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Process Improvement in Reverse Logistics and Reduction of Collection Requests at L'Oréal Portugal

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Master in Management of Services and Technology

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BUSINESS
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Department of Marketing, Operations and General Management

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Abstract

The importance of reverse logistics has increased in recent years as it directly impacts company's financial results. The increase of product options has generated high returns, which leads to investment and development of reverse logistics processes.

The Professional Products Division of L'Oréal Portugal is no exception and it is their interest improve processes in order to increase customer satisfaction, one of the biggest focus of this multinational.

The Lean philosophy is in this case study the chosen solution to improve the reverse logistics processes of the company L'Oréal. The main purpose is to reduce collection requests and, thus, increase the efficiency of the reverse logistics process. A theoretical framework is developed with the purpose of supporting research.

In this process there are several reasons underlying the requests for collection, however, there is a higher focus on requests for collection of damaged products and requests for collection of discontinued products as they are the only ones that allow intervention. As such, proposals for improvement will focus on improving the delivery process in order to reduce the delivery of damaged products and, thus, reduce collection requests and make the collection process more efficient since there are fewer orders to process and handle.

After present the opportunities for improvement in the delivery and collection processes, the proposals are presented. Its viability was analysed, and the proposals were successfully implemented.

Keywords: Lean thinking; Inverse Logistics; Processes improvement; Beauty and Hygiene.

Resumo

A importância da logística inversa tem aumentado nos últimos anos visto que impacta diretamente os resultados financeiros de uma empresa. A expansão das opções de produtos tem gerado altos retornos, o que suscita o investimento e desenvolvimento dos processos da logística inversa.

A divisão dos Produtos Profissionais da L'Oréal Portugal não é exceção e é do seu interesse melhorar os processos com vista a aumentar a satisfação do cliente, o maior foco desta multinacional. A filosofia Lean surge então neste caso de estudo como uma solução de melhoria nos processos de logística inversa da empresa L'Oréal onde tem como finalidade principal reduzir os pedidos de recolha e, assim, aumentar a eficiência do processo de logística inversa. Uma estrutura teórica é desenvolvida com o propósito de sustentar a investigação.

Neste processo existem vários motivos subadjacentes aos pedidos de recolha, contudo, neste caso verifica-se um foco nos pedidos de recolha de produtos danificados e nos pedidos de recolha dos produtos descontinuados pois são os únicos que permitem a intervenção. Como tal, as propostas de melhoria irão incidir na melhoria do processo de entrega de forma a reduzir a entrega dos produtos danificados e, assim, diminuir os pedidos de recolha e tornar o processo de recolha mais eficiente por serem menos ordens a processar e tratar.

Após apresentar as oportunidades de melhoria de ambos os processos de entrega e recolha, as propostas de melhoria foram apresentadas. A sua viabilidade foi analisada e as propostas foram implementadas com sucesso.

Palavras-chave: Pensamento Lean; Logística Inversa; Melhoria de Processos; Beleza e Higiene

Index

Acknowledgment i

Abstract iii

Resumo v

Index vii

Table Index xi

Figure Index xiii

List of Abbreviations xv

1. Introduction 1

1.1. Problem Statement 1

1.2. Research Question 2

1.3. Objectives 2

1.4. Methodology 2

1.5. Scope 3

1.6. Dissertation Structure 3

2. Literature Review 5

2.1. Logistics and Supply Chain Management 5

2.2. Reverse Logistics 6

2.2.1. Drivers of Reverse Logistics 7

2.2.2. Outsourcing in Rreverse Logistics 8

2.3. Process Improvement 9

2.3.1. Process Improvement in Reverse Logistics 10

2.3.2. Optimization 11

2.3.3. Simulation 12

2.3.4. Lean Philosophy 13

2.4. Lean Thinking 15

2.4.1. Origin of the Concept of Lean Thinking 16

2.4.2. Lean Thinking Principles 16

2.4.3. Lean Thinking Waste 17

2.4.3.1. Lean Thinking Tools 18

2.4.3.2. Process Map 18

2.4.3.3. Fishbone Diagram 19

2.4.3.4. Five Whys 20

2.4.3.5. Spaghetti Diagram 20

2.4.3.6. Key Performance Indicators 21
2.4.3.7. Kaisen 21
2.5. Conclusions 22
3. Methodology 23
3.1. Case Study Methodology 23
3.1.1. Case Study Characterization 24
3.1.2. Case Study Design 24
3.1.3. Research Ethics 24
3.2. Research Implementation Steps 24
4. Case study 27
4.1. Introduction to the organization 27
4.1.1. History of L'Oréal 27
4.1.2. Professional Products Division 28
4.1.3. Supply Department 29
4.1.4. Actors characterization 30
4.1.4.1. Warehouse 30
4.1.4.2. Transportation 31
4.1.4.3. Customers 31
4.2. Process Mapping 32
4.2.1. Customer Delivery Process 33
4.2.2. Customer Collection Process 35
4.2.3. Transport Subprocess 37
4.2.4. Warehouse Subprocess 40
4.2.5. AVA (Added Value Activities) e NAVA (Non-Added Value Activities) 42
4.3. Identification of Opportunities to Improvement 43
4.4. Proposals of solutions strategies 48
4.4.1. Improvement Proposal 1: Modify delivery boxes and use of resistant adhesive tape 49
4.4.2. Improvement proposal 2: Collection identification tags 52
4.4.3. Improvement proposal 3: Methods of handling the return map 55
4.5. Evaluation of proposals 57
4.5.1. Evaluation of Proposal 1 – Modify delivery boxes and use of resistant adhesive tape 57
4.5.2. Evaluation of Proposal 2 – Collection identification tags 58
4.5.3. Evaluation of proposal 3 - Methods of handling the return map 59

4.6. Implementation and Assessment of Results 59
4.6.1. Implementation 1: Label Implementation 61
4.6.2. Implementation 2: Implementation of the manual of procedures for handling the returns map 61
4.6.3. Implementation 3: Implementation of Box 2.5 and resistant tape 62
4.7. Conclusions of the Chapter 62
5. Conclusions 65
Limits to the findings 67
Future research work 67
6. References 69
7. Attachments 73

Table Index

Table 1.1 Methodology 3
Table 4.1 Brands of the four divisions 28
Table 4.2 Reasons for the data collection requests 35
Table 4.3 AVA (Added Value Activities) e NAVA (Non-Added Value Activities) 42
Table 4.4 Identification of opportunities to improvement 43
Table 4.5 Proposals of solutions strategies 49
Table 4.6 Information of the old box and Box 2.5 51
Table 4.8 Evaluation of proposals 57
Table 4.9 Implementation's results 60

Figure Index

Figure 3.1 Implementation steps and tools 25
Figure 4.1 PPD departments 29
Figure 4.2 L'Oréal Actors 30
Figure 4.3 Customer Delivery Process 34
Figure 4.4 Customer Collection Process 37
Figure 4.5 Transport Subprocess 39
Figure 4.6 Warehouse Subproce 41
Figure 4.7 Thickness 50
Figure 4.8 Box symbology 50
Figure 4.9 Adhesive tape 51
Figure 4.10 Box 3.0 52
Figure 4.11 PPD Label 54
Figure 4.12 To Be Map of Customer Collection Process 55
Figure 4.13 Legend and illustrative example 56
Figure 4.14 Implementation schedule 60
Figure 6.1 Warehouse location 73
Figure 7.2 CTT Logo 73
Figure 7.3 DPP Logo 73
Figure 7.4 Improvement Opportunity A 74
Figure 7.5 Improvement Opportunity B 74
Figure 7.6 Improvement Opportunity C 74
Figure 7.7 Improvement Opportunity D 74

List of Abbreviations

LOP- L'Oreál Portugal

PPD- Profissional Product Division

RL- Reverse Logistic

VSM- Value Stream Mapping

KPI- Key Performance Indicator

1. Introduction

The present chapter is organized as follows: in the sub-chapter 1.1, it is reported the contextualization of the theme and the problem related to the case study; in the sub-chapter 1.2, it is presented the research question of the project, and then, in the sub-chapter 1.3, general objectives and specific objectives are described. With the challenges defined, sub-chapter 1.4 presents the methodology used in the project and finally, in sub-chapters 1.5 and 1.6 is described the scope of the thesis project and its structure, respectively.

1.1. Problem Statement

In an increasingly competitive and demanding economy, companies must respond to their customers' needs as efficiently as possible, to maintain and/or improve their service levels whenever possible. The processes associated with reverse logistics are increasingly important and more visible today, the efficiency of these processes is also continuously a focus for many companies.

The concept of reverse logistics is considered one of the most recent concepts in the universe of logistics, which with the evolution of time, has grown in importance at a strategic level. The advantages adjacent to the implementation of reverse logistics may be reflected in the service quality, in the level of customer satisfaction, environmental impact and will influence legislative issues associated with waste. (Agrawal, Singh, and Murtaza 2015).

In order to contextualize the reality of the company under study, L'Oréal Portugal (LOP) has a complex reverse logistics process. The collection process flow begins when the customer sends the collection request for their products to the commercial or Customer Care team and ends when the credit is issued. Currently, based on data extracted since January 2018, the lead-time for collections is on average 25 days, which means that, after delivering the products, the customer expects about 25 days to receive their credit. This factor is the main one that justifies the theme of this thesis: Process Improvement in Reverse Logistics at L'Oréal Portugal.

The company has been investing in the implementation of reverse logistics processes, namely to reduce the lead time waiting for credit and thus improve customer satisfaction.

Thus, it has been experiencing some difficulties/inefficiencies in terms of this process, specifically, in terms of requests to collect products from its customers and in the collection process itself. On the one hand, the company feels the need to better understand/know the reasons for the collection requests, since a high number of these requests are difficult to manage the collection process, in order to find ways to reduce these occurrences. On the other hand, the collection process itself has proved to be time-consuming and has a long waiting time for the credit to be issued. As such, this project will focus on improving the reverse logistics process at L'Oréal, with a special focus on these two aspects.

1.2. Research Question

Based on the context presented above, the research question that will be investigated in this project-thesis is: "*How to reduce collection orders and thereby increase L'Oréal's reverse logistics process efficiency?"*

1.3. Objectives

The main objective of this thesis is, therefore, reduce collection orders as well as increase L'Oréal's reverse logistics process efficiency in order to reduce inefficiencies.

In this way, other specific objectives will be developed:

- Map and analysis of the processes "As-Is" – product delivery process, collection process, warehouse process, and transport process;
- Idetification of the opportunities for improvement;
- Definition of the improvement proposal strategies;
- Analysis of the implementation proposals according to the identified KPI;
- Implementation of the proposals;
- Analysis of the output with the data from the "As-Is" analysis; and
- Final recommendations for the L'Oréal Portugal company.

1.4. Methodology

The developed master's thesis is considered a project-thesis where, according to Yin (2013), the study involves several phases, such as proposal, implementation, and evaluation. It respects the following criteria:

- It answers a research questions which is a 'why' or 'how' question;
- The investigator has little (or no) influence on the activity of the operation; and
- The focus of the study is on a contemporary phenomenon.

The three criteria above are applicable, so the present project-thisis will be based on a case study. It will be possible to use the wide variety of evidence such as: documents, artifacts, interviews and observations and it will be a huge opportunity to take advantage of. (Yin, 2003).

To achieve the proposed objective, the methodology used for the project is divided into seven major phases:

Table 1.1 Methodology

Methodology	1. Contextualization of the Problem;
	2. Data collection and analysis;
	3. Process mapping;
	4. Identification of opportunities for improvement and waste;
	5. Improvement proposals;
	6. Implementation and evaluation of Improvement Proposals;
	7. Final recommendations and research proposals.

1.5. Scope

The project-thesis will be carried out at L'Oréal Portugal and the work developed will only be implemented in the Professional Products Division (PPD). The study will focus on the reverse process from the moment the customer makes a complaint to the Customer Care team or to the comercial until the moment the goods arrive at the warehouse and the credit is issued to the customer. Therefore, the process analyzed is the process of reverse logistics of professional products collected from L'Oréal customers.

1.6. Dissertation Structure

The development of this study will consist on five different chapters that are related to the different stage of study development:

Chapter 1: Introduction – where the framework of the problem is addressed, the research question, the general and specific objectives of the dissertation to be achieved, the methodology, the scope and the structure are presented.

Chapter 2: Literature review – which presents the tools and methodologies that will serve as theoretical support for the investigation. It will include the basis for solving the problem under the study.

Chapter 3: Methodology – which describes all the methods used to obtain data and where is the entire information processing development is presented.

Chapter 4: Characterization of the company and the industry – description of the dissertation problem, description of the mapping of the initial processes according to the As-Is Model, analysis and treatment

of the collected data, presentation of improvement proposals, implementation and evaluation, mapping of the processes after implementation according to the To-Be Model.

Chapter 5: Conclusions – where the research question is answered, and the main conclusions are presented. The main limitations adjacent to the study are also accessible and new opportunities for further study are proposed.

2. Literature Review

The literature review chapter addresses the themes, concepts, and models that will support the thesis project, with a special focus on reverse logistics.

The following contents were analysed using the following search engines: science direct; Google scholar and B-on where the main key-words used were Lean thinking; Inverse Logistics; Processes improvement; Beauty and Hygiene.

Following the main objective of this project, several concepts and studies are worth to be explored. First, the concepts of Logistics and Supply Chain management are reviewed so that it is possible to better understand its reverse process (section 2.1). Afterwards, a review of Reverse Logistics and its drivers is presented (section 2.2), since this is the process where the improvement proposals will be focused, with a particular analysis of outsourcing within reverse logistics, where L'Oréal relies on outsourcing to support its reverse logistics process. Process improvement is then explored, to analyse the various possibilities for changes to be implemented in a process, as well as to review methodologies and tools used within process improvement (sections 2.3 and 2.4).

2.1. Logistics and Supply Chain Management

Logistics is the process of strategically managing the procurement, movement, and storage of materials and finished inventory. Through the organization and its marketing channels, profitability is maximized through the cost-effective fulfilment of orders (Govindan et al. 2012).

According to Christopher (2011), Supply Chain Management is “a wider concept than logistics” and it is the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole.

Another point of view that matches with the previous opinion is from Govindan et al. (2012), where the term supply chain requires, the whole set of activities involved in marketing, planning, purchasing, manufacturing, distribution, delivery process, and reverse logistics.

Thus, Logistics is related to a planning structure where a strategy is created for the physical flow and information flow with the orientation for the business (Vachon and Klassen 2006) and the Supply Chain concept can substantially increase the value offered to the customer and reduce associated operating costs. It is a structure that focuses on the coordination of processes between various entities: suppliers, customer and the organization itself (Bernon, et al., 2011).

Currently, product delivery is flowing towards the end customer, however, an increasing flow of products is being sent back to the origin. This happens in a wide range of industries, covering a diverse range of products. Some industries in the chain were forced to withdraw products, others did

proactively, attracted by the value of the products used. Thus, in both situations, reverse logistics has become an important competence in modern supply chains (Brito et al., 2004).

Given the explanation of the concepts related to the delivery of the product or service, it would be possible to study its reverse process, Reverse Logistics, which is a process to study in the present case study.

2.2. Reverse Logistics

Managing reverse logistics is becoming an important element of supply chain management and, in some cases, a profit-generating function (Rogers et al*.,* 2001).

According to Rogers (2001) pp.2, Reverse Logistics is "the process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin to recapture or create value or proper disposal".

With a similar point of view, the author Genchev (2009) argues that the concept of Reverse Logistics is defined as the process of transporting goods from its destination to the initial one with the main objective of recovering value. The author also contends that the movement made in the collection process is nowadays making it a commercial need, regardless of the business sector.

There are more perspectives where reverse logistics should not be seen as an expensive business parallel to normal operations since it deals with returns of end-of-life (EoL) but as an opportunity to gain competitive advantages (Lau et al*.,* 2009).

Chileshe (2019) carried out investigations about specific sectors where the activities of reverse logistics can be critical for the company because, if their unit value is large, the rate of return will also be. Thus, it seems that some companies are more necessary than others to make an effort to improve return processes, however, it always has an impact on the business.

As for the obstacles to the implementation of reverse logistics, Lau et al. (2009), argues that the lack of laws and legislation is the main barrier to the implementation of reverse logistics. High operating costs, lack of advertising and lower knowledge of the benefits of reverse logistics are also barriers faced.

According to Liu et al. (2018), it was investigated that the implementation of reverse logistics can bring benefits and weaknesses. Once financial and operational attributes are involved in the supply chain, implementing reverse logistics can be an unsafe task for the industry as it can create some risks. However, one of the advantages of its implementation is the connection with growing environmental concerns; industries choose reverse logistics to take such precautions.

Another author who underlines the advantages of the implementation is Sobotka et al. (2017) who claim that in many industries, such as automotive and electronics, reverse logistics (RL) has been successfully implemented and has become a strategic tool for obtaining the economic benefits. As such, RL can also be a source of sustainable competitive advantage.

To better understand what motivates companies to implement reverse logistics, drivers of reverse logistics follow below in de section 2.2.1, to understand the possible incentives for organizations since all the companies must manage returns according to their own Reverse Logistics programs (Genchev et al*.,* 2011).

The option of carrying out the process of reverse logistics through subcontracted companies is afterwards explored - since reverse logistics is not the main business of many companies and the decision is whether or not to outsource such functions to a third-party reverse logistics provider (3PRLP) (Serrato et al. 2007). Outsourcing can represent a way to get partners specialized in the area thus adding value to their business and, for that reason, follows the analysis in section 2.2.3.

2.2.1. Drivers of Reverse Logistics

To understand reverse logistics drivers, the authors Akdoğan et al*.,* (2012) explain that it is important to realize that this process integrates returned products, unused products, damaged products or unused raw materials into a reverse distribution channel. Generally, reverse flow begins with the end customer and ends with the producer, which is the opposite of the traditional flow of logistics activities.

The same authors also defend that several forces motivate companies to adopt this return method. Some causes may be the need to generate profit, social pressure or awareness of environmental needs (Akdoğan et al*.,* 2012).

In agreement with previous authors, complementary studies where it is defended that the drivers are economic reasons, legislation and corporate citizenship (Brit*o* et al*.,* 2004).

More recent studies, Govindan et al. (2018), have proposed the following drivers in order to perceive motivational aspects that lead firms to perform reverse logistics, which are also complementary to previous studies:

- **Political issues:** where regulations and laws related to product return and reverse logistics are addressed;
- **Governance processes:** questions of cooperation and business partners in the supply chain;
- **Management:** support of human resources and integration of the department for the practice of reverse logistics;

— **Market and competitors:** issues such as customer satisfaction and competitive advantage are addressed;
— **Technology and infrastructure:** topics such as information technology, design availability and recovery technologies are addressed;
— **Economic issues:** analysis of financial and economic drivers related to reverse logistics are addressed;
— **Knowledge:** internal resources are analysed, such as information flows and awareness of reverse logistics in companies; and
— **Social concerns:** social pressure, such as public awareness of environmental conservation and pressure from corporate citizenship are aspects to be analysed.

Conclusively, as reverse logistics aims to increase resource efficiency, improving the quality of secondary materials and optimizing the use of natural resources, its drivers focus on addressing environmental issues, product durability and financial savings (Chileshe et al. 2019).

2.2.2. Outsourcing in Rreverse Logistics

According to Agrawal et al. (2016), reverse logistics outsourcing can reduce costs for the company, since it is possible to take advantage of economies of scale. In addition, by outsourcing reverse logistics, companies can reduce their asset base and distribute the capital released for other productive use. It is also proven that there are other advantages such as low costs, less uncertainty, less capital investment, more focus on the core business, more flexibility, better responsiveness to the customer and the possibility of greater use of new technologies.

Companies are more focused on specializing in their core competencies and outsourcing other non-core business activities. It is possible to realize that reverse logistics is not always part of the core business of many companies and as such becomes a potential business area for outsourcing. Organizations that implement outsourcing services must pay attention to establishing good long-term relationships with their outsourced partners (Kumar et al*.,* 2008).

Another important choice is whether such activities must be outsourced in full, in part or nowhere. (Agrawal, Singh, and Murtaza 2016) This choice will be made based on the growth in profit, the need to focus on essential skills and according to the analysis of cost savings (Serrato et al*.,* 2007).

Summarizing, according to Agrawal (2016), the main reasons for outsourcing are the following:
— Possibility to use advanced information systems and sophisticated equipment that allow access to complete solutions;
— Possibility of concentrating on core business core competencies and leaving reverse logistics activities, these secondary activities, to specialists in the area;

- Possibility of cost reduction as outsourcing can provide economies of scale; and
- Possibility of, by outsourcing reverse logistics, companies reducing their asset base and distributing the capital released for another productive use.

Therefore, considering all the advantages of outsourcing it is decisive for companies to select the best available third-party reverse logistics provider (3PRLP) by considering the desired selection principles (Zarbakhshnia et al. 2020). However, this decision to select companies capable of providing services that are needed is a complex topic to address. The author protects that the service companies that have been studied are mostly materials collection and transportation companies, which are only a part of the whole process business (Agrawal et al., 2016).

Besides, no studies that mention the negative impact of outsourcing reverse logistics where founded. However, according to Lau et al., (2009) conflict of interests among members can be a challenge as each try to offer its clients the greatest advantages.

For the ongoing investigation, after analysing the concept of reverse logistics, its drivers and the advantages of outsourcing process improvement is the chosen area to analyse. The purpose is to understand what tools and methodologies will be used to improve the process of reverse logistics of the present case study.

2.3. Process Improvement

Nowadays there is a lot of pressure between companies, which increases their level of competitiveness. In this way, companies feel the need to adopt new business improvement methodologies (Rashid 2013).

In the past 30 years, the emergence of new methodologies aimed the quality improvement and processes efficiency. Some of these approaches have proven to be successful and lasting and others have been adapted over the years (Thawesaengskulthai et al., 2008).

Thus, Business Process Improvement (BPI) is an essential area in development in the organizational changes. The approaches are individual where each topology is independent. Improving business processes is fundamental to business development as it improves quality and manages changes. (Bendell 2005).

With the same point of view, Vachon(2006), defend that it is a way of approaching the processes of a company with the purpose of making products or services enhanced to the consumer available.

It is possible to select the following terms within the concept of BPI: business process improvement, business process redesign, core process redesign and business restructuring, as well as business

process re-engineering. These concepts cover a range of activities extending from the continuous improvement of processes to the complete restructuring of organizations (Zairi et al., 1995).

Regarding Continuous Improvement, Bhuiyan (2005) argues that the concept is a culture of sustained improvement that aims to eliminate redundancies in the organization's process. For this, there must be teamwork and effort so that there are no major capital investments. The continuous improvement can be implemented through proposals for incremental improvements or radical changes. Often, improvements come from innovative ideas, new technology or countless incremental improvements.

Process mapping is a method used to analyse and identify the most efficient way to improve the process. This technique is used to detail business processes by focusing on the important elements that influence their actual performance. Management uses process mapping to view the business as an overall (Vachon et al., 2006).

The effective implementation of continuous improvement methodologies is an important success factor. As competition becomes more challengers, the rate of improvement and process optimization determines a company's success (Salah et al., 2010).

2.3.1. Process Improvement in Reverse Logistics

The importance of reverse logistics has increased in recent years since the expansion of product options has consequently led to high returns, which directly impacts the company's financial results. In this way, the development and analysis of the performance of reverse logistics has become a new topic. The performance of these processes can be analysed according to the strategies and capabilities of product returns and it is considered as a primary step in relation to possible measures or developed corrective structures (Shaik et al., 2012)

The author Fassoula (2005) defends the same ideology of the importance of the development of functions of reverse logistics to manage the return of the best form of products and services because the Reverse Logistics is able to improve the final cost, through its direct impact on the cost quality. The author also states that organizations are investing in improving processes through proposals for changes that may or may not add value and may or may not affect environmental issues. In this article, it is also argued that the implementation of a diagnostic tool to combine the management of reverse logistics with quality management and assess the impact of improving the management of reverse logistics can result in several benefits for companies.

In the view of author Bai(2013), reverse logistics must be flexible to changes and improvements so that it is possible to manage uncertainties that exist in networks and processes.

In order to prove the importance of process improvement in reverse logistics, one case was selected in the pharmaceutical industry and another in the electronics industry, as it was impossible to find a case study in the beauty and hygiene industry.

The following case study aims to analyze the pharmaceutical supply chain by the Define, Measure, Analyze, Improve, and Control (DMAIC) process in order to develop the reverse logistics in a recall to prevent the likelihood of harm to a consumer. The returned goods, in this case, could have multiple destinations as they could be repaired and sold, destroyed or, if they were not defective, repackaged and sold through alternative sales channels. In this study, it was possible to observe the importance of improving the reverse process in the logic that there are gaps to be corrected related to the quality of service, logistics service provider, pharmaceutical company and customers. It was also found that diagnostic tools are essential to understand the weaknesses of the existing supply chain and, thus, help to identify key areas for improvement within the organization (Kumar et al., 2009).

Regarding the second case, in the consumer electronics industry, there is a great prominence given the diagnostic tools to determine the reverse logistics maturity state. The authors believe that it is essential to implement improvements in the processes, but the opportunities for improvement must first be captured through diagnostic tools (Janse, et al., 2010).

In the case studies analized, the optimization, simulation and lean methodologies are the most used, which justifies the choice and focus of the review.

2.3.2. Optimization

Process optimization is a form of automated process improvement where pre-defined quantitative performance measures are used and optimized. This method is widely used to solve planning problems and focuses on finding the optimal solution as this methodology provides a quantitative basis that defends decisions, that is, mathematical models are used to justify the solution found. It also helps to reduce costs and supports the defence of various proposals for improvement (Vergidis et al., 2008).

There are other additional features associated with this methodology, such as the possibility to remove limitations in the current process cycles. It includes the planning of the process that integrates materials, resources, activities, resource loading, finite or infinite that are part of the system. In this way, optimization is an extension of the Business Process Reengineering automation principles, for business projects, where all participants in the process are studied and optimized in the best possible way (Samaranayake 2009).

The veracity of previous studies can be seen in the following three successful case studies. No case studies were found in the area of the present study, but more recent cases were selected.

The first study is based on the application of the optimization methodology in the routes for the collection of solid waste from a company (Apaydin et al., 2018). The objective was to reduce the total costs of disposal of solid waste. The application of the methodology allowed reductions of 24.7% in the distance and 44.3% in the time for collection and transportation. Thus, the company acquired a 24.7% benefit in the total expense. In addition, some extra benefits, such as exhaust and noise emissions, traffic congestion, resource savings that mean an increase in quality of life in the city.

The second case study addresses a case of a refinery where it is faced great management difficulties to keep the processing operation clean and green. In this case, optimization methodologies were implemented in order to produce optimal solutions with high precision in the model. This article explains that the problem uses a special formulation of correlation-based principal component analysis (PCA) and Design of Experiment (DoE) methodologies to serve as statistical process optimization for industrial refineries. The changes resulted in improvements in the operating conditions of the processing systems, changing the capacities of the equipment (Teng et al. 2019).

In the last case study *Optimization of reverse logistics network of End of Life Vehicles under fuzzy supply* was selected. Recycling end-of-life vehicles is an important topic to address due to the latest environmental challenges, public interest, government agency regulations and extended producer responsibility practices. Vehicles are generally considered to be the main source of environmental pollution, although, they also provide great economic value if material can be recovered. This study proposed a reverse logistics network with seven main clusters for the Istanbul metropolitan area and optimized them. In reverse logistics networks, one of the main challenges that policymakers face was the accurate estimation of the product returned. Thus, the quantity of product returned was considered as an uncertain parameter in the model. The merit of the model was validated by the case study where it was confirmed through the sensitivity analysis (Kuşakcı et al. 2019).

2.3.3. Simulation

Simulation is a tool that supports the process of continuous improvement. This tool is considered by Adams (1999) pp. 768 as "assistant in the identification of problems in the manufacturing process". As such, it is considered a training tool as it allows the simulation of all improvement proposals and afterwards allows the assessment of the impact of various improvement opportunities. The same author also argues that simulation "is a complementary tool and not a substitute for continuous improvement.". In other words, this tool is used to support several important steps in the process of continuous improvement, such as design, evaluation process or to justify results.

From the perspective of another author, simulation can be a good support to justify the cost, planning, tracking and forecasting of the project. The author also claims that simulation can help organizations with low process maturity and, at the same time, it increases the payment results when the simulation is applied to organizations with greater maturity (Christie 1999).

The application of this tool has been tested in the following case studies, where very positive and satisfactory results have been reported. No case studies were found in the area of the present study, but more recent cases were selected.

In the first case study, the article presents a simulation study to assess the performance of a real waste management system for electrical and electronic equipment in Italy. This simulation model was used to evaluate the economic performance of the current reverse logistics system and to explore some possible alternatives in order to improve system performance. In this case, this tool proved to be a useful tool for investigating questions about the As-Is model and the real-world system. It also proved to be very effective in the reduction of the system behaviour and comparing different scenarios, in order to improve the economic profitability of the system (Bottani et al*.,* 2019)

In the second select case study, it is showed an approach of this tool applied to the supply chain and reverse logistics system of a Brazilian beverage company. During the scenario simulation, it was possible to understand how to increase the positive effects and reduce the negative effects by analysing the scenarios generated via the implementation of the actions previously defined. Through this tool, it was possible to verify the effectiveness of System Dynamics to simulate different scenarios (Beiler et al. 2020).

Conclusively, the application of the simulation is not mandatory and essential, but if it is applied it can help the organization to obtain gains. This model is effective and helps with validation.

2.3.4. Lean Philosophy

In the last few years, there have been several technological changes where companies have grown in their digital offerings. An example of this growth is start-ups, small businesses that aim to promote easy and agile solutions to satisfy their consumers. This way, companies are keeping up with this growth, where they look for new models, take possible risks and try to conquer innovation to be able to respond to the demand. This is a difficult task where the focus must be on the consumer and on continuous improvement. To drive this topic nothing better than lean philosophy (Bhuiyan et al*.,* 2005).

Lean is defined as well as a philosophy that “uses less than anything compared to mass production because the idea is to use half-space, half-human force, energy, time and costs”(Sremcev et al. 2018).

Dombrowski and Malorny (2016) argue that lean philosophy can help to reduce rework, service costs and thus increase customer satisfaction. They also argue that employees, production resources and equipment can be used more effectively and efficiently, as some various methods and tools can help in this regard.

On the other hand, other opinions referees that the philosophy is recommended to organizations since it can identify the areas that generate waste and facilitate the optimization of processes with minimal investments. Lean is a philosophy to structure, operate, control, manage and continuously improve industrial production systems. Lean's goal is to minimize waste in activities with no added value, such as waiting time, movement time, configuration time and inventory (Sahoo et al. 2008).

To analyse the veracity of previous studies, the following two case studies prove the success of the application of Lean philosophy. No case studies were found in the area of the present study, but more recent cases were selected.

In the first selected case study, it is possible to analyse the results of implementing lean practices in the construction industry. This industry has invested in progressing and improving productivity and sustainability through lean production. Based on the study, it is possible to conclude that there is a culture in the implementation of management practices that seek to reduce costs and time delays, improve the quality of construction projects and increase customer/end user satisfaction. Thus, the conclusion to be drawn from this study is the potential of applying different lean construction practices as it is possible to achieve economic, social and ecological objectives of construction projects, helping to reduce the adverse impacts of construction activities (Babalola et al*.,* 2019)

The second case study focuses on implementing Lean Manufacturing to Reduce the Delivery Time of a Replacement Part to Dealers. In this case the lean philosophy was applied in order to reduce the waiting time replacement part for authorized national and international resellers. It was found that activities that do not add value have been eliminated or modified. The ativities that added value has been increased, the delivery time has been reduced and the number of product variants is reduced. Thus, this study shows that the application of this philosophy allowed for several improvements such as the definition of an appropriate logistic flow, shorter delivery lead time, reduction of operational and administrative work in this process by 40%, reduction of the percentage of complaints will be monitored monthly where expects a reduction of 30% in three months, 50% in six months and 80% in one year (Eleazar et al., 2019).

The last selected case study addresses the application of lean principles to improve business processes in an IT company in Latvia. According to the study, the application of this philosophy makes it possible to improve the organization's culture, allows the identification of waste and potential areas for improvement. With the help of its tools, it is possible to identify problem areas and activities that

do not add value. An example of a tool used in this case is the mapping of the value stream used to eliminate waste. By applying the philosophy and its tools, as is the case of Value Stream Mapping, the potential to easily reduce total lead time by 15.31% and reduce waiting time by 37.04% was easily identified. In this case, the Pareto analysis was used to detect the most ineffective and unprofitable processes that consume the most resources and bring the least profit. Thus, it is possible to conclude that the application of philosophy as well as the use of its tools, allowed to detect waste and to see improvements in processes even where the success rate of projects was already 97% (Nikiforova et al*.,* 2018).

According to the objective of the case study, the present literature review allows concluding that the Lean tool is the most fitting in this context.

Simulation and optimization methodologies have huge relevance for organizations when the objective is the process optimization and analysis of the change's impact. Since the present case study is a process to improve where simplification of processes and elimination of waste is required, it is confirmed that the Lean philosophy is the most appropriate methodology.Given the circumstances, a detailed description of Lean philosophy follows.

2.4. Lean Thinking

Lean thinking is the result of studying and understanding all the possibilities of applying Lean philosophy. Lean Thinking is considered a set of principles, philosophies, and analyses of the company's processes that consequently lead to the elimination of waste and make it possible the value proposition (Taylor et al.,2015).

This concept is focused on "value" which, in turn, concerns the ability to provide the exact product or service that the customer wants, with the minimum time between ordering and delivery, at an appropriate price. The stages of the process can be divided between "adding value" and "not adding value". Value-adding activities are those that directly contribute to the creation of products or services, and activities that do not add value are called waste (Joosten et al., 2009).

These authors also argue that lean thinking refers to a tool designed to improve the operational process of car manufacturers where the most important aspects are the operational and socio-technical aspects. However, for a more balanced approach, operational and socio-technological improvements can be mutually reinforcing (Joosten et al., 2009).

To better understand the evolution of the concept of Lean Thinking follows the explanation of its origin.

2.4.1. Origin of the Concept of Lean Thinking

The Lean concept original from a production philosophy and a quality system, which is focused on eliminating waste, training employees, reducing stock and improving productivity (Modi and Thakkar, 2014). There are several tools associated with the concept of lean thinking that was pioneered at Toyota Corporation and later used in the automotive, service and healthcare industries.

Firstly, the concept was disseminated to car manufacturers and later to manufacturing industries. The lean thinking applied in these industries was relatively like the application used at Toyota, since the original instruments were applied to new environments. Thus, the application was quite limited to factory tools, where kanban and poka-yoke tools were used. The first is a communication tool that allows movements in production and the second, poka-yoke, a device that prevents the assembly of incorrect parts (Joosten et al. 2009).

Over the years, the introduction of these principles in the market reinforced the importance of the value provided to the customer and placed waste reduction as a centre of thought. Currently, Lean can be applied to every part of the supply chain process and make it possible to obtain maximum benefits. However, there are problems associated with the application of lean in processes, as it is difficult to capture the tangible benefits (Melton 2005).

2.4.2. Lean Thinking Principles

The service emphasizes the customer's active role and its importance in the business. Integrating it into the process from service creation to delivery is beneficial for the prospect of process improvement (Andrés-López et al., 2015).

In this way, understanding the five fundamental lean principles can be an asset to the creation of proposals. Considering the previous authors, the principles are:

- **Create value:** value can be evaluated in the service environment and the service is to satisfy the customer and must be defined by the customer;
- **Identify the value stream:** in the service, value is created primarily by customer needs, so the value of the stream is the sequence of activities that enable them to be satisfied;
- **Flow:** flow is focused on optimizing the movement of activities to generate value;
- **Pull:** the principle of pull means the act of distributing customer demand throughout the value stream; and
- **The pursuit of perfection:** from the service point of view, the search for perfection is achieved when the customer is satisfied and, therefore, every effort is made to deliver exactly what the customer wants.

The elimination of waste is part of this process of reaching perfection and it is described in the following section 2.4.3.

2.4.3. Lean Thinking Waste

One of the main objectives of the lean thinking concept is to satisfy customer demand in the most complete possible way, by reducing waste. The elimination of waste can be analysed in the human resources, design, production, distribution and stock management departments (Manzouri et al. 2014).

In a complementary way, seven types of waste can be reduced, such as overproduction, waiting, transportation, inadequate processing, unnecessary stock, movement and unnecessary defects (Taylor et al., 2015).

According to Hicks (2007), it is noted that the same types of waste are described:

- **Overproduction:** occurs when productions continue even when they have reached their goal. The result of overproduction is overproduction and an increase in stock;
- **Waiting:** are the periods of inactivity where an upstream activity has not been delivered within the intended term in a downstream process. These downstream processes are used for activities that do not add value;
- **Transport:** refers to the movement of unnecessary materials. These distances covered must be minimized as they increase the process time during which there is no additional value;
- **Extra processing**: it is related to extra operations such as rework, reprocessing, overproduction, excess stock, or storage of defective products;
- **Inventory:** refers to all raw materials, ongoing products or finished products that are referent to customers' current orders;
- **Motion:** related to extra steps performed by employees or equipment. These movements take time and do not generate value for the product or service; and
- **Defects:** regarding goods or services that do not comply with the specifications or in accordance with the specifics of the customers.

As the present case study refers to a service, it is relevant to analyse the possible waste in the services. In the present case, when applying the Lean philosophy in services, there are a search for reducing waste, changing the culture to focus on customers and continuous improvement, instead of correcting failures (Suárez-Barraza et al., 2012)

Other authors hold the same view that services can be designed to eliminate waste in the service process, in order to reduce the cost and provide a more perfect service. The authors also argue that lean service is the application of lean thinking in the service industry and, as such, can be divided

into five types, such as: waste of service design, because it is not used as a response to the customer; waste in service failures, related to its creation process; waste of service capacity, where capacity is not fully utilized; waste of the service process, which leads to low efficiency work; and waste of service delay, which is related to the service or the time the customer waits for the reception of his service (Qu et al., 2011).

2.4.3.1. Lean Thinking Tools

The concept of Lean Thinking is a universal management method that can be applied in several fields. The decision of which tools can be more useful and efficient for the organization must be according to the case studies, as they are "classified in four different categories, describing the area of application: manufacturing type, patient flow, organization, management and support " (Machado et al., 2010; pp.385).

Mostafa (2015), in turn, also defends that it is a great help for the organization when the appropriate tools are chosen to deal with the types of residues detected.

Identical studies applied in the sector were not identified, making it impossible to choose the most used tools in this type of industry. However, cases from more recent studies have been analysed in order to understand which tools are most cited and used.

According to the authors Purushothaman (2020), Singh (2020) and Parab (2019) it is possible to conclude that the most used tools are the following: Process Map, Fishbone Diagram, Five Whys, Spaghetti Diagram, Key Performance Indicators and Kaizen. Thus, it follows the study of them.

2.4.3.2. Process Map

Process mapping is known as Value Stream Mapping (VSM). It contains the process steps sequentially until the product or service is complete and delivered to the customer. All steps presented are reported visually and the entire process is represented by standardized symbols (Machado et al., 2010).

The process map can be defined in 3 steps. The first includes actual material flows and information flows in their current state, which is called As-Is mapping. In the second stage, a map of the state of the future process is made, where the points of improvement are identified, a mapping named by To-Be. It can have a great financial impact on the process, a streamlined process flow. Finally, an implementation plan is carried out that includes all the actions necessary to achieve the project's objectives (Rahani et al., 2012).

In a complementary perspective, Anjard (1998), argues that this tool is a visual aid for the representation of processes where it is possible to include process mapping alerts for areas in which a change in processes will have the greatest impact on improving quality.

There are several cases of the Process Mapping tool application, however, this case was selected to prove its effectiveness because it was applied in an industrial company in the United States. Its application started with the creation of a current map of the value flow that reflected the status of the operation, and then a future map of the value flow was created and proposed to serve as a guide for future lean activities. Its application had extraordinary results because the company reduced the processing time and, at the same time, improved the quality of its products after the lean implementation. The possibility of identifying the main points for improvement and implementing them has brought about several successes such as: cross training of its employees, reduction in stock levels between each of the operations, and quality problems become more easily traceable. The success of the pilot test in the production sector led the company to adopt the lean concept as an ongoing business strategy (Chen et al., 2010).

2.4.3.3. Fishbone Diagram

A fishbone diagram is a tool used to facilitate the root cause analysis of an identified problem (Reilly et al. 2014). This tool, also known as the "Ishikawa diagram", is a tool for identifying the root causes of quality problems and it also provides a methodical way of looking at effects and the causes that subsidise to those effects (Ilie et al., 2010).

Each main cause identified can have several sub-causes that lead to the main cause and, thus, it is possible to obtain important information about the roots of the problem and where to start to correct it. Problem identification can be obtained through error analysis or expert studies. The identification of causes can be performed through technical processes, methods such as Delphi or Nominal Group Technique sessions, or through brainstorming processes (Bilsel et al., 2012).

To understand the importance of using this tool, the following article was chosen, which demonstrates how it can be useful in the improvement process. This case study aims to understand how it is possible to reduce post-furnace rejections to improve sustainability in the ceramics industry. Ishikawa diagrams were used to find the root causes of various rejections in post-furnace operations and the results were noteworthy. Its implementation was crucial in the results obtained as it reduced on average 40.51% post-oven rejections and saved US $ 0.26 million per year. It also reduced the problem of waste disposal and energy consumption and reduced the environmental, social and economic burden. Qualitative benefits were also observed in terms of skill improvement, teamwork, multiple skills and improved employee morale (Bhamu et al., 2015).

2.4.3.4. Five Whys

This tool is a method of questioning and investigating the root cause of a specific problem. To do this, an understanding of the entire process is necessary so that the cause of the problem is easily identified and resolved (Machado et al*.,* 2010).

The application of the Five Whys analysis allows a structured approach with a view to the total elimination of defects. This tool is originally from the manufacturing industry and was developed in a way to be applied in various sectors. The author believes that it is based on corrective and preventive actions (Murugaiah et al. 2010).

In conclusion, the effective use of the Five Whys analysis technique will determine the root cause of any non-compliance and, subsequently, lead organizations to develop corrective and possibly preventive actions that are effective in the long term (Hassan et al., 2012).

The following case study proves the fundamental help of applying this tool. The selected case study aims to evaluate the supply chain and business processes of St. James Hospital and understand the impact of using the five whys on the improvement development proposal. The result of the analysis was quite satisfactory as it allowed the company to realize that the problem areas are the lack of adequate equipment, defective process, misdirected people, poor material management, inadequate environment and inefficient management. Thus, it is concluded that the Five Whys were a very innovative and efficient way to solve the main problems of the organization because it allowed the main problem to be perceived: the inefficiency in supply chain management (Kanti Bose 2012).

2.4.3.5. Spaghetti Diagram

A spaghetti diagram is a visual representation of a continuous flow of an item or an activity. The lines of the diagram are part of a process and allow the possibility to identify opportunities to streamline the process flow. This diagram assists in the perception of the intersection points, helps to reduce the waste of transportation, movement and waiting time (Venkat et al., 2020). In the view of the writer Senderská (2017), the Spaghetti diagram, also known as the Spaghetti chart, Spaghetti model or also Spaghetti plot is a method to observe the movement of the object. This object can be an activity, a worker or a material.

In order to analyze the viability of this tool, the CaetanoBus case study by the author Freitas (2019) was selected. The application of this tool was intended to improve the efficiency of the hybrid warehouse in order to redefine spaces and internal flows. In this case, the Ishikawa diagram was used to define and minimize the routes of the picking process. The results were quite satisfactory because, using this tool in conjunction with others like the 5S tool, it was possible to get the investment back after 2.9 months. This project allowed the company to obtain a net profit of €43,285.69 at the end of

the first year after implementation, with average annual savings of € 50,000/year, increased worker satisfaction, eliminated the constraints related to lack of space, reduced the picking time to an average of 35 minutes faster, which represents a reduction of about 25%.

2.4.3.6. Key Performance Indicators

The Key Performance Indicators (KPI) tool is considered an important tool for performance evaluation and is also an essential standard of evaluation for the quality of the workers in the operation, administration, maintenance, provisioning and optimization area of the network (Ke et al. 2010). According to (Calabro, Lonetti, and Marchetti 2016)the main performance indicators allow the continuous tracking of the behaviour of the process and enable the assessment of the specific objectives of the process.

The case study selected to analyse the feasibility of this tool addresses Design and Engineering projects. The author argued that KPIs should be selected and customized based on the nature of the project, company size and considering the team. In the case of the selected company, it was found that the use of SAP ERP to extract data used for KPI calculations was an asset and, after the analysis, the KPIs validated the viability of the implementations (Gries et al., 2011).

2.4.3.7. Kaisen

Kaizen is a word composed of different concepts, being kai (mundaça) and Zen (for the better), which means “continuous improvement” (CI). This tool represents a continuous improvement process that involves all elements of an organization, from managers to employees, involving cultures and driven by the customer (Singh et al., 2009).

Other authors defend the same idea, because with the application of this tool, a set of practices are applied that focus on continuous quality improvement. Kaizen allows a rapid implementation of a solution with continuous real-time reassessment (Knechtges et al., 2014).

The selected case study is a manufacturing company in India that aims, through the implementation of kaizen, to produce products with greater productivity with the use of available resources, reduce errors in production and increase efficiency. After implementation, there were noticeable improvements such as increased productivity and efficiency, reduced lead time, reduced cycle time, reduced waste, improved process safety, immediate problem solving, optimal use of resources, improved teamwork and increased employee satisfaction. The implementation of Kaizen in this manufacturing company was a success, as it led to a more efficient and productive process with fewer rejections (Rathod et al. 2019).

2.5. Conclusions

The theoretical basis covered in this chapter supports the proposals for improving the reverse logistics process at L'Oréal Portugal. The empirical and academic contributions of Lean Thinking, as well as the definition, principles and versatility through their applications, were highlighted in this chapter. The feasibility of applying the concepts was proven based on the successful studies selected. When choosing them, it was found that there are few studies focused on the application of lean philosophy in the beauty and hygiene industry. Thus, the entire investigation was carried out in diverse sectors and considering cases from recent studies where the objectives of improving processes, increasing efficiency and reducing waste are the focus of the study. It is intended that the present study contributes significantly to the practice of the company but also to the literature of the area since there are few studies in this sector in particular.

Process Map, Fishbone Diagram, Five Whys, Spaghetti Diagram, Key Performance Indicators and Kaizen are the tools that can eventually help this case study as they are the tools that are most used in recent selected case studies. The viability of all was also proven with case studies selected based on their relevance and date.

3. Methodology

This chapter aims to describe the methodology adopted in the investigation. To achieve the general objective, the specific objectives and with the aim of answering the research question, it will be described the data collection methods, the steps of each one, and the tools used. Examples from other industries where the application of tools was successful will also be presented.

3.1. Case Study Methodology

The present project is focused on the analysis of the collection process of professional products from hairdressing salons since they are collected from customers until they are delivered to the warehouse in Spain. Opportunities for improvement will be identified and, afterwards, several solutions of improvement are proposed.

To select the structure that better suits this investigation, it is necessary to identify the type of the dissertation. The Master's Thesis developed is considered a project- thesis since it will be applied to a real case study and integrates the steps of development, implementation, and testing.

According to Yin (2018) and Eisenhardt (1989), the present project is based on a case study since the author defends the following principles:

- The research question answers the question “how”: “How to reduce collection orders and thereby increase L'Oréal's reverse logistics process?”;
- The researcher has none or little control over the processes under study;
- The material collected can be based on history or a contemporary basis. Direct observation and interviews with people involved in the investigation validate the contemporary source; and
- To understand social phenomena and real-life events, such as management processes, the appropriate and fitting methodology is the case study.

Additionally, to be classified as a case study, according to Yin (2003), it can also be categorized by its type of case study. Within all the typologies, case studies can be exploratory, explanatory and descriptive.

In this case, the approach adopted for the case study is descriptive and exploratory. Descriptive research because it will incorporate the study, analysis, recording and interpretation of the facts. Exploratory research because it will establish criteria methods for the discovery of new processes that will be originated.

In addition, this study can be considered a single case study since the researcher can question several old theoretical relationships and, at the same time, can explore new ones, so a more analytical study is carried out. This fact makes possible the researcher a deeper understanding of the theme (Gustafsson 2017).

In conclusion, the appropriate structure is the case study structure, since the research question, social phenomena, real-life events and additional studies are a justification to this type of structure.

3.1.1. Case Study Characterization

According to Yin (2013), two strategies can be followed: explanatory, descriptive or exploratory strategies.

The explanatory does not apply in this case. However, the descriptive and exploratory strategy will be evident throughout the case study. A descriptive strategy analyzes the process flow and provides information about activities that add value and that do not add value, which will be analyzed in the description of the processes, from the collection of products to the delivery at the warehouse. An exploratory strategy is used to identify opportunities for improvement through the application of Lean tools, which will be contacted in the presentation of proposals for improvements in processes and their implementation and consecutive evaluation.

3.1.2. Case Study Design

According to Yin (2013), it is possible to verify that the present case study is unique. This classification is justified because only one process is studied – the reverse logistics process – and since it is an internal company process where the processes of other companies do not weigh in the decision making.

3.1.3. Research Ethics

For the implementation of this project at L'Oréal Portugal in the Professional Products Division, authorization and consent from the division's Supply director in September 2019 were required, which should allow the application of improvement proposals until June 2020.

3.2. Research Implementation Steps

Considering the stipulated objectives and the research question, the tools of the Lean Thinking philosophy will be applied in this project-thesis.

Lean Thinking Mapping Tools will support the identification of opportunities for improvement in the process and will help to provide insights.

The implementation steps and the respective tooling are:

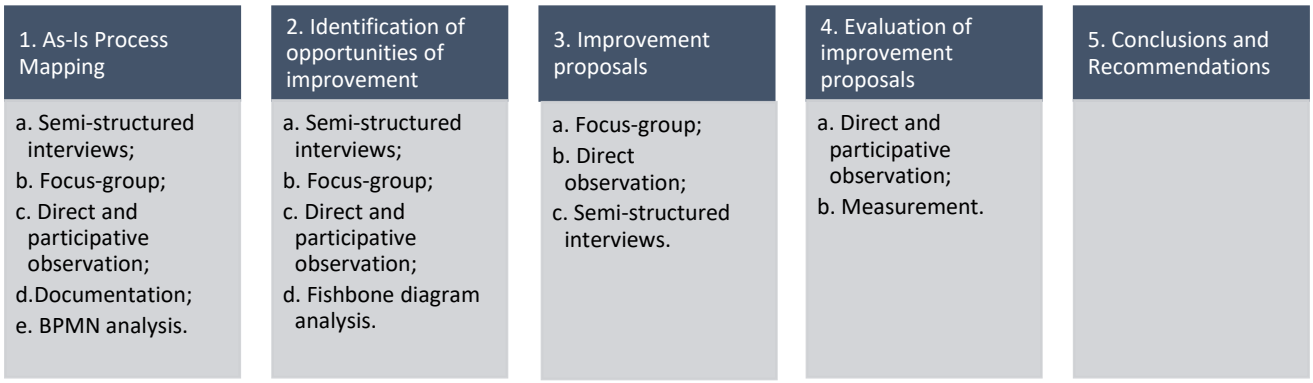


Figure 3.1 Implementation steps and tools

It is possible to verify that there is repeated tolling in each major step since they will be essential to sustain decisions and to help in the evolution of the project.

Semi-structured interviews will be carried out to elements of the Customer Care team, including the manager and the Supply team in the Professional Products Division, as they all end up intervening directly or indirectly in the return process.

Three different rounds of interviews will be conducted where the first will be at the beginning of the project, the second will be to identify the opportunities for improvement and the last one to validate the improvement proposals. All interviews will be conducted in person with the Supply team and the Customer Service team. The interviews will be conducted with semi-structured questions, in order to provide a guide line for guidance and to give freedom of expression on the topics. The main objective is to integrate all stages of the processes to describe and gather the description of all incidents that occur in the processes. In the second round, the interviews to be carried out with the service team and the supply team of the DPP division aim to capture the main causes adjacent to the incidents and analyze them to define opportunities for improvement. The last interview will be conducted only by the managers of the Supply and Customer Service teams. These interviews aim to validate the proposals made.

In the focus groups, meetings guided by me in the company will be prepared. The Customer Care team, the Customer Care team manager, the Supply team manager, who is the internal advisor of this project-thesis, will be present at these meetings. In the focus-group for the validation of proposals, warehouse managers and carriers will be present to validate the possibilities of moving forward with the proposals.

The first focus-group present in the step “As-Is process mapping” aims to validate the processes designed. The second focus group has the purpose of study together the fishbone diagrams in order to validate all the causes exposed and thus validate the opportunities for improvement.

Finally, in the last focus-group, the implementation dates of the proposals and the project owners will be defined.

Direct and participant observation will be an important source of information because the role as an intern in the Supply department and responsible for group of customers will allow to be inside the business and to collect information independently. Some of the daily responsibilities include the treatment of customer returns and analysis of incomplete credits, which allows direct contact with the customer and to understand their main frustrations.

The documentation will be obtained mostly from exports of information contained in the SAP ERP. It will be possible to obtain data to analyze the As-Is process, such as the number of return orders by number of orders, number of damaged products by number of returns, number of discontinued by number of returns. The same extractions will be made after the implementations to compare the data.

BPMN analysis will be essential to analyze the process and understand where the improvement proposals will focus. As-Is analyzes of the delivery process will be carried out, the collection process, the sub-process of collection of the carrier and the sub-process of treatment of collections from the warehouse.

Fishbone diagram analysis will be the tool used to analyze the causes of improvement opportunities and thus understand the most frequent ones.

Measurement, on the step of Evaluation of improvement proposals, will be the tool used to measure impacts after implementations and thus see if there have been improvements in processes.

4. Case study

This chapter presents an analysis of the product collection process in the hairdressing salons of the company L'Oréal Portugal (LOP). First, the company is presented and all the participants in the process are introduced. Subsequently, a description of the "As Is" flow is provided and the main points for improvement are identified. Following the lean philosophy, analyses will be carried out to identify waste and associated improvement opportunities. Finally, proposals of solution will be implemented, and its impact will be assessed.

4.1. Introduction to the organization

4.1.1. History of L'Oréal

The history of L'Oréal Paris began in 1907, when the chemist Eugène P. L. Schueller developed an innovative hair dye. (SuccessStory, 2017) This success led to the foundation of his own company, called "Société Française des Teintures Innofensives pour Cheveux".(Anon 2018)

It was through research and innovation that Eugène Shueller achieved rapid expansion. In 1910 it entered the Italian market, in 1911 in Austria and the Netherlands in 1913. In 1939, the company starts to be known by its current name, L'Oréal. The internationalization process was considered integral when, in 1954, it entered the United States market. Later, in 1974, L'Oréal developed a partnership with Nestlé, to penetrate the Asian market. The company arrived in Portuguese territory in the 1950s under the name "Sincoral" through an authorized agent. In 1962, the L'Oréal Portugal subsidiary was built. (Companieshistory.com 2014)

It must be noted that the company's structure is identical in its branches throughout the world, where four main Divisions distinguish different Distribution Channels:

- **Luxury Division** - Perfumery circuit;
- **Consumer Products Division -** Modern, Wholesale and Traditional Distribution circuit;
- **Professional Products Division** - Hairdressing salons circuit; and
- **Active Cosmetics Division** - Pharmacy and Drugstore circuit.

L'Oréal is characterized by unquestionable quality, a wide range of products and its mission is "Beauty for Everyone".(Anon 2015) In 2013, the company was present in 130 countries with a turnover of more than 14 billion euros. 290 subsidiaries, 42 factories, and more than 67 thousand employees were registered. In 2017, the L'Oréal Paris brand was valued at USD 24.533 billion, and it was considered the 3rd most valuable French brand, according to the Brand ranking. (L'Oréal – Wikipédia, 2019)

In these studies, the division under analysis is the Professional Products Division (PPD) which is the division responsible for the distribution circuit of products for hairdressing salons. Table 4.1 shows the main brands that represent each of the four divisions:

Table 4.1 Brands of the four divisions

Luxury Division	Consumer Products Division	Professional Products Division	Active Cosmetic Division
LANCÔME PARIS	L'ORÉAL PROFESSIONNEL PARIS	L'ORÉAL PROFESSIONNEL PARIS	VICHY LABORATOIRES
GIORGIO ARMANI fragrances & beauty	MAYBELLINE NEW YORK	KÉRASTASE PARIS	LA ROCHE-POSAY LABORATOIRE DERMATOLOGIQUE
YVES SAINT LAURENT	GARNIER	REDKEN 5TH AVENUE NYC	CeraVe DEVELOPED WITH DERMATOLOGISTS
RALPH LAUREN FRAGRANCES	NYX PROFESSIONAL MAKEUP	shu uemura	SKINCEUTICALS ADVANCED PROFESSIONAL SKINCARE
cacharel			
VIKTOR&ROLF			
URBAN DECAY			
Kiehl's SINCE 1851			
BIOTHERM			

4.1.2. Professional Products Division

Professional Products Division (PPD) consists of 6 groups, namely Chairs, Retailers, Stores, Agents, Wholesalers, and Independents.

To manage the business, PPD is divided into four distinct departments (figure 4.1), which are:

- **Marketing Department:** organized by brands, employees develop operational and communication strategies;
- **Commercial Department:** organized by "customer portfolio", where L'Oréal's strategy is aligned with the customer's strategy. Negotiations on product conditions, commercial actions and promotional campaigns are carried out according to the stipulated objectives;
- **Control & Financial Department:** consolidation, validation and calculation of financial and management metrics and indicators, by brand, department, client and category; and
- **Supply Department:** ensures that the products are delivered to the different customers in the right quantity, at the right time and in the exact location, while also performing the collection and customer services to meet clients' maximum satisfaction.

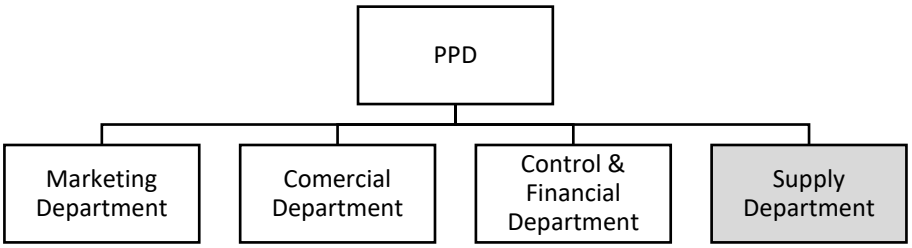


Figure 4.1 PPD departments

The case under study will focus mainly on the Supply department since the return process and its treatment is the responsibility of this area.

4.1.3. Supply Department

This department is one of the pivots of the business as it is responsible for providing consumers worldwide with a very comprehensive catalogue of products and brands. Their commercialization is carried out in extremely varied distribution circuits where they guarantee the production management, the acquisition, the subcontracting of the factory and manage the raw material warehouses and packaging warehouses.

The international logistics teams are responsible for supervising the synchronization of the logistics chain and managing the flow of purchases, managing the catalogue of products used in operations and coordinating the launch of products to other countries. Local logistics teams, on the other hand, are responsible for demand management, developing services for the group's commercial partners, and supplying the points of sale.

The supply chain, therefore, plays a fundamental role in the group’s development, where all its functions have the mission of ensuring the quality of service, flexibility, cost control, improving productivity and quality of local services.

Within PPD's Supply Department, there are three distinct functions: Supply Chain Director, Demand Planner and Customer Care Services.

The Supply Chain Director is responsible for directing the Demand Planner and Customer Care teams to meet customer expectations. Some fundamental functions are inventory management, control of logistics costs, managing collaborations with suppliers and assistance with launches to help to continue with the flexibility and efficiency of purchases.

Regarding the Demand Planner, there are responsibilities for the sales planning and forecasting process. This position is also responsible for coordinating the launch of new products and campaigns in collaboration with the sales, marketing, and management control team.

The Customer Services team is responsible for managing VIP customers, customers with higher revenue, where they process orders, control deliveries, handle incidents to obtain the maximum possible satisfaction. The remaining customers of the division are treated by an outsourcing company that has a dedicated Customer Care team in charge.

After analysing the company, the division and the department, it is essential to understand the behaviour of the actors that make part of the process that will be analysed: the reverse logistics process. The main actors, people and identities to be studied are: warehouse, transport, and customer (figure 4.2).

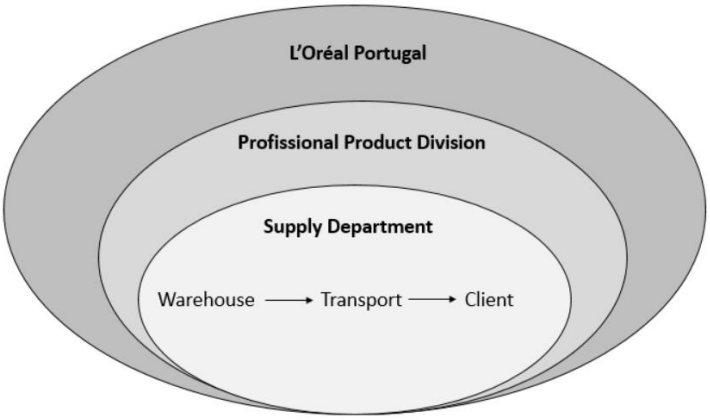


Figure 4.2 L'Oréal Actors

It is in the Supply department that the reverse logistics process is managed. This study will focus on this collection process as it directly impacts one of the division's major objectives: customer satisfaction. For several reasons that will be addressed in section 4.3.1, the customer can request a collection of products that arrived at his salon and the delay of the entire process between the colletion and the emition of the credit, was the problem raised by the department. After the customer makes his complaint, it is necessary to pick up the product and send it to the warehouse in Spain because it is only after the goods conference that the customer's credit is issued.

4.1.4. Actors characterization

4.1.4.1. Warehouse

In 2009, L'Oréal Portugal decided to close its warehouse in Portugal and centralize its operations with L'Oréal Spain. From that year onwards, the supply chain started to have a different configuration: the distribution center became Iberian and the stock started to be shared by both countries.

Currently, the L'Oréal Portugal warehouse is in Spain, Alovera la Huerta (figure 7.3), and is considered the logistics center responsible for supplying the Iberian Peninsula. Regarding the

warehousing and distribution operations until reaching Portugal, the operations are subcontracted to a logistics operator, DHL. To better understand how the order preparation flow, order transmission, and order processing are carried out using SAP software (Systems, Applications, and Products in Data Processing). In the system used, the four brands are separated by order as if they were independent companies, even for orders that are delivered to the same customer. L'Oréal is currently working with 4 brands where L'Oréal Professional has 630 SKU (Stock Keeping Unit); Redken has 300 SKU; Kerastase has 150 SHU, and Shu Emura has 140 SKU. Orders are prepared by warehouse employees in rotating shifts. After the order is prepared, the invoice is issued, and the orders are shipped in trucks to the carriers. The requested orders are sent to the carriers responsible for delivering the customers' orders, which means that the orders are divided between the reception platforms of DPD and CTT. There is only one specific time per day for expeditions, where two trucks leave the warehouse, one for each carrier. If there is an urgent order, it is possible to place it in the system on the day itself, but it is necessary to send an email requesting urgent preparation and requesting dispatch on the day.

4.1.4.2. Transportation

The PPD division has subcontracted CTT and DPD for transportation. The partnership with CTT is already quite old, however, the contracting with the DPD took place in September 2019 and the experimentation and testing phase started in July of the same year. Both carriers have trucks to collect the orders at the warehouse and bring them to Portugal to deliver directly at the customer's addresses.

What differs from the services practiced by both carriers are the system parameterizations that try to make the best out of these business partners. The L'Oréal Company considers that CTT is specialist in heavier loads. Even if the order consists of several boxes or several pallets, this carrier can deliver everything at once. DPD, on the other hand, is specialized in volume delivery where its strength is the speed and control of the order.

Thus, the parameterization that chooses who delivers what is done based on the order's weight. CTT is responsible for delivering heavy orders and DPD is responsible for lower weight orders.

4.1.4.3. Customers

The range of the Professional Products Division's customers is quite large and they are distinguished according to their characteristics. Currently, customers are segmented into 6 distinct groups, namely: Groups, E- Retailers, Stores, Agents, Wholesalers, and Independents:

- **Groups**: made up of several hairdressing salons belonging to one company. They are the large chains scattered around shopping centres and localities;
- **E-Retailers**: companies with online platforms and sometimes with stores where products are sold;

— **Agents**: the name given to retail companies in the Azores and Madeira islands;
— **Wholesalers**: intermediaries who sell the product purchased at the company to the consumer or to independent hairdressers; and
— **Independents salons**: those who represent the individual hairdressing salon businesses.

Partnerships with customers can contract the sale of all brands or just one, according to the customer's needs, proposals or choices. Each client is visited once or twice per month, on average, depending on the client's weight for the company or depending on the need per month to align goals and maintain a close relationship with the company.

The Groups segment is the one that has the greatest impact on sales, followed by the Independents group, and then by the Wholesalers group. The group in fourth place is E-Retailers and in last place the group of agents.

4.2. Process Mapping

The process mapping was based on direct and participatory observation, informal semi-structured interviews with the participants in the process, focus group, and documentation.

Direct observation was used during the duration of the internship that started in June 2019 and was one of the most useful methodology to support the mapping design as it allowed the complete observation of the entire collection process. The participatory observation allowed the perception of all possible alternatives to events represented in the processes. Informal semi-structured interviews were carried out by the Customer Care team, supply manager, the head of the DPD division at the warehouse in Spain and were also made to the heads of the two carriers. The documents provided (such as invoices, collection guides, manuals of procedures of the Customer Care Service team and second copies of credits) enabled a deeper analysis of all the presented information. The focus group with the Customer Care team and the manager was a fundamental help in the design of the process and allowed the validation of the presented design, and validated all the information that was collected from other methodologies (observation, informal semi-structured interviews, and documents).

The process presented includes the general delivery process, the reverse logistics process and the two sub-processes that include the various possibilities of events with the transporter and the warehouse. In other words, the general process represents the all process from the beginning to the end, i.e., from the moment the customer transmits his incident to the customer service team or the commercial until the customer receives the credit. The transport sub-process (figure 4.8) depicts how the carrier processes internally and the warehouse sub-process (figure 4.9) shows how collections are handled until the credit is issued.

4.2.1. Customer Delivery Process

The following diagram represents the As-Is process of delivering the products from the customer's order until the moment the customer receives the desired product.

The process begins with the client analyzing the portfolio of materials that includes possible campaigns. In this situation, the customer, if he has access to the online platform to submit his order, can do, otherwise, he sends the completed by Excel order note and it is the commercial that places it on the platform. After the order is in the system, the Customer Care team is responsible for analyzing the order and processing the order in SAP so that the warehouse receives the preparation order.

In the warehouse, picking is carried out, the product is prepared, packed and sent to the "Product Shipping" area. At this moment, there is a criterion for to differenciate places where the heaviest orders are sent to the CTT collection area and the lightest orders are sent to the DPD collection area. Subsequently, the trucks corresponding to each carrier will collect their orders from the warehouse in Spain and take the orders to the distribution center in Portugal. Orders are then placed on distribution routes and delivered to the customer via door-to-door delivery.

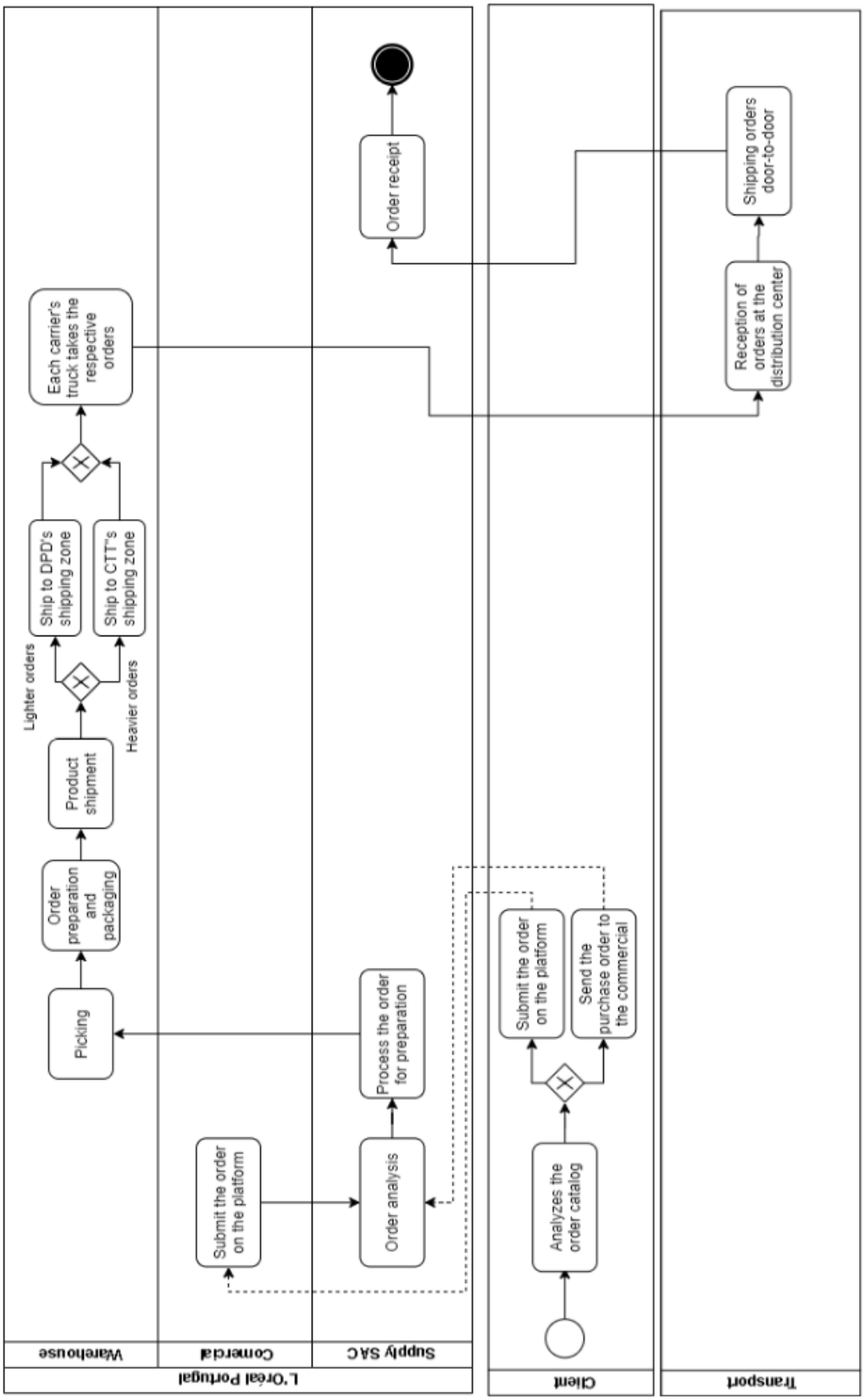


Figure 4.3 Customer Delivery Process

4.2.2. Customer Collection Process

The following diagram of the collection process represents the As-Is process of collecting products in hairdressing salons, from the incidence's claim, through its collection, treatment, and until they receive their respective credit. The credit is only issued when what has been collected matches what arrived at the warehouse. The focus of the process under study is to issue the credit as quickly as possible so that the customer does not wait too long for his refund.

The process begins with an assessment of the customer's needs, that relates to a request for the products return that are not in compliance. This customer request can have several reasons recorded in SAP when the order is registered in the system, such as: commercial error, in which the order is placed in the wrong way (e.g., when more units are added to a product than what was ordered) [1]; alteration of the order by the customer after the invoice is issued [2]; damaged products [3]; planned collection when multiple products from multiple invoices are collected – this may include damaged and discontinued products [4]; technical problems that cause errors when sending orders to the customer (e.g., duplication of the invoice that leads to the duplicate shipment of products) [5]; error caused by the carrier [6]; products collected for destruction [7]; customer financial problems that make order settlement impossible [8]; error by the Customer Care team that caused an error in delivery (e.g., adding products to the order in wrong quantities or adding wrong products caused by an error in the code) [9]; warehouse preparation error when ordering [10]; obsolete products (when it comes to products that have been discontinued and there are new collections) [11].

Based on data extracted from January 2018 to October 2019 follows, a percentage of the reasons for the data collection requests (table 4.2).

Table 4.2 Reasons for the data collection requests

Frequency of occurrence (January 2018 – October 2019)		Reasons for collection requests
Number of occurrences	Percentage of occurrences	
710	35,1%	Commercial billing error
60	30,3%	Post-invoice order change
717	10,8%	Damaged products
707	10,6%	Planned collection
714	4,1%	Technical problems
706	2,7%	Transporter error
ZDR	2,2%	Scheduled destruction
713	1,9%	Financial problems

Frequency of occurrence (January 2018 – October 2019)		Reasons for collection requests
Number of occurrences	Percentage of occurrences	
59	0,9%	Customer Care team error
705	0,5%	Warehouse preparation error
703	0,4%	Obsolete product

Returning the general collection process, the customer can request the collection in two ways: to the customer service manager or the sales representative. If the request is sent to the commercial department, the department will have to forward it to the Customer Care team, responsible for handling the collection from the beginning to the end. The Customer Care team, when receiving the order, must place it in the SAP system. This information is sent via EDI to the carrier so they can collect it from the customer and deliver it to the warehouse in Spain. This sub-process will be described in chapter 4.2.3.

The carrier is then responsible for delivering the container to the Iberian warehouse where it is necessary that the goods received correspond to the information in SAP because the credit will be issued only if there is a correspondence. Alternative cases, such as the lack of correspondence between physical material and what is in the system will be analysed in the warehouse sub-process in the sector 4.2.4.

This process ends with the customer receiving the credit. The SAP order is also completed as it loses the status of "pending credit" and has a credit number at the end of the process flow.

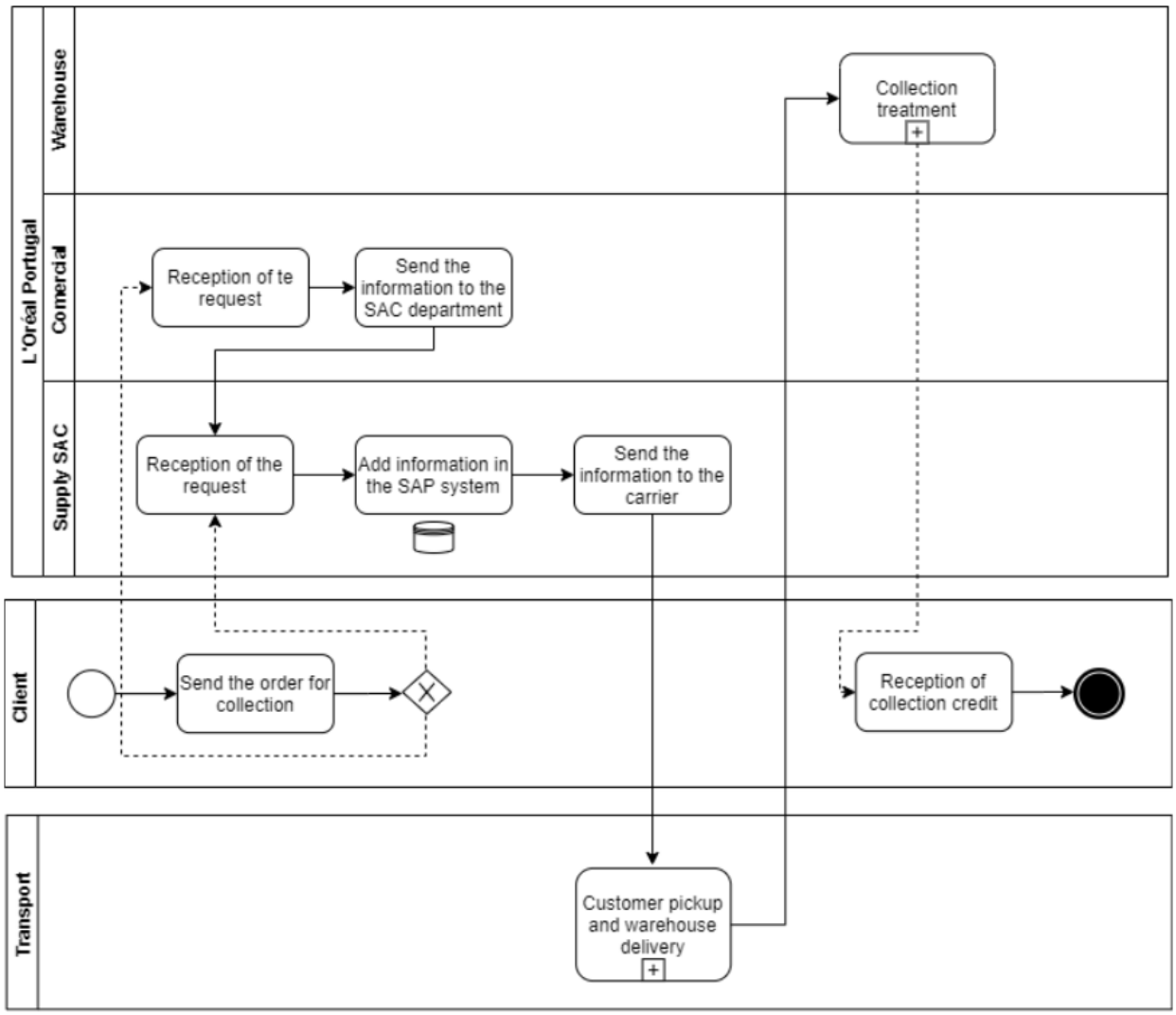


Figure 4.4 Customer Collection Process

4.2.3. Transport Subprocess

In this sub-process the various possibilities of events are detailed, hence it is portrayed as a sub-process. L'Oréal's partner carriers have a very similar order processing procedure, which has made it possible to standardize it in one.

As shown in the general process, the carrier receives the collection request from the customer via EDI and this is where the collection treatment by the carrier begins. Carriers create an internal order with an internal number to start the process. Drivers receive a withdrawal notification so that the order is part of the daily itinerary if there is availability on the route integration. Otherwise, this action is integrated into the next business daily route.

The address is sent at EDI, the driver goes to the pick-up point, and the client delivers the products to be collected. At this time, the driver must place internal labels and, if there are not enough labels for the number of volumes to collect, it is just possible to collect the identified ones. At this

point, there is a moment of indecision. If all volumes are identified, all products will be collected, otherwise, the customer makes a complaint to its Customer Care team to inform the incident. The team, after receiving the complaint, resends another collection request to the carrier and there the process is the same as the initial one.

Later, at the end of the route, the driver returns the collection to the carrier's facilities. All collections are accumulated in the container and they are sent to the Iberian warehouse when it is full. All the products collected in the same container are now part of a common number called CRM because they are sent in the same batch. This CRM number becomes proof that the collection was delivered in the warehouse.

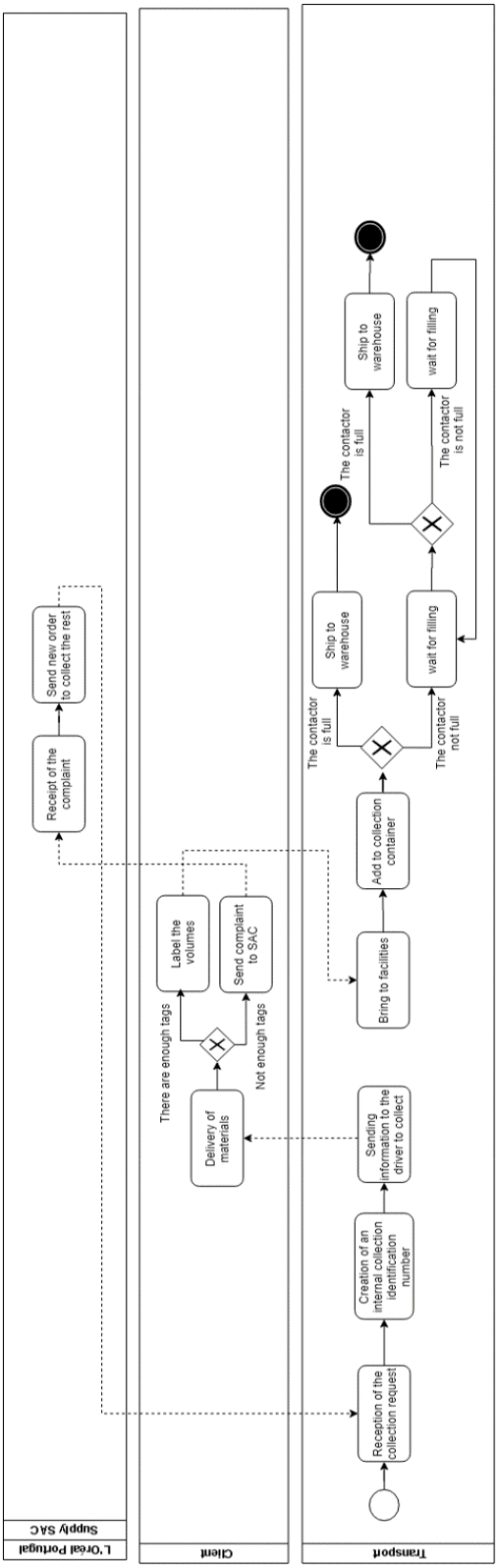


Figure 4.5 Transport Subprocess

4.2.4. Warehouse Subprocess

The warehouse sub-process is quite complex given the variety of tasks.

The optimum event is the case of receiving all the goods that are in the order. The received products are inserted into the System and the possibility of a match between what was received and what was in the collection order in SAP is analysed. The quantities and materials are the same, the credit is issued and the customer receives the credit. However, it does not always happen.

If the quantities do not match, the warehouse team puts the information in a file. The contents of this file can be communicated to the Customer Care team in two ways: by warehouse's initiative where it transmits it to the Customer care team through the Microsoft teams program or through an alert where the team asks the reason for the significant lead time. This alert is sent by the Customer Care team because it was also questioned by the customer.

After the treatment team has access to the file, an analysis is carried out and gives rise to two possible decisions: in the case of an urgent incidence where the difference in units and materials is not significant, the Customer Care team assumes the difference, that is to say, the warehouse credits what has been received and the differences are credited by a value credit, issued internally by the company L'Oréal Portugal.

In the case of a significant difference in units and quantities, the team follows another analysis to find out where the error is. Since the error may have been originated either at the customer or at the carrier, the information that the customer sent is analysed again. In this situation, there are two possible paths.

If it is validated what is in the SAP system, the carrier is asked for the CRM. The CRM is the identification number that identifies the truck that took the returns from the carrier to the warehouse and serves as proof of delivery. The carrier, when approached by the Customer Care team, has three different possibilities: if they already has the CRM in his possession, they must send it to the team; if they finds that the carries has not collected all the quantities, they must return to the customer and then the process returns to its beginning as in the main flow or, lastly, carries assumes the difference because they rest of the merchandise was lost or damaged when it was in his possession.

In the other possible case, if the information sent by the customer is not correct and there is a difference between the units and materials, the customer is asked for the correct information. It is rectified in SAP and the warehouse is informed of the change through a shared file.

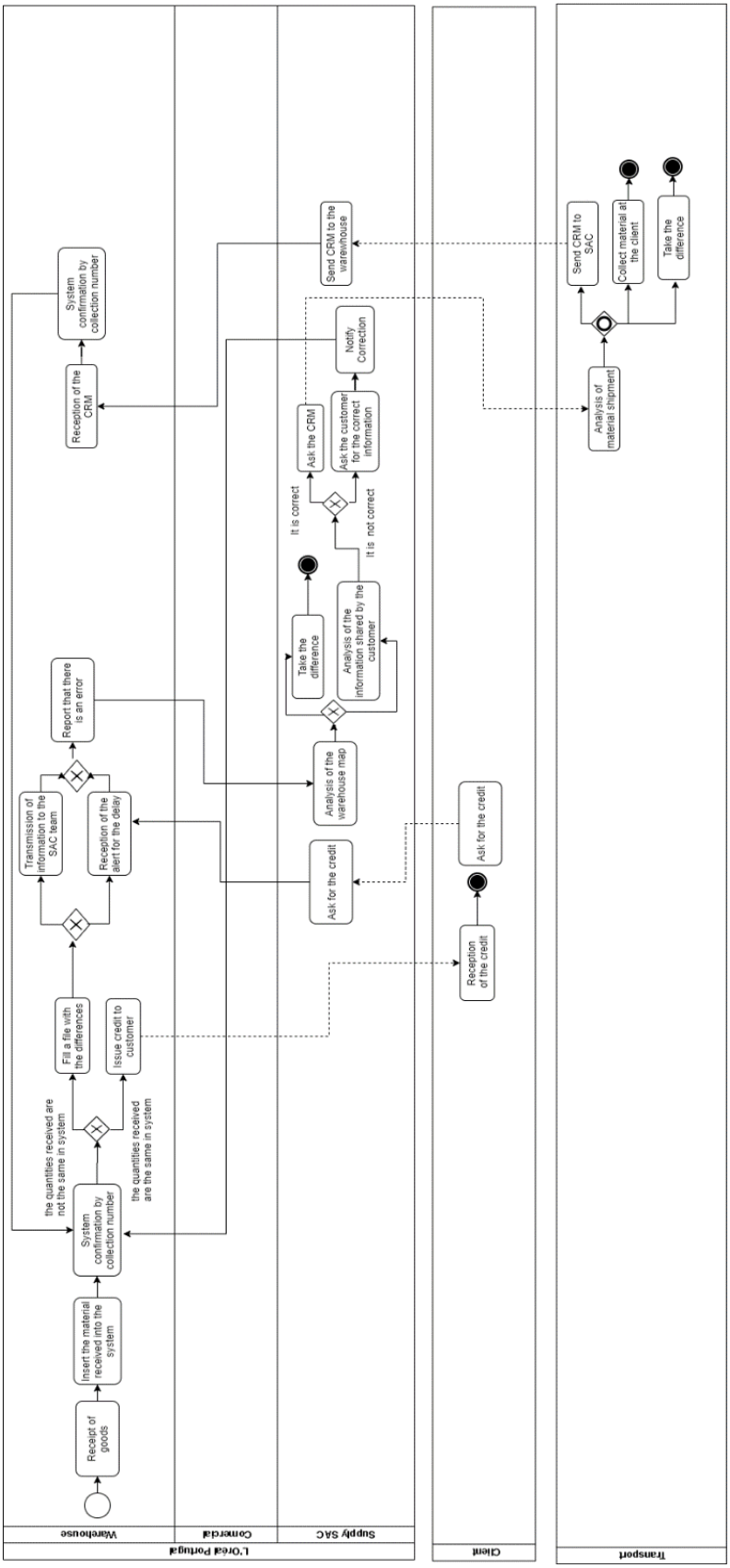


Figure 4.6 Warehouse Subproce

4.2.5. AVA (Added Value Activities) e NAVA (Non-Added Value Activities)

Given the descriptions of the delivery process, collection process and the two sub-processes, the warehouse, and the carriers respectively, there is a need to understand which activities add value and which activities do not add value to actors who make part of the four processes.

The actors to be analysed are the customer, the carriers, the warehouse and L'Oréal Portugal.

The objective of the following table is to be able to perceive what are the activities that will focus the implementation proposals and what are the activities to eliminate that do not add value to the surrounding actors.

Table 4.3 AVA (Added Value Activities) e NAVA (Non-Added Value Activities)

Owner	Added Value Activities	Non-Added Value Activities
Client	Receipt of credit; Speed in treating incidence.	Delivery of products to the carrier; Send the complaint to the carrier.
Carriers	Customer pickup; Accumulate returns in the container.	Delivery of goods at the warehouse.
Warehouse	Issuance of credit to the customer; Send of the materials addressed to the incidents to their destination (or stock or offers).	Treatment of incidents in the issuance of credit; Add differences in quantities in the file.
L'Oréal Portugal	Issuance of credit to the customer; Customer satisfaction; Speed in the treatment of the incident.	Treatment of incidences in the returns map; Communication with the carrier to detect errors.

4.3. Identification of Opportunities to Improvement

After a detailed analysis of the delivery process, return process, and the sub-processes previously described, it is possible to identify which are the main wastes along the process, which translate into opportunities to improve the efficiency of the collection process and reduce the number of collection orders

Table 4.4 Identification of opportunities to improvement

Opportunities for improvement	Process	Type of Waste	Proposal
A. Long credit waiting time	General Return Process	Delays; Excessive movement	1
B. The high number of damaged products	General Return Process	Delays; Inefficiencies	2
C. Incoherence between what is collected and what is in the system	Transporter Subprocess	Delays, Excessive Movement, Communication Errors	3
D. Excess of returns in treatment	Warehouse Subprocess	Delays, Resources Inefficiencies, Communication errors	4

For this stage of the project, informal semi-structured interviews with participants in the process, direct observation in the entire process, participatory observation concerning the Customer Care treatment of incidents, and a focus group with the Supply team were carried out to validate the identified wastes. The purpose of these information is to identify opportunities for improvement in the entire return process, to take advantage of activities that add value to the customer and the company and eliminate tasks that do not add value to the surrounding actors, represented in the previous table.

When analysing the table 4.2, it is evident that it is difficult to act in the correction of errors by the commercial team, since the mistakes made by them are in the placing of orders and only they will be able to mitigate it. Regarding requests to modify the order after an invoice has been issued, it is impossible to act on the customer's decisions. In this case, as L'Oréal is focus on customer satisfaction, the customer wanted order is sent and it is collected what was sent by his mistake. In this way, the incidences that will be analyzed are damaged products, planned collection and carrier error.

The entire process was analysed from the moment the customer makes his request for collection until the moment he receives the credit. The opportunities for improvement and the associated waste are identified in table 4.4.

Improvement Opportunity A: Long credit waiting time

The first improvement opportunity was identified, the long waiting time for the issuance of credit. Currently, based on data extracted from January 2018 until October 2019, the lead-time for collections is 25 days, which means that, after delivering the products, the customer expects about 25 days to receive the credit. The fishbone diagram was carried out to analyse the causes adjacent to this opportunity for improvement (see Fig. 7.10).

People: the excessive waiting time is caused mainly by the lack of knowledge of the process of outsourcing workers who do not know the needs of the company and do not have proper training. The lack of customer intervention is also influencing credit issuing waiting time because the more the customer knows that their participation in the process is important, the better. Currently, customers do not deliver the products dully identified and, in most cases, they do not deliver inside boxes, which represents a major congestion. Thus, there is a lack of customer intervention and, even more important, lack of cooperation.

Measurement: the fact that the process is manual, both tasks of collection and sorting collections, can cause some consequences such as incomplete collections, forgetfulness in the treatment of some product. The dependence on the processes is also a matter of concern because the proper functioning of the warehouse sub-process depends on the carrier's sub-process, which in turn depends on the information from the customer to the company and from the company to the business partners.

Machine: the collection processes and the return handling processes are manual, and this fact can be more disposed to the existence of errors.

Materials: there is no support material for collection, that is, when collecting from the client, material such as boxes, tape or labels is not available. This fact makes it difficult to sort the materials when they arrive at the warehouse.

Methods: the method of filling the container is based on simply filling it, which consequently increases the waiting time for the credit. Another established method is the control of the goods to be carried out only in the warehouse, that is, the goods are not checked by the carriers.

Management: another significant detail is the fact that the client does not participate in the process and is not aware of how important it is that the information that is transmitted is reliable. In this way, it is possible to understand that there is a management failure between the actors of the process, that is, between the LOP, carriers, warehouse and customer.

Thus, this problem gives rise to the following wastes:

— **Delays**: handling of the products/goods returned by the customer is a complex process that requires synchronization between all the stakeholders in the process. However, the possible incidences in the process, such as the treatment of the difference between what was collected and what was requested

cause an increase of waiting time, which represents an upheaval to the client and the company is also left with a pending order to be resolved; and

— **Excessive movement**: associated with collections, both the carriers and the warehouse, carry out excessive movements until the function is completed. The carriers sometimes make more than one trip to the customer because they do not take the necessary number of labels for the volumes to be collected. This may be caused by the lack of information on the number of volumes to be collected. In the case of the warehouse, it ends up having an increase in the physical flows in the search for the returned merchandise. When the goods arrive, they are sent to a place waiting to be sorted. This sorting is done manually, which is difficult when there is more and more volume to be sorted, hereafter the increase in physical flows.

Improvement Opportunity B: High number of damaged products

The high number of damaged items is considered the third biggest cause adjacent to collection requests for the period under review, from January 2018 to October 2019 and it becomes an interesting opportunity for improvement (table 4.4). By analysing the data collected in SAP, it is possible to check that the collections of damaged products represent 10.8% of the total collection requests. The focus will be on the treatment of causes of damaged products. The fishbone diagram (figure 7.11) was carried out to analyse these causes and understand the difficulties.

People: those responsible for delivering the products are also responsible for delivery several orders from different companies, which means that they do not consider the type of material that is circulating. In the case of L'Oréal products, these are often fragile and, if they are damaged, their commercialization is impossible.

Measurement: another cause of the existence of damaged orders is the complexity of the delivery process, which is deductible given the route that the orders take from the moment it is prepared in Spain, unloaded in the carrier's warehouse, loaded in a distribution transport until the moment that it is delivered.

Machine: in the case of the DPD carrier, an automatic sorter is used to separate the routes. Although its efficiency, it ends up damaging more fragile products.

Materials: the fragility of the materials and the ease of damaging them was a topic widely discussed between the company and its business partners, the carriers and the warehouse. The materials are delivered to the customer in boxes that are easily breakable and arrive at the customer often in poor condition.

Methods: the methods of preparation of the goods are quite variable, it can be on a pallet, in boxes that come from the factory or in warehouse boxes. Small products often come in large boxes with a lot of air inside which can damage its condition during its journey.

Management: the need to improve coordination between the management category's stakeholders was evident. In the case of the warehouse, it was found that inappropriate packaging materials were used since the box was easily scratched and broken and the glue peeled off easily. In the case of the carrier, more specifically DPD, the use of sorter at the time the orders were segmented caused damage to volumes, despite its efficiency.

Thus, this problem gives rise to the following wastes:

- **Delays**: the delays on the collection of products by the carrier, the delay that occurs by the warehouse in its treatment and when the Customer Care Team control the entire process;
- **Inefficiencies**: from the moment a damaged product is delivered, and a collection request is made, the operations that are carried out do not generate value and result in a cost for the company.

Improvement Opportunity C: Incoherence between what is collected and what is in the system

One of the biggest struggles is when the merchandise arrives at the warehouse, it is checked and does not match what is in SAP, which delays the issuance of the customer's credit. This opportunity for improvement is a challenge as there are several possibilities for error at various stages of the return process. Thus, the best way to define a corrective measure is to capture the underlying causes of this problem and thus attack them with an improvement proposal capable of correcting the error. The fishbone diagram was the tool used to discover the causes (figure 7.12).

People: based on the analysis carried out, the root cause of this problem is the poor integration of the customer and the carriers in the process as they are not aware of how important their collaboration with the company and the process is.

Measurement: the reverse logistics process is long and complex. It goes through several stages and depends on different process participants.

Materials: there is a lack of support materials for collection. The carrier does not provide materials such as boxes, tapes or identification tags. It only places internal tags that do not help the process as they are only part of their own process.

Methods: the beginning of the reverse process is critical to be successful as it influences the whole process. Thus, it is expected that the appropriate delivery of the goods will be made to the driver, properly packaged and identified. However, it does not always happen, as there are situations where the customer either delivers the products without the original box, does not deliver all the products, delivers volumes without identifying the shipment or event delivers the product unpacked directly to the driver . In these situations, it is the drivers who ask the customer if they can place the products in boxes and identify them or put the products in the carrier's plastic bags.

Management: as noted above, neither the carrier nor the customer are aware of how important it is to deliver the products properly packaged and identified as they will go through many

levels until they reach the warehouse. If they arrive incomplete or unidentified, the credit is not issued. In the case of carriers, drivers only inform they will collect the products, however, they do not control whether the collection is identified with the internal number L'Oréal. They only put a label with their internal number as a proof of collection. This situation proves that there is no agreement on the necessary steps and methods between the process participants.

Thus, this problem gives rise to the following wastes:

- **Delays**: the wasted time is reflected in the carrier's sub-process because it is the driver who has to wait for the customer to rectify the failed packaged and it is also the carrier who makes many trips to try to collect everything. The efforts to identify the reason why there is no match between what is in order in SAP and what was received are also a good example of wasted time in the warehouse sub-process;
- **Excessive Handling**: when the carriers tries to collect the products and they are not ready to be collected, there are unnecessary movements and added routes that cause increases the physical flow; and
- **Communication errors**: communication between stakeholders in the process is the basis for its proper functioning. The lack of communication between the Customer Care team and customers as well as between the carrier and the Customer Care team may result in misinformation (about the materials to be collected), misunderstanding between date and time of collection and lack of specification in the requirements for the collection.

Improvement Opportunity D: Excess of returns in treatment

The accumulation of unresolved returns results in congestion of returns, thus hindering the warehouse's sorting operations. The net value of outstanding credits increased significantly in 2019 because when L'Oréal Portugal contracted in July with the new carrier DPD, the number of incidences and damage increased, which led to the growing demand for returns. Although, operations are now more stabilized, the adaptation period has passed, the volume of outstanding loans has reached a worrying value and its treatment has become an opportunity for improvement. Thus, to find out how to approve this congestion of unprocessed pallets, the fishbone diagram analysis was carried out to know how to rectify the incident (figure 7.13).

People: it should be noted that there is little communication between both the Customer Care and warehouse teams as well as there is no method of working in partnership in order to avoid this accumulation.

Measurement: the excessive number of collections per creditor causes physical congestion and congestion on the treatment map. There is a map allocated in teams where the Customer Care team and the warehouse have access and communicate. The warehouse adds all the issues and the

map dated in November 2019 includes more than 600 lines, which means that there are more than 600 issues to resolve.

Materials: poor identification of collections in packages or pallets. There are internal labels of the carriers, however, these are not useful for the warehouse because they mention neither the customer's number nor the number of the incident in SAP.

Methods: prioritization of orders according to the order of arrival method. This causes the oldest orders to fall into forgetfulness and no attention is paid to the maturity of the pending collections.

Management: inexistence of a manual of procedures regarding the treatment of the map, which in turn will allow the issuance of pending credit.

Thus, this problem gives rise to the following wastes:

- **Delays**: the increase in collections under treatment consequently increases the waiting time for the issuance of the customer's credit;
- **Inefficiencies**: the costs of using the space in the warehouse increase with the accumulation of merchandise from the unresolved credits because, while the credit is not issued, the merchandise to be analysed is in the warehouse and occupying space. The returned merchandise only follows another destination when the credit is closed in the system and the order is resolved, that is, when the customer receives the credit, the material follows a new destination. If the material is in good condition, it will be included in the company's stock again; if it is not in good condition, it will be destroyed or go for donation; and
- **Communication errors:** communication between the warehouse and the Customer Care team occurs through a file with no response deadlines and no methodologies created.

4.4. Proposals of solutions strategies

In this chapter, the improvement proposals studied will be presented based on the improvement opportunities and respective wastes previously mentioned.

The following table presents the improvement proposals and their interconnection with the improvement opportunities. The proposals were planned and studied in the focus groups carried out by the Customer Care and Supply teams and their viability was checked in the direct observation made by the team. Flowcharts were one of the tools used to analyse possible implementations and thus validate possible impacts.

Table 4.5 Proposals of solutions strategies

		Inefficiencies			
		A . Long credit waiting time	B. High number of damaged products	C. Inconsistency between what is collected with what is in the system	D. Excess returns in treatment
Implementation Proposals	1. Modify delivery boxes and use of resistant adhesive tape		X		X
	2. Collection identification tags	X		X	X
	3. Methods of handling the return map	X		X	X

4.4.1. Improvement Proposal 1: Modify delivery boxes and use of resistant adhesive tape

To reduce the high number of damaged and excess returns in treatment, it was found that the decisions to be considered would affect the delivery process and not the process understudy of the collections.

After conducting the focus group with the team, two types of proposals emerged, one of which is to be implemented in the warehouse and the other in the carrier. The proposal to be implemented in the warehouse involves changing the box used in the packaging process to a more resistant box capable of assuring the delivery of products without incident. The proposal to be implemented in the carriers consists in choosing the method of sorting the orders to be delivered since there is the possibility of being manual or using the sorter.

Proposal implemented in the warehouse

Regarding the warehouse, in February 2020, it was proposed to change the packaging box.

The development of this proposal started with a version of a new box in February (called version 2.5), and this version was later adapted to a more suitable version and started to be used in July (version 3.0).

There was the need for an intermediate box since the version 2.5 was immediately available and ready to use, unlike the 3.0. There was an urgency to rectify the packaging.

Thus, the following comparison is for the current Box with Box 2.5. The warehouse did not provide information regarding Box 3.0 as it is still in the testing phase.

— **Change in the thickness of the microchannel for mediumwave:** a change that translates into an increase in the thickness of the cardboard, from 2 mm to 5 mm; the initial box (a) has 2mm and the 2.5 box (b) has 5mm (see Fig. 4.9);

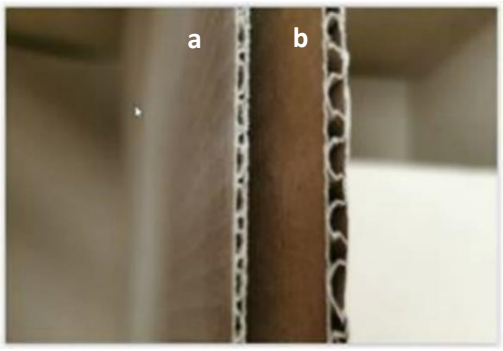


Figure 4.7 Thickness

— **Increased strength of the box:** this increase was proven through a 400 kg box compression test where this coefficient measures the maximum weight that can be positioned on the top of the box. The previous box held a maximum weight of 250kg;

— **Symbology**: a space for the label has been included to ensure that this essential element is always placed in the same position in all boxes and, thus, facilitate the dispatch, sorting and identification of the actors in the process. Both images that follow are from Box 2.5 where the frame where the label is placed (a) and the box with the label already displayed in the correct place (b). The previous box had no mark. (see Fig. 4.10);

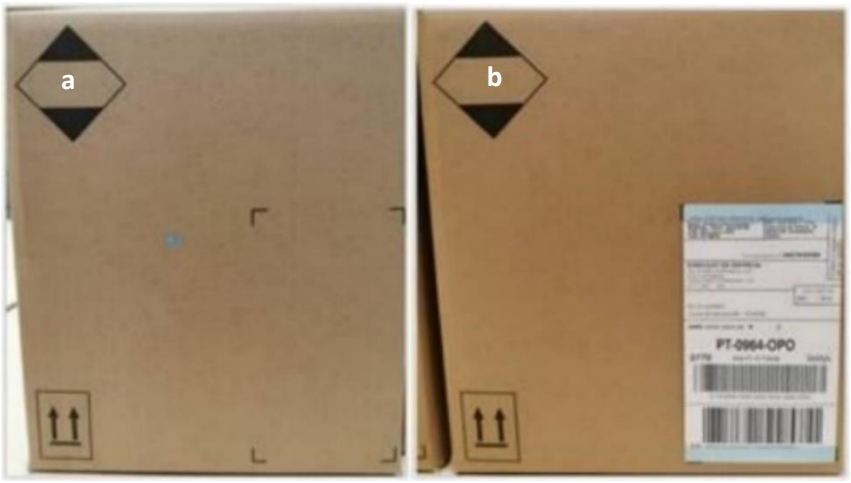


Figure 4.8 Box symbology

— **Adhesive tape on the bottom of the boxes:** change to a more resistant tape to reinforce the bottom closure of the box. The following images represent the old boxes, the big one (a) and the small one (b). The brown ribbons represent the way it was placed in the old box and the red rectangles represent the way the new ribbon will be placed. In this way, the use of 3 tapes on the large and 2 tapes on the small will be reduced to 1 tape, 1 horizontal line in the central part in both boxes (see Fig. 4.11).

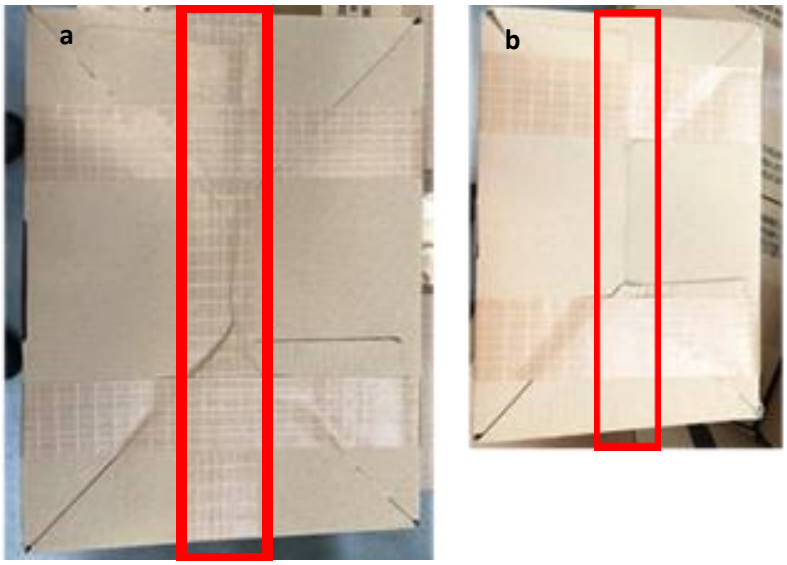


Figure 4.9 Adhesive tape

Follows a summary of changes from the old box to Box 2.5.

Table 4.6 Information of the old box and Box 2.5

Boxes	Old box	Box 2.5
Thickness	2 mm	5 mm
Increased strength of the box	250 kg	400 kg
Symbology	-	Frame
Adhesive tape	3 ribbon (large box) and 2 ribbon (small box)	1 horizontal ribbon

Regarding Box 3.0 to be implemented in July, it was proposed to design a box without the need to add adhesive tape. Particularly, to open Box 3.0 it is necessary to break it, using a cardboard tape that is previously included in the perforated box. It will be more resistant than 2.5. In the following images, it is possible to check in the first two photography how the box is opened, where the use of glue tape is not necessary. Cardboard tape is sanded through the box.

Figure 4.10 Box 3.0

In the first photograph (a) it is possible to see how Box 3.0 is opened, using a cardboard tape. In the following image (b) it is noticeable how the box looks after the tape is removed and in the last photography (c) shows the status of the box after it is opened.

Despite all the resistance that it presents and all the guarantee that it offers in the deliveries without problems, it is important to notice the visible disadvantage that consists in the impossibility of reusing the box 3.0.

Proposal implemented in the carriers

Regarding the proposal for implementation in the carriers, it was requested to manually sort the orders to be delivered with the Box 2.5. In July 2020, after implementing Box 3.0, the DPD carrier will be allowed to use the sorter again and thus make deliveries faster, safer and more efficiently.

The move to Box 2.5 will bring benefits that focus on the causes identified in the fishbone diagram for inefficiencies: high number of the damaged product and excess of returns in treatment.

Those causes chosen to focus were:

- **People**: ignorance of fragile products;
- **Measurement**: increased number of damaged products;
- **Machine:** use of the old box and the order weighing sorter;
- **Materials**: weak material used, box rope up and tear easily, boxes are easily crushed; and
- **Methods**: unsuitable packaging method.

4.4.2. Improvement proposal 2: Collection identification tags

To correct the inconsistency of what is collected with what is in the system, to reduce the waiting time for credit and to reduce the congestion of collections that are due for treatment, the proposal for

improvement will focus on the beginning of the process so that this investment will have repercussions at the end and thus provide the match and the expected credit.

Collection identification tags will be the proposal submitted. As presented in the general collection process As-Is, the customer complains about what he wants to return to the Customer Care team or to the commercial team, which in turn, transmits the information to the team. The customer care team is responsible for placing the order in the SAP system. Then, the collection request is sent to the carrier through EDI and it is collected without any extra information (number of volumes or confirmation that the volumes are ready to be collected).

However, with the proposed implementation of the label, a new stage will be added. The L'Oréal team is responsible for filling the label with all the important and necessary data so that the warehouse can issue the credit.

This label will bring benefits that focus on the causes identified in the fishbone diagram for inefficiencies: long credit waiting time, inconsistency of what is collected with what is in the system and excess of returns in treatment.

The causes chosen to focus were:

- **People**: lack of customer intervention, outsourcing staff without knowledge of the process and lack of communication between the warehouse team and the Customer Care team;
- **Measurement**: complex process and excessive collection requests;
- **Materials**: lack of customer support material;
- **Methods**: inexistence of a collection method in partnership with the customer and poorly structured collection methodology; and
- **Management**: inappropriate coordination between company and carrier and inappropriate coordination between company and client.

The label follows the structure of figure 4.13 and must include the following data: division (*divisão*), customer number (*nº do Cliente*), return number (*nº da devolução*), collection number (*nº da recolha*) and the number of volumes (*volume*) to be collected. If the customer does not have a printer, he is asked to manually write the return number on the volume instead.

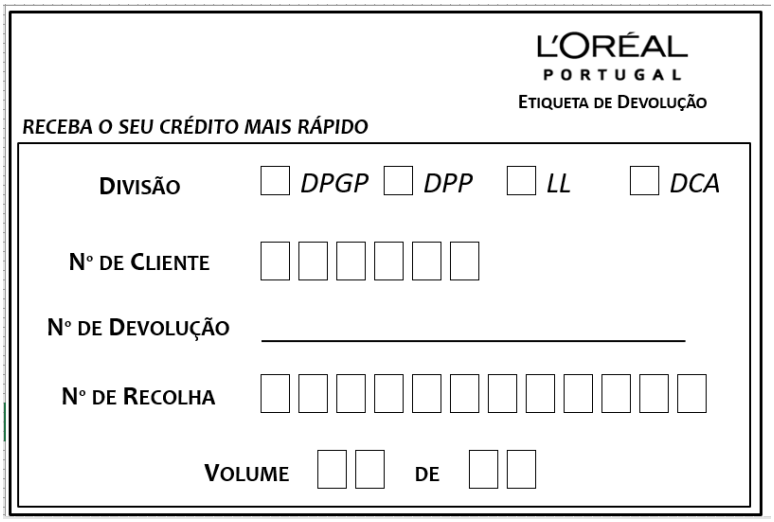


Figure 4.11 PPD Label

This label includes the data that the warehouse needs to have to issue the credit immediately. Currently, the division has more than 90% of all customers' email addresses in the system, which favours the implementation.

For customers who do not have an e-mail address in the system, the collection number will be transmitted by call and the number will be recorded manually on the volumes since the company has 100% of the customer numbers.

This implementation will have an impact on the As-Is mapping previously presented and is going to follow To-Be mapping represented in the figure below.

The general collection process remains the same, however, it now includes the step of sending the completed label to the customer, the step of preparing the volumes with the label as well as the step of the notification sent by the customer about the volumes being ready to be collected.

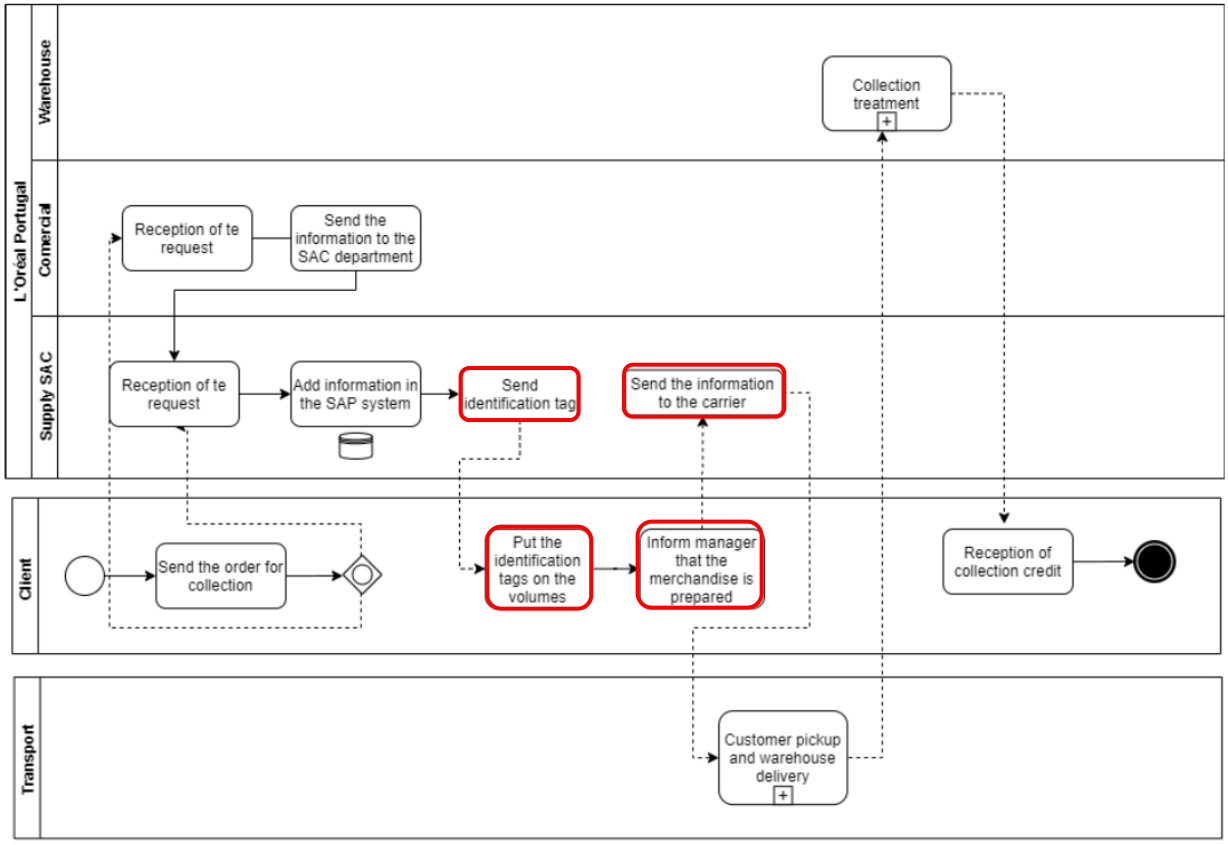


Figure 4.12 To Be Map of Customer Collection Process

4.4.3. Improvement proposal 3: Methods of handling the return map

A measure to be considered to eliminate the problem of excess returns in treatment, reduce incoherence in the warehouse and the ability to decrease the waiting time for credit would be the creation of a methodology for handling the returns map. This map includes all collections with incidences where the material that arrived at the warehouse does not match the information in the system and there are differences in units or materials.

If the map has the answers needed to resolve the issues, the warehouse will have an easier tracking goods and thus eliminating congestion.

This map is filled by the warehouse with all the returns incidences that they were unable to handle on their own and, therefore, they need the help of the Customer Care team to understand how they should proceed.

Currently, there is no defined methodology between the Customer Care team and the warehouse. The information is added to the map without criteria, there is no color to identify the indications and the Customer Care team adds the treatment when possible.

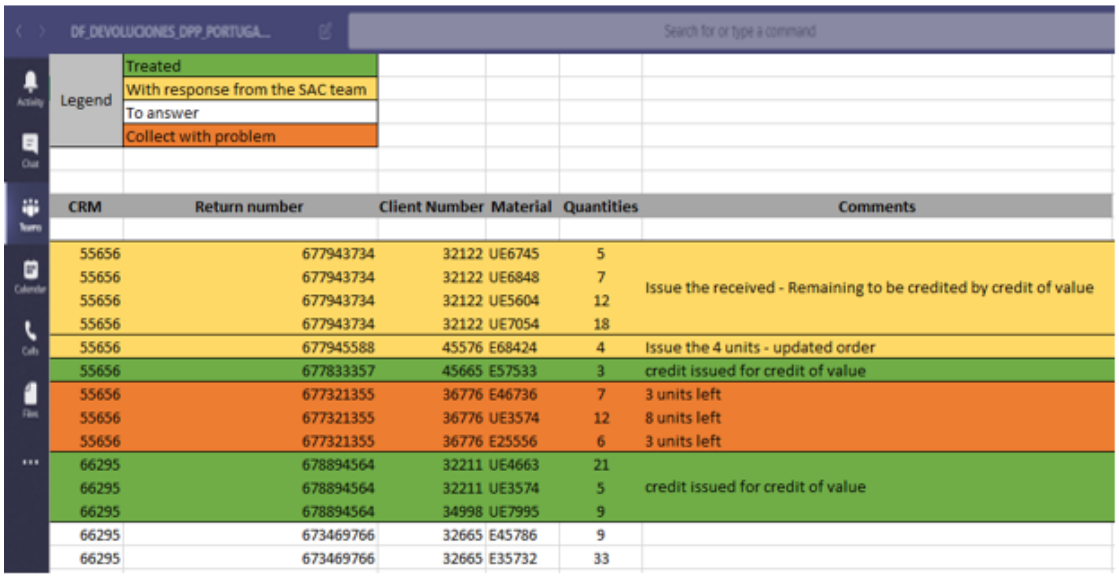
To follow up all incidents on the map, the action plan involves defining days for the warehouse to add information and treat incidents with the responses already added and days for the Customer

Care team to respond and help. Thus, Customer Care team spends three days with this process and the warehouse spends two, as shown in the following figure.

Table 4.7- Information schedule

Monday	Tuesday	Wednesday	Thursday	Friday
Customer Care team	Customer Care team	Customer Care team	Warehouse	Warehouse

The file will include a caption (figure 4.16) by colour for guiding the two teams and the communication column between them is the comments column. When the cell in this column is blank, it means that the Customer Care team must provide the information; it is yellow when the Customer Care team responds and is waiting for treatment from the warehouse it is green when it is solved, the credit is issued and it is the Customer Care team that must pass the lines from the old incident to the history sheet; it is orange when there is a difference in the units or materials and there must be another type of intervention, for example, an indication of the area manager to advance with credit of value in the remaining units. Who decides what to credit is the manager and the procedures are all dealt with via email. In the following figure, it is possible to find the appearance of the file with an example of four different states.



CRM	Return number	Client Number	Material	Quantities	Comments
55656	677943734	32122	UE6745	5	
55656	677943734	32122	UE6848	7	Issue the received - Remaining to be credited by credit of value
55656	677943734	32122	UE5604	12	
55656	677943734	32122	UE7054	18	
55656	677945588	45576	E68424	4	Issue the 4 units - updated order
55656	677833357	45665	E57533	3	credit issued for credit of value
55656	677321355	36776	E46736	7	3 units left
55656	677321355	36776	UE3574	12	8 units left
55656	677321355	36776	E25556	6	3 units left
66295	678894564	32211	UE4663	21	
66295	678894564	32211	UE3574	5	credit issued for credit of value
66295	678894564	34998	UE7995	9	
66295	673469766	32665	E45786	9	
66295	673469766	32665	E35732	33	

Figure 4.13 Legend and illustrative example

The definition of a method of handling the return map will bring benefits that focus on the causes identified in the fishbone diagram: long credit waiting time, inconsistency of what is collected with what is in the system and excess of returns in treatment.

Those chosen causes to focus were:

— **People**: lack of customer intervention, staff without knowledge of the process and lack of communication between the warehouse team and the Customer Care team;
— **Measurement**: complex process and no manual of procedures;
— **Methods**: prioritization of orders according to the order of arrival; and
— **Management**: inappropriate coordination between company and transport, inappropriate coordination between company and client.

4.5. Evaluation of proposals

The proposals presented above have the main purpose of achieving improvements in the reverse loigstics process as well as improving the delivery process at the level of efficiency, reducing waste and thus achieving the objectives to which the study is committed.

To analyze the feasibility of the proposals, the following KPI (Key Performance Indicators) will be used for the study, as shown in Table 4.7 and will be used as well as the wastes mentioned in section 4.4 will also be analyzed.

Table 4.7 Evaluation of proposals

<table>
<tr><th colspan="2" rowspan="2"></th><th colspan="2">Evaluation of Proposals</th></tr>
<tr><th>Quantitative evaluation</th><th>Qualitative evaluation</th></tr>
<tr><td rowspan="3">Implementation Proposals</td><td>1. Modify delivery boxes and use of resistant adhesive tape</td><td>KPI 1- Number of damaged products;

KPI 2- Number of incomplete orders.</td><td>KPI 4- Customer satisfaction;

KPI 5- Cost reduction.</td></tr>
<tr><td>2. Collection identification tags</td><td rowspan="2">KPI 3- Credit waiting time.</td><td>KPI 6- Better communication;

KPI 7- Better warehouse organization;

KPI 8- Reduced distance traveled.</td></tr>
<tr><td>3. Methods of handling the return map</td><td>KPI 6- Better communication;

KPI 4- Customer satisfaction.</td></tr>
</table>

4.5.1. Evaluation of Proposal 1 – Modify delivery boxes and use of resistant adhesive tape

The implementation of Box 2.5 and the use of resistant adhesive tape will focus on reducing the number of damaged items. A reduction of the number of product shortages is also expected since the order will be less likely to open on the way and not lose units on the route.

Regarding qualitative assessment, improving orders' status increases customer satisfaction as the product arrives as expected. The KPI cost, despite sending a quantitative variable, will be analysed qualitatively because it is impossible to quantify it. In this way, it is also expected that the L'Oréal investment in the exchange of the boxes will pay off as there will be fewer costs in handling the incidents.

The proposals (including both the proposal to be implemented in the warehouse and the carriers) will impact the waste as follows:

- **Delays** - after implementing Box 2.5, an improvement in delivery time is expected since the orders will be better identified, with the label always in the same place and it will facilitate the carriers work. After implementing Box 3.0, greater speed and efficiency in delivery are expected, as the DPD carrier will be able to use the sorter again; and
- **Inefficiencies** - a major impact on costs is expected because, despite all the investment in the two versions of the new boxes, the orders will arrive at the customer in a consumable state without being damaged. The associated costs reductions with the request for collection from carriers, treatment of collections in the warehouse and damaged products will be more significant than the investment.

4.5.2. Evaluation of Proposal 2 – Collection identification tags

The implementation of the labels will have a quantitative impact on the effective reduction of the waiting time for the credit, that is, since lead time will be shorter.

Qualitatively, on the other hand, labels will simplify the process, making communication simpler and easier and will also facilitate the handling of collections in the warehouse, making it more organized and leaner. Another aspect to be considered qualitative in the impossibility of quantifying it is the reduction of the distances travelled by the carrier in an attempt to failed collections, as it will only start to collect the goods with the customer's information that everything is ready to be collected. The proposals will impact the waste as follows:

- **Delays** - reduction of time for handling the collection due to facilitation in the process. The volumes arrived at the warehouse without any identification or only with the delivery number several times. This way, it will be avoided the waste of time searching for the collection order or even waiting for the help of the Customer Care team to discover the information presented on the label:
- **Excessive Movement**- As the customer is now responsible for identifying the volumes, it is expected that he will prepare the volumes and place the label instead of waiting for the carrier to do this task. As such, the carrier will always have the goods ready to pick up and collection delays will be avoided; and

— **Communication errors** - the implementation of the label will create a methodology that will improve communication between all, as the Customer Care team knows that they have to send the labels and all instructions, the customer knows that he must close all boxes and identify them and the carrier knows that it can only collect closed and identified packages. The definition of rules and methodologies is the best technique to help with communication as it is a manual of procedures that they must respect.

4.5.3. Evaluation of proposal 3 - Methods of handling the return map

The creation of the manual of procedures with methods of communication between the Customer Care and Supply teams with the warehouse on the returns map in the Microsoft Teams program is analysed quantitatively according to the effective reduction in the waiting time for credit.

Regarding the qualitative impact, an improvement in communication between Iberian teams is expected as well as an increase in customer satisfaction as the issuing of credits will be more efficient.

The proposal presented will impact the following presented:

— **Delays**: an effective reduction in waiting time for credit will be visible, as the creation of the manual of procedures will speed up the entire process;

— **Resources Inefficiencies**: the reduction of congestion will have an impact on space, which consequently leads to a reduction in storage costs and an increase in the number of materials that re-integrate the stock; and

— **Communication errors:** the creation of methodologies in the treatment of incidences between teams helped significantly in their relationship.

4.6. Implementation and Assessment of Results

The analysis of the three implementations will be carried out in two parts. The reason for this separation is justified by the fact that the implementations were carried out in different phases.

Thus, four periods will be analysed. The study start date was chosen because it was the first month where the delivery operations began to be carried out by the two carriers, CTT and DPD. Thus, the initial period is from July 2019 to October 2019.

This is followed by two different implementation periods: the first between November 2019 and December 2020, where the label on the boxes was implemented simultaneously with the definition of the method for handling the returns map and the second period from January to February where the change of the box and the adhesive tape were implemented. It should be noted that the period under analysis ends in March 2020 in order not to include the impact caused by the global

pandemic since it started to impact operations on the subsequent dates. However, this month will still include evidence of the pandemic in the final results. These periods are represented in the figure below.

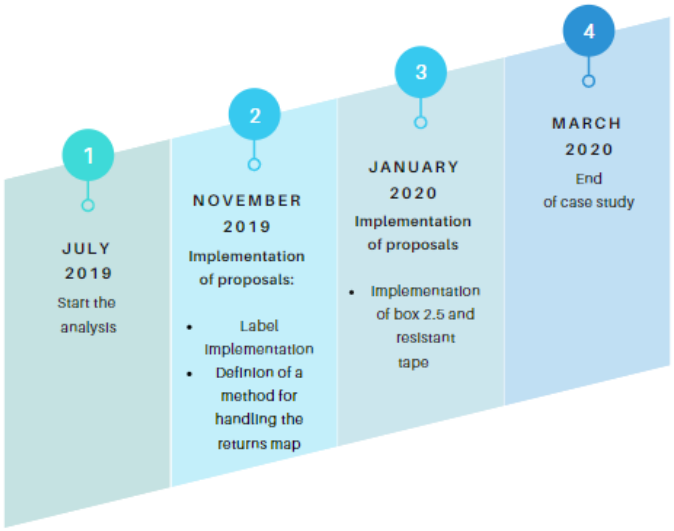


Figure 4.14 Implementation schedule

The table below presents the results chronologically and according to the implementation phases. The values presented indicate the monthly average, in days in the case of credit waiting time and order units in the remaining variables.

As an evaluation criterion, three KPI were selected: the analysis of the number of damaged products (KPI 1), the number of incomplete orders (KPI 2) and credit waiting time (KPI 3).

Table 4.8 Implementation's results

	2019		2020	
Dates	**June to October**	**November to December**	**January to February**	**Mach**
Ations	Start of analysis	Label and procedures Manual Implementation	Implementation of box 2.5 and resistant tape	End of the study case
KPI 1 - Number of demaged product	45	24	5	22
KPI 2 - Number of incomplete orders	38	60	22	59
KPI 3 - Credit wating time	48	38	27	90

When analyzing the table, the month of March does not include the expected results of a continuous evolution of improvement in the processes as it includes reflections of the beginning of the pandemic as the carriers were strongly impacted and the hairdressers closed their doors, which consequently impacted the physical delivery flows.

In this way, it follows the analysis of the quantitative KPI represented in the table above and the analysis of the respective qualitative KPI for each implementation.

4.6.1. Implementation 1: Label Implementation

The implementation of the label carried out in November had a positive impact.

To analyse the changes, we use the respective KPI: credit waiting time (KPI 3). Initially, in the period from June to October, the customer waited an average of 48 days for his credit and, after the implementation of the label, there was an average reduction of 10 days between November and December and reduced it again to an average time of 27 days in the timeframe from January to February. In March, the average time increased to 90 days, data influenced by the world pandemic.

Regarding the remaining qualitative Key Performance Indicators – better communication (KPI 7), better warehouse organization (KPI 8), reduced distance traveled (KPI 9) – there was a positive impact as the labels enabled better and simpler communication. It also greatly facilitated the handling of collections in the warehouse and it reduced the distances traveled by the carrier since they started to collect only when they received the notification that everything is ready to be collected.

In this way, it can be concluded that this implementation was successful and it is expected that, after this conditioning, this implementation will again provide positive results.

4.6.2. Implementation 2: Implementation of the manual of procedures for handling the returns map

The implementation of the methodology developed to deal with the returns map between the teams from Portugal and Spain was implemented in the same month as the label, in November 2019, and its impact is evaluated by the same KPI: credit waiting time (KPI 3).

After implementing this proposal, there was a significant improvement, since it showed an evolution of 48 days of credit waiting time before implementation, to 38 days, from November to December. This value decreased again to an average wait of 27 days in January and February as it was the time when the map was updated and with less incidence.

In March, the average number of credit waiting time increased to 90 days, as a result of global circumstances.

Regarding data collected from a map analysis, in October, the map reached more than 600 lines of incidence waiting for a response to treatment and, in February, it had 25 lines to be resolved.

Regarding the qualitative KPI associated with this implementation, there was an effective improvement in communication between the teams (KPI 7) and as customers wait on average less time for their credit, it consequently led to an increase in their satisfaction (KPI 6).

In conclusion, this implementation not only had a good result in the immediate future in quantitative terms but in qualitative terms, it has improved communication between teams and increased customer satisfaction.

4.6.3. Implementation 3: Implementation of Box 2.5 and resistant tape

The implementation of Box 2.5 and the resistant tape was carried out in February 2020 and had a significant impact, even after previous implementations. This change is evaluated according to the KPI of the number of damaged products (KPI 1) and the number of incomplete orders (KPI 2).

Regarding the impact on the number of damaged products (KPI 1), at the beginning of the analysis, it presented a monthly average of 10,8% incidences of collection requests (see Table 4.2). The fact that this number is too high is justified by the beginning of the partnership with the carrier DPD. In the months that followed, it reduced to an average of 24 monthly collection orders as DPD stopped using the Sorter in November, which causes a lot of damage to orders. However, the big reduction occurred after the implementation of the box: in the period from January to February, there was an average of 5 incidents per month.

Regarding the second indicator, the number of orders delivered incompletely (KPI 2), it was found that the incidences in deliveries averaged 38 complaints in the period from June to October and 60 complains from November to December and after the implementation of the box and tape, the value decreased to an average of 22 incidences, which was quite satisfactory for the Supply team (see Table 4.8). The result in the penultimate period was quite impressive and it is expected a proportional continuity in reducing this number.

The other KPI related to this implementation also showed satisfactory results because the company, especially the commercial team, received very satisfactory feedback, which increased the level of KPI 6 (customer satisfaction).

4.7. Conclusions of the Chapter

Taking into account the objectives and research question of this thesis project, in this chapter lean philosophy was applied as well as the process mapping, fishbone diagram, key performance indicators tools that allowed for a more careful analysis and study of all processes.

The use of these tools together with informal interviews, focus groups and direct and indirect observation of the process, allowed to identify the opportunities for improvement presented. These opportunities for improvement were developed with proposals to be implemented, which were, in turn, validated by the supply director.

Subsequently, it is possible to analyze the results of the implementations through the defined KPIs both in the delivery process and in the process of collecting and handling the returns.

The implementations carried out were: modification of delivery boxes and alteration of the type of resistant adhesive tape; implementation of collection identification tags; and definition of methods of handling the return map. The first proposal, to modify the delivery boxes and use resistant adhesive tape, had an impact in reducing the large number of damaged products and excessive returns in the treatment. The second implementation, using identification tags, reduced the long waiting time for credit, reduced the inconsistency between what is collected and what is in the system and reduced the excess of returns in treatment. Finally, the third proposal, definition of treatment methods for the returns map, impacted the credit waiting time, reduced the inconsistency between what is collected and what is in the system and reduced the excess of returns in treatment.

5. Conclusions

The concept of reverse logistics is one of the most current concepts in the world of logistics given the need to improve the service provided to the customer and L'Oréal Portugal is distinguished by Its desire to improve its services. The present case study represents a complex collection process that needed intervention because the waiting period for credit related to a collection made at the client took an average of 25 days to be issued. Thus, it is possible to conclude that the main objective of this thesis project is to reduce collection orders as well as improve the efficiency of L'Oréal's reverse logistics which goes against the research question defined initially "*How to reduce collection orders and thereby increase L 'Oréal reverse logistics process efficiency? ".*

In order to achieve this objective and to be able to answer the research question, a literature review was developed that properly supports the implementation proposals presented. In the literature review, the philosophy used was the lean philosophy as it meets the stated objective of improving the reverse logistics process, reducing the number of collection requests and reducing the inefficiencies of the process.Subsequently, the methodology was developed in order to idealize the entire project and all the necessary tools for it to be successful.

In the chapter of the case study it is possible to find a description of the company L'Oréal, the characterization of the Professional Products Division as well as the description of all the functions of the Supply department that actively participated in the development of the project. A description of other stakeholders such as the warehouse and the carriers, CTT and DPD, is provided.

After describing all the As-Is processes, it has identified the following opportunities for improvement: long credit waiting time; the high number of damaged products; incoherence between what is collected and what is in the system; and excess of returns in treatment. These inefficiencies were proposed to be improved/elliminated , particularly, by presenting the following proposals of improvement: modify delivery boxes and use resistant adhesive tape; implementation of collection identification tags; and definition of methods of handling the return map.

The first implementation proposal, modify delivery boxes and use resistant adhesive tape, focused on the attempt to reduce the large number of damaged products and excess returns in treatment. The second implementation of the collection tags, intended to mitigate the long credit waiting time, reduce the incoherence between what is collected and what is in the system and reduce the excess returns in treatment. Finally, the third proposal, definition of a methods of handling the return map, focused on the attempt to decrease long credit waiting time, decrease incoherence between what is collected and what is in the system and reduce excess returns in treatment. These proposals were validated, implemented and evaluated according to the defined KPIs and according to

the impact on inefficiencies. However, the project end period was brought forward to March 2020 due to the global pandemic Covid-19.

The implementation of the label was successful because, according to the KPI credit waiting time (KPI 3), there was a significant lead time reduction from 48 pending orders to 27 orders between October 2019 and February 2020. Remaining Key performance Indicators - better communication (KPI 7), better warehouse organization (KPI 8), reduced distance traveled (KPI 9) - there was a positive impact as the labels enabled better and simpler communication.

Regarding the second implementation of the manual of procedures for handling the returns map, it is possible to prove its success according to the same KPI credit waiting time (KPI 3). Additionally, it was found that in October 2019, the data collected from a map analysis reached more than 600 lines of incidence waiting for a response to treatment and, in February, it had 25 lines to be resolved. In relation to the remaining KPIs, there was an effective improvement in communication between the teams (KPI 7) and there was an increase in their satisfaction (KPI 6).

Regarding the latest implementation of Box 2.5 and resistant tape, it is possible to prove improvements according to the KPIs number of damaged products (KPI 1) and the number of incomplete orders (KPI 2). Concerning the impact on the number of damaged products (KPI 1), it went from 45 to 5 in the period from October to February and, for the second indicator, the number of orders delivered incompletely (KPI 2), there was an improvement from 38 to 28 incomplete orders. The other KPI showed satisfactory results because the Customer Care Team received very satisfactory feedback, which increased the level of customer satisfaction.

In this way, it is possible to answer the research question because it was conceivable to reduce collection orders and thereby increase L'Oréal's reverse logistics process when implementing box 2.5 and use resistant adhesive tape, when implementing collection identification tags; and when defining a methods of handling the return map.

Limits to the findings

The global pandemic Covid-19 began to have an impact on business in Portugal and Spain in March 2020, which led to a readjustment of the implementation plan and analysis deadlines. Chronologically, the analysis of the implementations was to have more time in order to better support the justifications for the implementations.

Another limiting factor was the fact that the reverse logistics processes have outsourcing companies as business partners. As these are external companies, access to information is more restricted and limited access to particularities of carriers that could have been considered, such as fixed costs for collection, dismissal times filling a return truck).

The completion of an internship with the functions of controlling a client portfolio was also a limitation, as the focus was not only on the completion of the project since there were other responsibilities.

Future research work

It would be very interesting for future work to study the impact of the implementation of box 3.0. This box was never implemented, however, there were expectations of putting it on the circuit in July 2020. In addition to the delivery process analysis proposed, it might be interesting to analyze the reverse process since this box is destroyed by the customer when the materials are received. As mentioned in section 4.4.1, this box does not have adhesive tape, it must be torn to open it, which makes impossible to reuse it for the return process. Customers will need another alternative to make their returns.

Another idea that arouses interest is how the company L'Oréal defined the action plans for the impacts caused by the global pandemic Covid-19 and how they can correct the increase in returns. Despite all the improvements seen throughout the analysis, in March 2020 returns returned to increase significantly. Many orders were placed in distribution for delivery and were refused due to impossibility of payment or because the door to the salons was closed.

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7. Attachments

Figure 6.1 Warehouse location

Figure 7.2 CTT Logo

Figure 7.3 DPP Logo

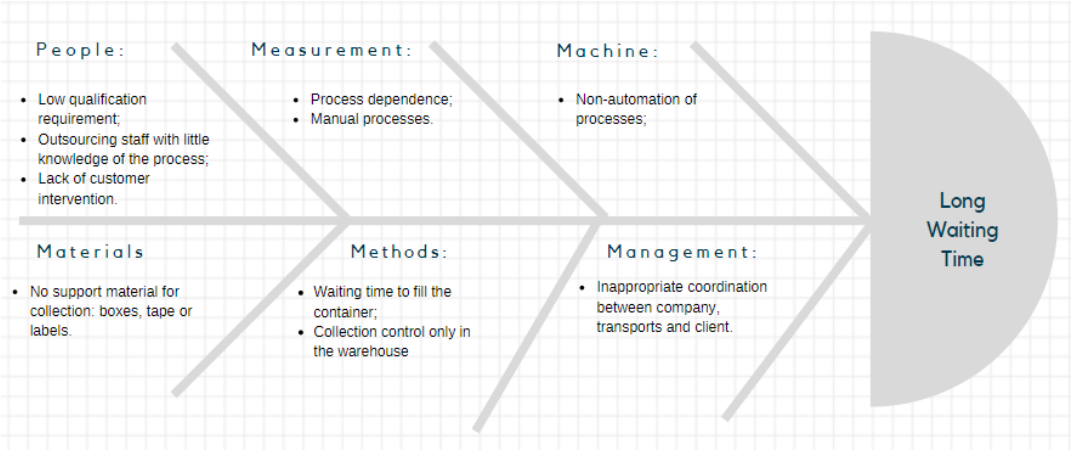

Figure 7.4 Improvement Opportunity A

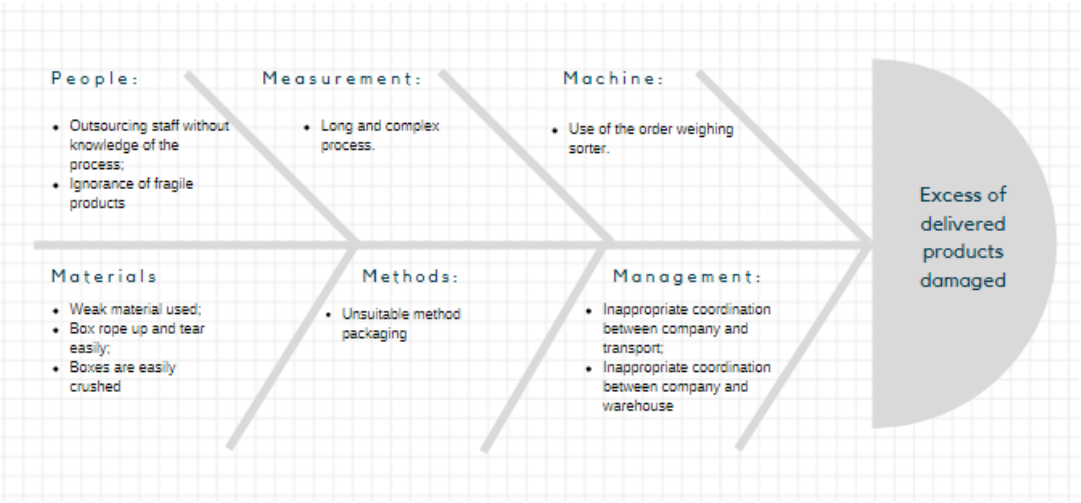

Figure 7.5 Improvement Opportunity B

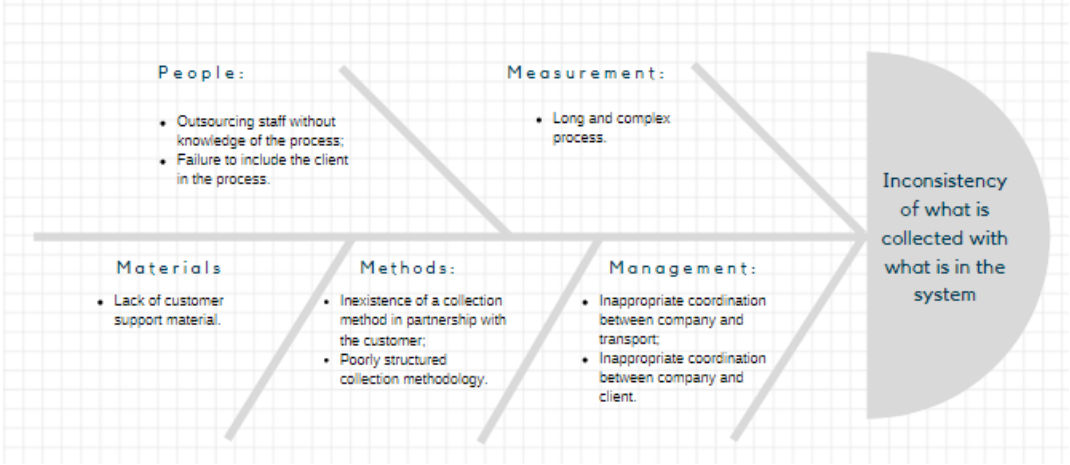

Figure 7.6 Improvement Opportunity C

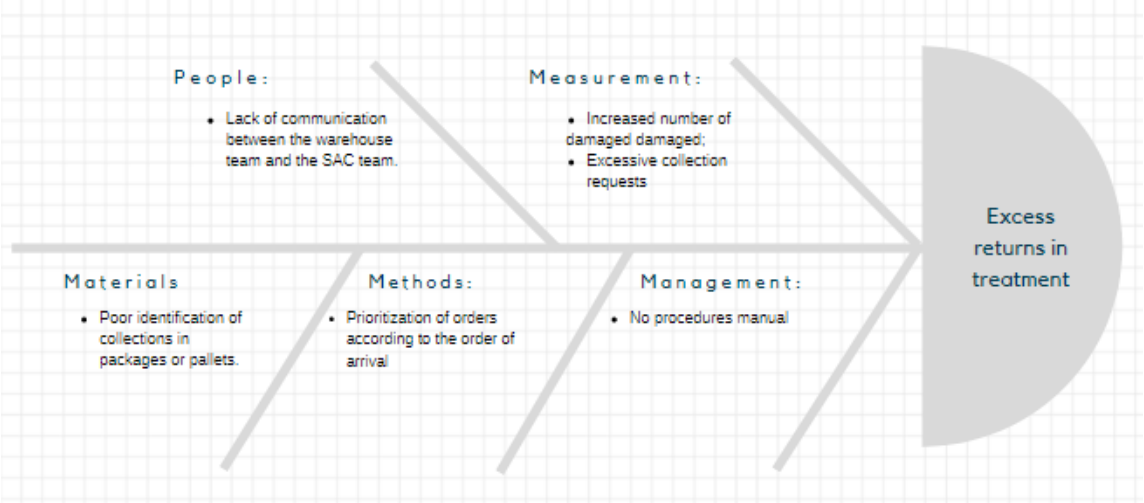

Figure 7.7 Improvement Opportunity D

Guide for interview 1

Participants: Customer Care Team and Supply Team

Topics:

- Describe the stages of the delivery process;
- Describe the stages of the collection process;
- Describe the stages of the carriers' sub-process;
- Describe the steps of the warehouse sub-process;
- Describe the process incidents.

Guide for interview 2

Participants: Customer Care Team and Supply Team

Topics:

- Analyze the possible causes of the incidents;
- Make the fishbone diagrams;
- Define opportunities for improvement.

Guide for interview 3

Participants: Customer Care Manager and Supply Manager

Topics:

- Analysis of proposals;
- Definition of implementation dates;
- Definition of implementation methodologies.