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The Impact of the Circular Economy on the Value Chain: In the Context of the Portuguese Footwear Industry

Diogo Coutinho Balula

Masters in management of services and technology

Supervisor:
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ISCTE Business School-IUL

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BUSINESS
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This is for all those who have always believed.

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I'd like to take this opportunity to thank everyone who played a part in this achievement, however small it may seem to you.

I'd like to start by thanking all the participants in this survey. A special thank you to All Around Shoes, Lazuli, Lidarco, Nimco Made4You, Officina Sixty Seven and Soulful Shoes, without whose co-operation none of this would have been possible. I would also like to thank APICCAPS, which helped me to obtain the contact details of all the companies I contacted, which then led to the tip with the 6 companies mentioned above.

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Thanks again to all of you. I made it.

Resumo

Este trabalho trata de um estudo sobre a praticabilidade da aplicação de modelos de negócio baseados numa economia circular na indústria portuguesa de calçado. O objetivo é identificar as questões fundamentais subjacentes ao modelo circular estandardizado, bem como relacionar os fatores impulsionadores e os obstáculos em termos de reconhecimento dos potenciais facilitadores do sistema como um todo, para que estes novos modelos de negócio alternativos possam ser aplicados com sucesso. Para a realização desta investigação, foram colocadas questões aos consumidores deste tipo de produtos e realizadas entrevistas a empresas do sector, as quais foram posteriormente uniformizadas e analisadas de forma a estabelecer relações entre ambos os inquéritos. O objetivo deste trabalho foi estudar o ponto de vista português da indústria do calçado e o potencial deste mercado em termos de circularização, tendo em conta as suas limitações, que advêm de uma análise bastante relativa, dado o facto de se basear fortemente em dados qualitativos. Após a obtenção dos dados, podemos compreender que esta questão deveria ser analisada de um ponto de vista mais holístico, uma vez que a adoção destes modelos afeta diretamente dois pontos opostos da cadeia, os clientes e as empresas, devido aos elevados custos associados a uma mudança de modelo de negócio, que afetaria sempre ambas as partes, apesar de a mudança ser reconhecida como essencial para o futuro. De um modo geral, estamos a um pequeno passo desta mudança. Precisamos apenas de mais ideias inovadoras para ultrapassar esta barreira de custos muito importante.

Palavras-chave:

Calçado; Economia Circular; Gestão da Cadeia de Abastecimento; Logística Reversa; Logística; Sustentabilidade.

Códigos JEL:

L670; M110

Abstract

This work deals with a study on the practicality of applying business models based on a circular economy in the Portuguese footwear industry. The aim is to identify the fundamental issues underlying the standardised circular model, as well as to relate the driving factors and obstacles in terms of recognising the potential facilitators of the system as a whole, so that these new alternative business models can be applied successfully. In order to carry out this research, questions were asked of consumers of this type of product and interviews were conducted with companies in the sector, which were then standardised and analysed in order to establish relationships between both surveys. The scope of this work was to study the Portuguese point of view of the footwear industry and the potential of this market in terms of its circularisation, bearing in mind its limitations, which come from a rather relative analysis, given the fact that it relies heavily on qualitative data. After obtaining the data, we can understand that this issue should be analysed from a more holistic point of view, as the adoption of these models directly affects two opposite points in the chain, customers and companies, due to the high costs associated with a change in business model, which would always affect both sides, even though change is recognised as essential for the future. Overall, we are just a small step away from this change. We just need more innovative ideas to overcome this very important cost barrier.

Keywords:

Circular Economy; Footwear; Logistics; Reverse Logistics; Supply Chain Management; Sustainability.

JEL Codes:

L670; M110

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CHAPTER 1

Introduction

The purpose of this section is to contextualize the reader to what they will encounter throughout the thesis. It will do this by providing a framework about the context of the thesis topic, following on to an identification of the problem at hand, the goal, and the research questions. In addition, it will also mention where the research is focused, what its limitations are, and finally, how the thesis will be organized.

1.1. Thesis Background

1.1.1. Worldwide Context

Simply put, footwear is a response to a human need, providing support and protection for our feet. Beyond this practical aspect, footwear has become a form of expression of human beings in terms of their lifestyles, no longer being just an object of support and protection, but also an object of matching their personality.

To satisfy this need to bring support, protection and identity over the years, the Global Fashion Industry has become one of the largest industries in our society. This has led to a far-reaching impact on the environment, from the extraction of raw materials to the production, distribution, wear and disposal of clothing and footwear. As the world's population increases to 8.5 billion people by 2030, global annual apparel consumption is expected to rise and, in proportion, so are its environmental impacts. It is therefore vital that ways are found to reduce this negative effect. One such way is through the so-called Circular Economy, which in short is an economic model where waste is kept to a minimum. Some companies are already starting to develop their business models based on this type of logic, but there are still many others that do not, for various reasons. However, one of the most common is that it is not possible to adapt the current business model to a model that enables a sustainable circular economy.

Now, focusing a bit more on the topic of this thesis, the Global Footwear Industry is a multi-billion-dollar industry. This industry consists of social footwear, sneakers, luxury footwear, athletic shoes, and athletic footwear, as well as other related complementary goods. Footwear products are typically made of leather, textiles, and a range of synthetic materials. In 2019, the United States had the largest footwear market in terms of revenue, with a revenue of $91.2 billion (Statista, 2021). There are several large multinational companies within this industry, one of the most well-known being Nike, the American sportswear company. In 2019, TJX Cos was the world's leading apparel retailer, with revenues of $41.7 billion (Statista, 2021).

1.1.2. National Context

For obvious reasons, the Portuguese reality is not at all identical to the reality in the United States of America.

In Portugal, the Footwear Industry encompasses all types of footwear that are produced for private end customers, with the exception of work and safety footwear. However, these final clients end up being what in most cases makes the difference between the success or failure of a company, so it is extremely important that there is a constant adaptation to the buying habits of customers. At this point, the rise of e-commerce, new store concepts created by major sportswear manufacturers, and the concern for the environment by the younger generations (Bernardes et al., 2018) are putting a lot of pressure on fixed retail stores across the country.

Still, Portugal is virtually in the top of the world's footwear exporting countries (Marques and Guedes, 2015), recording revenues of around $2,376 million in 2021, with the market expected to grow by about 2.46% annually through 2025 (Statista, 2021). The largest segment of the Portuguese Footwear Industry is the leather footwear segment with a market volume of about $1,303 million in 2021, more than half of the total market revenue (Statista 2021). In relation to total population figures, revenue per person of $233.70 is generated in 2021 and the average volume per person in the Footwear Industry is expected to amount to 4.47 pairs in 2021 (Statista, 2021).

1.2. Problem Definition

Despite data showing the tremendous potential of this sector of the market, there are several problems inherent to it, some of which are still without an efficient solution identified.

On the one hand, there are problems related to the environmental costs that the textile industry presents. These costs are not related to the design and assessment phases of the shoes, but rather to their "physical manufacture", so to speak. In the phases of patternmaking, cutting, sewing and assembling is where these such environmental costs become more evident, being related not only to the electricity used, but also to the quantities of water that are polluted throughout the process. This is one side of the existing problems: the increase in environmental costs related to footwear production, both in terms of the end product and in terms of waste in the manufacturing process itself.

On the other hand, the increase, in general, in the quality of life of societies in more developed countries has allowed that the expenses in clothing can be higher and higher, and this has culminated in the creation, and in recent years the growth, of the so called "fast fashion". This is the second major problem existing in this type of industry. The need for constant fast production makes it difficult to use less polluting or more sustainable means, to the detriment of using the fastest means, often regardless of their cost. And this will undoubtedly be a major barrier to overcome how to present the collections within the requested periods but without giving in to less sustainable methods, but also, how to change this "fast fashion" consumption mindset.

Finally, there is a third problem that connects the two problems already mentioned. This is related to the difficulty in changing the existing business models to models that contemplate more cyclical theories and that allow the reduction of waste along the value chain of the companies. This problem is obviously linked to financial reasons, technological reasons, but also, often linked to reasons of some scepticism on the part of company managers who have always worked the same way.

1.3. Objective and Research Questions

The main objective of this thesis is to provide a better understanding on how to use sustainability as a competitive advantage and business opportunity, through the introduction of non-conventional materials, as well as alternative business models, in the Footwear Industry, namely, through business models based on Circular Economy.

1.1.1. Research Objectives

The aim is to identify the core issues behind standard circular model, as well as to relate drivers and barriers in terms of recognising potential enablers of the system as a whole, so that these new alternative business models can be successfully applied.

1.1.2. Research Questions

To achieve the stated goal, the following questions will be answered as fully, directly, and correctly as possible:

1. How can the environmental costs associated with footwear production be effectively reduced, both in the final product and throughout the manufacturing process, to establish a sustainable business model?
2. Which key sectors within the footwear production chain should be prioritized to foster greater circularity, promote reuse, and enhance recycling, without compromising production timelines and even potentially accelerating them?
3. What motivates and hinders core stakeholders from actively participating in material circularity within the Footwear Industry, and what strategies should be implemented to promote and enhance circular practices?

1.4. Thesis Scope and Limitations

This thesis has as scope to study the Portuguese point of view of the Footwear Industry and what potential this market has regarding its circularization. Its main purpose is undoubtedly to understand in which functions it will be necessary to make changes so that new alternative models become viable for the vast majority of Portuguese companies, whether large or not.

As limitations to this thesis, one can already foresee that the identification of these same functions will always be fallible, since it will be done based on qualitative methods, as well as third parties, and thus may present partial practicality. Furthermore, the alternative models presented will always be subject to some scepticism and mistrust on the part of some companies still hostage to more traditional methods.

1.5. Destinated Audience

This thesis is aimed at an audience with an interest in more sustainable business models centred on circular economy theories. This audience could be regulators who are interested in a

transformation of this industry towards a greener concept, but also the industry's stakeholders themselves, be they mere workers or the industry's top managers.

Furthermore, any researcher or student trying to develop further studies within this theme may find this thesis to be useful for them and their work.

1.6. Thesis Organization

To finalise this framework, this thesis will present the following alignment in the next chapters:

- Chapter 2 – will present the Literature Review that will serve as the theoretical basis for everything that is presented;
- Chapter 3 – will describe the methodology used in this thesis;
- Chapter 4 – will provide a conceptual framework that will explain the natural progression of the phenomenon that will be addressed;
- Chapter 5 – will present the results obtained during the investigation, as well as its analysis and discussion;
- Chapter 6 – it will be here that, after all the research steps are completed that will conclude the results and reflect on the work carried out throughout the thesis.

CHAPTER 2

Literature Review

This chapter aims to provide an overview of the literature on different definitions regarding this more sustainable and circular idea that the footwear industry can achieve.

At first, an overview of the literature on the Circular Economy will be given. It will then also look at reverse logistics models. Finally, we will look at the footwear industry in Portugal.

2.1. Circular Economy

Although, over the years, several authors have described this concept, one thing is clear to all: Circular Economy is a business model that promotes sustainability by minimising waste through better product design and by promoting the reuse and recycling of the materials used in the manufacture of those same products. It is a business model that aims at sustainability enriched through restorative objects and design (Ghisellini et al., 2016).

This model contests the, until then, only existing model known as Linear Economy where a Take, Make, Use, and Throwaway System is the basis for the operation of companies, in which large amounts of non-renewable resources are used for the manufacture of products. After purchase, these same products are used a few times by consumers losing their usefulness very quickly, which causes these products to be landfilled, creating large amounts of waste (Doppelt, 2003). According to studies, about 80% of raw materials used in LE-based business models are discarded after their first use (Ellen MacArthur Foundation, 2013). The negative impacts on the planet will be obvious if each industrial sector is associated with a waste rate of this value after its first use. With this type of rates, we may be talking about depletion of existing natural resources, reduction of forest cover, changes in global temperature and economic damage from climatological disasters – all of this putting human health and well-being at risk (Didenko, Klochkov, & Skripnuk, 2018). In addition, the increasing world population, and consequent demand for raw materials, leads to resource limits being reached much more quickly than expected, which could even lead to the onset of dependencies between European Union countries for raw materials. However, a smarter use of raw materials can reduce CO2 emissions (European Commission, 2021) and all the other impacts on the planet already mentioned.

The transition from Linear to Circular Economy is thought to be the way forward when it comes to this smarter use of resources. Therefore, several authors have been working on the subject to establish a cohesive idea that can be followed by all. From the most referenced ones, such as the Ellen MacArthur Foundation, definitions have emerged that describe this new model as something that would provide the possibility of transforming today's economic practices, inspired by nature, through product and system innovation. Circular Economy is developed on a basis of sustainability coupled with the goal of extending the life cycle of products, thus reducing waste of materials, as well as reducing energy and water consumption. Furthermore, the Circular Economy gives rise to new relationships between companies that start to establish symbiotic relationships with each other through the reincorporation of materials in the production cycle. As such, the Circular Economy is based on three principles: design out waste & pollution, keep products & materials in use, and regenerate natural systems (Ellen MacArthur Foundation, 2012, 2013, 2014, 2018). Another widely referenced author regarding Circular Economy is Walter R. Stahel who says that "a circular economy would turn goods that are at the end of their service life into resources for others, closing loops in industrial ecosystems and minimizing waste. It would change economic logic because it replaces production with sufficiency: reuse what you can, recycle what cannot be reused, repair what is broken, and remanufacture what cannot be repaired" (pp. 453). It is in what Walter R. Stahel says that many new authors have been adding small contributions to the topic, focusing on this association of Circular Economy with a loop in production to minimize waste and environmental impact, as well as giving a new purpose to products at their supposed end of life (Kamyar Shirvanimoghaddam, Bahareh Motamed, Seeram Ramakrishna, Minoo Naebe, 2020), or as they say (Geissdoerfer, M., Savaget, P., Bocken, N. M. P., Hultink, E. J., 2016), Circular Economy is "a regenerative system in which resource input and waste, emission and energy leakage are minimized by slowing, closing and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling". That said, Circular Economy is nowadays defined by the European Commission as "a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products for as long as possible" (European Commission, 2021), and as such, the action plan in figure 2.1 has also been drawn up which aims to accelerate the intended transformational change over the coming years.

Figure 2.1. – The Circular Economy Action Plan
(Source: European Commission, 2020)

Through this new stage of the economy, it will be possible to achieve systemic change to build long-term resilience, create commercial and economic opportunities and deliver social and environmental benefits through technical and biological cycles (Shaharia Pavel, 2018). In addition, it will be possible to focus on decreasing waste (Dubey et al., 2019), postponing cradle-to-grave material flows, organising strategies to enable self-sustaining and 'environmentally friendly' manufacturing decisions, and also, that resources are recycled to the maximum extent possible (McDonough and Braungart, 2002b). All this is with a view to the core value that Circular Economy focuses on: recovering value from tangible goods through a tighter closed loop of reuse and restoration that could increase economic and environmental performance for recycling and energy recovery (Ashby, 2018).

However, the most important thing in discovering this type of innovative model is knowing how to apply it so that the expected benefits can be achieved. Thus, it is a priority to understand the facilitators of this model, which in the case of Circular Economy, in order to apply the loop in the production chain, it is necessary to master the principle of the 10 R's (Geissdoerfer, M., Morioka, S.N., de Carvalho, M.M. and Evans, S., 2018). This principle considers as elements of circularity 10 activities will be implemented along the value chain, these being Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacturing, Repurpose, Recycle and Recover. This principle is primarily responsible for materials staying within the production cycle for longer and reducing the consumption of raw materials using recycled materials. And this is where a new concept emerges with enormous importance, which is the so-called Reverse Logistic.

2.2. Reverse Logistic

As the name suggests, Reverse Logistics is the process relating to the reverse path that products take when manufactured and subsequently sold. But its definition encompasses many more concepts, concepts which, over the years, have been addressed by various authors with the aim of defining this process as completely as possible.

The first definitions of this concept described the process as "the movement of goods from a consumer to a producer in a distribution channel" (Pohlen and Farris,1992) or as Stock wrote in 1992, it is "the term often used to refer to the role of logistics in recycling, waste disposal, and hazardous materials management; a broader perspective includes all issues related to logistics activities performed in source reduction, recycling, substitution, materials reuse and disposal". However, the concept was still rather vague, and so in the following three years, two new definitions emerged to complement the ideas already established. One of them said that Reverse Logistic "is a broad term that refers to the logistical management and disposal of hazardous or non-hazardous packaging and product waste. It includes reverse distribution that causes goods and information to flow in the opposite direction from normal logistic activities" (Kopicky et al.,1993), or more briefly, "Reverse Logistic is characterized by logistics management capabilities and activities, related to waste reduction, management and disposal" (Kroon, L., Vrijens, G., 1995).

But and as might be expected, the years continued to pass, and things continued to evolve. So, at the turn of the 20th century, new voices came to contribute to the theme. It was said at the end of the 20th century that "reverse logistics is defined as a process of planning, implementing and controlling the efficient flow of low-cost raw materials, in-process inventory, finished product value, and related information from the point of consumption to the point of origin. It seeks to recover the value of the initial materials or facilitate proper product disposal" (Rogers, D.S.; Tibben-Lembke, R.S.,1998) or else that "reverse logistics is the process in which a manufacturer systematically accepts back previously shipped products (or part of them) to recycle, remanufacture, or dispose of them" (Dowlatshahi, S., 2000).

Today, already in the middle of the XXI century, and according to the most respected authors on the subject, better known as The European Reverse Logistics Working Group, composed of authors such as Dekker, R., Fleischmann, M., Inderfurth, K. and Van Wassenhove, L.N, present the following definition: Reverse Logistic is "the process of planning, implementing and controlling backward flows of raw materials, in-process inventory, finished goods, and related information from the point of origin for the purpose of value recapture or proper disposal" (Dekker, R., Fleischmann, M., Inderfurth, K. and Van Wassenhove, L.N,., 2005).

However, knowing the definition of the concept is not enough to understand what Reverse Logistics all is about. It is also important to understand what the steps of this process are. Everything begins at the end consumer when the products go through the Collection phase, followed by an Inspection where we find out what will happen to the products in the Recovery phase. In this phase, there may be two paths, direct recovery, or reprocessing. If there is a direct recovery, the products go directly to the second hand markets. If a higher level of recovery is required, the product is routed according to processing levels that can be: product level (repair), module level (refurbishment), component level (re-manufacturing), selective part level (retrieval), material level (recycling – where they enter the chain as raw materials) or energy level (incineration). At the end of Recovery, there is redistribution of the products, either by direct recovery or reprocessing, as illustrated in figure 2.2 (Figure RL Process)(Kannan Govindan, Hamed Soleimani, Devika Kannan, 2013; Marisa P. de Brito, Rommert Dekker, 2003).

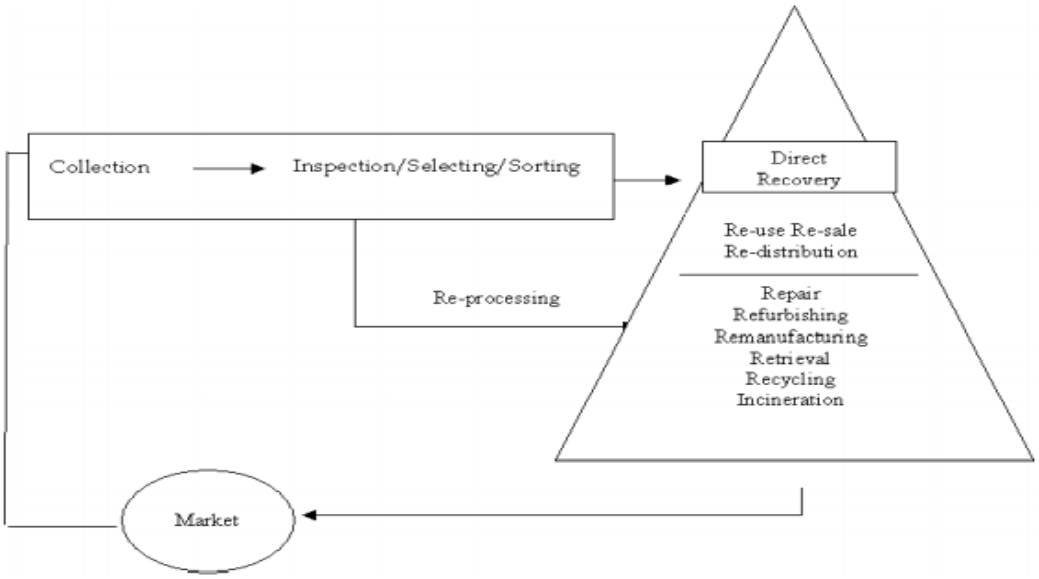

Figure 2.2. – Reverse Logistic Processes
(Source: Adapted from Marisa P. de Brito and Rommert Dekker, 2003)

This whole process, which as shown by figure 2.3, is complemented with the process of production and sale of products, aims to retain value in the chain through the rehabilitation of products or even the raw materials themselves in the production chain (Govindan, K. and Soleimani, H., 2017). However, this goal is only accomplished if the key players in this process are fully integrated in their proper roles. According to Fuller and Allen (1997), these actors can be identified in the supply chain (for example suppliers, manufacturers, wholesalers, or retailers), in the reverse chain itself (for example workers or recycling specialists) and opportunistic actors (which are all charitable organisations). It is crucial that these actors of the process know what to do during the process and which factors are critical for it to run perfectly, or at least as well as possible. These factors we can say are undoubtedly time, quantity, and uncertainty in quality in the acquisition of the products entering the reverse chain (Fleischmann et al., 1997).

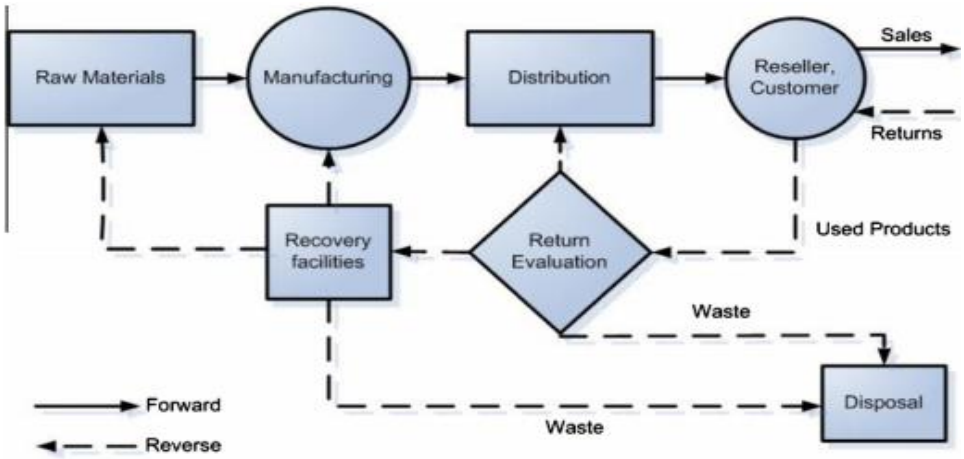

Figure 2.3. – A Generic Form of Forwarding/ Reverse Logistics
(Source: Tonanont et al., 2008)

Nevertheless, despite knowing the process, what are its phases, its main players, it is also important to know what are the drivers that enable companies to engage with Reverse Logistic. These drivers may be to derive benefits from this process because they need to do so, or because there is social motivation for these processes to occur. Thus, we categorise the drivers into three main strands: Economics, Legislation and Corporate Citizenship, as shown in figure 2.4 (Marisa P. de Brito, Rommert Dekker, 2003). The first driver is subdivided into two subcategories, direct gains and indirect gains. In direct gains, the motives are related to the materials used and the reduction of their costs so that there is value recovery in the chain. On the other hand, the indirect gains are related to the improvement of the company's image through marketing actions. The second driver, as the name indicates, is related to environmental regulations that have obliged manufacturers to take back and recover their products after use, in order to reduce waste disposal volumes and increase the sustainability of the products that are put on the market. Finally, the missing driver relates to the sensitivity that companies need to have in order to take back their products after use. In this way, companies seek to avoid leakage of sensitive components to secondary or competing markets. In addition, this avoids potential competition between original and recalled products (Moritz Fleischmann, 2000).

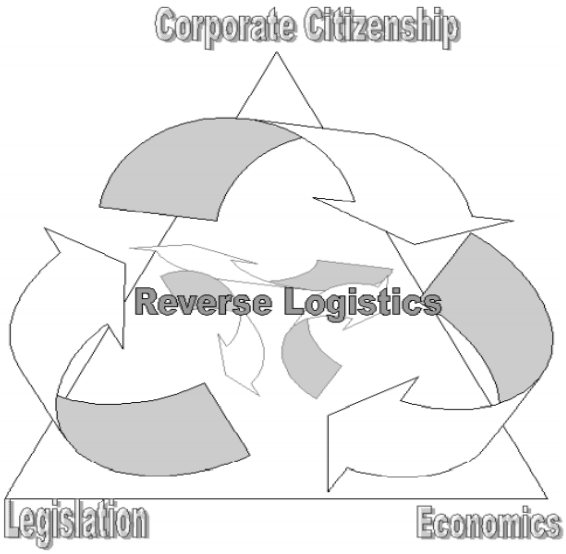

Figure 2.4. – Driving Triangle for Reverse Logistics
(Source: Adapted from Marisa P. de Brito and Rommert Dekker, 2003)

Finally, it only remains to be seen what the reasons are why products are returned. In general, we can say that products enter the reverse chain either because they no longer work or because they are no longer needed. However, we can list them according to the usual supply chain hierarchy in the manufacturing - end customer direction. Already in Manufacturing we find reasons for returns, such as surplus raw materials or returns with quality control and production leftovers. Following the supply chain, we arrive at the Distribution area where we find returns such as product recalls, commercial returns (B2B – such as unsold products and wrong or damaged deliveries), stock adjustments, and functional returns. At the end of the chain, we have customer returns which can be commercial returns (B2C – such as refunds), warranty returns, service returns (for repairs or for spare parts), end-of-use returns, and finally end-of-life returns, as illustrated in figure 2.5 (Marisa P. de Brito, Rommert Dekker, 2003).

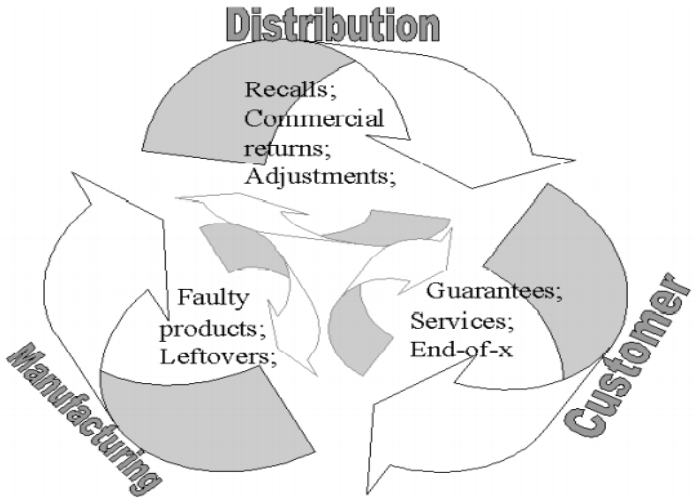

Figure 2.5. – Return Reasons for Reverse Logistics
(Source: Adapted from Marisa P. de Brito and Rommert Dekker, 2003)

2.3. Hypes and Hopes in the Footwear Industry Sustainability

The footwear industry in Portugal is a prominent sector in the country's economy, widely recognised for its quality, design and innovation (Duarte de Almeida & da Silva, 2023). The industry has a strong international presence, with most of its production exported to countries such as France, Germany, Spain and the United Kingdom.

One of the central themes addressed in the articles is the growing importance of sustainability in the footwear industry (Diniz et al., 2015 and APICCAPS, 2023). The transition to a circular economy has become a priority, aimed at reducing waste, promoting the reuse and recycling of materials and preserving natural resources. Companies in the sector are increasingly committed to adopting sustainable practices in their operations.

Innovation also plays a crucial role in the evolution of the footwear industry in Portugal (Ribeiro et al., 2021 and Skačkauskienė & Vilkaitė-Vaitonė, 2022). Companies are investing in research and development, focusing not only on innovative products, but also on more efficient production processes and logistics. Collaboration with universities and research centres is a common strategy for driving innovation in the industry.

Consumer awareness has been an important driver for change in the footwear market (Diniz et al., 2015 and APICCAPS, 2023). Consumers are increasingly attentive to the origin of products, looking for options that are aligned with their environmental and social concerns. Companies that adopt sustainable and transparent practices in their supply chain are gaining the trust of consumers and conquering a growing market for eco-friendly products.

However, the footwear industry in Portugal also faces significant challenges (Diniz et al., 2015 and APICCAPS, 2023). The transition to more sustainable practices can be complex and costly. In addition, it is crucial to increase awareness and knowledge about the circular economy among companies and stakeholders in the sector.

To summarise, the footwear industry in Portugal is undergoing a remarkable transformation towards sustainability and innovation, with consumer awareness playing a crucial role (Diniz et al., 2015, APICCAPS, 2023, Ribeiro et al., 2021, Skačkauskienė & Vilkaitė-Vaitonė, 2022 and Duarte de Almeida & da Silva, 2023). The search for more sustainable practices and collaboration with research institutions are driving this evolution, while challenges related to implementation and awareness remain areas of focus for the footwear industry in Portugal.

2.4. Literature Review Summary

The circular economy and reverse logistics are central themes discussed throughout these chapters. The circular economy represents a business approach aimed at sustainability, minimising waste through product design and promoting the reuse and recycling of materials. This contrasts with the linear economy, which operates on the basis of the "Take, Make, Use and Dispose" model, resulting in large amounts of waste and consumption of non-renewable resources. The transition to the circular economy is seen as essential for the efficient management of natural resources and the reduction of negative environmental impacts.

Reverse logistics, on the other hand, deals with the reverse movement of products, materials and information, from the consumption stage back to their origin, with the aim of recapturing value or carrying out appropriate disposal. This area has evolved over time, with various definitions and approaches to describe the process. Reverse logistics involves steps such as collecting, inspecting, recovering and redistributing products, with the aim of reusing, recycling or reprocessing materials.

In the context of Portugal's footwear industry, sustainability and innovation are key issues. The footwear industry is internationally recognised for its quality and design, exporting most of its production to European countries. Sustainability has become a priority in this sector, with the transition to a circular economy and the adoption of sustainable practices in its operations.

Innovation plays a crucial role in the evolution of the footwear industry, with companies investing in research and development for innovative products and more efficient processes. In addition, consumer awareness has driven change, as consumers look for products aligned with environmental and social concerns.

However, the footwear industry in Portugal faces challenges, such as the costs and complexity of transitioning to more sustainable practices and the need to raise awareness of the circular economy among the sector's stakeholders.

To summarise, the footwear industry in Portugal is undergoing a remarkable transformation towards sustainability and innovation, driven by consumer awareness and the search for more sustainable practices. The circular economy and reverse logistics play crucial roles in this evolution, while challenges related to implementation and awareness remain areas of focus for the sector.

CHAPTER 3

Conceptual Framework

A conceptual framework is a structure which the author believes can best explain the natural progression of the phenomenon to be studied. It represents the researcher's idea on how the research problem should be explored and describes the relationship between the main concepts of the study, showing how ideas can relate to each other (Adom et al., 2018).

Moreover, a research framework is the key step from the formulation of the research objective to the set of research questions. As referred in Section 3.1 of Chapter 1, the main objectives of the research are:

i) to identify the core issues behind standard circular model;

ii) to relate drivers and barriers in terms of recognising potential enablers of the system as a whole, so that these new alternative business models can be successfully applied.

With this in mind and revisiting the research questions (Section 3.2, Chapter 1), the present conceptual model (figure 3.1) was created based on the literature review.

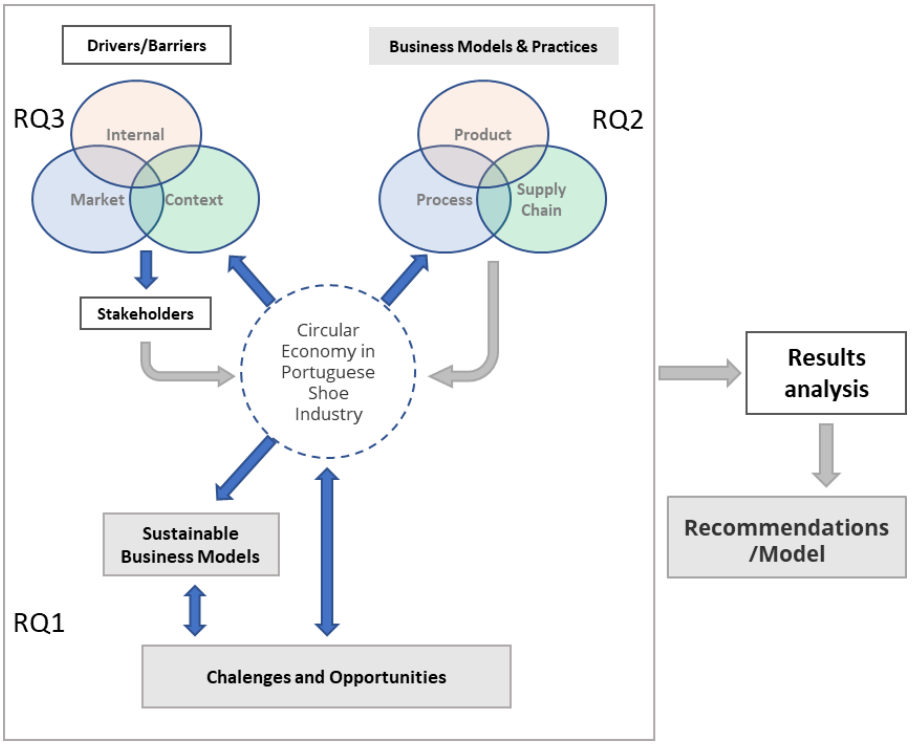

Figure 3.1. – Conceptual Framework to address the impact of Circular Economy in sustainable business models in Shoe Industry

The conceptual framework for the present research (figure 3.1), comprises two main points, (i) the drivers and barriers related to Circular Economy principles application in the Shoe Industry and related stakeholders, and (ii) the business models and practices in Shoe Industry, not only in the production but also across the supply chain, that could be improved in a Circular Economy context and adopt circularity practices with a strong focus on reverse logistics.

Therefore, it is hoped that this framework allows companies to understand the best strategy to perform a sustainable business model by choosing the type of sustainable innovation/performance brought by the circular economy and the stage in which it should occur. For Varadarajan (2015), a company can have sustainable innovation outcomes when performing a sustainable innovation strategy correctly.

By performing it correctly, companies will achieve an efficient, sustainable orientation that will result in sustainable process performance, sustainable product performance and a sustainable supply chain. In turn, the sustainable process performance, and the sustainable products, both brought by circularity, can boast competitive advantage and bring environment performance's outcome. A model is expected to be developed so that this can be achieved in the Portuguese Shoe Industry.

CHAPTER 4

Methodology

In this chapter the research approach that will be taken in order to achieve the results will be described.

The methodology will be divided into four phases. The first is a general approach to the research, followed by the explanation of the designs used to obtain the answers from each *Parts*, followed then by the approach that will be taken to data collection, and at the end, the approach that will be taken to data analysis.

4.1. Overall Research Approach

As mentioned at the beginning of this thesis, its aim is to provide a better understanding of how to use sustainability as a competitive advantage and business opportunity by introducing unconventional materials and alternative business models into the Portuguese footwear industry, namely through business models based on the Circular Economy. These models include a strong commitment to reverse logistics processes in order to recover materials for the production cycle, thus saving the planet in terms of raw materials used and waste caused in their production and handling.

The following topics will explain the approach to be adopted for the development of the research, in order to understand which key factors in the supply chain must be taken into account so that the production cycle in companies becomes essentially cyclical with the re-entry of products through reverse logistics. Thus, the practical and concrete aim of this thesis is to show what the current state of this "ecosystem" is so that products can be reintroduced into the supply chain, and then how companies, after this input from customers, work on the "recycled" products to make them marketable again and reduce waste.

To do this, two distinct parts of the supply chain need to be investigated, one referring to customers (hereinafter referred to as *First Part*) and one referring to the company (hereinafter referred to as *Second Part*), as shown in figure 4.1. Firstly, and for the whole process to be possible, it is necessary to find out whether customers are willing to participate in the chain in this way, other than just buying the product for their own benefit. Next, identify the key factors for this participation in the supply chain and verify whether the necessary conditions for this participation currently exist, and if not, how they can be introduced in companies. Secondly, one must analyse the entire recovery process carried out by the company itself, going through the different parts of reverse logistics discussed in the Literature Review (Collection, Inspection, Recovery – which can be Direct or through Re-processing) and ending in Redistribution. Similarly to the first part, one must ascertain if companies are open to this transformation, if conditions currently exist within companies for this process to take place and if not, how can it be introduced in a sustainable manner. In addition, it is also important to understand what the key factors are for this process to take place in the best possible way.

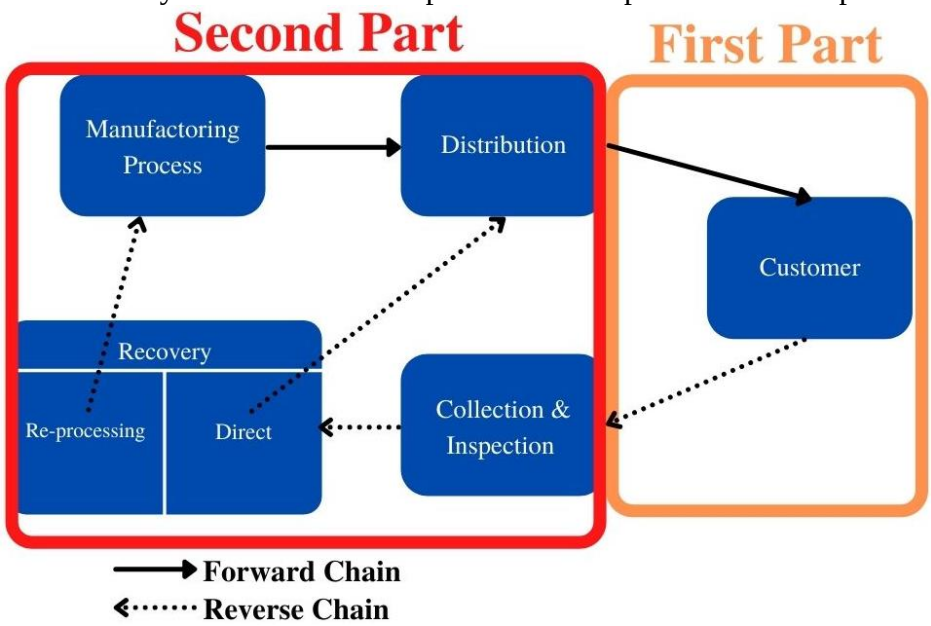

Figure 4.1. – Division of the Research Parts from the Supply Chain to Investigate

At the end of these evaluations, both the first and the second part pointed out in the figure 4.1, we will try to propose a set of actions that make the transition from a linear model to a circular model easier in the Portuguese Footwear Industry. These actions will be based on the key functions found to make the model more sustainable.

4.2. Questionnaire and Interview Script Design

In order to understand the research that will be carried out, it is necessary to understand which tools will be used. In this case the *First Part* will be studied through a questionnaire (see annex A), while the *Second* will be through interviews (see annex B).

It is important to note that before any of these tools, questionnaire and survey, were made public, a pre-test, or pilot test, was carried out. These pre-tests help to identify any problems with the questions in the questionnaire, such as ambiguities, confusion or poorly worded questions. This allows us to adjust and refine the questions to ensure that they are understood correctly by the respondents. These pre-tests reveal any potential biases in the questions or methodology, allowing us to take steps to reduce them.

In the *First Part*, and as we are going to evaluate customers, the collection will be done via an online questionnaire, without a specific target, as anyone can be a potential buyer of Portuguese shoes. Thus, the questionnaire will have a maximum of 20 questions, tending towards multiple choice or short answers. This questionnaire will have a minimum response target equal to 100 potential buyers. The question areas that the questionnaire will have will be focused on the consumer's behaviour regarding their shoes at the end of their life, their acceptance regarding sustainable practices in the identified industry, and also their tendency to accept to get involved in this process.

For the *Second Part*, the collection process will be semi-structured interviews with members of the industry companies, probably through electronic means such as Skype or Zoom. In these interviews, a conversation will be had with the company representative, following an alignment, to understand if there is openness for this transformation and if there are conditions for this to happen or not. However, all interviews will be adapted to the respective interviewee. The objective in terms of the number of companies interviewed will be between 5 and 7, and for that, probably a few more will have to be contacted.

Through these two tools, questionnaires, and interviews, we can establish a link between the information obtained and the research questions previously drawn up. Thus, according to table 4.2, we can understand which interactions with customers or companies gave rise to the conclusions for each of the research questions. This table guarantees that we are looking for consistent and sufficient answers to each of the research questions.

Research Question / Questionnaire or Interview Item	1. How can the environmental costs associated with footwear production be effectively reduced, both in the final product and throughout the manufacturing process, to establish a sustainable business model?	2. Which key sectors within the footwear production chain should be prioritized to foster greater circularity, promote reuse, and enhance recycling, without compromising production timelines and even potentially accelerating them?	3. What motivates and hinders core stakeholders from actively participating in material circularity within the Footwear Industry, and what strategies should be implemented to promote and enhance circular practices?
Questionnaire (All Items)			X
Interview Question Nº1	X	X	X
Interview Question Nº2	X	X	
Interview Question Nº3			X
Interview Question Nº4	X		X
Interview Question Nº5	X		
Interview Question Nº6		X	X
Interview Question Nº7			X
Interview Question Nº8			X
Interview Question Nº9	X	X	X

Table 4.2. – Relation between the interactions with the customers and companies and the research questions

4.3. Data Collection and Analysis Approach

In this last section of the Methodology Chapter, we will explain how data is to be obtained for the two *Parts* previously identified, taking into account the designs previously mentioned. Thus, it is necessary to define how both collections will be done. Furthermore, we will explain how these same data will be examined, based on the theoretical research previously carried out. To do so, we will use figure 4.2 as a basis.

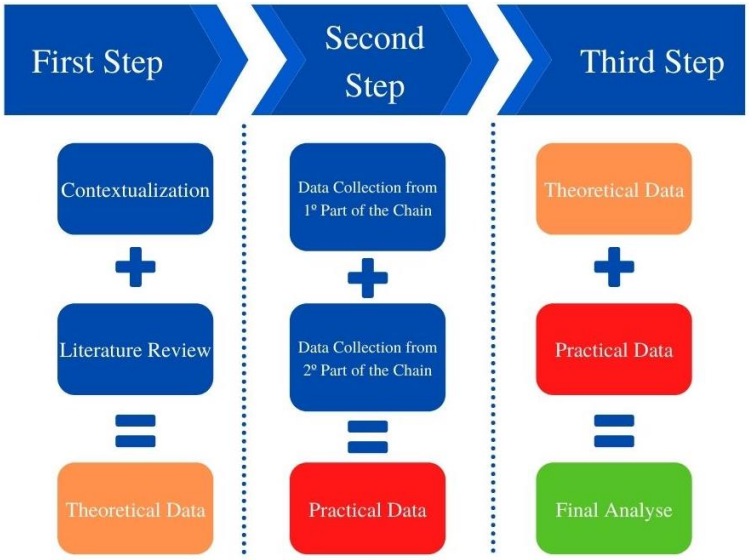

Figure 4.3. – Research Design for the Thesis

After analysing the context of the theme together with the literature review, we can have an idea of the theoretical data necessary to evaluate the data obtained. This is the first step in the construction of the thesis. It is through the crossing of the theories of some authors who study these themes with the background obtained by common sense and the observation of all of us that cohesive theoretical bases are created to define concepts that help us understand the world around us.

Then follows the second step, data collection, both for the *First Part* of the supply chain and for the *Second Part*. As mentioned in the previous phase, in the *First Part* of the supply chain the questionnaires will be made to customers through the *GoogleDocs* platform, so that *Excel* can then be used to process the data obtained. Regarding the *Second Part* of the chain, the interviews will be semi-structured so that one can have a "conversation" with the representatives of the companies in an open and constructive way. During the interviews, notes will be taken in addition to the direct answers to the questions asked. At the end, and in addition to a more subjective and general analysis of the interview as a whole, an *Excel* analysis of the possible answers will also be attempted, as for the first part.

Finally, in the third step, the two previous steps are combined, where the analysis of the data obtained is carried out taking into account the theoretical data and the practical data. Here, one will try to understand the practical results obtained from customers and companies through the theories studied in the Literature Review, in order to be able to answer the three central questions of this thesis and build a base model so that more companies in the market can adhere to this type of business strategies.

CHAPTER 5

Results Obtained

This chapter aims to investigate the two parts of the supply chain addressed in the Methodology Chapter, presenting the results found and their analysis. Furthermore, this chapter also discusses the results obtained, where the analysis of the same shall be interconnected with the theoretical data compiled in the Literature Review.

5.1. Results Obtained from Supply Chain's *First Part* – Customers' Side

In this section we can understand a little better the customers' side of things and what are the most common behaviours related to the topic. Once the questionnaire was done, all the answers were compiled and processed in order to have coherent data and allow us to draw useful conclusions to build a clear idea of what the common consumer does when it comes to sustainable practices related to their shoes.

Thus, and so that we may better understand the data obtained, we shall first characterise the sample of 100 respondents approached through the demographic questions carried out. Then we will then address the answers to the questions concerning the theme of this research.

5.1.1. Demographic Profile

The results obtained correspond to a sample population of 100 participants. Of these 100 respondents, it was possible to ascertain that all were Portuguese and that 70% assumed they were of the biological female sex. Furthermore, 85% attended or concluded Higher Education. In terms of age, the two main age groups were 18 to 25 years old, corresponding to 43% of the answers, and 43 to 57 years old, corresponding to 32%. As for their geographical areas, two thirds of the answers come from inhabitants of Lisbon and the second region with the most participations was Santarém with a correspondence of 16% of the answers. Finally, we obtained information on the daily life of these participants through their professional situation, which revealed that almost half (47%) of the answers came from employees in a permanent situation, and that after these, the most significant representations came from self-employed workers and students, with 16% and 14% of the answers, respectively.

This allows us to state that we are dealing with a sample which is actively present in the consumption of this type of product, as well as belonging to generations of people who are aware of the issue of sustainability. This data indicates that the data obtained therefrom may be used as indicators for improving current models and/or creating more sustainable future models.

5.1.2. Customers' Behaviour regarding their Shoes

Moving on to the results obtained on consumer behaviour regarding their footwear at the end of its life and the acceptance of circularisation practices by companies, the results obtained will be described according to the following logic: first ascertain what are the habitual behaviours of consumers and then ascertain their possible reaction in an involvement in a circularisation process with these companies.

The first question asked *"How often do you maintain your shoes (such as polishing, sole care, cleaning, replacement of damaged parts, etc.)?"*, with the answers being *"I regularly maintain all my shoes"*, *"I maintain all my shoes when visibly necessary"*, *"I maintain specific shoes regularly"*, *"I maintain specific shoes when visibly necessary"* or *"I do not maintain my shoes at all"*. Figure 5.1 represents the answers given and their proportions. We can see that the most common result, 43%, is related to a maintenance to specific shoes when it is visibly necessary and that the rarest result is related to a regular maintenance to specific shoes. Looking more closely at the graph we can see that 84% of people surveyed either do no maintenance at all or do it only when visibly necessary.

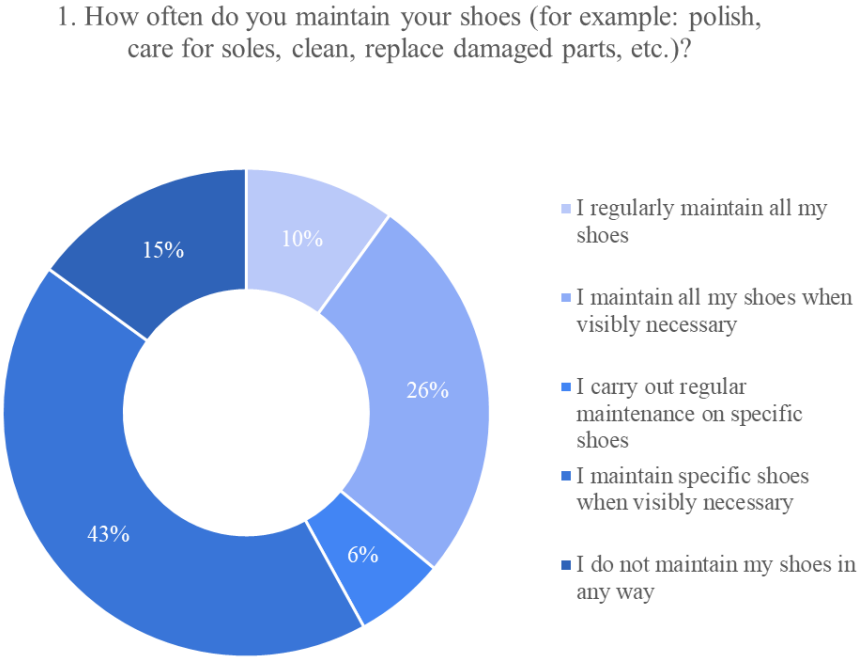

Figure 5.1. – Question N.º1 from Customers' Survey

In the second question, *"When do you feel that your shoes are at the end of their life?"* six different scenarios were given (*"When I no longer like to look at them"*, *"When small wear marks appear"*, *"When they have a lot of wear marks"*, *"When they go out of fashion"*, *"When holes appear"*, *"When comfort is no longer possible while wearing them"*) and respondents were asked to rate according to a Likert scale, ranging from *"Never"* to *"Always"*, in order to ascertain which behaviour(s) is/are the most common for when consumers perceive their shoes to be at the end of their lives. After analysing the results, we can see that, in general, consumers perceive that the end of life of their shoes has arrived when they no longer like to see themselves wearing them or when small wear marks appear, as shown in the *"Always"* column (Fig. 5.2).

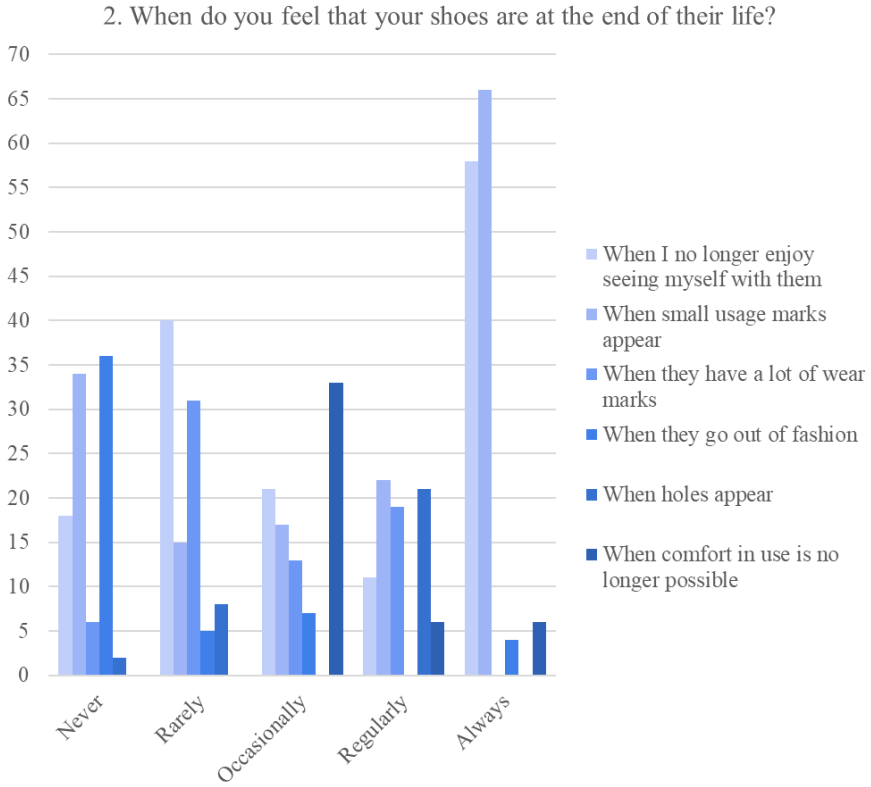

Figure 5.2. – Question N.º2 from Customers' Survey

Question three, *"Once you have reached the end of life of one of your pairs of shoes, as a rule, what is your next step?"*, works in much the same way as question two. Five scenarios were given (*"Donate the shoes to a charity"*, *"When in good condition, sell second-hand"*, *"Give to a relative or friend"*, *"Give to a shop"*, *"Throw in the bin"*) also to be assessed with a Likert scale. In this question, contrary to the previous one, the most common next step was not easy to ascertain as the results were somewhat dispersed. What was possible to ascertain was the next step that is *"Never"* done, which according to graph 5.3 is to sell second-hand or to deliver to a shop.

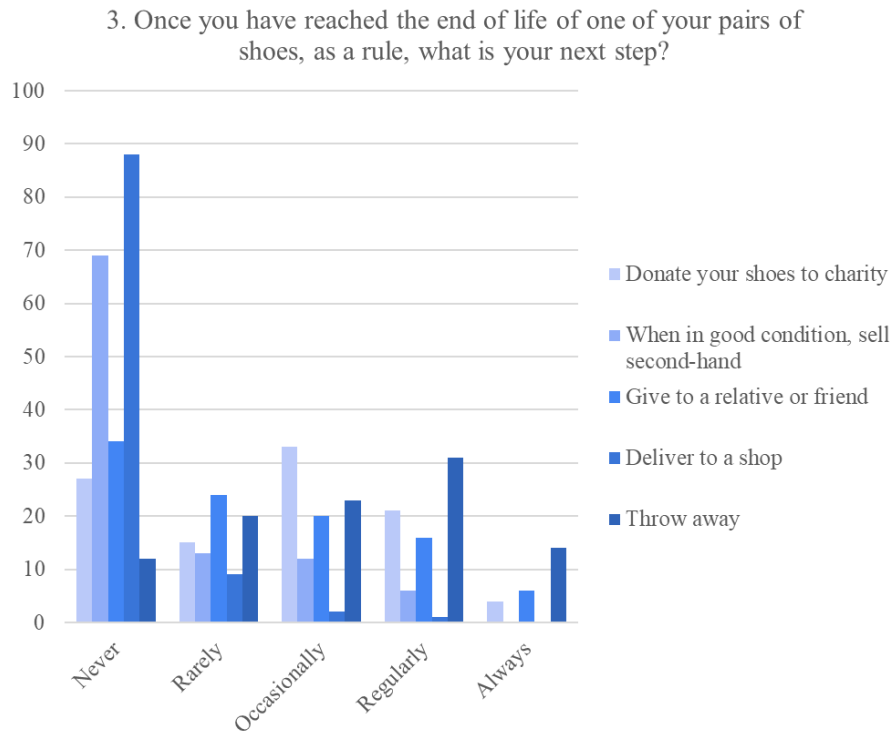

Figure 5.3. – Question N.º3 from Customers' Survey

With question 4, *"Do you consider yourself a person concerned about the environment and the waste caused by the textile industry?"*, we tried to directly understand if the sample of respondents that we had had knowledge about the theme to be explored by this thesis. As shown in graph 5.4, the majority (90%) consider themselves to be aware of these themes.

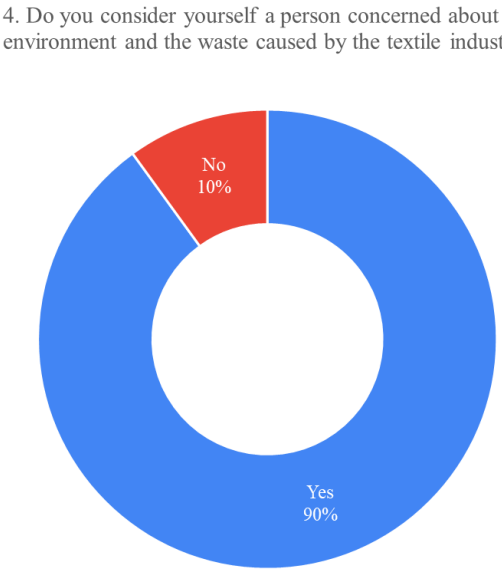

Figure 5.4. – Question N.º4 from Customers' Survey

Question 5, *"If in the previous question you answered "no", why?"* is a continuation of the previous question which allows us to extract the reasons why the previous answers were not all positive. For a better analysis, the answers were placed in 3 categories which summarised the answers given (*"Lack of Interest"*, *"Lack of Information"*, *"Other"*). Thus, we can ascertain that half of the answers were related to lack of interest in this subject. In addition to this answer, lack of information was also mentioned a lot (30% of the answers). The rest of the answers were various reasons (see graph 5.5).

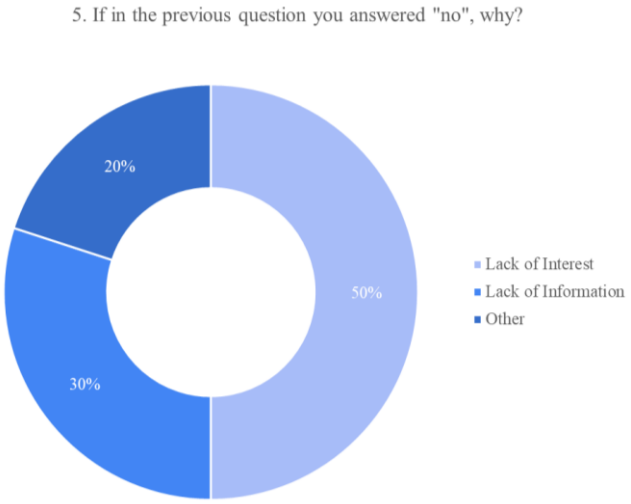

Figure 5.5. – Question N.º5 from Customers' Survey

As in question 4, in question 6, *"If there were a chance to deliver your end-of-life shoes to a store for recycling purposes, would you be interested in making these deliveries?"*, a yes or no question was asked for, since delivering to a store is never the next step for consumers when their shoes come to the end of their lives, if there were such a chance, would they be interested in doing so. The results were also quite demonstrative with 87% of respondents answering positively (see graph 5.6).

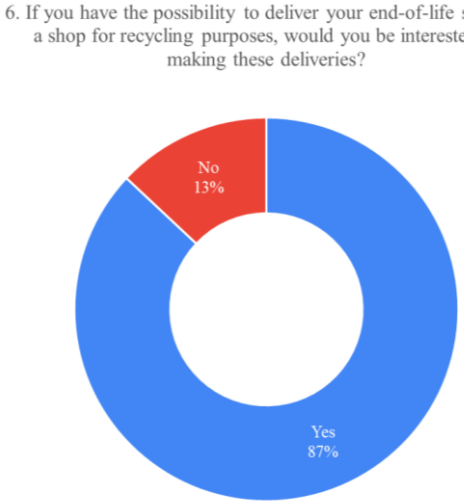

Figure 5.6. – Question N.º6 from Customers' Survey

After these results, in question 7, *"If in the previous question you answered "no", why?"*, and as in question 5, we went to understand the justifications for not having all the respondents in question 6 stating that they are interested in delivering their shoes to stores. Once again, we elaborated categories (*"Because of lack of confidence in real recycling"*, *"Because it is laborious"*, *"Because it is embarrassing"*, *"Because I prefer to donate"*, *"Because of lack of confidence in real recycling"*, *"Because I prefer to sell"*) to better analyse the different answers. In the responses, the fact that it is awkward was the most common answer, with 31% of the responses, followed by a "tie" between the lack of trust in real recycling by companies and the preference to donate with these products, with 23% of the responses each (see graph 5.7).

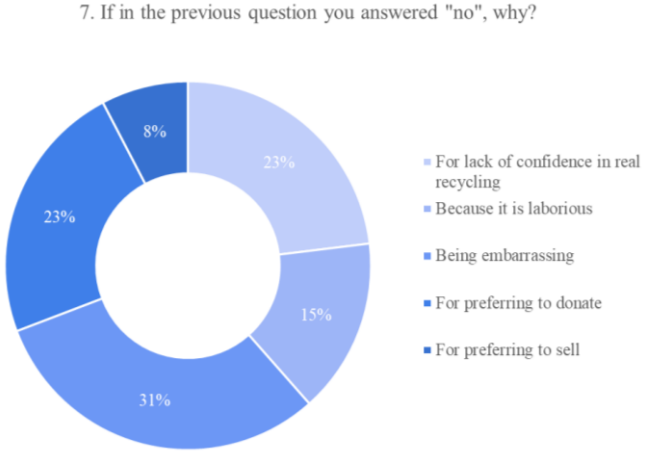

Figure 5.7. – Question N.º7 from Customers' Survey

After these questions, we perceive that there is, in general, a chance to have more sustainable actions regarding the reuse of footwear. In question 8, *"Have you ever seen any type of initiatives or shoe collection stations in a store?"* we tried to directly understand if it is visible, for consumers, this type of initiatives by companies. The results were practically unanimous, with 96% of the respondents saying no, as shown in graph 5.8.

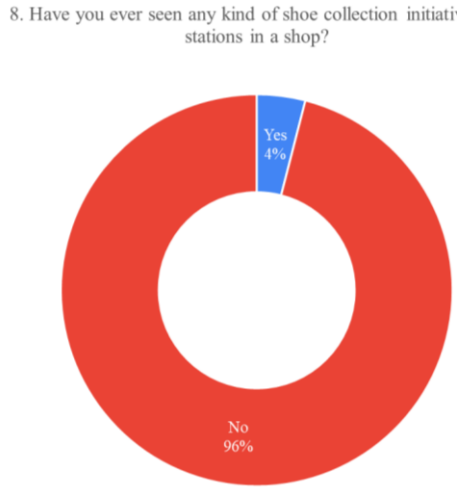

Figure 5.8. – Question N.º8 from Customers' Survey

To finalize and understand how consumer participation in this process could be increased, question 9, *"If there were some kinds of reward when you make this delivery, would you be more interested in returning your end-of-life shoes to a store?"*, intends to understand if there is any incentive for this participation. After viewing graph 5.9, we can verify that there is. More than three quarters of the respondents say they would be more interested in participating if they got something in return for this action.

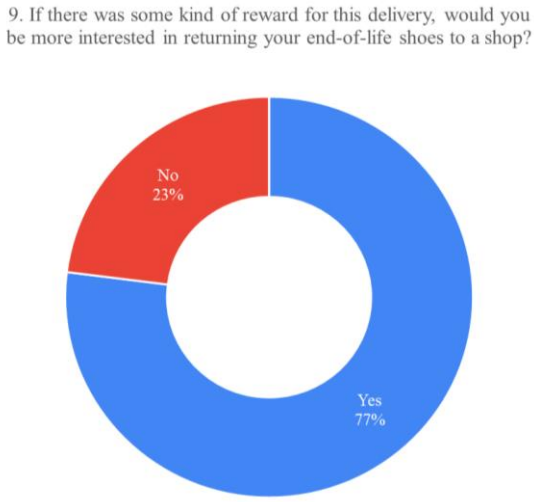

Figure 5.9. – Question N.º9 from Customers' Survey

In the last question, *"If in the previous question you answered "yes", what kind of reward would be most attractive to you?"*, we returned to the analysis by categories (*"Cash"*, *"Discount vouchers"*, *"New products"*, *"Points in customer account"*, *"All options"*, *"Other"*). With this question, and after analysing graph 5.10, we realize that the overwhelming majority is divided between discount coupons (42%) and cash (39%) as "currency" for their end-of-life shoes.

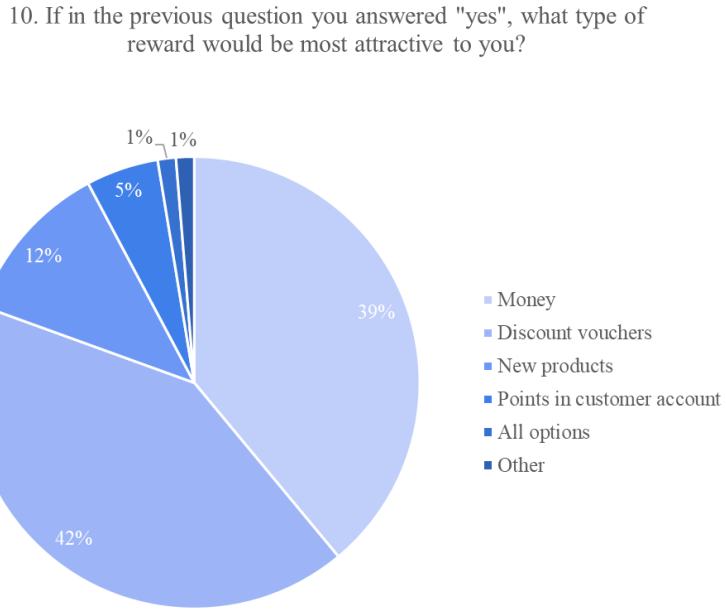

Figure 5.10. – Question N.º10 from Customers' Survey

5.2. Results Obtained from Supply Chain's *Second Part* – Company's Side

Now let's look at the other side: the companies in the industry. For this, a similar strategy was used to the customers.

We prepared questions that were intended to be answered by the companies, but first it was necessary to establish contacts with these same companies. For this, we contacted APICCAPS – Portuguese Association of Footwear, Components, Leather Goods, and its Implements Industry which is a business association of national scope and represents the sectors of footwear industry, footwear components, leather goods and equipment trade for the sectors mentioned.

From this contact came a list of 208 companies in the footwear industry that we contacted via email with the request to conduct an interview/ conversation so we could get the answers to the questions we had previously established.

We quickly received a response from some companies that were willing to collaborate but asked that these questions be sent by email so that they could answer them internally. We further developed the questions we had and then made a questionnaire for the companies to answer.

We went back to the initial list of 208 companies and sent out the questionnaires. Immediately 4 reported delivery errors, so we were unable to contact these companies. However, everything else was received and we were able to get 18 responses. Of these responses, 3 ended up bringing rejection to participation, but the other 15 were interested in participating in this work. To date we have received 5 responses and it is on these that we will work.

As such, we will evaluate company by company using the same questionnaire.

5.2.1. All Around Shoes

Before addressing the answers given to the survey carried out, let us go through a short presentation of what this company is:

> *It all started in 1945, the year in which Manuel de Almeida Jorge, a master footwear craftsman, began producing high-quality shoes in São João da Madeira, the heart of traditional Portuguese footwear. Still working from the same location on Rua Jaime Afreixo, Mariano now produces shoes that reach demanding customers around the world. Now in the fourth generation, Manuel's family keeps his craftsman spirit alive and stays true to their commitment of producing high quality handmade footwear.*

Now that we know a little about the context of All Around Shoes, let's move on to the conversation had with those responsible for it. We started by asking *"Taking into account the concepts mentioned above, do you feel that, currently, in your company there are already processes built based on a Circular Economy?"*. The answer was positive. Therefore, we asked *"Could you identify and briefly describe what these processes are like?"*. The answer was: *"Our models are industrialized to ensure the lowest possible consumption of raw materials and to reduce material waste. We also take care to make different models with smaller size pieces so that we can take advantage of some of the waste."*. Given this answer we asked *"What are the barriers that you have overcome to succeed in applying this type of process?"*, to which we were told that *"The optimization of material consumption through prototyping and more efficient industrialization is a process that has already been used in the industry for quite some time however the reason that led to this optimization was a cost issue and not waste reduction due to sustainability issues"*. So, we wanted to know what had driven optimization and asked, *"And what were the drivers that were a leverage factor for this application?"* The answer they gave us reinforced the idea of the previous question as they said that *"The main driver was as I explained to you earlier purely an issue related to the cost of the final product."*.

After this approach to the circular economy, we moved on to reverse logistics, and were asked *"Does the concept of reverse logistics mean anything to you? Do you feel it makes sense to build a supply chain that allows this reverse flow to be as fluid as the "normal" flow? Why?"*. The answer came quite concisely: *"Yes, and it needs to be created in order to reduce the time between the consumer and the company and to speed up the bureaucratic processes"*.

After these insights received it was important to understand how this company's relationship with its customers was. Thus, it was asked: *"Regarding your relationship with customers, do you feel that this can be a hindrance to apply circular models? Or, on the other hand, do you feel that they are a driver for this type of models? Have you made any effort to get in touch with customers to force these dynamics between both parties?"* The answer came as *"No! We have a restoration service for our products that we make it a point to inform customers about."*.

Leaving the more ideological side of the question, we ask about current production: *"Do you already produce materials that are based on Circular Economy models?"*. The answer came back positive. However, we learned that they were a minority because *"not all components have the technical and physical characteristics to make products with the quality and comfort we want."*.

Finally, we tried to find out the capacity of these companies. So, we asked *"Do your supply chains have the capacity to feed these types of models?"*. The answer was positive, so we asked if *"Was your cost much higher than if you hadn't taken these kinds of business models into consideration?"*. The answer we got was the following: *"Supply chains are increasingly equipped with components based on circular economy, yet high investments were needed to get new materials to market. For our part, we are open to testing them, but some are still far from the results of the usual materials."*.

5.2.2. Lazuli

The second candidate in our search is Lazuli, a Portuguese company that excels in innovation and refinement, and this is their introduction:

> *Lazuli was launched in 2014, in Santa Maria da Feira, with the mission of combining women's footwear with the Portuguese tile and its historical wealth. Since 2020 no model has materials of animal origin and they seek daily to use increasingly sustainable solutions. Respect for workers and human rights are values that are part of the company's DNA. They always consider ethical and fair values towards their workers and seek partners who share these same values. They also seek to reduce the environmental impact of transporting materials by using mainly local suppliers. Currently all the materials they use are vegan and, within these, they try to choose those whose production method is more ecological and sustainable.*

As with the previous company, the conversation with Lazuli officials followed the same order of questions. We started by asking *"Taking into account the aforementioned concepts, do you feel that, currently, in your company there are already processes built based on a Circular Economy?"*, to which they replied yes. Following this statement, we explored the situation a little by asking *"Could you identify and describe, in a brief way, what these processes are like?"*, to which we were told that *"We use many recycled materials in the production of shoes, the soles for example are made from rubber remains, cereal remains or plastics from the oceans, all the components are sustainable and we always try to focus on reuse"*. On the other hand, we also asked *"What are the barriers that you have overcome to be successful in the application of this type of processes?"* to which we were told that *"we often have to test leftover materials in the injection to see if the material works, also in other types of textiles in the application of shoes have to be tested to be able to use, we always take more time in the production"*. To finalize this first approach we tried to know *"(...) what were the drivers that were a leverage factor for this application?"*, which we found to be environmental concern, sustainability and slow fashion.

Turning now to the collection of information related to reverse logistics, we asked if *"Does the concept of reverse logistics mean anything to you? Do you feel it makes sense to build a supply chain that allows this reverse flow to be as fluid as the "normal" flow? Why?"*. The answer came positive and justified as *"it makes sense, anything that allows surplus to be reduced, makes sense and makes the production process more sustainable and we maximise the use of all resources."*.

Turning now to the relational aspect with customers, we asked *"Regarding your relationship with customers, do you feel that this can be an obstacle to applying circular models? Or, on the other hand, do you feel that they are a driver for this type of models?"*. The answer was as follows: *"Yes, sometimes customers are drivers, but on the other hand we always try to get customers to follow us in this way of being and thinking, and we believe that younger consumers already fit this profile."*. Then we also asked if *"Have you made any effort to get in touch with customers to force these dynamics between both parties?"*, which we were told that *"Yes, we have made every effort in communication and in the information we pass to our customers when we are planning a production."*.

At the production level, we tried to find out if *"Do you already produce materials that are based on Circular Economy models?"*, which they informed us that *"yes, we use materials that make up the shoes that are recycled and sustainable, but the final product "shoe", still cannot be incorporated back into the production process."*. We also tried to understand if they were a minority, which also proved to be affirmative, due to *"not all components of the shoe can be 100% reintegrated into a new production process"*.

Still within the production theme, we tried to understand if *"Do (...) supply chains have the capacity to feed this type of models?"* We found that they do. However, by questioning whether *"Were major reconfigurations necessary or was it already initially studied so that they would have this capacity?"* we understood that *"configurations were necessary, because initially there was no reintegration"*, but also that, and through a new question *("Was their cost much higher than the cost that they would have had if they had not taken this type of business model into consideration?"*), *"Initially there was an investment so that the raw materials could be reused, there was a need to adapt machines to reuse the materials, but in the short term they are starting to be more profitable processes"*.

Continuing in our conversation, we asked *"In your company what are the drivers that you think are the most determinant for the application of a Circular Economy model?"* and *"And what are the most complex barriers to overcome?"*, which clients answered for the first question and, costs and minimum quantities for the process to happen and justification work for the second.

We went a little deeper into this topic and asked *"Regarding your clients, what are the drivers that you identify in them that favour a Circular Economy model?"*, to which we were answered *"vegan, sustainable brands that direct efforts so that we can all work in this way"*. But we also asked about the barriers, which we were again told were the costs, more specifically the initial costs.

In order to understand the environment around the company, we asked *"Do you identify any drivers for this type of business model that are related to the environment of your company, such as government (or other) support?"*. The answer came positive, making reference that *"European funds would be fundamental for companies."*. Therefore, we asked if *"(...) on the other hand, do you feel the existence of barriers, such as, for example, at the level of supervision (or other)?"*, to which we were answered that *"Not yet, as there is not yet a relevant amount of companies in circular economy, there is also not much supervision yet."*.

Finally, and to end our conversation, we asked our final question: *"What is the challenge and the opportunity that you consider most relevant for you, regarding a business model based on a Circular Economy?"*. The answer was *"The opportunity is that we have clients that seek to work in these circumstances, the challenge is to be able to integrate suppliers in this circular economy"*.

5.2.3. Lidarco

Our third candidate is a company that differs somewhat from most of the participants, due to the fact that it is not a shoe producing company, but a company providing processing services in the area of cutting and sewing shoes. This makes it impossible to make an introduction similar to the other participants due to the lack of a brand concept. However, and to have a comprehensive view of the whole market we wanted to understand what the impact of the theme of this research on these stakeholders. Therefore, it remains to mention that Lidarco, based in São João da Madeira, is present in the market since 1991.

In the first question, *"Taking into account the aforementioned concepts, do you feel that, currently, in your company there are already processes built based on a Circular Economy?"*, we obtained a positive answer. Therefore, we asked *"Could you identify and briefly describe what these processes are like?"*, to which we were answered *"Reuse of cardboard and plastic packaging in the transport processes between our production and our clients (we work in B2B)"*. Next, we asked *"What barriers have you overcome in order to be successful in applying this type of process?"* and they said *"Large initial investments in the acquisition of reusable packaging, for clients who already process in this way"*. In addition we wanted to know *"(...) which drivers were a leverage factor for this application?"*, which they told us was *"Medium/long term cost reduction"*.

The second question *"Does the concept of reverse logistics mean anything to you? Do you feel it makes sense to build a supply chain that allows this reverse flow to be fluid just like the "normal" flow? Why?"* generated a negative response, where we were told it was a *"totally new"* nomenclature. We were also told that *"Actually, I believe that this flow already exists whenever it is economically viable, I am referring to scrap metal or even businesses that engage in second hand products."*.

In the third question, *"Regarding your relationship with your clients, do you feel that this can be a barrier to applying circular models? Or, on the other hand, do you feel that they are a driving force for this type of model?"*. We were told that *"In fact, legislation itself is the biggest barrier to circular economy models. When we talk about exportation, for example, which is our case, passing through reusable packaging or even raw materials that can be used for other purposes becomes expensive due to transportation, but also due to the difficult justification of making those materials cross borders without justifying an invoice (being raw material remainders, for example). The law becomes even more perverse when companies become certified and for that reason are forced to establish a very broad set of processes making them most of the times more costly both in production cost and in environmental costs and even limits/impediments to circular economy"*.

The answer to the fourth question, *"Do you already produce materials based on Circular Economy models?"*, revealed that, as they are providers of a transformation service, they do not have *"great autonomy regarding the circularity of raw materials or other components"*, as they do everything on the basis of technical data sheets provided by producers. Nevertheless, they revealed *that "However, in a small minority, which does not reach 4% of our production, we make a product developed and exploited by us, where we always seek the maximum circularity in production, from the process of purchasing raw materials to the process of treating leftovers or waste caused by us"*.

In question 5, *"Do your supply chains have the capacity to feed this type of models?"* we obtained a negative answer, which was justified as follows: *"the fashion industry will always live from a huge need to constantly update new materials (colour, material, texture, technical specificity, etc.) that very quickly makes any material obsolete even if very similar"*.

In the seventh question, we asked *"In your company, which drivers do you think are the most important for the implementation of a Circular Economy model? And what are the most complex barriers to overcome?"*. The answer was as follows: *"The economic result. A company always has a single objective and that is to make a profit. We can always consider as profit the well-being and satisfaction of customers, suppliers and employees, and this well-being can also come from an awareness of working in a company that seeks within possible an ecological footprint as light as possible, even if this is so, although it is more difficult to measure this driver is also of profit. In my opinion, legislation is still a strong obstacle in several aspects, whether because it limits the use of more advanced technologies through requirements that make the price of exploiting such technologies prohibitive, or because of the very tight control of invoicing and transportation guides that often make the bureaucratic process of circular economy economically unfeasible"*.

Finally, we wanted to know, *"Regarding your clients, what are the drivers that you identify existing in them that favour a Circular Economy model?"*. They reinforced the answer given in the previous question, *"Adding only the fashion factor as a generator of even more waste"*.

5.2.4. Nimco Made4You

The fourth candidate presented is called Nimco, and this is his introduction:

> *Nimco Made4You is part of Nimco International, it is a Dutch company with several footwear businesses. Nimco's head office and commercial administration is located in Berg en Dal in the Netherlands. All Nimco shoes are produced in Portugal, in our factory in Cesar, Oliveira de Azeméis. We have a team of 200 experienced and excellently trained footwear craftsmen who work daily to bring you the most innovative, environmentally friendly and affordable orthopaedic footwear solutions. Nimco Made4You was founded in 1904 in Nijmegen, the Netherlands. It started as a specialty footwear company that manufactured and sold its products locally. From the very beginning, it was very clear that this was not just another normal footwear brand.*

Our conversation started with the same question as all the other conversations: *"Taking into account the above mentioned concepts, do you feel that currently in your company there are already processes built on the basis of a Circular Economy?"*. The answer was positive. Therefore, we returned a new question that asked if *"Could you identify and describe, in a brief way, what those processes look like?"*. It was explained to us that *"In our company we have some waste reduction processes namely the separation of paper, plastic, glass, contaminated waste, manufacturing waste, contaminated packaging, light bulbs, batteries, metal and cork"*. We then asked *"What are the barriers you have overcome to be successful in applying these types of processes?"* The answer was that *"The barriers we have overcome are the investment to be able to recycle, the reorganisation of space, and making people aware of the need to reduce waste and separate it"*. To conclude this part, we only asked *"(...) what were the drivers that were a leverage factor for this application?"*, to which we were very promptly answered that *"One of the factors was environmental awareness"*.

We continued our conversation to point two, which asked if *"Does the concept of reverse logistics mean anything to you? Do you feel it makes sense to build a supply chain that allows this reverse flow to be as fluid as the "normal" flow? Why?"*. The response from the company was that *"The concept of reverse logistics is a good way for us to reuse the various materials, but it will be a little difficult in the area in which we operate"*.

Therefore, we moved on to questions related to customers. We asked if *"Regarding your relationship with customers, do you feel that this can be a barrier to applying circular models? Or, on the other hand, do you feel that they are a driver for this type of model?"*. We were told that *"We usually take the initiatives."*, which led us to ask if *"Have you made any effort to contact clients to force these dynamics between both parties?"* The answer was *"Yes, making them aware of the changes in the packaging used, as we change our packaging thus moving to a 50% reduction of raw materials used in them, a 50% reduction of weight to save on shipping and a 50% reduction of the environmental footprint thus moving to 100% recyclable packaging."*.

In the fourth question, we wanted to know if *"Do you already produce materials that are based on Circular Economy models?"* We were told that *"We do not produce materials, but we use some based on circular economy models such as cork, fabrics, ..."*.

So, we moved on to question 5, where we asked if *"Do your supply chains have the capacity to feed this type of models?"*. We realised that yes, and when we asked if *"Were major reconfigurations necessary or was it already studied initially to have this capacity?"* and if *"Was their cost much higher than the cost they would have had if they had not taken this type of business models into consideration?"* we were told that *"It depends on the supply."*.

For the sixth question, *"In your company what are the drivers that you think are the most determining for the application of a Circular Economy model?"*, the answer we had was that *"The biggest driver is environmental and social awareness."*. On the other hand, we also asked *"(...) what are the most complex barriers to overcome?"*, which we were told that *"The most complex barriers is getting partner companies."*.

In the fourth question, we wanted to know if *"Do you already produce materials that are based on Circular Economy models?"*. We were told that *"We do not produce materials, but we use some based on circular economy models such as cork, fabrics, ..."*.

So, we moved on to question 5, where we asked if *"Do your supply chains have the capacity to feed this type of models?"*. We realised that yes, and when we asked if *"Were major reconfigurations necessary or was it already studied initially to have this capacity?"* and if *"Was their cost much higher than the cost they would have had if they had not taken this type of business models into consideration?"* we were told that *"It depends on the supply."*.

For the sixth question, *"In your company what are the drivers that you think are the most determining for the application of a Circular Economy model?"*, the answer we had was that *"The biggest driver is environmental and social awareness."*. On the other hand, we also asked *"(...) what are the most complex barriers to overcome?"*, which we were told that *"The most complex barriers is getting partner companies."*.

In the seventh question, we tried to understand *"Regarding your customers, what are the drivers that you identify in them that favour a Circular Economy model?"*, to which we were told that *"The driver regarding customers has to do with the sensitivity of each one regarding environmental terms"*, i.e. it depends a lot from person to person.

Following on from the previous question, we asked if it was possible to identify *"(...) any driver for this type of business model that is related to the environment of your company, such as government support (or other)?"*. We were told that *"Yes, we have a Green Commitment for footwear"*. Furthermore, when we asked the question in the opposite direction, *"(...) do you feel the existence of barriers, for example at the level of inspection (or other)?"* they readily stated that no.

Finally, we leave the final question, *"Which challenge and opportunity do you consider most relevant for you, as far as a business model based on a Circular Economy is concerned?"*, to which they stated as *"Having dimension and volumes that arouse the interest of partners"*.

5.2.5. Officina Sixty Seven

The fifth applicant contacted introduced themselves as Officina Sixty Seven, but they are currently best known for their brand Sons Of A Cobbler and so you can get to know a little more of their story here is their presentation:

> *The Cobbler was born in 1954 and began his journey in shoe manufacturing under the influence of his father. He bought his father's factory in the 1980s and expanded the business globally. In 2018, his son and daughter founded Officina Sixty Seven, a high-end shoe factory. They also launched their own brand, Sons Of A Cobbler, which combines traditional and modern techniques to create luxurious products at affordable prices. The brand's aim is to pay homage to fathers and offer high quality products to men.*

In the first question, *"Taking into account the aforementioned concepts, do you feel that, currently, in your company there are processes already built based on a Circular Economy?"*, the answer was immediately positive. Therefore, we asked *"Could you identify and briefly describe what these processes are like?".* The answer given was quite concise: *"In the footwear industry, unfortunately, in the device of transformation/ production of a shoe, we can not develop this process for various reasons, but for some raw materials that are used in the process, we can achieve that goal. I give the example of the soles that, in some cases, are already transformed from the recycling of used shoes and that the brands collect and send to the soles manufacturers. In leather, some suppliers are also already able to recycle used leather and leftover production to manufacture leather insoles and soles."*. So we also wanted to know *"What are the barriers you have overcome to be successful in applying this type of process?" The answer was that "Essentially the price of these products which, because they require a more complex and lengthy transformation process, are more expensive. It is imperative that the market, essentially the end consumer, understands that to achieve sustainability, price must cease to be the main priority, as it has been until today. Delivery times have also increased, exactly for the reason explained above. It is still too time-consuming a process."*. We then asked *"(...) which drivers were a leverage factor for this application?"* The answer was that *"Essentially political and market 'pressure'"*.

We then asked if *"Do you already produce materials that are based on Circular Economy models?"* and if *"Are they a minority?"*, to which they answered that they produce *"Basically soles and insoles"*. We wanted to understand why, and they explained that: *"In leathers, in our product segment, there is still no 'recycled' market offer that allows us to ensure the finish and level of quality that our customer demands."*.

As for the next question, *"Do your supply chains have the capacity to feed this type of model?"*, we immediately got positive feedback, which prompted us to ask if *"Have major reconfigurations been needed or was it already studied initially to have this capacity?"*. They told us that *"We are now adapting to this new reality. Honestly, until recently, we had not yet structured anything accordingly"*. Following this, we asked if *"Was your cost much higher than the cost you would have had if you had not taken this type of business model into account?"*, to which they replied that it was *"Slightly higher yes. It is more expensive to buy raw materials that go through this transformation process."*.

To the next question, *"In your company, which drivers do you think are the most decisive for the application of a Circular Economy model?"*, the answer revealed that these drivers are *"Consumers, but essentially the political lobby, which is guaranteed to have more interest in this type of economy than any other player."*. So we also asked *"(...) what are the most complex barriers to overcome?"*, to which we were told that *"For now only prices and delivery times. But in the future the transformation process will be much more complicated, due to the complexity of recycled materials."*.

To change the perspective of the questions a little, we asked *"Regarding your customers, what are the drivers you identify that favour a Circular Economy model?"*. To which they told us that *"The niche of 'vegan' consumers are, as a general rule, the biggest drivers of this type of economy."*. And so, we wanted to know again *"(...) what are the barriers?"*, to which we were told that *"It will undoubtedly be the price and the limitation with regard to value-added finishes (which still distinguishes Portugal from other footwear producing countries)."*.

At the end of our conversation, we asked if you could identify *"(...) any driver for this type of business model that is related to the environment of your company, such as government support (or other)?"*, to which they promptly told us that *"Yes, there is government support for this type of business model at various levels."*. Which also led us to ask if *"(...) on the other hand, do you feel the existence of barriers, such as at the level of inspection (or other)?"*, which revealed that *"For now, as we are not yet transformers of recycled raw material we do not have this type of barriers."*.

In our last question, *"What is the challenge and opportunity that you consider most relevant for you, regarding a business model based on a Circular Economy?"*, the answer they gave us was the following: *"Due to the positioning of my product and my target customer, I cannot answer that question yet."*.

5.2.6. Soulful Shoes

The sixth and last company contacted is Soulful Shoes and here is a short introduction about them:

> *The Queirós & Moreira Lda was founded in 1979 by two people with extensive knowledge in shoe manufacturing. Initially with just three employees in a small facility, the company now has a 3000m2 facility and a team of over 90 direct employees, located close to the city of Porto, an important centre of the footwear industry.*
>
> *Specialising in Private Label, Queirós & Moreira creates and develops customised shoes for its customers, from design to delivery in renowned showcases around the world. The company embraces industry 4.0 and utilises the latest technologies for efficient processes, waste reduction and energy consumption, providing an excellent relationship between quality and price. Queirós & Moreira's core values are quality, commitment and sustainability, which are reflected in its final products.*

To the first question of our questionnaire *"Taking into account the above-mentioned concepts, do you feel that, currently, in your company there are already processes built based on a Circular Economy?"* they answered negatively. This led us to ask if they could *"(...) explain to me why they do not have processes based on a Circular Economy?"*, to which they replied that *"Our company works in private-label, so it does not develop its own product, we manufacture shoes developed by customers. In addition, the products of our current customers are focused on fast fashion."*.

In the second question we asked *"Does the concept of reverse logistics mean anything to you? Do you feel that it makes sense to build a supply chain that allows this reverse flow to be fluid like the "normal" flow?"* and *"Why?"*, to which they answered that *"It is a new concept for us. In our opinion it does not make sense to build such a chain because it would only be possible and profitable to recycle the product, which in our industry does not happen."*.

In the next question we wanted to understand *"Regarding your relationship with your customers, do you feel that they can be an obstacle to the application of circular models? Or, on the other hand, do you feel that they are a driver for this type of models? Have you made any effort to engage with customers to force these dynamics between both parties?"* The answer we got was that *"In our context, our clients are an obstacle to the application of these models."*.

In the fourth question of our conversation we wanted to know if *"Do you already produce materials that are based on Circular Economy models?"*, which turned out not to be true. Therefore, we wanted to know *"What is missing for the pioneering product to appear?"*, which according to the company, what is missing at the moment is *"Economic viability."*.

Next we wanted to know about the company's supply chains so we asked *"Do your supply0 chains have the capacity to feed these types of models?"* to which we were told *"Yes."*. So we also asked if *"Were major reconfigurations needed or was it already studied initially to have that capacity?"*, to which they answered us positively, again. Therefore, we wanted to know if *"Was your cost much higher than the cost they would have had if they had not taken this type of business models into consideration?"*. The answer given by the company was that *"Their cost was much higher than the cost they would have had if they had not taken this type of business models into account."*.

Then we went on to the part of the drivers where we asked *"In your company, what are the drivers that you think are the most decisive for the application of a Circular Economy model?"*, to which, given what they had been answering during the conversation, they answered that *"There are none."*. Therefore, we wanted to know *"(...) what are the most complex barriers to overcome?"*, and here they already pointed out *"Low return on investment."*.

To the seventh question, *"Regarding your customers, what are the drivers that you identify that exist in them that favor a Circular Economy model?"*, the answer we obtained was that *"There are none."*. Then, and following the logic of the previous question, we asked *"(...) what are the barriers?"*. The answer came also following the logic of the previous answer: *"Low return on investment."*.

Moving on to a new focus, we asked if they could identify *"(...) any driver for this type of business model that is related to the environment of your company, such as government support (or other)? And on the other hand, do you feel the existence of barriers, for example at the level of supervision (or other)?"*. The answer we got was that *"There are several government supports in this sense, without major barriers to their granting, but once again they would only make sense if the product was interesting for our customers, which does not apply."*.

Finally, we asked *"What is the challenge and opportunity that you consider most relevant for you, regarding a business model based on a Circular Economy?"*, to which they answered that *"The biggest challenge is the application of reverse logistics because it has a very high cost in the circular economy process. The biggest opportunity is the more efficient use of resources that are finite and/or harmful to the environment."*.

CHAPTER 6

Analysis and Discussion

In this section we will analyze everything we have obtained in the last two sections, as well as find common points and opposite points, so that we can begin to prepare the answers to the questions elaborated in the objectives of the Thesis, as well as try to indicate a path for new business models, based on the Circular Economy, to be created.

6.1. Analysis of the Results from *First Part* – Customers' Side

Therefore, it is first necessary to realise that the sample population taken into consideration for the report presents data from 100 participants, all of Portuguese nationality. In its composition, 70% of the participants identified themselves biologically as women and 85% had attended or completed higher education. In terms of age group, the largest representations are in the 18 to 25 age group (43%) and the 43 to 57 age group (32%). The location of the participants of this sample is mostly in Lisbon, having a weight of about two thirds, in relation to the total sample, and the next area with greater representation is Santarém, where it had 16% of the answers. Finally, about 47% are permanent employees, 16% are self-employed and 14% are students. All these data lead us to believe that the sample well represents a real public of the companies studied, as well as the market, and that it can even be considered a "Target" public of these companies.

Now, analysing the results obtained in the survey carried out, we can identify that the majority of consumers (84%) do not carry out regular maintenance to their footwear, doing it only when necessary. Consumers consider that their shoes reach the end of their useful life when they no longer enjoy wearing them or when they show minor signs of wear (43% each). This leads to the majority of consumers not selling their used shoes or giving them away in shops (68%). Approximately 90% of consumers consider themselves concerned about the environment and the waste caused by the textile industry. In this sense, 87% of consumers are interested in delivering their shoes to shops for recycling. On the other hand, it was identified that most consumers who are not interested in handing over their shoes in shops claim that it is embarrassing or that they do not trust real recycling done by companies. One approach that could be considered for these consumers unwilling to hand in their shoes could be through incentives, as over three quarters of consumers would be more interested in participating if they received rewards for doing so, with discount coupons (42%) and cash (39%) being split as the most attractive rewards for handing in. To analyse what has already been done, only 4% of consumers have seen this type of initiative in shops.

With this, and based on the information provided by the survey, we can draw the profile of the footwear consumer in question. It is a predominantly female sample, with a high level of education and covers a wide age range. Most consumers are from Lisbon and have different occupations, with permanent employees being the most representative group. These consumers tend not to maintain their footwear and consider that the end of their footwear's life occurs when they no longer enjoy wearing them or when they start to get damaged. After the end of life, most throw away these shoes. Environmental awareness is high among consumers, with the vast majority having shown concern for the environment and industry waste. There is interest in circularisation, with the majority showing willingness to hand over used shoes to shops for recycling, especially if incentives such as discounts or cash are available. However, a lack of shoe collection initiatives, a lack of confidence in real recycling and embarrassment may be hindering consumer participation in such circularisation programmes.

This survey provides important insights into consumer profile and behaviour towards circularisation and recycling in this type of industry. The results indicate that there is interest and potential for adopting more sustainable practices, but lack of awareness, lack of incentives and lack of adequate infrastructure may be limiting effective consumer participation in the process. Companies looking to implement circular models should consider this information to develop more effective consumer engagement strategies and overcome the identified barriers. Furthermore, the survey reveals the importance of raising consumer awareness about the importance of sustainability and the benefits of circularisation to drive meaningful change in the Footwear Sector.

6.2. Analysis of the Results from *Second Part* – Companies' Side

As for the results obtained from the *Second Part* of the supply chain, we can highlight some common points and the main characteristics related to the Circular Economy in different topics, namely: the Vision on the Circular Economy, the Circular Processes, the Implementation Challenges, the Drivers for the Circular Economy, the Barriers to the Circular Economy, the Relationship with Customers, the Government Support and, the Opportunities Inherent to the Circular Economy.

Regarding the Vision on the Circular Economy, all companies are aware of this type of economy, and some have already implemented processes aligned with this economic model. All these companies share the concern about sustainability, reduced environmental impact and the use of recycled and sustainable materials in their operations.

When it comes to Circular Processes, companies that have applied a Circular Economy to their operations have in common the use of recycled or reused materials in their products. These companies seek to reduce waste and increase the reuse of resources in their production processes and supply chain.

In the Implementation Challenges, one of the main challenges faced by companies is the high initial cost to implement this model. Adapting machinery and processes, obtaining high-quality recycled materials and raising customer awareness of the added value of sustainable products are factors that hinder the transition to this economic model.

As for the Drivers for the Circular Economy, environmental awareness is one of the main factors driving companies to adopt this business model. The desire to reduce environmental impact and to meet the demand of customers who value sustainable products are strong drivers in this direction.

On the other hand, the main Barriers to Circular Economy mentioned by companies include customer resistance to higher prices for sustainable products, lack of availability of high-quality recycled materials and the complexity of reverse logistics. Legislation is also an obstacle in some situations, especially when the requirements made by this same legislation force an increase in production costs.

Regarding Customer Relations, some companies see customers as a driver for adopting circular models, especially when there is an increasing demand for sustainable products. However, others face obstacles when introducing more expensive products in a more fast-fashion focused market.

Regarding Government Support, some companies mentioned government support through incentives and programmes for the implementation of circular practices. However, the viability of these efforts often depends on the acceptance and interest of end customers.

Finally, in Opportunities, and despite the challenges, companies recognise significant opportunities in this model, such as reducing environmental impact, satisfying customers who value sustainability and the potential to improve resource efficiency.

In short, all companies are aware of the importance of the Circular Economy, and some are already implementing sustainable practices. The main characteristics found in companies that are already moving in this direction are the use of recycled and sustainable materials, the search for waste reduction and environmental awareness. However, high upfront costs and market resistance are still significant challenges for a wider adoption of the Circular Economy in the Footwear Sector.

6.3. Joint Chain Analysis

Based on these two previous analyses, we can now make a joint analysis where we can identify the common points and the main characteristics of consumers and companies, as well as the drivers and barriers for the implementation of business models based on a Circular Economy in companies of the Footwear Industry.

Both parties show interest in more sustainable practices in textile production and concern about the environmental impact of this industry. The importance of moving towards a Circular Economy is recognised, as well as the potential reduction of the environmental impact that these models bring, something that, when your customers value sustainability, is very advantageous.

On the other hand, there are still some extremes that need to be narrowed down. The constraint on the participation of this process by customers, as well as the challenges inherent in the implementation of reverse logistics that enables effective recycling are some of these topics that have to be overcome. However, the most "complicated" topic to overcome will be linked to money. Consumers have a preference for cheaper products, while some companies still face resistance to higher prices for sustainable products, often related to the cost of production itself, which turns out to be higher as well.

However, some details that could be a good "fuse" to unleash this whole transformation are related, in general, to people's awareness. Lack of knowledge and incentives are some barriers to effective consumer participation in circular initiatives by companies. However, on the consumer side, there is a clear willingness to hand over their used shoes for recycling in shops, and to feed this circularity, especially if there are incentives to do so. This sounds contradictory, but ultimately it is not. There is clearly a communication problem between the two parties. In addition, two very important factors in this transformation are the high initial cost of implementing sustainable practices and the limited availability of high-quality recycled materials. But this is where a new "fuse" emerges. According to the consumer survey, one factor that can be a good fuel for this transformation is the current consumer profile, most of whom do not regularly maintain their shoes, which can lead to a shorter product life cycle. Therefore, more material entering the production cycle, logically lowering the cost of these same materials that would be used in reverse chains, according to the law of supply and demand.

Therefore, and so that we can understand more concretely the way forward, we can identify that the main drivers of business models based on Circular Economy are environmental awareness and concern about the impact of industry on the environment, both for companies and consumers, as well as the growing demand for sustainable products by customers, which encourages companies to adopt circular practices and require this transformation.

Regarding the barriers to the implementation of these models, we identify some more factors, the main one being the high initial cost of adapting and implementing circular practices for companies, which is then reinforced by customers' resistance to higher prices for sustainable products, the result of more expensive production. Added to this is the lack of availability of high-quality recycled materials and the complexity of reverse logistics and some legislative barriers that increase production costs again, due to the requirements made for a product to be considered "recycled" or "sustainable".

6.4. Discussion

In this section, we will now compare the analysis we have made of our results with other analyses by other authors, in order to confirm that the results we have obtained do not deviate from the results of other studies in this area.

Therefore, the main conclusion we have reached is that a sincere commitment needs to be established between all stakeholders if reverse supply chains are to be successful and economically viable. It is clear from various studies that environmental awareness and concern about the industry's impact on the environment are increasingly ingrained in the minds of all players in this industry (Fleischmann, et al., 1997; Carter and Ellram, 1998; Rahimifard and Staikos, 2007), as was demonstrated in this work through the questionnaires carried out in the field with customers and companies.

However, this commitment needs to be analyzed in a more general way, allowing for the development of various aspects so that this transformation can take place. On the one hand, the regulatory environment needs to be in total agreement with this change and also be a driving force behind it. All the synergies between regulators and companies must flow in a unidirectional way to facilitate the construction of inverted supply chains that are useful for these models (Carter and Ellram, 1998), something that we have seen is already happening in Portugal, due to the incentives that already exist.

On the other hand, another area where changes will have to be made is in company-end customer communication, as the end customer is also key to this whole process. The outlook of today's customer is completely different from that of 100 years ago. Today, the customer is much more interested in the production process and its impact on the environment and is therefore more willing to participate in reducing the negative impact. You just have to "let them participate" (Vehmas, et al., 2018). This has all been proven through the customer questionnaires carried out during the course of this work, in which customers' concern about the industry's negative impact on the environment was clear.

Finally, the most "dramatic" aspect of this whole transformation: the financial aspect. This is still a major barrier and undoubtedly the most difficult to overcome, as it is estimated that the cost of maintaining reverse logistics processes is around 10% of total logistics costs. These are processes that are very expensive to implement and maintain, which often makes their implementation unfeasible, especially for small and medium-sized companies (Thiyagarajan and Ali, 2016; Ahlström, et al., 2012), as we heard during our conversations with the companies, which, despite their different expressions in the market, all of them felt was undoubtedly the biggest obstacle to these changes.

CHAPTER 7

Conclusions and Recommendations

In this final section, we will develop the final conclusions, answering the questions we raised at the beginning of this work. We will also reveal the limitations we believe this thesis has, as well as fields that could be developed in future research after reading and analysing this thesis.

7.1. Final Conclusions

Based on the analyses made in the previous chapter, it can be concluded that the adoption of Circular Economy-based business models in the Footwear Industry requires a more holistic approach, which addresses consumer concerns, encourages participation and raises awareness about the benefits of sustainability. Companies should look for innovative solutions to reduce upfront costs, improve reverse logistics and ensure the availability of high-quality recycled materials. In addition, government support can also play an important role in facilitating the transition to more sustainable practices so that costs can be reduced and, as a result, translate into more competitive market prices that make these types of industries thrive.

We have now reached the end of this work, but not before returning to the beginning. The goal we set out at the beginning was to identify the core issues underlying the standardised circular model, as well as to list the drivers and obstacles in terms of recognising the potential enablers of the system as a whole, so that these new alternative business models can be successfully applied. And it was with this idea in mind that we developed our Research Questions. These questions were nothing more than guides for us to better understand this market and this topic. However, no question should ideally be left unanswered, so let's move on to the answers we can now give.

To the first question, *"How can the environmental costs associated with footwear production be effectively reduced, both in the final product and throughout the manufacturing process, to establish a sustainable business model?"*, we can say to reduce environmental costs in footwear production and achieve a sustainable business model, it is necessary to adopt several strategies and practices.

At the final product level, companies can prioritise the use of sustainable materials, such as recycled materials, vegetable leather or other materials with low environmental impact. In addition, they can seek to develop durable and timeless designs to extend the lifespan of shoes, thus avoiding early disposal. Another approach is to implement a circular economy model, where shoes are designed to be easily disassembled and recycled at the end of their useful life. This can include using materials that can be separated and recycled easily, as well as implementing systems for collecting and recycling used shoes.

At the manufacturing process level, companies can adopt more sustainable production practices, such as reducing energy and water consumption as much as possible, minimising waste and using clean technologies. In addition, they can seek partnerships with suppliers of sustainable materials and invest in research and development of new technologies that reduce the environmental impact of production. However, consumer education and awareness also play an important role in reducing environmental costs. Companies can engage customers in the importance of sustainability by incentivising proper shoe maintenance and promoting the return of products at the end of their life for recycling or reuse.

Moving on to the second question, *"Which key sectors within the footwear production chain should be prioritized to foster greater circularity, promote reuse, and enhance recycling, without compromising production timelines and even potentially accelerating them?"*, it can be said that the essential sectors in a footwear production chain, which can be starting points for increasing circularity, reuse and recycling are: Product Design and Development, Procurement and Materials, Production and Manufacturing and, Logistics and Distribution.

Regarding Product Design and Development, the design process is crucial to incorporate circular economy principles from the beginning. This includes designing products with recyclable and easily disassembled materials, as well as creating durable and timeless designs that promote the longevity of footwear.

Already in the Supplies and Materials sector, the selection of sustainable and recycled materials is key to promote circularity in the footwear industry. Partnerships with suppliers committed to sustainability can ensure the availability of low environmental impact materials and thus find solutions that are so far not on the table.

The next sector is Production and Manufacturing, where optimising manufacturing processes to reduce waste, consumption of natural resources and energy is essential to achieve greater circularity. Clean and efficient technologies can be implemented to accelerate and improve the production of sustainable footwear.

Finally, the Logistics and Distribution sector where reverse logistics strategies are important to enable the collection of used footwear for recycling or reuse. The creation of efficient return channels and the integration of shops and collection points are key to make circularity viable.

For the third and final question, *"What motivates and hinders core stakeholders from actively participating in material circularity within the Footwear Industry, and what strategies should be implemented to promote and enhance circular practices?"*, we have to approach the answer in two strands: one of Drivers and one of Barriers.

In the Drivers strand we have four topics to emphasise: Environmental Awareness, Market Opportunities, Regulatory Pressure and Technological Innovation.

In Environmental Awareness, the growing interest and concern of consumers and society in general with sustainability and the environment are driving the demand for more sustainable products, including shoes, to areas never explored before, thus becoming a major driver for these business models, which leads us to pass our second driver.

The Market Opportunities that companies adopting circular economy measures and offering more sustainable products are embracing increase year on year, with these companies gaining competitive advantages in the market, attracting consumers who value this sustainability and gaining more market share.

Another very important driver is Regulatory Pressure, as stricter environmental regulations can incentivise companies to adopt circularity and recycling practices in their operations so they can comply with requirements and enjoy new benefits.

Finally, the last driver is Technological Innovation, as the technological advancement we are subjected to on a daily basis is opening new possibilities for recycling and reusing materials in the footwear industry, making circularity increasingly feasible and efficient.

Turning now to the barriers strand, we can again identify four topics: Initial Costs, Consumer Resistance, Availability of Recycled Materials and the Complexity of Reverse Logistics.

The first barrier is Initial Costs, as the transition to a more circular business model requires significant investments in new technologies and infrastructure, which is a barrier for some companies, especially smaller ones.

In addition, and in a completely different perspective, Consumer Resistance, due to the lack of familiarity and knowledge about sustainable footwear and the fear of paying higher prices for these products can represent a barrier to the adoption of these circularity practices.

The third barrier is related to production, which is the Availability of Recycled Materials, as the scarcity of high-quality recycled materials and the lack of reliable suppliers makes it difficult to incorporate these materials into shoe production, thus having to resort to conventional materials.

Finally, the Complexity of Reverse Logistics is one of the barriers also identified, as the implementation of efficient collection and recycling systems for used shoes can be challenging and requires collaboration between businesses, consumers, governments and other stakeholders.

But after all, what is needed to increase circularity in Footwear Industry Companies?! It makes sense to elaborate a set of Necessary Actions, which will address different aspects: Education and Awareness, Investment in Research and Development, Partnerships and Collaborations, Government Incentives and, Certifications and Standards.

For the first strand, Education and Awareness, it is important to sensitise consumers on the benefits of circularity and how their choices can have a positive impact on the environment.

Next, in the Research and Development Investment strand, it is important to support research for the development of innovative technologies and processes that facilitate the recycling and reuse of materials in the footwear industry that will develop new methods to lower costs and overcome existing barriers.

On the Partnerships and Collaborations side, partnering with recycled material suppliers, reverse logistics companies and other organisations to strengthen the sustainable supply chain would be important and would greatly accelerate the transformation process.

In terms of Government Incentives, governments could offer more tax incentives and financial support to companies that adopt circular economy and sustainability practices, in order to leverage these companies and attract new ones to join these business models.

Finally, in the area of Certifications and Standards, it was essential to create standards and certifications for sustainable products, in order to help guide consumers in choosing more eco-friendly and reliable shoes.

Based on the answers given to the initial questions, it is possible to identify the challenges and opportunities for the adoption of more sustainable and circular practices in the footwear industry, both for companies and consumers. It will be a long road and a lot of sacrifice. Only with the engagement of all stakeholders, including companies, consumers and governments, will it be possible to drive the change towards a more circular and sustainable business model.

7.2. Research Limitations

As far as the limitations of this thesis are concerned, we can say that a sample of just six companies may not be representative of the entire market, but they were the only companies out of the 260 contacted that were willing to take part.

In addition, another limitation of the thesis was the difficulty in substantiating everything that was shown, since it is very difficult to access scientific or certified documents, as the overwhelming majority are only available for purchase and not for free consultation. We therefore had to resort to some older documents that may already be out of date in terms of practical reliability.

7.3. Suggestions for Future Research

In the future, we hope that studies can be carried out that overcome the barriers presented, particularly those that are most difficult to overcome: the high costs associated with this transformation. It would be very useful and interesting to see studies carried out into ways of reducing these costs, so that these models become more economically viable, rather than just more sustainable.

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Annexes

Annex A – Questionnaire

Introduction:

Hello, first of all, thank you for your contribution!

As part of my master's thesis, I am conducting a survey of consumers of footwear products in Portugal, in which I address some important aspects regarding the use and reuse of these products.

I would therefore appreciate it if you could take a little time out of your day to fill in this survey with 20 questions, all of which are quick to complete.

Although anonymous, your opinions and perceptions will play a fundamental role in trying to improve the sustainability of this industry, developing business models that enable a more sustainable evolution for these companies and for the planet.

Questions:

1. How often do you maintain your shoes (e.g. polish, treat soles, clean, replace damaged parts, etc.)? [Multiple Choice]
    - **a.** I regularly carry out maintenance on all my shoes.
    - **b.** I maintain all my shoes when it is visibly necessary.
    - **c.** I regularly maintain specific shoes.
    - **d.** I maintain specific shoes when visibly necessary.
    - **e.** I do not maintain my shoes at all.
2. When do you feel that your shoes are at the end of their life? (check your most frequent option) [Multiple Choice with Likert Scale → Never - Rarely - Occasionally - Regularly - Always]
    - **a.** When I no longer like to see myself in them.
    - **b.** When small wear marks appear.
    - **c.** When they have a lot of marks.
    - **d.** When they go out of fashion.
    - **e.** When there are holes.
    - **f.** When you can no longer wear them comfortably.
3. Once you've reached the end of life of one of your pairs of shoes, what do you usually do next? (check your most frequent option) [Multiple Choice with Likert Scale → Never - Rarely - Occasionally - Regularly - Always]

a. Donate the shoes to a charity.

b. When in good condition, sell second-hand.

c. Give to a relative or friend.

d. Drop off at a shop.

e. Throw them away.

4. Do you consider yourself a person concerned about the environment and the waste caused by the textile industry?

a. Yes. **b.** No.

5. If in the previous question you answered "no", why?

a. _____

6. If you have the possibility to deliver your end-of-life shoes to a shop for recycling, would you be interested in making these deliveries?

a. Yes. **b.** No.

7. If in the previous question you answered "no", why?

a. Because it is too much work to go to a shop to make the delivery.

b. Because it is embarrassing to deliver a pair of used shoes to a shop.

c. Because I prefer to donate to charity.

d. Because I prefer to sell second-hand.

e. Because I don't trust brands to recycle my shoes.

f. Another _____

8. Have you ever seen any kind of shoe collection initiatives or stations in a shop?

a. Yes. **b.** No.

9. If there was some kind of reward for this delivery, would you be more interested in returning your end-of-life shoes to a shop?

a. Yes. **b.** No.

10. If in the previous question you answered "yes", which rewards are most attractive to you?

a. Money. **d.** New Products.

b. Discount vouchers. **e.** Other _____

c. Customer Account Points.

11. Biological Sex

a. Male

b. Female

c. Does not want to answer

12. Age

- **a.** <18
- **b.** 18-25
- **c.** 26-42
- **d.** 43-57
- **e.** 58-75
- **f.** >75

13. Nationality

- **a.** Portuguese
- **b.** Other

14. Please state if you:

- **a.** Attended or Completed Higher Education
- **b.** Did not attend Higher Education

15. Please state your current employment status.

- **a.** Permanent worker
- **b.** Fixed-term worker of one year or more
- **c.** Fixed-term worker for less than a year
- **d.** Unemployed
- **e.** Self-employed
- **f.** Other _____

16. District of Residence

- **a.** Açores
- **b.** Aveiro
- **c.** Beja
- **d.** Braga
- **e.** Bragança
- **f.** Castelo Branco
- **g.** Coimbra
- **h.** Évora
- **i.** Faro
- **j.** Guarda
- **k.** Leiria
- **l.** Lisboa
- **m.** Madeira
- **n.** Portalegre
- **o.** Porto
- **p.** Santarém
- **q.** Setúbal
- **r.** Viana do Castelo
- **s.** Vila Real
- **t.** Viseu
- **u.** Other ____

Annex B – Interview Guide

Concepts Covered:

In one sentence, Circular Economy is an economic model where waste is kept to a minimum. It is a model that promotes sustainability by minimizing waste through better product design and promoting the reuse and recycling of the materials used to manufacture them.

Reverse Logistics is the process related to the reverse path that products take when they re-enter the production chain. It is described by some authors as the process that involves "the movement of goods from a consumer to a producer in a distribution channel".

Questions:

1. Taking the above concepts into account, do you feel that your company currently already has processes built on the basis of a Circular Economy?
    - **a.** If "yes":
        - **i.** Could you briefly identify and describe what these processes look like?
        - **ii.** What barriers have you overcome to succeed in implementing this type of process?
        - **iii.** And what were the driving forces behind this application?
    - **b.** If "no":
        - **i.** Could you explain to me why you don't have processes based on a Circular Economy?
2. Does the concept of reverse logistics mean anything to you? Do you feel it makes sense to build a supply chain that allows this reverse flow to be as smooth as the "normal" flow?
    - **a.** Why?
3. With regard to your relationship with customers, do you feel that this could be an obstacle to applying circular models? Or, on the other hand, do you feel that they are a driving force behind this type of model?
    - **a.** Have you made any effort to get in touch with customers to force these dynamics between the two parties?
4. Do you already produce materials based on circular economy models?
    - **a.** If "yes":
        - **i.** Are they a minority?
            1. Why?
    - **b.** If "no":
        - **i.** What is missing before the pioneering product appears?
5. Do your supply chains have the capacity to feed this type of model?
    - **a.** If "yes":
        - **i.** Have any major reconfigurations been necessary, or was it initially planned to have this capacity?

   - **ii.** Was the cost much higher than if you hadn't considered this type of business model?
- **b.** If "no":
   - **i.** Why?

6. In your company, what do you think are the most decisive drivers for implementing a Circular Economy model?
- **a.** And what are the most complex barriers to overcome?

7. With regard to your customers, what drivers do you identify that favor a Circular Economy model?
- **a.** And what are the barriers?

8. Do you identify any drivers for this type of business model that are related to your company's environment, such as government (or other) support?
- **a.** And on the other hand, do you feel there are any barriers, for example in terms of supervision (or other)?

9. What do you consider to be the most important challenge and opportunity in terms of a business model based on a Circular Economy?

10. Finally, how many years have you been operating in this market?