In Figure 42, it is possible to see the counter prior and after the 5S implementation. Counters at the store have now been normalized and are arranged in the same fashion as the one in the figure on the right. The most requested items are on the counter, with labels on the drawers, which allows all the collaborators to be very familiar with the locations, gaining efficiency thus reducing AST.



Figure 42: 5S at the counter

An additional improvement was undertaken in the treasurer's support shelf - before the 5S implementation items were neither identified nor labelled and thus only the treasurer was able to know their location. As shown in the picture on the left, the items are now identified and colorful, so that they are very visible. For example, in the past collaborators used to hand important papers to the treasurer, who would subsequently separate them; now all the collaborators have started separating the papers themselves. Another change was to have all the materials used in the store identified, as depicted in the

non-salable material shown in the right figure. In this way, store or counter replenishment can be easily done by anyone.



Figure 43: Examples of 5S implementation

As referenced in the previous phases of implementation, *Visual Management* is used to increase productivity and create sustainability for the implemented improvements. Figure 44 shows the Archive of Store A. There are four types of archive, and colored cards have been attributed to each so that all the employees can easily find what they need and what needs to be sent to the central archives or for destruction using an arrow. This process has now been simplified, based on an OPL (One Piece Lesson), (Figure 44), allowing everyone (even from another store) to know which files should be sent to the central archive or for destruction without the need to question anyone.



Figure 44: Archive 5S and OPL implementation

6.3.1 – Acknowledgement System

As discussed before, the acknowledgement system needed to be changed and normalized. The new standard presented earlier was turned to reality:

- Creation of a new standard for storing fine warnings, by day and then by the last digit of the number of the bar code of the warning (Figure 45 on the left);
- Creation of a new standard for Reception and Storage of Orders using the last digit of the ID of the Request (Figure 45 on the right).



Figure 45: New standard for acknowledgement system

Following the creation of a new standard an OPL was also developed to help the collaborators that were not included in the implementation phase.

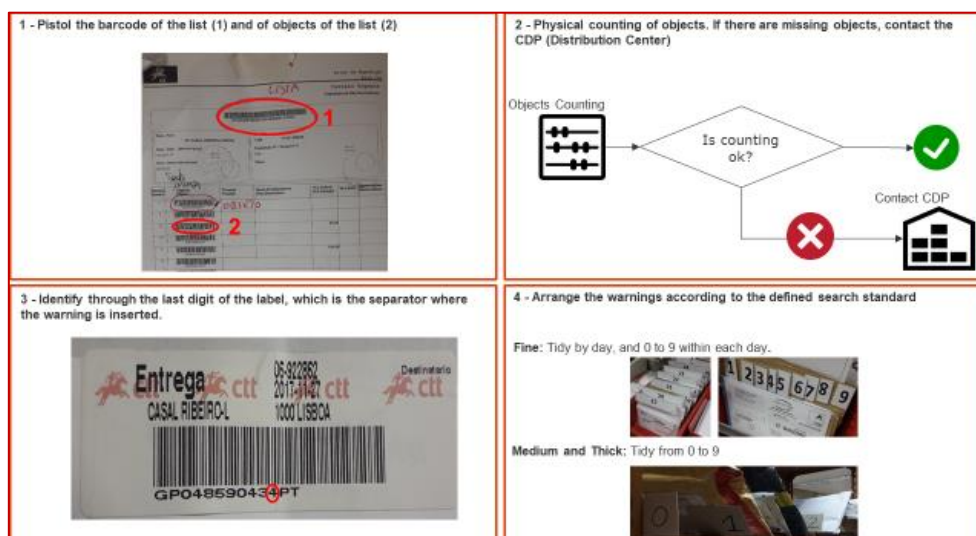


Figure 46: Acknowledgement system OPL

Since the main idea is implement across all stores if the pilot is successful, this OPL will help everyone to understand how the new process works.

6.3.2- Cash Replenishment

The main objective of this initiative is to reduce the number of times the treasurer needs to give cash to collaborators, while assuring acceptable security levels.

Therefore, taking into consideration the cash needed for a given day (Figure 49), 70% (maximum amount allowed by safety reasons) is given to collaborators and rest is kept in the store safe (Fig. 47).

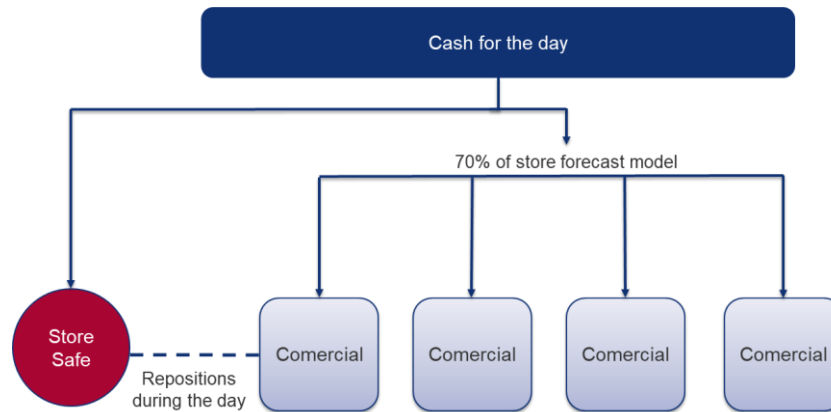


Figure 47: Cash replenishment distribution

The money distributed per collaborator is:

$$\text{Commercial limit} = \frac{70\% \text{ of all cash for the day}}{n^{\circ} \text{ of commercials}} \quad (6.3.3.1)$$

The treasurer receives an excel in the beginning of the month with all the amounts discriminated by day to do the distribution by collaborator (Figure 50).

The other change that was implemented, was a bi-daily verification of cash needs by the treasurer which allows foreseeing any cash reinforcement needs.

The first verification takes place before the treasurer's lunch break, where he will verify if a given employee has less than 50% of the cash required (in which case the cash will be reinforced) or if it has more than 100% cash (in which case the excess cash will go in the safe) (Figure 48).

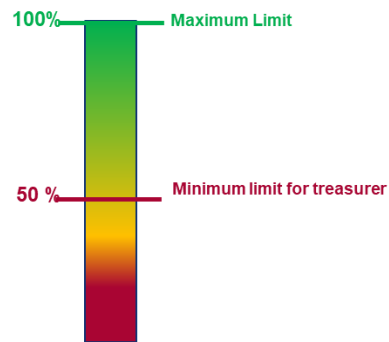


Figure 48: Reinforce measure

The second verification is before the end of the day. This is to put all employees to the maximum limit for the next day and to request the employees all the checks they have. This will allow the employees to start work next day without having to ask the treasurer for cash.

To prevent employees from experiencing cash constraints, one more rule was imposed. If the employees reach 30% of the initial cash, they will have to ask for money from the treasurer.

Store		2/jul	3/jul	4/jul	5/jul	6/jul	9/jul	10/jul	11/jul	12/jul	13/jul	16/jul	17/jul
A Store		€ 5 000,00	€ 5 200,00	€ 10 000,00	€ 18 100,00	€ 12 400,00	€ 15 200,00	€ 10 900,00	€ 6 500,00	€ 5 000,00	€ 6 400,00	€ 5 000,00	€ 5 000,00

Figure 49: Money Estimation

Store	Frequency ETV	2/jul	3/jul	4/jul	5/jul	6/jul	9/jul	10/jul	11/jul	12/jul	13/jul	16/jul	17/jul
A Store	10	€ 5 000,00	€ 5 200,00	€ 10 000,00	€ 18 100,00	€ 12 400,00	€ 15 200,00	€ 10 900,00	€ 6 500,00	€ 5 000,00	€ 6 400,00	€ 5 000,00	€ 5 000,00
Store Values													
value that is left for the store		€ 5 000	€ 5 200	€ 10 000	€ 18 100	€ 12 400	€ 15 200	€ 10 900	€ 6 500	€ 5 000	€ 6 400	€ 5 000	€ 5 000
value that is left for <i>frontoffice</i>		€ 3 500	€ 3 700	€ 7 000	€ 12 700	€ 8 700	€ 10 700	€ 7 700	€ 4 600	€ 3 500	€ 4 500	€ 3 500	€ 3 500
Comercial Values													
Max Commercial		€ 875	€ 925	€ 1 750	€ 3 175	€ 2 175	€ 2 675	€ 1 925	€ 1 150	€ 875	€ 1 125	€ 875	€ 875
Min Commercial		€ 500	€ 500	€ 875	€ 1 588	€ 1 088	€ 1 338	€ 963	€ 575	€ 500	€ 563	€ 500	€ 500
Breaking Limit		€ 300	€ 300	€ 525	€ 953	€ 653	€ 803	€ 578	€ 345	€ 300	€ 338	€ 300	€ 300

Figure 50: Money distribution

6.3.3 – Stock Management

In CTT two main initiatives were pursued:

- i. An automated file, for salable materials.

As we saw before, stocks should be managed using a periodic system during the first phase of the project.

All items that a customer can buy in store, stamps, boxes to send deliveries, etc., are controlled via computer system. Every time a customer makes a purchase the system acknowledges it, and at the end of the month the treasurer sees the actual stock and performs the order according to the target stock (section 5.2.3).

Since we intended to test the process from the beginning, the first objective was to achieve the target value for all the salable materials. Therefore, to start the month in a normal (future) situation, for the items with excessive stocks, the excess quantity was returned and for the missing items, the required quantity was requested to reach the target level (Table 13):

Table 13: Deviation to target levels

Description	STOCK	Average Cons	Target	Deviation
NATIONAL AA SEALS 20G_BOOKLETS 50 SEALS	7950	3297	6594	-1356
ENV. DL NACIONAL BLUE MAIL	3774	807	1613	-2161
PADDED ENVELOPE S	648	379	757	109
PADDED ENVELOPE L	648	281	563	-85

After this, the new values for cash invested in stock was calculated:

$$\text{Money invested} = (\text{Initial stock} - \text{Actual stock}) \times \text{Cost} \quad (6.3.2.1)$$

This represented a reduction of more than €13,000 in stock value.

Once these conditions were achieved, the system could be implemented.

The last step was the creation of a new routine for the treasurer to, once a month, see the quantities in stock and request the quantities needed (difference between the target and the actual stock).

Table 14: New orders calculation

Description	Stock		Quantity
	Jun	Target	
NATIONAL AA SEALS 20G_BOOKLETS 50 SEALS	2900	6594	3694
ENV. DL NACIONAL BLUE MAIL	643	1613	970
PADDED ENVELOPE S	489	757	268
PADDED ENVELOPE L	412	563	151

- i. Kanban systems for non-salable materials.

Kanban's implementation has two main objectives: 1) visual management of purchase needs and 2) serve as a basis for controlling those items that do not justify a sophisticated control but are needed for the normal operation of a store.

Each box of material in stock is identified with a Kanban that summarizes the information on the Quantity to Order and the Level of Reposition of that product. In addition to these two fields, there is still another one containing the product bar code for direct reading (Figure 47).



Figure 51: Kanban Example

The idea of implementing the Kanban system is also for all collaborators be able to help with stock control. Basically, if the collaborator uses the last box before the Kanban, he should pick the card and place it in the box of “products to order”, then the treasurer or the store manager can see that there is the need of order, orders the item and then puts the card in “products ordered”. When the product arrives the product is reset, and the card is placed in the order point (Figure 48)

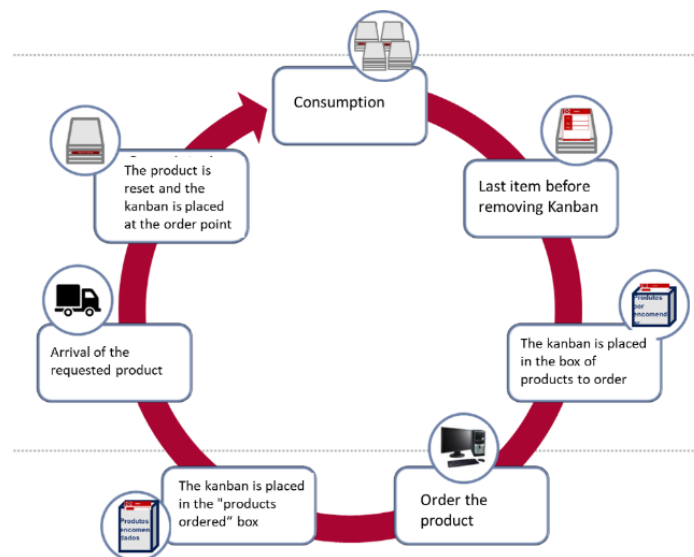


Figure 52: Kanban System

6.3.4 – Adjust Customer Demand to Store Supply

In Section 5.1, it was possible to see that no adjustment on the collaborators schedule was in place that brought into account the flux of clients. Two situations were clear, there were too many employees in the mornings and too few during lunch time.

Two solutions were found:

- Reduce the lunch period (by Portuguese Law this is possible if never smaller than 30 minutes)
- Postpone start time for some collaborators (For collaborators who don't have adaptability there is a maximum of 7:48 working hours per day)

The beginning of the implementation comprised demonstrating the need to change to collaborators. This change was a very sensitive issue and if not properly done, could jeopardize the success of the transformation process. This process involved a lot of explanation, but the figure below helped employees to recognize the problem:

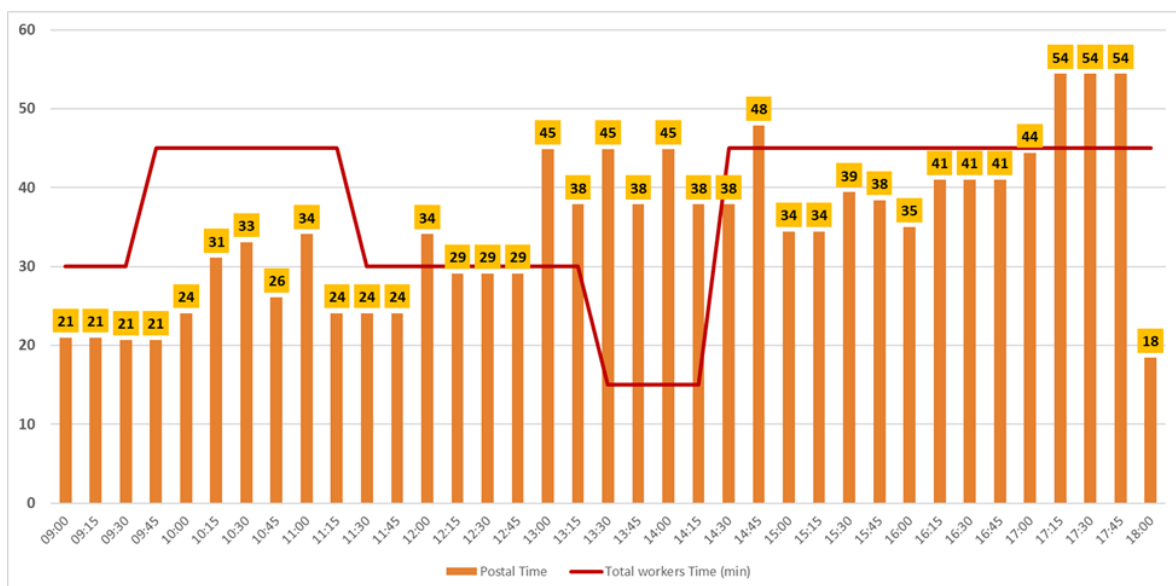


Figure 53: Supply and store demand

An analysis of an alternative schedule was performed, and a more appropriate schedule was reformulated (in blue – collaborators pause, in red – service period, in yellow- bank commercials, in orange – treasurer time of back-office service).

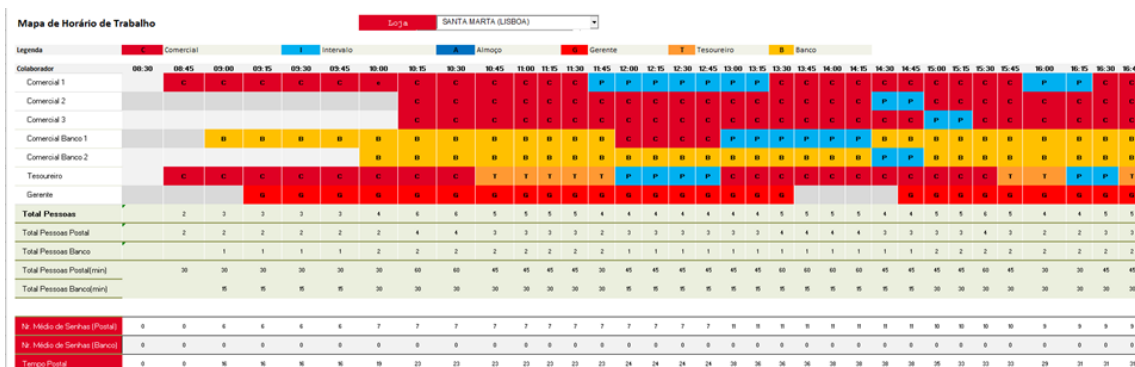


Figure 54: Schedules adaptation

With this new schedule, which is more adapted to client demand, we expect an improvement in the Average Waiting Time and in the percentage of clients with AWT above 10 min.

Another change in schedules was to grant adaptability to the treasurer to cope with the fact that there is increased demand in the store during the first 15 days of the month. The treasurer now has two possible schedules: work an extra half-hour during the first half of the month (figure 56), and work half-hour less in the second half of the month (figure 57).

By comparing figure 53 (initial situation) with figure 56 and 57 (after implementing new schedules) the improvements are very clear, in particular at lunch time, when clients demand was always higher than the front-office capacity to respond. Now there are 3 collaborators in front-office (before only 2 were available) and consequently the store is now ready to cope with this increase of clients at lunch time. This was done by reducing front-office time in the first hours of the day, when there were too many employees available for the client's requirements.

Sch. N°	Information	Service	Begin	Pause 1	Restart	Pause 2	Restart	Finish
H1		Store Manager	9,12	13,30	14,30			18,00
H2	a)	Treasurer	8,45	12,00	13,00	16,00	16,30	18,30
H3	a)	Treasurer	8,45	11,06	13,00	16,00	16,30	18,30
H4		Bank Commercial	9,00	13,00	14,30			18,18
H5	b)	Bank Commercial	10,00	14,30	15,00			18,18
H6		Postal Commercial	8,45	11,33	13,30			18,30
H7	b)	Postal Commercial	10,12	14,30	15,00			18,30
H8	b)	Postal Commercial	10,12	15,00	15,30			18,30

- a) Schedule under the adaptability regime under clause 56 of the CTT AE with rest intervals pursuant to paragraph 5 of clause 58 of the EA
- b) Time with rest interval under n°4 of CL^a 58 of the AE CTT

Figure 55: Final A store schedule

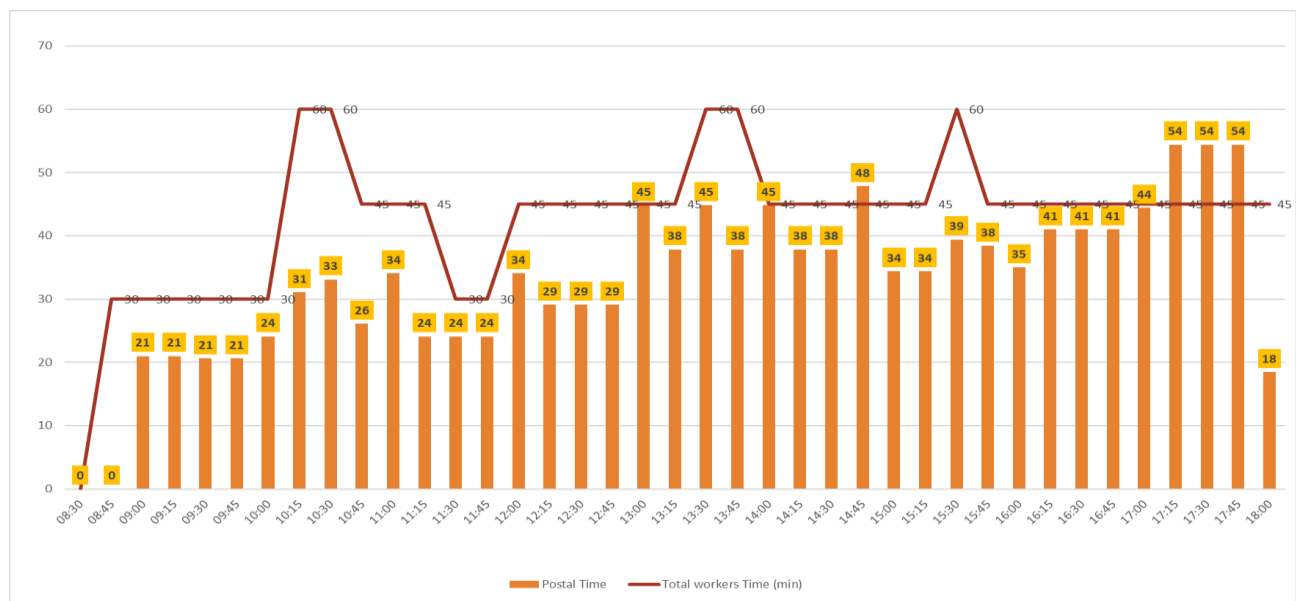


Figure 56: Supply and A store demand (2 first weeks)

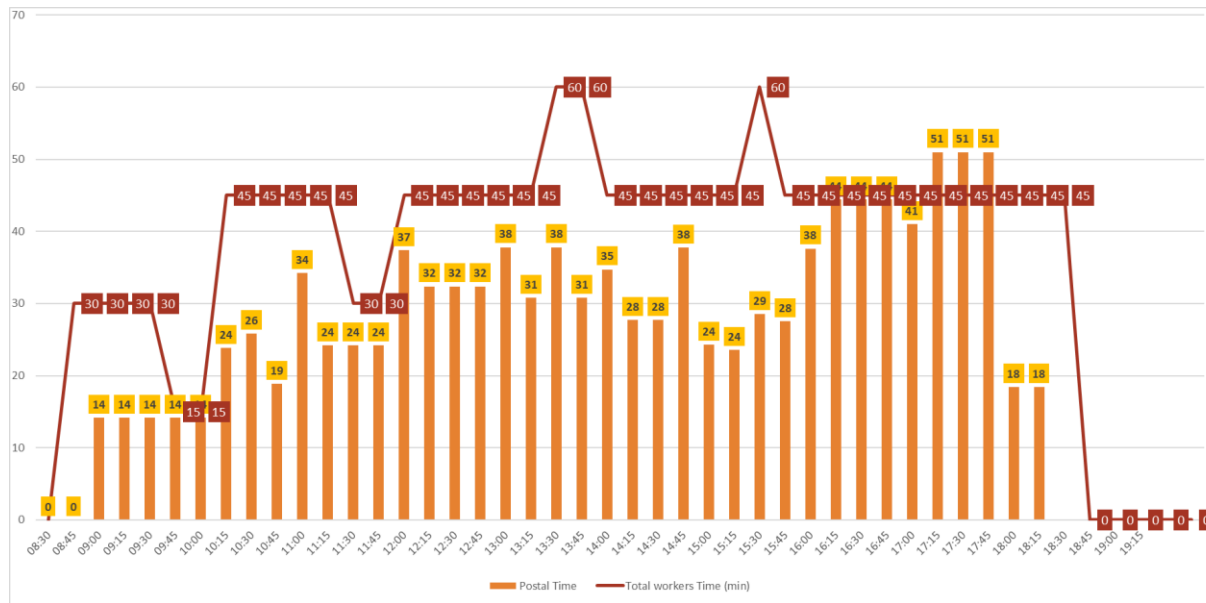


Figure 57: Supply and store demand (last weeks)

6.4 - Customer Communication

Altering the tops and the detachable parts of the exhibition furniture was the first change to be implemented. The new tops can be seen in Figure 58.



Figure 58: Old and new tops

Not only the tops were changed but also the way in which the books are organized, with sub topics like, Scholar help (in green), Kids, Well Being (in pink), Cooking and Romance (Figure 59).



Figure 59: New sub topics

The panel presenting all types of services in CTT stores has already been designed (Figure 60) and will be deployed in October.

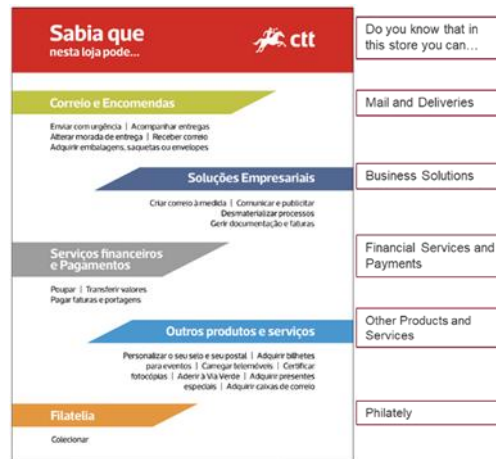


Figure 60: Services panel

A manual containing exposure rules and good practices was created having in mind the new tops and some good practices that we could see in some stores. With the help of an OPL a list of the fundamental rules was created. The manual can be seen in the attachments 7 and 8.

A4 stand-out display, is another change that has not yet been implemented, but a prototype was created (Attachment 9).

For CTT to have a service of excellence, special attention must be given to the dress code and specially the way the collaborator speaks to the client. For this some cards were created to be present at the counter to help collaborator contacting clients. The cards deal with four different moments: reception, farewell, complaint management and service of excellence. These cards are already being tested, as well as the best way of over-the-counter display, so that the customer does not see the card.



Figure 61: Card for service excellence

The last modification was to take advantage of the TV screens in CTT store. Some simple movies and online information were added to the screens as entertainment, to reduce the perception of in-store time. An example of this is figure 62 below, containing weather information.



Figure 62: TV screens information

6.5 – Chapter Conclusions

This chapter presents the various phases of Implementation phase based on the problems and opportunities identified previously.

The first phase consisted of the creation of standard meetings of teams in the store. We defined a framework containing several useful elements, mainly related to the monitoring of metrics of performance evaluation of the store and management of the competences of each collaborator. This measure has resulted in increased collaborator engagement in the transformation process, greater discipline in complying with the standards, through the creation of a training cycle and the Matrix of Competencies.

The second phase entailed organizing spaces and standardizing the service counter and all back-office spaces, in order to have all spaces optimized and standardized in order to increase efficiency.

The creation of norms for the various processes developed in the store has ensured that operations are performed equally by all collaborators and, more than that, are carried out in the most efficient way. For the processes that already had an associated standard, the standard was improved. The main benefits are related to the ability of any process to be performed by any element of the store or even by a new element that has been recently admitted.

The last phase of implementation was aimed at improving in-store communication, reducing the perception of time, and improving the client experience, using new media such as television and the CTT services panel.

A detailed measurement of the benefits achieved will be carried out during chapter 7.

Chapter 7 - Follow-up Phase

In this chapter presents the follow-up phase that shows the benefits associated with the implementation of the solutions drawn during the planning phase.

7.1 – Evaluation of the Benefits Obtained

The evaluation of the benefits obtained was carried out by analyzing the indicators established in Section 5.2 to support the monitoring of the performance of the implemented alternatives.

The following table presents the reference value of each KPI before and after the implementation:

Table 15: Project KPI's

KPI	Begin		Now	
	Period	Value	Period	Value
AWT	2017	15:42	August	06:49
%Clients>10'	Q4-2017	54,7%	August	30%
Average Time Activity (Ack. Syst.)	March	5'	August	2'30"
Average Replenishment Requests	March	2.75	August	0
Stock Invested	March	€ 26 325	August	NA
NPS	April and May	3	N/A	N/A

- Acknowledgement system

It is possible to verify that in general the search and the delivery of the items to the clients is now quicker than before - the new AST for this activity is now 2.5 min, representing a decrease of 60%.

This means that the new organization method together with the new space organization are delivering good results.

- Cash Replenishment

The objective of avoiding the need for collaborators from requesting additional cash during the workday has been fully met. During August no additional cash request were recorded, while prior to the implementation of the policy 2.75 request were recorded per day. Consequently, more front office time was available, and client waiting times were reduced.

- Stock control

The stock control model has not yet been implemented since it also involves some changes in headquarters and supply chain. However, we expect results to be aligned with forecasts.

In what concerns the non-salable items, the Kanban system is working properly without any problems namely avoiding stockout issues. However, no KPI has yet been defined for this.

- Average waiting time

The AWT reduction is one of the most important objectives of the project, and a lot of the measures proposed are contributing to its improvement – reducing activity time, organizing spaces and the new scheduling (probably the most disruptive and difficult change to be implemented since it changes the collaborators habits).

In the following chart we can see the evolution of AWT from March to August – during this period the various measures were successively implemented, contributing to a reduction of AWT.

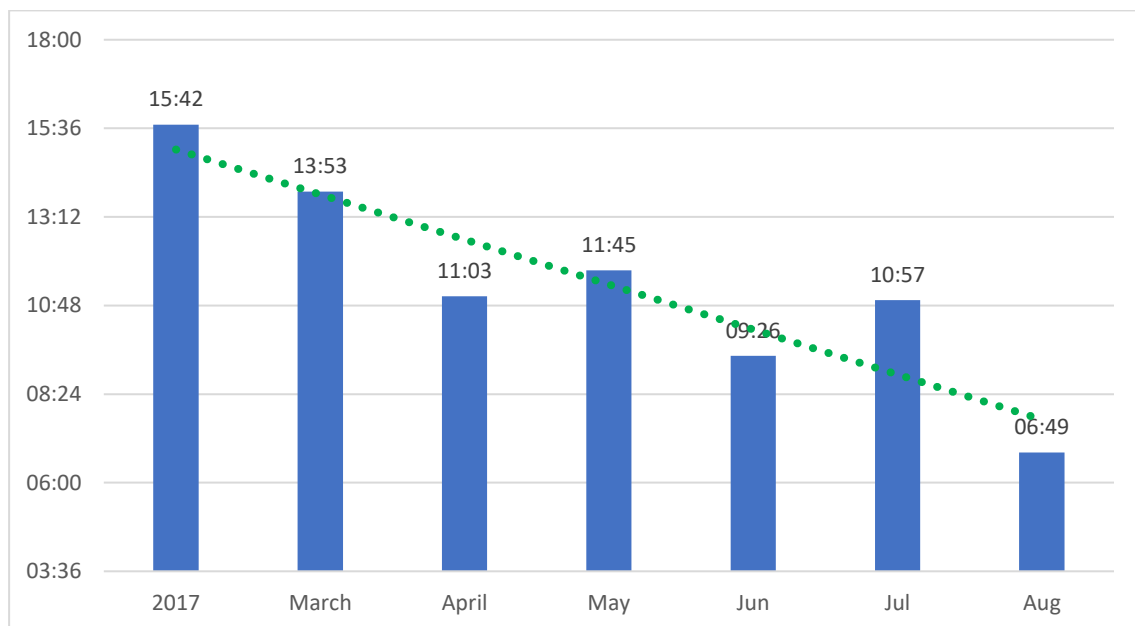


Figure 63: AWT evolution

August is the first month where all the measures contributing to AWT reduction were already implemented (the new schedules only started in August). During August AWT was 6:49 min, which compares with the 2017 average of 15:42. Furthermore, only 30% of clients had to wait for more than 10 min (47% in 2017).

A notable improvement (56% and 45% for these KPI's) has already been achieved, which has clearly resulted from the combined effect of all the measures. The results obtained were in line with expectations.

- NPS

The NPS will only be followed after all measures have been implemented, including communication, which are expected to be concluded during October.

7.2 – Critical Analysis

One of the difficulties encountered was the resistance to change by employees in relation to the new schedules. The employees, despite having accepted the new schedules, questioned whether it would be possible to increase lunch hours since they felt that it was very difficult to have lunch in half an hour, and that it often made it impossible to leave the store.

Therefore, new calculations were made to see if it would be possible to change the lunch time to 45 minutes instead of 30 minutes. As you can see in the figure 64 below, great changes are not foreseen, so this new schedule will be tested.

Sch. N°	Information	Service	Begin	Pause 1	Restart	Pause 2	Restart	Finish
H1		Store Manager	9,12	13,30	14,30			18,00
H2	a)	Treasurer	8,45	12,00	13,00	16,00	16,30	18,30
H3	a)	Treasurer	8,45	11,06	13,00	16,00	16,30	18,30
H4		Bank Commercial	9,00	13,00	14,30			18,18
H5	b)	Bank Commercial	10,00	14:30	15:15			18,18
H6		Postal Commercial	8,45	11,33	13,30			18,30
H7	b)	Postal Commercial	10,12	14:00	14:45			18,30
H8	b)	Postal Commercial	10,12	14:45	15:30			18,30

a) Schedule under the adaptability regime under clause 56 of the CTT AE with rest intervals pursuant to paragraph 5 of clause 58 of the EA
b) Time with rest interval under n°4 of CL° 58 of the AE CTT

Figure 64: Proposal of workers schedule

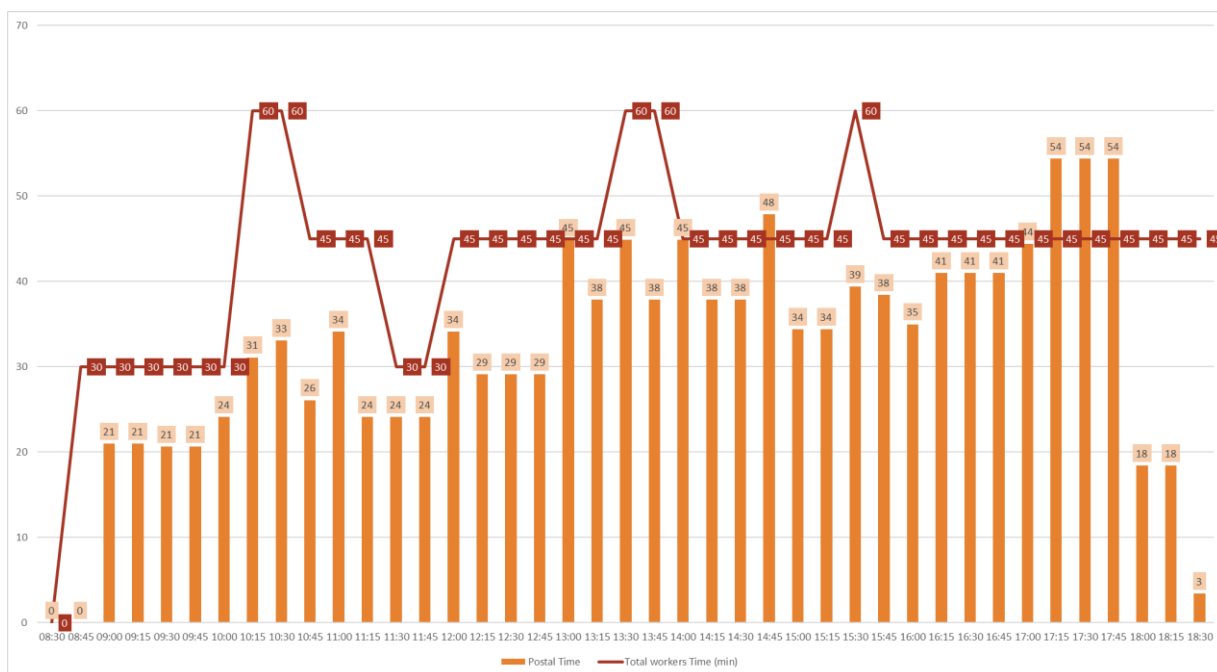


Figure 65: Supply and store demand proposal scenario

The rest of the changes were well received by all collaborators; in fact, they agreed that the new methods make their work easier and mentioned that having the daily meeting to prepare for the day is very fruitful.

This was the most enriching part of this project: involving the whole team, witnessing them evolve from initial fear and resistance to change to an utter embracement of the changes once they understood the real need to change. Watching the employees work as a team engaged in raising their performance is certainly a success of this Kaizen project.

One of the questions now is to make sure the store can continue with the 5S in store, since it requires a lot of discipline.

7.3 – Chapter Conclusion

Chapter 7 presented and analyzed relevant project indicators. These show a very positive trend, resulting in the improvement of all objective KPIs, including a 40% reduction in AWT.

Many improvements have been implemented, but some are not yet finished, particularly the in-store communication. Only after their implementation, a new NPS will become available. This will be crucial to verify that the improvements introduced in the store, which are delivering good and measured results, are well perceived by the clients and do increase client's satisfaction.

The change in employees' schedule was the most disruptive change, since it involved changing habits. Upon its implementation employees showed some difficulties complying with a 30-minute lunch break. Once this hurdle was identified, a new proposal was presented, pointing that increasing the lunch break to 45 minutes, does not greatly affect supply and demand dynamics. Thus, this solution will be tested in November, to confirm our belief.

Chapter 8 – Final Conclusions and Future Work

CTT is the oldest Portuguese company, holding a large network of stores with the goal of providing the best customer service possible.

The challenges facing CTT are enormous: a shrinking market, new competitors coming in, demanding public service obligations as any listed company, pressure from the shareholders for results – more revenues and less costs, etc. Our project was designed to help CTT improve its stores' operations (i.e. increase performance and reduce costs) and improve in-store communication, which together will ultimately result in increased sales and customer satisfaction.

Our main objective was to reduce the Average Waiting Time of clients in the store. Thus far we already achieved a reduction of more than 40% - the AWT reduced from 15:42 to 6:49 and the number of clients waiting for more than 10 minutes fell from 47% to 30%. This is excellent considering that this was achieved solely by improving efficiency in operations – back-office, front-office, space and especially, people engagement. These improvements were visible in the reduction of time spent in the acknowledgement system (from 5 min to 2.5 min) and in the elimination of cash requests from the employees (2.75 per day before the implementation).

Measures related to communication and client experience are now being implemented and only after we will have a new NPS, as it will only be measured next month. In my opinion, NPS will increase but not yet to the level of CTT international peers.

One of the most relevant parts of Kaizen projects is that after helping boosting efficiency, it leaves a “continuous improvement philosophy” in the client company. This should ensure that more improvements will continue to happen in the forthcoming months.

The next steps to be implemented are divided into two main points: a) to complete the changes that could not be finalized, such as inventory management and in store communication; b) roll-out the implementation of all the measures, in phases, to all the CTT stores network.

As shown by the results after the schedule changes, these solutions do not ensure the level of service desired by ANACOM, nor do they create real conditions for further sales. For this, an additional set of solutions will need to be found – for example, alternative ways to manage contractual mail, which uses a lot of front office time in periods with a lot of clients in the store or reinforcing personnel in the store at certain times of the day using people that may be “idle” in the central office.

References

- ANACOM, (2018). Serviços Postais. From: <https://www.anacom.pt/render.jsp?contentId=1433905>. (Assessed 24th April 2018).
- ANACOM (2018b) Valores dos IQS em 2016. From: <https://www.anacom.pt/render.jsp?categoryId=392671>. (Assessed 24th April 2018).
- Andrawis, R. R., Atiya, A. F., & El-Shishiny, H. (2011). Forecast combinations of computational intelligence and linear models for the NN5 time series forecasting competition. *International Journal of Forecasting*, 27, pp. 672–688.
- Arora, N., & Saini, J. K. R. (2014). Approximating methodology: Managing cash in automated teller machines using fuzzy ARTMAP network. *International Journal of Enhanced Research in Science Technology & Engineering* 3, pp. 318–326.
- Balram, B., 2003. Kanban systems: The Stirling Engine Manufacturing Cell. *Lean manufacturing performance in China: assessment of 65 manufacturing plants* 19, pp. 217-234.
- Bayo-Mariones A., Bello-Pintado A. & Cerio J., (2009). 5S use in manufacturing plants: contextual factors and impact on operating performance. *International Journal of Quality & Reliability Management* 27, pp. 217-230
- Behzod M. & Richard R., (2017). Self-Service Technologies: Investigation on how self-service technologies influence the consumer's perception of quality. From: <http://www.diva-portal.org/smash/get/diva2:1119780/FULLTEXT01.pdf>. (Assessed 20th May 2018).
- Bijvank, M., & Vis, I. F. A. (2012). Lost-sales inventory systems with a service level criterion. *European Journal of Operational Research*, 220, pp. 610–618.
- Borges A., Herter M. M. & Chebat J. (2015). "It was not that long!": The effects of the in-store TV screen content and consumers emotions on consumer waiting perception. *Journal of Retailing and Consumer Services* 22, pp. 96–106
- Brito, (2013) CTT: uma empresa onde se lê a história do país. *Publico*. From: <https://www.publico.pt/2013/12/04/economia/noticia/ctt-uma-empresa-onde-se-le-a-historia-do-pais-1614866>. (Assessed 26th April 2018).
- Carvalho, J. C. (2010). *Logística e Gestão da Cadeia de Abastecimento*. Lisboa: Edições Sílabo.
- Claycomb, C., Germain, R. & Dröge, C., 1999. Total system JIT outcomes: inventory, organization and financial effects. *International Journal of Physical Distribution and Logistics*, 29, pp. 612–630
- Collier, J. E., & Bienstock, C. C. (2007), "An analysis of how nonresponse error is assessed in academic

- marketing research", *Marketing Theory*, 7, pp. 163-183
- Courtois, A., Pillet, M., & Martin C., (1997). *Gestão da produção* (4a ed.). Lisboa: Lidel
- Coyle, D., Prasad, G., & McGinnity, T. M. (2010). On utilizing self-organizing fuzzy neural networks for financial forecasts in the NN5 forecasting competition. In *Proceeding of: International joint conference on neural networks, (IJCNN)*
- Crone, (2008). Welcome ... to the 2008 Time Series Forecasting Competition for Computational Intelligence. From: <http://www.neural-forecasting-competition.com/NN5/index.htm>. (Assessed 28th April 2018).
- Customer Guru, (2018), Logistics / delivery/postal services net promoter score 2018 benchmarks. From: <https://customer.guru/net-promoter-score/industry/logistics-delivery-postal-services>
- CTT (2018). CTT Companies. From: <https://www.ctt.pt/ctt-e-investidores/a-empresa/empresas-ctt/index.html>. (Assessed 2th April 2018).
- CTT (2018a). Mission, Vision & Values. From: <https://www.ctt.pt/ctt-e-investidores/a-empresa/estrategia-empresarial/missao-visao-valores.html?com.dotmarketing.htmlpage.language=1>. (Assessed 5th April 2018).
- CTT, (2018b). Annual Reports since 2013 until 2017. From: <https://www.ctt.pt/ctt-e-investidores/informacao-financeira/contas-consolidadas.html?com.dotmarketing.htmlpage.language=1#panel1-2>. (Assessed 5th April 2018).
- White D. & Absher K., (2007), "Positioning of retail stores in Central and Eastern European accession states", *European Journal of Marketing* 41, pp. 292 – 306.
- Darwish, S. M. (2013). A methodology to improve cash demand forecasting for ATM network. *International Journal of Computer and Electrical Engineering* 5, pp. 405–409.
- Delafrouz, N., Taleghani, M., Taghineghad, M. & Nademi, M. (2013). The impact of service innovation on consumer satisfaction, *International Journal of Business and Behavioral Sciences* 3, pp. 114-129.
- Djelassi, S., (2018). Decision Support Systems, From: <https://doi.org/10.1016/j.dss.2018.04.004>. (Assessed 30th May 2018).
- Ekinci Y., Lu J. & Duman E., (2015). Optimization of ATM cash replenishment with group-demand forecasts. *Expert Systems with Applications* 42, pp. 3480–3490.
- Eurostat (2018). Postal Services Statistics. From: <http://ec.europa.eu/eurostat/statistics>

- http://ec.europa.eu/eurostat/statistics-explained/images/e/e2/Turnover_from_the_domestic_postal_sector_relative_to_GDP%2C_2004_and_2011_%28%25_of_GDP%29.png. (Assessed 18th May 2018). (Assessed 28th April 2018).
- Fisher, M., & Rajaram, K. (2000). Accurate retail testing of fashion merchandise: Methodology and application. *Marketing Science*, 19(3), pp. 266–278.
- Flynn, B.B., Sakakibara, S. & Schroeder R., (1995). Relationship between JIT and TQM: practices and performance, *Academy of Management Journal* 38, pp. 1325-1360.
- Freeland, J.R., (1991). A survey of just-in-time purchasing practices in the United States. *Production and Inventory Management Journal* 32 (2), 43–49.
- Gremler D. & Brown S. W., (1996). Service loyalty: its nature, importance and implications. *Proceedings American Marketing Association*, pp. 80-171.
- Hammer M. & Stanton S. (1999). The question of process standardization. *Harvard Business Review* 77, pp. 108-120.
- John, R.R. (2015). Postal Systems. *International Encyclopedia of the Social & Behavioral Sciences* (Second Edition), 640-643.
- Kaizen Institute (2018). About Us. From: <https://www.kaizen.com/about-us.html>. (Assessed 10th April 2018).
- Kaizen Institute (2018a). Kaizen Fundamentals. Kaizen Institute Internal Communication. (Assessed 10th April 2018).
- Kaizen Institute (2018b). Total Service Management - Overview. Kaizen Institute Internal Communication. (Assessed 10th April 2018).
- Kaizen Institute (2018c). KBS Introduction. Kaizen Institute Internal Communication. (Assessed 10th April 2018).
- Kaizen Institute (2018d). Kaizen Fundamentals on Visual and 5S Management. Intern Documents of Kaizen Institute.
- Keiningham T.L., Aksoy L., Cooil B. & Andreassen T. W., (2008). Linking customer loyalty to growth. *MIT Sloan Management Review* 49, pp. 50–57.
- Keller L. K. & Lehmann D. R., (2006). Brands and Branding: Research Findings and Future Priorities. *Marketing Science* 25, pp. 740-759.
- Keller L.K., (1993). Conceptualizing, Measuring, and Managing Customer-Based Brand Equity. *Journal*

of Marketing 57, pp. 1-22.

- Kiumarsi S., Mohd Isa S. & Jayaraman K. (2015). Determinants of service quality on service loyalty: the mediating role of customers' satisfaction and brand equity. *Problems and Perspectives in Management*, 13, pp. 347-376.
- Krol, M. W., de Boer, D., Delnoij, D. M., & Rademakers, J. J. D. J. M. (2015). The Net Promoter Score - an asset to patient experience surveys? *Health Expectations*, 18, pp. 3099–3109.
- Melton, T. (2005). The Benefits of Lean Manufacturing. *Chemical Engineering Research and Design* 83, pp. 662–673.
- Míkva M., Prajová V., Yakimovich B., Korshunov A. & Tyurin I, (2016). Standardization - one of the tools of continuous improvement, *Procedia Engineering* 149, 329 – 332
- Ng W. L., (2006). A simple classifier for multiple criteria ABC analysis. *European Journal of Operational Research* 177, pp. 344–353
- Ohno, T. (1988). *The Toyota Production System: Beyond Large-Scale Production* (1st ed.). Productivity Press.
- Oliver, R.L. (1993). A conceptual model of service quality and service satisfaction: compatible goals, different concepts, *Advances in Services Marketing and Management* 2, pp. 65-85.
- Pedersen, P.E. & Nysveen, H, (2010). Service innovation challenges at the policy, industry, and firm level: A qualitative inquiry into the service innovation system. Working Paper No. 10/10.
- Pettersson, A.I. & Segerstedt, A. (2011) 'Performance measurements in supply chains within Swedish industry', *International Journal of Logistics Systems and Management* 9, pp.69–88.
- Público (2018). CTT confirmam fecho de 22 lojas. 2nd January. From: <https://www.publico.pt/2018/01/02/economia/noticia/ctt-vao-fechar-pelo-menos-22-lojas-1797882> (Assessed in 15th April, 2018).
- Rahman N. A. A., Sharif S. M., & Esa M. M. (2013). Lean Manufacturing Case Study with Kanban System Implementation. *Procedia Economics and Finance* 7, pp. 174 – 180
- Ramanathan R., (2007). A note on multi-criteria ABC inventory classification using weighted linear optimization. *European Journal of Operational Research* 182, pp. 1488-1491
- Ratkovi, Pavlovi & An, (2017). Comparative Analysis of Customer Satisfaction in Postal and Banking Services. *International Review* No.1-2, 108-120
- Reichheld, F.F., (2003). The one number you need to grow. *Harv. Bus. Rev.* 81 (12), 46–55.

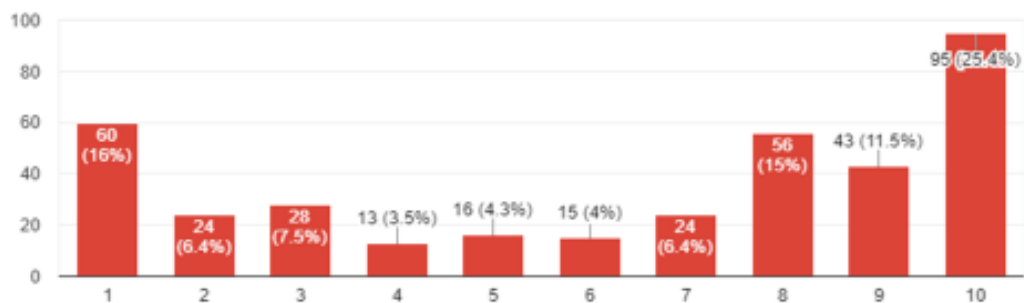
- Rushton, A., Croucher, P. & Baker, P. (2011). *The Handbook of Logistics & Distribution Management*. Kogan Page 4th edition
- Sanders, N. R. (2012). *Supply chain management: a global perspective*. Hoboken: John Wiley & Sons
- Simutis, R., Dilijonas, D., & Bastina, L. (2008). Cash demand forecasting for ATM using neural networks and support vector regression algorithms. In 20th EURO mini conference – continuous optimization and knowledge-based technologies, pp. 416–421.
- Silver, E. A., Pyke, D. F., & Peterson, R. (1998). *Inventory management and production planning and scheduling* (3rd ed.). New York: John Wiley & Sons
- Simutis, R., Dilijonas, D., Bastina, L., & Friman, J. (2007). A flexible neural network for ATM cash demand forecasting. In 6th WSEAS international conference on computational intelligence, man–machine systems and cybernetics, pp. 162–166.
- Spearmant M. L., Woodrufft, D. L., & Hoppt W. J., (1990). CONWIP: a pull alternative to Kanban. *International Journal of Production Research* 28, pp. 879-894.
- Stock, J. R., & Lambert, D. M. (2001). *Strategic logistics management* (4th ed.). Boston: McGraw-Hill.
- Taylor, S.A. & Baker, T.L. (1994). An assessment of the relationship between service quality and customer satisfaction in the formation of consumers' purchase intentions, *Journal of Retailing* 70, pp. 163-178.
- Teddy, S. D., & Ng, S. K. (2011). Forecasting ATM cash demands using a local learning model of cerebellar associative memory network. *International Journal of Forecasting* 27, pp. 760–776.
- Tochkov, K. (2015). The efficiency of postal services in the age of market liberalization and the internet: Evidence from Central and Eastern Europe. *Utilities Policy* 36, pp. 35-42.
- Venkatesh, K., Ravi, V., Prinzie, A., & Van den Poel, D. (2014). Cash demand forecasting in ATMs by clustering and neural networks. *European Journal of Operational Research* 232, pp. 383–392.
- Veres, C., Marian, L., Moica, S. & Al-Akel, K. (2018). Case study concerning 5S method impact in an automotive company. *Procedia Manufacturing* 22, pp. 900-905.
- Weijters B., Rangarajan D., Falk T. & Schillewaert N., (2007). Determinants and outcomes of customers' use of self-service technology in a retail setting, *Journal of Service Research* 10, pp. 3–21.
- Wichard, J. D. (2011). Forecasting the NN5 time series with hybrid models. *International Journal of Forecasting* 27, pp. 700–707.

Wisner, J.D., Leong, G.K. & Tan, K.-C., (2005). Principles of Supply Chain Management: A Balanced Approach. Southwestern, United States

Attachments

How do you rate the waiting time in the CTT store (between 1-10)?

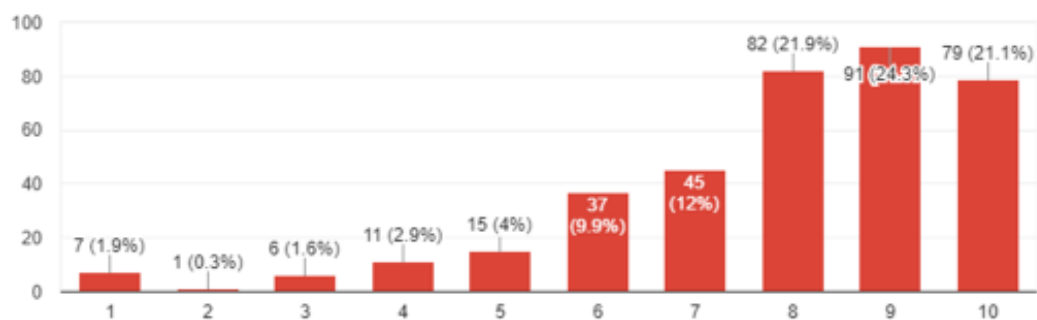
374 responses



Attachment 1: Questionnaire answer

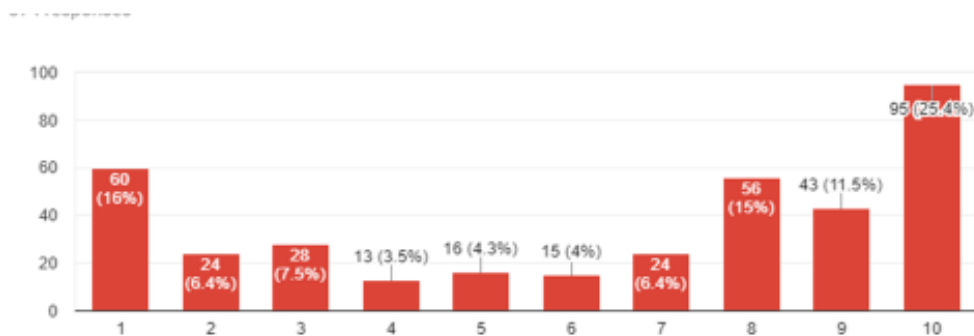
How do you rate the service time in the CTT store?

374 responses



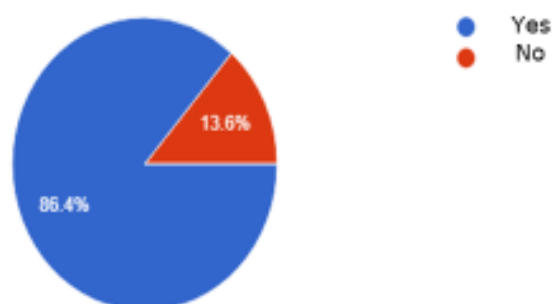
Attachment 2: Questionnaire answer

Would you like to have an estimate of the waiting time printed on your ticket?



Attachment 3: Questionnaire answer

Do you consider CTT's store hours adequate?



Attachment 4: Questionnaire answer



Attachment 5: Book-store top



Attachment 6: Highlights

1 The products must be organized by the face of the furniture. On each side only one product family should be placed, for example: • Blue Mail; • Green Mail; • CTT Expresso; • Collecting; • Books; • Telecommunications; • Highlights (seasonal / thematic campaigns); • Stationary store. 2 All gondolas must be clearly and perceptibly marked through the categories created for this purpose. 3 The 2-sided checkout must be used for the display of mail products (for example, blue or green mail packs). 4 The displays should always be completed 5 Replacement should be done daily (defined by stores) and whenever there is a product failure. 6 Prices should be affixed to rulers (eg packs or packages) or to the product itself (eg books).	2 3 6
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Attachment 7: OPL CTT express

1 Mail Products and CTT Express			
Sachets 	Mail Boxes 	Mail Packs 	CTT Express

Attachment 8: OPL CTT express and Mail products

Destaque

Veja o que temos hoje para si!

Featured Products and Services
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Linha CTT 707 26 26 26
Dias úteis e sábados das 9h às 22h



Attachment 9: A4 Highlights

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