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Business Plan: Recycling plant of post-industrial waste of the textile industry

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BUSINESS PLAN: RECYCLING PLANT OF POST-INDUSTRIAL WASTE OF THE TEXTILE INDUSTRY

Luís Fernando Alves Pereira

Abstract

Recycling is important in today's world if we want to leave this planet for our future generations. In the last few decades, movements and trends have educated the general public to recycle, reduce and reuse its consumer products. However, despite the steps made in changing the mentality in the individual landscape, a big cog in the machine that churns out waste into this world still goes unchecked: the manufactures. The industry landfills millions of tons of textile fibers mainly because there are no incentives to reverse this trend. Once in landfills, natural fibers can take hundreds of years to decompose and release a plethora of toxic gases and substances. As such, textile recycling is a significant challenge to be addressed as we strive to move closer to a zero landfill society and a low resource use circular economy society.

The development of this Business Plan intends to create a solution to this problem in the textile industry, more exactly the Portuguese textile Industry, and aims to assess the economic and financial feasibility, and market deployment of this innovative format and transform the Portuguese textile recycling industry. The aim is to feed the recycled raw materials, which traditional get reused - not recycled - into insolation material, back into the economy as a raw material to be used in innovative lines of environmentally friendly yarns, which consequently gets made into environmentally friendly fabric that can be used in most everyday products.

Keywords: Business plan: Innovative product; Recycling; Textile fibers

Resumo

A reciclagem é um factor incontornável nos dias de hoje e algo essencial se quisermos deixar uma casa habitável para as gerações futuras. As últimas décadas viram nascer movimentos e tendências que educaram a população a reciclar, reduzir e reutilizar os produtos que consumem. Porém, apesar dos importantes passos dados na mudança de mentalidade no sector individual, existe ainda uma peça da engrenagem que continua a gerar quantidades desmesuradas de desperdício: a indústria. Devido à falta de incentivos para reverter esta tendência, este sector produz milhões de toneladas de resíduos de fibras têxteis, que tem como destino final os aterros sanitários. Uma vez depositadas em aterros sanitários as fibras naturais e sintéticas podem demorar centenas de anos a se decompor, e nesse processo, libertam enormes quantidades de gases e substancias tóxicas para o ecossistema. Assim sendo, melhorar as condições desta indústria é um desafio necessário para podermos nos aproximar de uma sociedade com zero resíduos e uma economia circular que consumo um baixo nível de recursos.

O desenvolvimento deste Plano de Negócios visa criar uma solução para este problema a indústria têxtil, mais precisamente, a indústria têxtil Portuguesa. Além disso visa averiguar a viabilidade financeira e económica, e a forma de implementação e comercialização deste formato inovador que visa transformar a indústria recicladora têxtil portuguesa. O objectivo é fornecer matérias-primas, que tradicionalmente são reutilizadas para insulamento, à economia que possam ser usadas em gamas de produtos amigas do ambiente.

Palavras-chave: Plano de Negócios, Produto inovador; Reciclagem; Fibras têxteis

Acknowledgments

I would like to thank a few people present in this arduous journey and helped make this project possible, this project is dedicated to you;

To my mother,

To my father,

To my brother and sister,

To my two little nephews,

To my close friends,

To Professor Rui Ferreira,

And to all the people I have encountered in this five magnificent years of university, you have all made me who I am today.

Glossary

CAPEX - Capital Expenditures

CAPM - Capital Asset Pricing Model

DL – *Decreto de Lei* (Law Decree)

EAR - Effective Annual Interest Rate

EPA - U.S. Environmental Protection Agency

ERA - European Research Area

EU – European Union

IRR - Internal Rate Of Return

ISO - International Organization for Standardization

NPV - Net Present Value

PET - Polyethylene terephthalate

R&D - Research and development

Rd – Cost of Debt

RE – Required Rate of Return

RU – Unlevered Required Rate of Return

Tex - a unit of weight used to measure the density of yarns. It is equal to 1 gram per 1000 meters.

VAT – Value Added Tax

Executive Summary

Nature is not simply a warehouse of resources to serve human needs. Rather, it is a highly integrated, interdependent functioning system upon which all life forms depend for survival. Due to growth of world population and of continued high levels of consumption, especially in the developed world, worldwide pressures on the environment are steadily increasing and walking into an irreversible state of environmental unsustainability.

This project arises to tackle this problem. A recycling plant of textile post-industrial waste that upcycles waste and reintroduces materials into the system, reducing the need to harvest new materials and transport them to their final destination. This plant will employ new textile recycling technologies, seeking to provoke a change in the textile recycling environment of the *Vale do Cávado e Ave* area, an area that focus only on downcycling the existing materials into products that only have one more life cycle until landfill. An open loop cycle does little to address the increasing pressure the industry applies on the environment caused greatly by the raw material harvest and processing parts of the supply chain.

This business project will have two fronts, a waste management segment and a recycling segment. The first segment regards to the business of collecting waste from textile manufacturers, and it a business segment that is done at break-even cost because the main objective is not to make a profit but instead to collect the raw materials necessary for the core business of the company – recycling. The second segment of the company, the recycling segment, is the core of the business. In this segment the collected waste in the previous segment are processed using simple, yet innovative, processes in order to obtain recycled textile fibers.

The main targets for the waste management segment are, as previously stated, small and medium sized textile manufacturers, who value price and commodity above all and therefore are an easy market to gain a market share. The main target for the core of the business are the textile yarn spinners. This manufacturers use textile fibers to spin yarn cones to be used in the manufacturing of textiles. This segment's main focus is quality or any other feature that may set them apart in a very homogenous market.

A differentiation focus strategy for the core of the business was chosen based on *green* characteristics of the fibers. In a market where recycling plants down-cycle textile

waste to insolation materials this project aims to provide an alternative where the fibers are instead fed back into the cycled by providing them to the yarn spinners. Therefore, this will be the differentiation factor in the project, it will be one of the few players in the market capable of delivering near mint perfect textile fibers in order for the yarn spinners to create a "*green line*" of products to offer their clients.

The project undertakes the development of a reliable service and product lines with continuous improving, and considers a timeline with a duration of 6 years. It will require 10 employees with the necessary competencies and skills to meet the positions requirements. From a financial perspective, the company needs an initial investment of 70.138€ to support mainly the investments in equipment.

Regarding the financial part, from an investor's perspective, at the end of 2024, the company reaches a NPV equal to 271.340€, which is superior to 0, an IRR equal to 145,71% (above the market premium of 11,90%), and payback period equal to 751 days year (less than the project's duration).

"Dans la nature rien ne se crée, rien ne se perd, tout change.

In nature nothing is created, nothing is lost, everything changes."

— Antoine-Laurent de Lavoisier, Traité élémentaire de chimie

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1 Introduction

1.1 Motivation

I grew up in a family with deep connections to the textile industry. My parents and uncles jointly owned and operated a medium sized textile factory since the late 80's as it was the industry that was dominant Porto and Minho area. Thus, I spent my entire life emerged in that environment, visited every stakeholder in the industry, got to know the intricacies and unique culture of the industry in that area. However, of all those experiences one left a profound mark on me - the visit of a textile recycling plant. In the summer of the year 2012 I accompanied my father in his visit to seal a deal for our new waste management company regarding textile fibers. Having been an environmentalist I was shocked and disappointed that the textile fibers were not being recycled and fed back into the system, but instead reused into another material, which would have one more life and sent back to the landfill. I immediately saw that the method of reusing and not recycling was inefficient and a waste of resources, and thus, a flame sparked in my soul that I had to do something to revert that trend in the industry and be the catalyst of a reform in the textile recycling industry.

This desire was exacerbated when I looked into the numbers of the industry. The Textile industry is one of the biggest contributors to the increased environmental pressure is the Fashion and Textile industry. This industry is the second most polluting in the world, second only to big oil, due to its lengthy and harmful supply chain that is responsible for 5% of the world landfill volume, 25% of dangerous chemicals, 20% of pesticides, 120 million logged trees per year and 10% of the emissions. Continuing current practices, by 2030 fashion's annual waste from production and consumer disposal will increase by 60%. Today, only 20% of apparel is recycled at end-of-use, and most of that is down cycled into lower-value materials due to inadequate technology. Assuming a linear production model, the industry could save society 4 billion euros per year by keeping the total amount of waste constant. (Pulse of the Fashion Industry Report 2017)

1.2 Objectives and opportunities

There is a big opportunity in the Vale do Ave e Cávado area, a very compact geographic zone where 86% of the Portuguese textile industry is located - according to the report Análise setorial da indústria dos têxteis e vestuário 2012-2016 (Banco de Portugal, 2018) - regarding the underdeveloped textile recycling industry in the area.

There is abundant supply due to the concentration of textile manufactures, and the competition is not competing in the same bracket due to them focusing more on reusing the materials rather than recycling them.

There is also a gap in the market regarding the supply of 100% *green* yarn to be used in products that require fabric. The existing indirect competition focuses mainly on providing the materials for cleaning clothes, ignoring the potential in the *green* trend that has been spreading during this decade.

Therefore, this Business Plan seeks to demonstrate the existence of those opportunities and tendencies, taking advantage of their perceived benefits, by introducing a new product in the market and defining a variety of innovative strategies and activities in order to fulfil the society needs.

1.3   Structure

The opportunity identified comes from a market with potential and underexploited and the solution comes from providing a new product to the customers, mainly manufactures of yarn. The Business Model, comprising the mission, vision and values, is differentiated and attractive in order to gain customers and meet their expectations and needs.

At the outset was the search for scientific articles, books, and other sources about the manufacturing techniques and specifications of the materials in order to the concepts, trends, advantages, disadvantages and other market dynamics from the studied industries. This approach helped to establish a deep understanding of the market and its intricacies, providing a guideline for the literature review.

The second step was to analyze the context by carrying out a Market research with the help of a plethora of tools such as: A PEST analysis in order to understand the context in Portugal, and the trends and constraints in Portugal and in Europe; a Porter Five Forces Analysis, in order to check the attractiveness of the industry; a competitors analysis in order to create benchmarks for the establishment of the companies best practices.

The third step comprised of an internal analysis in which are established the company's value chain and its core activities. This step is complemented with the use of tools such as a SWOT analysis to determine the company's strengths, opportunities, weaknesses, and threats and how these interact with each other and create synergies.

The next step was the formulation and implementation step, where a strategy was shaped, the company's culture was formulated, company organization and respective responsibilities, and type of technology and resources necessary established. In sum, it established the necessary actions and polices to run the business, taking into account the defined and consistent directions.

The final step will be an economical and financial analysis in order to attest the project's feasibility and sustainability.

Therefore, this Business Plan has the objective to create a base to start a recycling manufacturing plant that focus on an unexplored gap in the market – the textile fibers segment – and so ally entrepreneurship with environmentalism.

2 Identification of the innovative proposal

This proposal consists on the creation of a product, the creation of recycled fibers to be used as raw materials with innovative, and underused, recycling techniques.

Attention to the impact of the supply chain of the textile industry is rather recent. In the last few years several studies have been published in analyzing the impact this Supply Chain has on the environment, and suggestions on how to diminish it, several studies regarding new techniques and technologies to recycle textile waste, post-industrial or post-consumer, however there have been few to none studies regarding the economic viability and costs of implementing this new technologies and regarding the process of making the supply chain greener. My research has yielded only a few articles regarding the collection of post-consumer textile waste in the United States, which is not the scope of this project nor is the geographic and economic atmosphere the same.

It is also in part to cover this gap in the literature that this project arises. The analysis that will be made in order to complete this Business Plan are, most of them, on parts of the Portuguese industry that have very little public information and studies. Therefore, this project's conclusions could be used to benchmark the industry and access if any external help, such as government help, is needed to kick-start this new trend.

The project area of interest will be the Vale do Cávado e Ave area, more exactly in the Barcelos municipality, an area where a great number of textile manufacturing plants are located, which the target suppliers and clients. Portuguese law mandates (DL n. º 178/2006) that textile factories dispose of textile waste with certified waste disposal companies or be subject of a fine if said waste ends on a landfill. For that reason, textile factories usually pay a service to waste management company to collect and dispose the waste produced. The destiny given to the waste is most of the times down cycling as said before or even landfill. This project's company would collect said waste, receiving a payment for such service, and upcycle it. It would then certify the company as an "environmental friendly" company. This action would provide added value to the manufacturer for choosing us and would strengthen the bound between the two companies, decreasing the risk of losing the company to another company on the field. Another possibility is, if companies use our services, they are qualified to the International Standards Organization (ISO) standards for a labeling system to identify garments that

meet criteria as environmentally friendly. These standards are not yet published, so this is one of the future possibilities.

Regarding the technologies and techniques, this project would focus on mechanical techniques of recycling, in order to reduce startup costs and maintenance. The focus of this project is the recycling of cotton and materials with the same *mechanical shredding capability*, like wool. The shredded cotton would then be sent to yarn spinning factories where, after mixing with some virgin fibers, an environmental yarn would be created. The Portuguese Yarn Spinning industry, one of the elements of the textile supply chain, has been trying to modernize itself through innovation in order to compete with the cheaper competition of South Asian companies. This wave of innovation has stimulated the creation of R&D labs such as NIDYARN. One of the objectives of this project is to construct partnership with this companies and labs to create a line of environmental friendly yarn. Concerning the garments that are not possible to recycle through mechanical techniques, like the case of polyester-based textiles, these garments are shredded and then granulated, and processed into polyester chips. These are subsequently shipped to companies that need said chips for their production processes or sent to companies where they can be melted and used to create new fibers for use in new polyester fabrics. This way we ensure the materials are reintroduced into the system.

3 Literature Review

3.1 Textile Supply Chain

The Textile Supply chain is remarkably long and complicated a journey that starts as a fiber and ends as a finish good on the consumer. It starts at the production of the raw material that are either grown naturally, like wool and cotton, in a process that takes years, or artificial with the use of non-renewable materials prevenient mostly from oil, such is the polyesters' case. These raw materials are then shipped to yarn spinning factories. These factories turn loose fibers into cones of yarn that are used for weaving fabrics in the next stage of the supply chain. At any moment in these three steps of the supply chain, the fibers may be sent for dyeing into a desired colour. The finished fabrics are then sent to apparel manufacturers where, in combination with other textile supplies such as threads, zippers and other accessories, and other auxiliary materials, is created a piece of

clothing. This piece of clothing then goes through the normal retail supply chain until it reaches the final consumer. This supply chain can be summarized in the Figure 1.
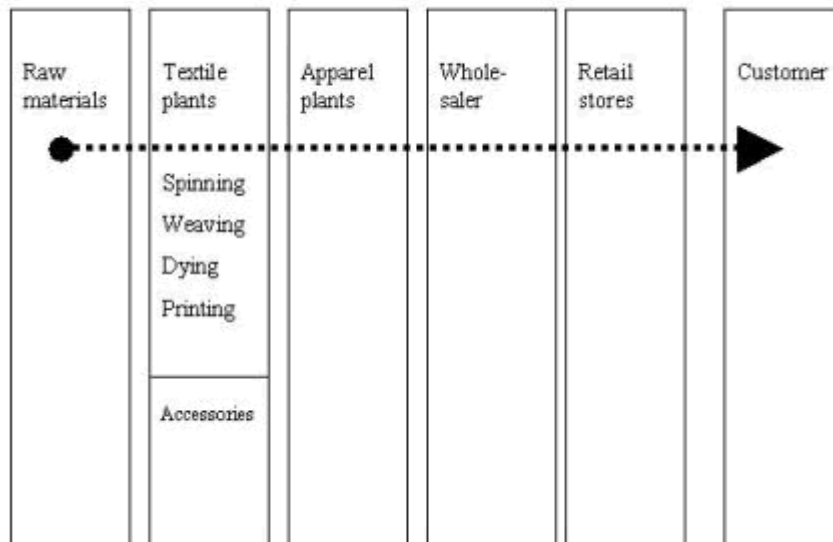
Figure 1- Textile Supply Chain   Source: Dieter Maaß, Betriebswirt

The growing importance of Sustainable Supply Chain is driven mainly by the escalating deterioration of the environment, e.g. diminishing raw material resources, overflowing waste sites and increasing levels of pollution.

Green supply-chain management has its roots in both environment management and supply chain management literature. Adding the "sustainable" component to supply-chain management involves addressing the influence and relationships between supply-chain management and the natural environment. The definition and scope of Sustainable Supply Chain in the literature has ranged from green purchasing to integrated green supply chains flowing from supplier to manufacturer to customer (Zhu and Sarkis, 2004). The most up-to-date definition of Sustainable Supply Chain is the integration of environmental thinking into the supply chain. This includes management, product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life. The part relevant for this project is the material sourcing and selection and end-of-life management of sustainable supply chain management.

Nowadays constructing a sustainable supply chain does more than appeasing the conscious of the stakeholders, it also provides a competitive advantage over those with more traditional and dirty supply chain. Yang and Dong (2017) investigated sustainable

apparel product strategy where products are partially produced using recycled materials. They considered two types of consumers: environmentally conscious and regular consumers. Their analytical results indicated that if consumers value sustainable products more, the firm would increase its sustainability level and gain a higher profit. Additionally, they found if converting regular consumers to be environmentally conscious is not too costly, firms should provide sufficient sustainability information for consumers, in order to encourage all consumers to be environmentally conscious. On the same line Shi et al. (2017) evaluated economic and environmental performance in the fashion supply chain from a power perspective. Their analytical results implied that the follower with less supply chain power has incentive to make more sustainable efforts and achieve a higher profit. In most scenarios, the optimal amount of sustainable investment is greater in the apparel manufacturer case than in the retailer case.

3.2   Circular economy

Over the last decade, growing attention has been paid worldwide to the new concept and development model of Circular Economy. Circular Economy is "an industrial system that is restorative or regenerative by intention and design. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models''. The overall objective is to "enable effective flows of materials, energy, labor and information so that natural and social capital can be rebuilt" Ellen MacArthur Foundation (2013). The negative effects caused by waste are threatening the stability of the economies and the integrity of natural ecosystems. To tackle this threat a change to a circular economy is starting to be slowly implemented. Companies like Nike, which states "We envision a transition from linear to circular business models and a world that demands closed-loop products- designed with better materials, made with fewer resources and assembled to allow easy reuse in new products" (Nike, 2017), are embracing this system not as a public relations stunt, but as a way to create a competitive advantage in the resource scares world of tomorrow.

3.2.1   Open loop vs Closed loop

Open-loop recycling indicates that it can be recycled into other types of products, usually a downcycling of the materials. This means that a material is not recycled indefinitely and is eventually excluded from the utilization loop and becomes waste. In the textile and apparel industry, materials are often downcycled into insulation materials, whose destiny after its life cycling is the landfill, ending the life of the material. (Figure 2)
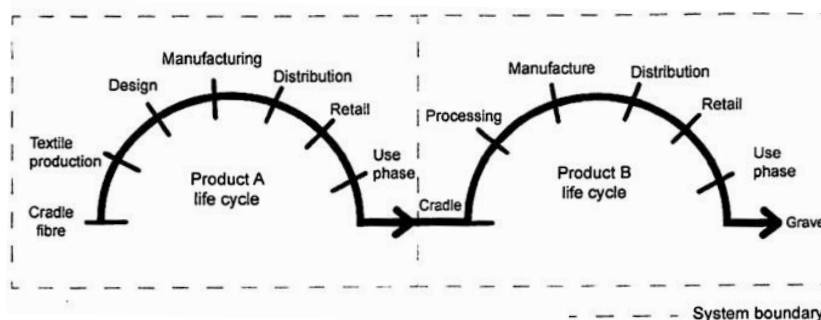
Figure 2 - An open Loop System (Payne 2015)

On the other hand, *closed-loop* recycling of a material can be done almost indefinitely without degradation of properties. This method is more sustainable a better match to a perfect circular economy. Conversion of the used product back to raw material allows repeated making of the same product over and over again. In any sustainability scenario, closed-loop approach is the goal, however, sometimes it takes radical changes and innovative thinking at the level of product and process design, having to resort most of the times to an open-loop system.
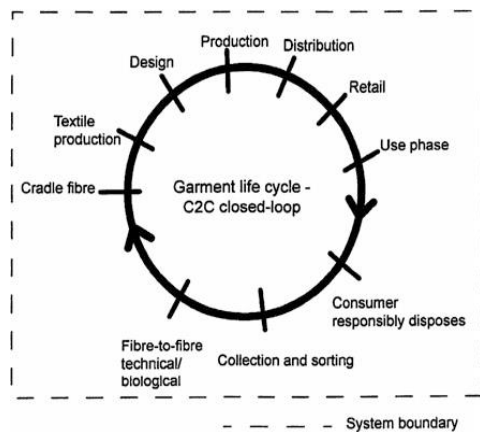
Figure 3 - A closed Loop system (Payne 2015)

A number of textile and apparel companies are working to achieve closed-loop recycling including Patagonia as seen on the company's Web site "best option at this point is to buy recycled-content fabrics and to continually find new ways to recycle our products at the end of their life and keep them out of traditional disposal methods".

3.3 Recycling of Textile materials

When considering textile recycling we must understand what the material consists of. Most textiles are composites of biodegradable materials, vegetal fibers (cotton, flax, hemp, jute, ramie, flax, abaca), animal fibers (wool, catgut, sinew, silk, cashmere, mohair, angora), mineral fibers, wood fiber, man-made fiber (lyoccel, rayon, modal), (Koslowski, 2000), and non-biodegradable (normally composed of polypropylene, polyethylene, nylon or other synthetic fibers). A particular problem in landfill as synthetic products is that it will not decompose, while woolen garments do decompose and produce methane, which contributes to global warming. The world production of fibers is increasing, however, cotton production is moving to "peak cotton", and since around 1995 the main increase occurs in the production of man-made fibers (CIRFS European Man-Made Fibers Association, 2016).
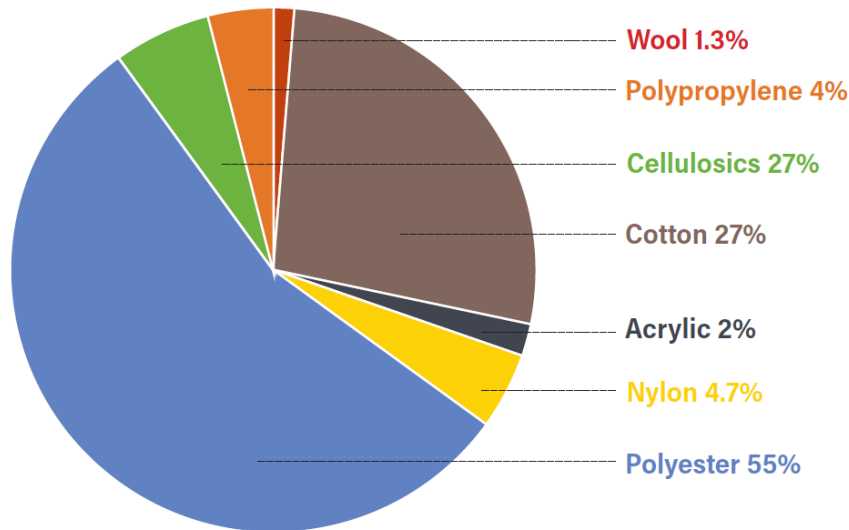
Figure 4 - Textile raw materials global market share (2016 Preferred Fiber and Materials Market Report)

In 2013, the global consumption of fibers and yarns increased to 90.1 million tons from a record of 82 million tons in 2011. To produce fibers in 2011, it required 145 million tons of coal and a couple trillion gallons of water (McGregor, 2015) The US EPA estimates that textile waste occupies nearly 5 % of all landfill space and the average US citizen throws away 35 kg of clothing annually. It is also estimated that the textile recycling industry recycled approximately 1.7 billion kilograms of post-consumer textile waste that accounts for approximately 15 % of the total (National Cotton Council of America, 2016). Woolridge et al. estimated an energy savings of 65 kWh when reused textiles displace a kilogram of virgin cotton, but this value is highly uncertain, and will vary based on the types of products under consideration and the logistical requirements of returning the product to market.

Textile waste can be divided into two categories. Post-industrial waste and post-Consumer Waste depending on what stage of the supply chain the waste comes from. Post-industrial waste is the manufacturing waste that is generated by processing fibers, (natural or synthetic) and the production of finished yarns and textiles, technical textiles, nonwovens, garments and footwear, including off-cuts, selvages, sheerings, rejected materials and/or B-grade garments, off-cuts of saleable size etc., (Chavan, 2014) and is usually deemed "clean" due to its high quality, as it is derives straight from the source and has no wear. Post- Consumer Waste textile waste consists of any type of garments or household textiles (such as sheets or towels) that the consumer no longer

needs and decides to discard, either because they are worn out, damaged, outgrown, or have gone out of fashion. (Chavan, 2014) Materials of good quality in this category are recovered and subsequently reused by another user as second-hand clothing, much of which is sold to third-world nations. The materials are deemed damaged or worn are sent to recycling. For this reasons materials in this category are of low quality, and so its destiny is usually shredding for insulation materials. As we can see, the main methodology is using industrial scraps to produce products of equal value as the waste. Almost all textiles that are sold as "made from recycled fibers" today are produced from industrial scraps according to the primary approach. (Peterson, 2015)

Traditionally there are two ways of recycling textile materials. Wither trough mechanical methods, where fibers are pulled apart and reworked into yarn, or though chemical methods where fibers are repolymerized into a chemical and spun. Knitted or woven woolens and similar materials are "pulled" into a fibrous state for reuse by the textile industry in low-grade applications, such as car insulation or seat stuffing. The textiles are shredded and mix together with other selected fibers, depending on the intended end use of the recycled yarn. The blended mixture is carded to clean and mix the fibers, and spun ready for weaving or knitting. Textiles that are not able to be recycled into raw materials again are shredded to make filling insulation material for car insulation, roofing, loudspeaker cones, panel linings and furniture padding. Problems arise when materials that are mechanically recycled and materials that are only chemical recycled are present in a blend fabric. The common destination of these blends is shredding for insulation, however new research by Palme (2016) proposes, for one of the most popular mixes - cotton and polyester -, maintaining the cotton and degrading or dissolving the PET. This can be achieved by hydrolysis to maintain the cotton and alcoholysis to dissolve the PET. Regarding Mechanical recycling of textile materials, blended fibers cannot be used as the feed if the goal is recycled cotton. Due to the friction and tugging that the fibers undergo during the recycling process, mechanical recycling produces yarn with inferior tensile strength and shorter length to virgin fibers. Therefore, during the yarning stage of the textile supply chain virgin fibers have to be mixed in in order to obtain garments of acceptable strength and quality. (Wang, 2006)

4   Reference Framework

The research process of finding scientific articles, books, reports and other suitable literature review about the textile industry, textile fibers and the techniques and processes of recycling such materials, represents an essential step in the process of analyzing and corroborating predefined ideas and concepts toward the covered topics, and thus provides support for the remaining work. This first approach will ensure the correct consistency and direction of the literature review and the sub consequent steps in this business plan. To better synthesize the impact and importance of the elements of the literature review in the entire project the following Figure 5 was created.
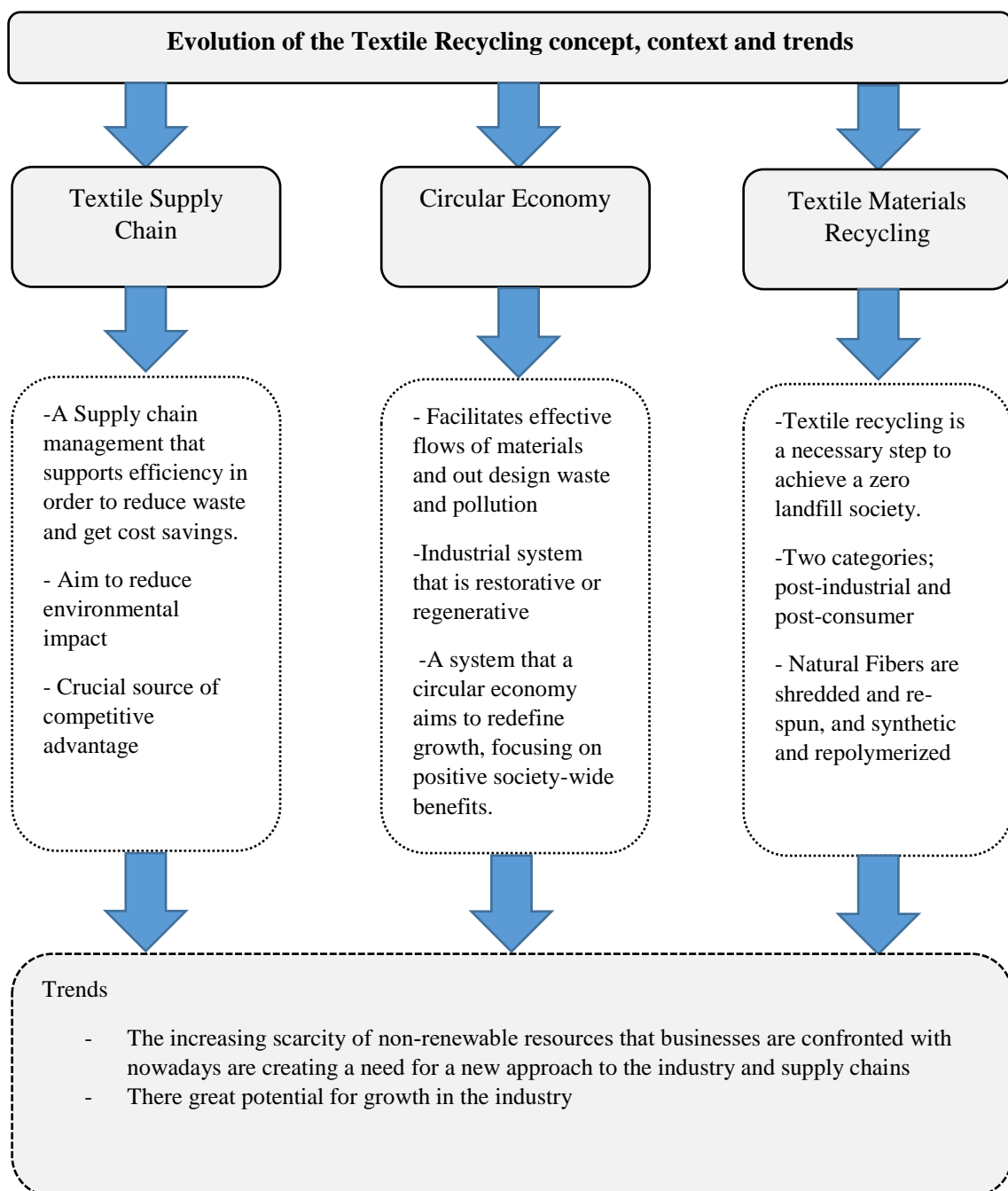
Figure 5 - Reference Framework regarding Literature Review. Source:

5   Market Analysis

5.1   Recycling in the EU

The recovery of secondary materials, or resources, for recycling within the European Union (EU) has become central in the drive to the greening of European economies. This drive is motivated by three factors. First, there is an environmental and geopolitical driver to decouple economic growth from the consumption of finite material resources. Resource recovery is seen as a way to achieve sustainable production and as a way to diminish the resource dependence of external powers, therefore reducing the risk the EU's textile industry supply chain has. (European Commission (EC), 2011; European Environment Agency (EEA), 2011).

A second factor to take into account is the fact that current global recycling labour is found largely in the developing world (Alexander and Reno, 2012) and is haunted by the trope of waste workers in the Global South whose labour breaks up the consumer goods and residues created by first world countries. This leaves the EU countries exposed to political and economic dynamics of those recycling countries. This waste recycling relationship lead to a disinvestment in waste processing and recycling in EU countries, so much that there is no capacity in the waste producing countries to process and recycle all the waste produced by them, which lead to half of EU's waste being exported (European Commission, 2017). If the third world countries that take most of EU's waste stop doing so, the consequence would be a pile up of waste and recycling materials that, due to the lack of infrastructure to process it, would end up in the landfill. In fact, this has already started to happen. In July 2017 China, the world biggest waste processing and recycling country (citation needed) has announced a ban of 24 categories of solid waste, including certain types of plastics, paper and textiles (World Trade Organization, 2017), the ban entered in effect in January 1st 2018 and has caused in the first months vast bottlenecks in the EU recycling infrastructure and has forced several local governments to landfill the excess materials, such as Halifax's decision to bury 300 metric tons of material (citation and revision). [The ban could also have the positive effect of prompting countries to focus on developing domestic recycling industries, said Jean-Marc Boursier, president of the European Federation of Waste Management and Environmental Services.] "The Chinese decision forces us to ask ourselves whether we wouldn't be interested in making processing plants in Europe so as to export products rather than waste," he said.

Third, there is the promise that elevated levels of that elevated levels of European resource recovery might also boost EU economies, via increasing employment in the 'green economy'. Waste management companies, for example. In the EU as a whole, jobs in recycling-related activities grew from 230,000 to 500,000 between 2000 and 2008, at a rate of over 10% per annum (EEA, 2011: 17). This ecological modernization that has spurred the creation of thousands of jobs figure strongly in the two major European policy statements on green growth and the development of a European green economy: the EU Thematic Strategy on the Prevention and Recycling of Waste (Commission of the European Communities, 2005) and the Roadmap to a Resource Efficient Europe (EC, 2011), both of which set the EU on the course to becoming a "recycling society" by 2020. In these documents, European recycling is invariably portrayed as a clean as well as green activity.

5.2   Textile Recycling

5.2.1   Textile Recycling market and Textile Industry in Portugal

The Textile and Clothing Industry in Portugal is one of the most dynamic sectors in Portugal. The companies realized that continuing to insist in a competitiveness based on low prices would have been a disaster and instead have introduced modern elements such as new technologies, new work dynamics, design, and new production and technologies.

The Textile and Clothing Industry comprehends, in 2014, approximately 2 per cent of the companies in Portugal, 11766 enterprises, representing about 5 per cent of the total employed personnel and 2 per cent of the turnover. The districts of Braga and Porto represent 57 per cent and 25 per cent of the turnover of the sector, representing together 82 per cent of the global turnover of the sector. (PORDATA, 2018) The activity more common in the sector is the Manufacturing of Outdoor clothing representing 57 per cent of the number of enterprises and 89 per cent of the companies in the sector are involved in an activity that generates post-industrial textile waste.

Regarding the composition of the sector by size of the enterprises about 60 per cent are micro enterprises and 39 percent are Small and Medium-sized Enterprises. Small and Medium-sized Enterprises represent 73 per cent of global turnover and 76 per cent of the number of employed people by the sector. This contrasts with the average composition

of the Portuguese businesses which are composed of 96.3 percent micro enterprises and 3.7 per cent Small and Medium-sized Enterprises. (Banco de Portugal, 2016)

In relation to influence of the Portuguese Textile and Clothing Industry in the exports, it is responsible for 10 per cent of the national exports and 3 percent of the EU Textile and Clothing exports. It is also responsible for 20 per cent of the jobs in the national Manufacturing industry and 8 per cent of the jobs in the EU in the Textile and Clothing Industry. Furthermore, it is responsible for 8 per cent of the gross turnover of the Portuguese manufacturing industry and 4 per cent of the gross turnover of the EU's Textile and Clothing Industry. (Banco de Portugal, 2016)

5.2.2 Regarding the future of the sector

The main destinies of the exports of the Portuguese Textile and Clothing Industry is the European Union, which represents 82% of the exports total, and is led by Spain with a quota of 31% of the exports and followed by France with a quota of 13%. The next big destinations of are the United Kingdom and Germany, both with a share of 9%, the United States and Italy, both with a share of 5%, and finally the Netherlands with a share of 3%. Outside the EU the main markets are Angola, Tunisia, China and Czech Republic, all with a share around 1%. (Associação Têxtil de Portugal, 2017)

The textile recycling industry is almost non-existent in Portugal. According to a report by Instituto Superior Técnico, the Portugal the Plano Nacional de Gestão de Resíduos 2014-2020, this sector is still not one of the focus of the Portuguese economy, which still focus more on companies engaged in recycling more "traditional" residues, such as car tires, vegetable oil, plastic and card packages, and electronic waste. Besides the report concludes that the economy in order to adapt to the future and prosper has to incorporate a circular economy system into its structure. Henceforth, through the data and conclusions in this report we can state that the potential for the textile recycling industry is immense, due to being critically underdeveloped and due to the around the bend trends, unidentified and mentioned both on this report and on this business plan.

5.3 PESTEL analysis

5.3.1 Political – Legal

Regarding the political context, economic depression and social anxiety due to the changing demographics in Europe have created a wave of division throughout the continent. This division can be seen in sudden rise of populist of parties and movements in the United Kingdom with *Brexit*, France with National Front, Italy with an anti-establishment government, amongst others, and the appearance of minority cabinets supported by fragile coalitions such as in Portugal, Spain and the Netherlands. This polarization in world politics is leading to governments where creating new legislation is becoming increasingly harder and less urgent matters, such as Environmental reforms and incentives, are shelved.

Portugal has been modernizing and digitalizing its legal system. Since 2006 the Portuguese Government has been releasing reforms bundles for its Legal system named Simplex, in order to fight bureaucracy and simplify the life of its citizens and companies. From the philosophy of this program and in order to better follow European standards, which emphasize swiftness and simplicity when talking about realizing licenses, came the creation of the DL nº75/2015, of 11 of May. This diploma states any request for licensing in the Waste Management has been shifted to the Modulo LUA online platform of the SILIAmb (Integrated system of Environmental Licensing). This system articulates with all the licensing systems, such as the System of Responsible Industry (SIR) or the Waste Management System, making the process quicker and simpler and fulfilling their motto of "one request, one bill, one rate". Regarding Waste Management it is regulated by the DL nº151-B/2013 about Environmental Impact Evaluation (RJAIA), and the DL nº178/2006 about Waste Management.

Portugal adheres to EUROPE 2020 targets to support smart growth, sustainable growth and inclusive growth as well as ERA and the "Innovation Union" aims to promote excellence in education and skills development, enhance access to finance for innovative companies, European Innovation Partnerships, reform research and innovation systems and more.

5.3.2 Economical

According to the Portuguese Central Bank, Banco de Portugal, the Portuguese economy is expected to maintain a recovery path over the projection horizon, with a pace

of growth in line with that currently projected for the euro area as a whole. Following a growth of 1.4 per cent of GDP in 2016, the Portuguese economy grew 1.8 per cent in 2017, and is expected to grow by 1.7 per cent in 2018. (Annex 5) These developments in activity over the projection horizon are sustained by strong growth of exports, reflecting a favorable external economic and financial environment, with exported goods and services having projected to stand 60 per cent above the 2008 numbers.

Diversely, private consumption also increased by 2.1 per cent in 2017, continuing the trend of growth of the previous year, which registered a 2.3 per cent increase. The 2017 numbers combine a slight acceleration of consumption of non-durable goods and services with a deceleration of consumption of durable goods, notwithstanding, consumption of non-durable goods and services is expected to grow overall in line with real disposable income. Regarding future projections, 2018 and 2019 point to a significant deceleration in private consumption to 1.4 per cent in both years.

The profile of the Portuguese economy shows a clear international specialization in activities of low or medium-low technological intensity, with a particular concentration in the North of the country. The large diversity and the significant size of the Clusters that characterize the North of the country present significant potential to benefit from economies of agglomeration. The variety of the activities and the relationships between their producers open the way to various types of positive externalities and synergies. The potential for gains from significant economies of scale, related variety and knowledge spillovers in each sector, is enhanced by the regional concentration of these activities in the North of the country, by the national scientific specialization in the areas of each sector, and by those employed in Research and Development.

The Textile, Clothing and Footwear sector is the most specialized in terms of employment and value added, representing a significant part of the Portuguese economy. Although the economic activities of this sector are characterized by below average productivity compared to the European Union, the sector has shown itself to have an important dynamism in terms of the number of high growth companies. It has also benefitted from a high degree of national scientific specialization in Materials Science – Textiles, as well as other highly relevant scientific areas, and from a significant number of people employed in R&D. These sector have shown a significant dynamism of firm growth in terms of employment. (see Annex 5)

5.3.3 Social

Despite making good progress in social security measures, the country is faced with the challenges of an increase in both the aging population and unemployment, which are common problems for many European nations. The challenge of an increase in the number of aged people, which has not been balanced by a proportionate increase in birth rate, is a major issue in Portuguese society has the government social net becomes increasingly more overburden by the growth of a sector of population that requires special social and medical care. Indeed, the birth rate has been declining continuously and there are fewer people entering the work force, a problem father exacerbated by the scores of young people that emigrate to seek better opportunities. Moreover, the sluggish economic growth will force the government to undertake a reduction in social expenditure.

Regarding education Portuguese educational system traditionally delivered education and training that do not respond to the needs of the labor market and are not oriented to cultivating entrepreneurship or based upon competitive advantages. This can be seen in the study of the Centre for Research on Education and Lifelong Learning (CRELL), where in the most recent study Portugal scored below the European average in every indicator (see Annex 1 and 2). However, the development of these indicators suggests that Portugal will be within European averages in the next decade.

5.3.4 Technological

Portugal ranks 30 out of 139 nations in the Networked Readiness Index (SOURCE, 2017), which assesses the factors, policies and institutions that enable a country to fully leverage information and communication technologies for increased competitiveness and well-being. It has emerged has a key indicator of how countries are doing in the digital world. Portugal an average of 4.9 out of 7, the same score has the previous year of 2015 but an improvement from the 4.7 registered in the years of 2014 and 2013. According to the report, Portugal excels in the field of Technological infrastructure and the connectivity of the Portuguese people (under the field individual usage).

Despite this technological advantage, E-commerce is still underused, despite its increasing popularity in Portugal, due to significant cultural challenges connected to it.

Shopping and evening walks in the shopping alleys are part of the Portuguese way of life, and personal contact is highly appreciated.

Moreover, the Portuguese technological and innovation system lag behind the major western economies. The main deficiencies of the Portuguese innovation system can be summarized in the inherent difficulties to enter the knowledge economy and sustain competitive advantages. Thus, the mismatch between education, industry and innovation labor market, the limited exploitation of research results by the productive sector, fragmentation of the innovation endeavors as well as poor business expenditure of innovation comprise the main obstacles of reaching the knowledge base society targets.

This is also compounded by the limitations of public policies in articulating competitive advantages and in orienting the productive base towards knowledge intensive and high added value segments, although this is a point that the program Portugal2020 is investing heavily in order to correct it. One of the upshots of this program, COMPETE 2020, looks to enact reforms on the basis of creating an enabling environment for investments in the modernization of the business sector in terms of R&D investments, and continue the trend of growth in the area. Portugal is the leading country in terms of growth in the R&D (OCDE Science and technology) sector, having double its expenditure per GDP in the last 15 years, however this growth rate is due to the severe underdevelopment the sector had in Portugal.

In the Environmental Performance Index (Yale Center for Environmental Law & Policy, 2018) Portugal scores 71.91 points and ranks 26 out of 180 countries, however that score puts Portugal in 21 out of the 22 western democracies analyzed, just 0.7 points shy of the 22nd United States of America. This ranking provides a careful measurement of environmental trends and progress, and can be used to gauge at how close is Portugal to fulfilling its environmental goals.

On the subject of the current textile recycling research mindset in Portugal it is, as mentioned before, still very underexplored. The leading research centers in Portugal are CITEVE and Universidade do Minho. The first is the foremost certifier and facilitator of green textiles and eco-design – two corner stones of this project; however only in the middle of 2018 has it opened a research center dedicated to develop these two areas. On the other hand, Universidade do Minho has an approach less focused on business but more focused on the technologic side of this area with a department dedicated to develop new textile techniques and materials, of which a few have a *green* focus.

5.4 Five Porter's Forces

5.4.1 Threat of new entrants

Medium. In order to fully comprehend this threat we must analyze height of entry barriers that are present and the reaction entrants can expect from incumbents. In order to fully establish themselves in the market a new entrant would have face a higher than normal capital requirements, supply side economy of scale and demand-side benefits of scale. That is to say, a higher investment and client portfolio than average business opportunity in order to be able efficiently explore the market. Regarding the customer switching costs we have to divide this category in two; the suppliers of the raw materials that function has a supplier-client, and the companies that buy the raw materials. Regarding the former their costs are next to none since it does not matter who comes to pick up the waste has long has the proper paperwork is filled. However, the latter have to incur a medium degree of customer switching costs. These costs come through the form of altering product specifications in order to integrate the recycled material, and the modification of some processes and the retraining these changes bring. On the other side of the spectrum are the incumbency advantages, which only come though the form of long term relationships between supplier and clients, unequal access to distribution channels, which in this B2B market is a threat not to be considered, and restrictive government policy, which despite being slightly higher than your run of the mill business can be considered normal business red tape. The biggest share of the incumbents are family owned SMBs which are reluctant to change and to small in order to perform some sort of cartel, therefore the expected retaliation is none.

5.4.2 Bargaining Power of Suppliers

Low. Powerful suppliers capture more of the value for themselves by charging higher prices, limiting quality or services, or shifting costs to industry participants. Powerful suppliers can squeeze profitability out of an industry that is unable to pass on cost increases in its own prices. However in this business the suppliers of the raw materials are the creators of post-industrial textile waste, who do not see the activity has its core business and are mandated by law to dispose of it through the proper channel and pay the company that is responsible of the waste management all its expenses with the process.. This legal obligation to dispose the waste through our industry and the obligation to pay a fee while doing so makes the power of the suppliers low.

5.4.3 The Power of the Buyers

Medium. Powerful customers, the other side of powerful suppliers, can capture more value by forcing down prices, demanding better quality or more service, and generally playing industry participants off against one another, all at the expense of industry profitability. Buyers are powerful if they have negotiating leverage relative to industry participants and use that leverage to pressure price reductions. These power can be measured by comparing the number of buying in the industry, the standardization go the products, the switching costs to the buyer, possibility to integrate backwards, and its price sensibility. All these categories can be classified as normal for an industry with the exception of the standardization of products. The recycled raw materials produced face competition from fresh raw materials which can sometimes be of higher quality and some buyers have a bigger trust on. However, the market segment our industry is trying to market itself is for those that are producing an environmental friendly line of products, which those traditional sources cannot satisfy. Therefore, we can classify this threat as Medium.

5.4.4 The Threat of substitutes.

High. A substitute performs the same or a similar function as an industry's product by a different means. In this industry of supplying recycled textile fibers, the main substitute is the traditional sources of fresh raw materials, such as the agricultural sector or the chemical sector. When the threat of substitutes is high, industry profitability suffers. Substitute products or services limit an industry's profit potential by placing a ceiling on prices. If an industry does not distance itself from substitutes through product performance, marketing, or other means. This is the route we are going in order to curb this threat. By marketing this material to companies that want to offer a line of environmental friendly products, we are attacking a segment of the market where fresh raw materials just cannot compete. However, in a normal segment those materials hold more power since most of the times they can offer more quality than the recycled class, with only the close availability to the client being the main counterpoint to that threat. Therefore, this force can be classified as High.

5.4.5 Rivalry among existing competitors

High. High rivalry limits the profitability of an industry. The degree to which rivalry drives down an industry's profit potential depends, first, on the *intensity* with which companies compete and, second, on the *basis* on which they compete. In this industry, the competitors are roughly the same side, which increases the chances of poaching of the limited pool of clients and suppliers. This limited pool of suppliers also increases the fight for market share and the fight for good suppliers, which have a limited output. To add to that, the exit barriers of the industry are higher than average, due to the amount of basic infrastructure needed to set up the business. This keeps companies in the market even though they may be earning low or negative returns, pushing the market downwards. Regarding a more direct rivalry, the biggest component is the price competition due to the standardization of the product. Therefore, we can classify this threat has High.

5.4.6 Main Conclusion

As we can see in the Table 1, the analysis of the Porter's Five Forces shows that the industry forces are powerful, at an average of *3,33* points out of *5*, and accordingly the industry's attractiveness is rather low, with an average of just 1,67 points out of 5.

Forces	Power	Attractiveness
Threat of New Entrants	2,89	2,14
Bargaining Power of Suppliers	2,5	2,5
Bargaining Power of Buyers	3,4	1,6
Threat of Substitutes	4,3	0,7
Rivalry among Existing Competitors	3,6	1,4
Average Result	**3,33**	**1,67**

Table 1- Porter's Five Forces grid. Source: Author

5.5 Costumer and Client Profiles

5.5.1 What Consumer Needs

With the new trend of environmental responsibility, consumers are requiring products that are made from conscientiously sourced raw materials. The consumer therefore demands a reform in the supply chain that begins at production of the raw materials, where its traditional methods drain the planet's resources at an unsustainable way. This push for reform creates a need for closed-economy solutions were the waste and end-life final product are re-fed into the system.

There is also a need in the textile manufacturing market to have a company in charge of managing its post-industrial textile waste. Portuguese law mandates that a company with the infrastructure necessary to process that waste should dispose textile waste, and that the producer of this waste should reimburse the waste managing company for its expenses incurred during this process.

5.5.2 Who

Our clients/potential consumers are every manufacturing company, or even private citizens, who require large amounts of recycling yarning raw materials. These raw materials can be then used to make a line of yarn that is environmentally friendly so companies can produce lines of clothing that fulfill the demand mentioned above.

For our waste management part of the business, it is every manufacturer that uses textiles in large quantities, therefore creating an industrial batch of post-industrial textile waste.

5.5.3 Competition

As mentioned before this company faces competitors on its two fronts of the business, the wholesale of raw materials and the waste management service. The director of the Portuguese Association of Textiles and Clothing (ATV), Paulo Vaz, said in an interview to the newspaper Expresso, "There is no Portuguese company with a big size in the textile recycling industry". The industry is composed by small family owned businesses that are slow to keep up with the changes of the market and then a few medium sized businesses with state of the art technology and techniques.

For our analysis we are going to analyze the bigger and most advanced competitors, has they are the ones that can offer the same services as we do and have similar characteristics, the other players in the market are so different that they can be classified as substitutes instead.

The following companies were chosen for direct competitors: *Ambiberica*, *SASIA*, *Seraical*, *and Triar*.

5.5.4 Indirect Competitors/Substitutes

There is indirect competitors both on the waste management side of the business, as well as in the delivery of raw materials side. On the waste management side of the business, the main indirect competitors are the family owned recyclers that focus on shredding the textiles for insulation. These focus on collecting waste from small textile manufacturers, who produce less than 2 tons of waste per month, and have a very small portfolio of manufacturers. Their infrastructure and machinery is generally obsolete and deteriorated, and some are managed as nothing less than a side job for some extra income besides their main job. Even though they present a sub-par service compared to modern waste management companies, their prices for the service are very similar as they rely solely on their client being indolent and not seek out more professional waste management companies.

Regarding the delivery of raw materials for the manufacturer of yarn the main substitute are the virgin fibers. These fibers are mostly imported to Portugal and then resold by intermediaries. As explained, a direct competition, with the focus to completely supplant the use of virgin fibers with recycled fibers is utopic. Virgin fibers are, on general, of higher quality and there is a higher trust by manufacturers on those then on recycled fibers. Moreover, for the instance of cotton a mix recycled-virgin has to be used to make quality-recycled products. That is why the focus is to exploit a gap in the market that demands lines of environmentally friendly products rather than to attack these substitute supply lines head-on.

5.5.5 Positioning

In order to better understand the competitors and their positioning it was created a gold positioning triangle, with the three characteristics that should be taken into account:

Competitors Positioning

- Competitive prices

- Specialization in insulation materials

Customers' Expectations

- Quality *green* material
- Great price/quality ratio

Potential Service trumps

-Materials for the clients to explore an unexplored market
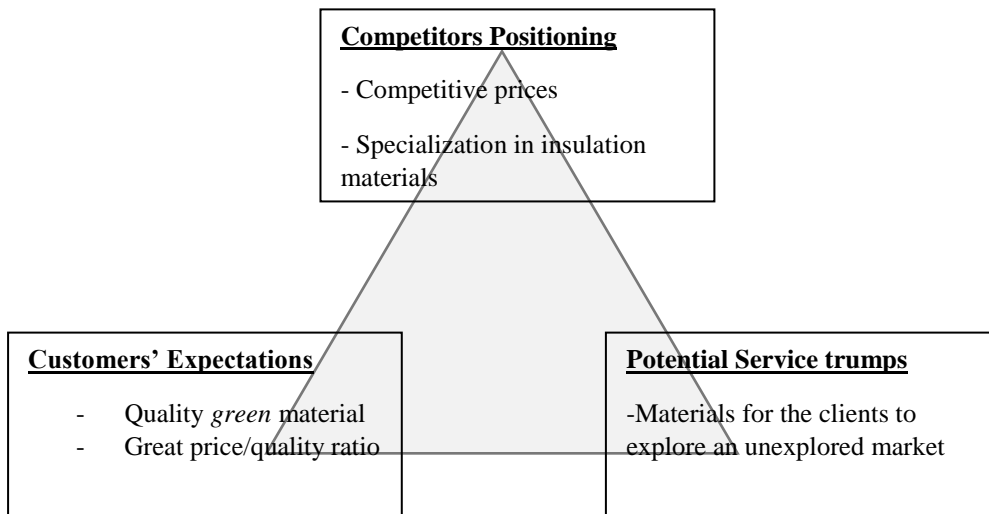
Figure 6 - Gold Positioning Triangle. Source: Author

6 Internal Analysis

6.1 Value Chain

Understanding how a company creates value, and looking for ways to add more value, are critical elements in developing a competitive strategy. The concept was introduced by Michael Porter in his book *Competitive Advantage* (Competitive Advantage, Porter 1985) and defines it as a set of activities that an organization carries out to create value for its customers. Porter proposed a general-purpose value chain that focuses on systems, rather than departments cost types, and divided said chain into primary and core activities. The following chart identifies the company's activities:

Inbound Logistics: The inbound logistics in this company refer to the textile fibers waste collected by the company at the associated manufacturers that use the company's waste management service. These are collected at the manufacturer and transported to the company's facilities where it is unloaded in the recycling area.

Operations: After the waste collected is in the facility it is then fed into the feeding slot of the machine necessary to process that material. The output of the machine is then baled in order to be in a storable shape so it can go to the warehouse for final products in the company's facilities.

Outbound logistics: The bales of recycled textile fibers created in the Operations activity are then stored in the company's facilities. After a sale is made, the bales are then transported to the final client. The company itself, the client if he chooses so or a third party transportation company, can do them shipping phase. The latter is used if the distances are too great for the company to be able to service the client, or if an event or high demand pressure has overburden the logistics of the company.

Marketing and Sales: This part of the value chain is explain in detail in the chapter 10 of the Marketing Mix of this business plan.

Client Service: In this are handled the post-sales relations with the clients, providing a service to enhance the value of the product after it has been sold and delivered. It is handled by the same team that is responsible by the sales so a connection and conduit between marketing, sales and post-sales service, making the whole experience more seamless, fluid and enjoyable.

<u>Support Activities:</u> This includes the activities such as management, finance, accounting, and human resources. These activities go across the primary activities and aim to coordinate and support their functions as best as possible with each other by providing the inputs related to their field.

7   Competitive Analysis

7.1   SWOT Analysis

The SWOT analysis is an indispensable strategic planning technique. Its elaboration allows its author to specify the objectives of the project and identify internal and external factors favorable or unfavorable to achieving those objectives.

Strengths	Weaknesses
MODERN AND SOPHISTICATED TECHNIQUES AND INFRASTRUCTURE	HIGH INITIAL INVESTMENT TO ACQUIRE REQUIRED INFRASTRUCTURE
PROXIMITY TO THE SUPPLIERS AND CLIENTS	QUALITY OF END PRODUCT WHEN COMPARED TO VIRGIN PRODUCTS
	HIGH ACQUISITION COST OF BOTH THE SUPPLIERS AND THE CLIENTS
	LIMITED NUMBER OF SUPPLIERS AND CLIENTS
	REGIONALISM OF THE BUSINESS
Opportunities	**Threats**
UNFULFILLED MARKET DESIRE FOR ENVIRONMENTALLY FRIENDLY RAW MATERIALS	ENTRANCE OF NEW COMPETITORS AND PRODUCTS IN THE INDUSTRY
GROWTH OF THE TEXTILE INDUSTRY IN THE REGION	PRESENCE OF STRONG SUBSTITUTES
DEVELOPMENT OF NEW *GREEN* TRENDS WHICH CAN BOLSTER THE MARKET	

Table 2 - SWOT analysis. Source: Author

7.2 Qualified SWOT

After the SWOT analysis, a qualified SWOT should be developed in order to analyze the different combinations of Strengths, Weaknesses, Opportunities and Threats. As such, bellow is the main challenges, constraints, warnings and risks that can be extracted from the SWOT analysis:

	Opportunities	Threats
Strengths	Challenges S2 vs S3 vs O2: Taking advantage of the increasing market potential in the region S1 vs 03 vs O1: Using the competitive advantage and infrastructure to increase the market reach of the company and fully take advantage of the existing trends	Warnings S2 vs T2: Company should try to make the clients aware and change the mentality that even though traditional sources of fibers offer more reliability, the future lays in *green* alternatives S1 vs T1: The lack of intellectual protection of this techniques and machinery makes the possibility of entrance of new players a substantial threat that the company should minimize with the benefit of being one of the firsts in the market, and therefore establish reputation.
Weaknesses	Constraints W4 vs O1: Even though there is a desire down the line for this kind of environmentally friendly products, the distance between the final consumer and the company's position in the supply line, in addition with the low number of players in the supply line compared to other types of companies (such as companies that sell to the mass market), may difficult the time or disposition for the industry to adopt this nonstandard product.	Risks W3 vs W4 vs T1: The entrance of new competitors will stress and drain an already shallow client and supplier pool. W2 vs T2: The difference of quality in the cotton product line (the remaining are free from this weakness) compared to the substitutes may precipitate some clients to use them. The company must leverage the other advantages of the products in order to counteract this fact.

Table 3 - Qualified SWOT matrix. Source: Author

Legend: *Sx* stands for Strengths; *Ox* for opportunities; *Wx* for Weaknesses; *Tx* for Threats – where x stands for the number of said attributes.

8 Differentiation Strategy

Competitive advantage is at the heart of any strategy, and achieving competitive advantage requires a company to select a path, it must choose the type of competitive advantage it seeks to obtain and the scope within which it will attain it. If a company tries to please everyone and pursue all paths available, it will end up not having a competitive advantage at all. Porter, in his book *Competitive Strategy: Techniques for Analyzing Industries and Competitors* published in 1980, identifies three broad generic strategies to achieve competitive advantage: cost leadership, differentiation and focus, with the focus strategy being divided into two variants, cost focus and differentiation focus.

Out of the three generic strategies to achieve competitive advantage presented by Porter the one that fits better the profile of this company is the *differentiation focus* strategy. In this strategy, the company selects a segment or group of segments in the industry and tailors its strategy to serving them, to the exclusion of others, by focusing on the special needs of the buyers. That can be achieved by delivering a distinguished service, with unique and innovative characteristics, to the selected and well defined segment (niche). The scope of this business plan has been previously described. The differentiation is based in the following competitive advantages:

Product features: The product line has an array of differentiation features, which can be seen in greater detail in the chapter (Product 10.1).

Market Specialization: By specializing in delivering a product with such an underused potential and focusing of the company's resources into the growing niche fully *green* items, the company can obtain a competitive advantage.

Client Service: The industry is populated by small family owned companies that lack a sales or a marketing team. Hence, the presence of a team that is responsible for the marketing, sales and post-sales transactions is a differentiation factor in the industry. Besides, the presence a single team responsible for this thread of tasks ensures a coherent posture throughout every phase of the client experience.

8.1 Vision, Mission, and Core Values

Vision: To become a leader and forerunner in the techniques and technologies that encompass circular economy

Mission: To recycle waste into new raw materials, so our clients can produce truly environmentally friendly products

Core Values:

Sustainability: A Sustainable and responsible attitude towards the environment is the embodiment of the company, and thus, one of its main goals.

Quality: To provide the highest quality products, (to ensure our client deliver the final consumer the highest grade products as possible)

Performance Driven: Demonstrating initiative in supporting the goals and overall strategy of the company.

Innovation: We look in different places and pioneer in new technologies and techniques. We lead the way forward.

9 Implementation Policies

9.1 Brand

The definition of a brand is an important step in creating a business, since the brand is not only the source of identity, but also serves as a guide to understanding the purpose of the key business objectives. A quality brand gives people something to believe in, something to stand behind, it is the source of a promise to the consumer. That being said the name of the company of this business plan will be *GreenStar*. The company wants to set a precedent and be the standard for the market regarding recycled textile fibers, and wants obviously to be seen as a company that is, above all, environmentally friendly. The chosen name reflects all those things into those two words. The name deliberately resembles a few certifications names, like Energy Star, in an effort to subconsciously pass the message that the fibers are certified to be the highest quality possible, and the products that use those fibers are as "green" as they can get. The name also opens the possibility of products that end in the final consumer's hands bear the brand's logo in the packaging as a certification that the products uses recycled fibers and as such, with the passage of time, consumers may demand *GreenStar* textile products, increasing the demand for our product lines.

The logo (Figure 7) reflects the aforementioned characteristics of the brand, and is simple, clean, and easy to understand.

Figure 7 - GreenStar Logo

9.2   Segmentation, targeting and Positioning

For the business being analyzed in this business plan we need to divide the segmentation and targeting of the market into two areas: the waste management area and the raw materials area.

9.2.1   Waste Management Segmentation and Positioning

Characteristics: Textile manufactures produce a variety of wastes during its manufacturing process, with most of the volume of said waste being fabric and textiles scraps. Portuguese law mandates, through the decree DL n. ° 178/2006, that any waste produced by manufactures has to be handled and disposed through licensed companies, or else a hefty is to be paid by the infractor. Furthermore, the waste producer has to compensate the entity in charge of managing said waste with the later issuing in return a certificate that certificates the company as one that is following the regulations.

Client Target: Medium to large textile manufactures in the Vale do Ave e Cávado Sub region.
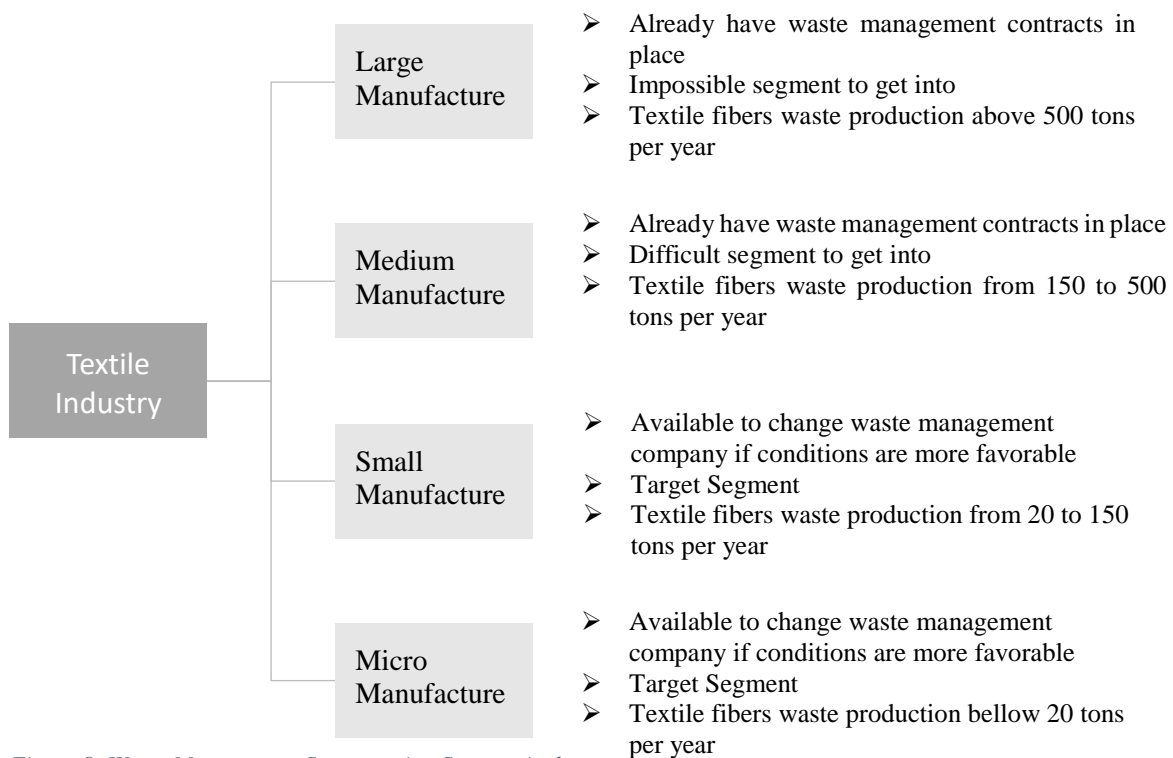
Figure 8- Waste Management Segmentation Source: Author

9.2.2 Consumers of recycled fibers

Yarn Spinners

The bread and butter of this side of the business plan. The appearance of the trend of environmentally friendly clothing has created a market for recycled textile fibers. Every fabric is composed of fibers. The yarn spinners are a crucial cog of the textile industrial chain. If a trend is born at the end of the supply chain it ripples back into the yarn spinners rather quickly. Even though every yarn spinner would jump at the chance of expanding its product line in order to develop its market reach and market share, at the moment only a few yarn spinners offer product lines composed of yarn cones made from recycled textile fibers, mainly due to the lack of a steady source of raw materials necessary to sustain such line. The company will therefore target this raw material hungry factories that are searching for a steady supplier of recycled textile fibers.

10 Marketing Mix

10.1 Product

This project is about an innovative way of revolutionizing the supply chain in the textile industry while at the same time saving the environment of needless resource stress. In this part of the business plan it is presented the product range of the company, which will be constructed around three pillars, and the potential technical difficulties and idiosyncrasies. The latter are important to identify and explain because without fully understanding the strengths and weaknesses of the product it is impossible to craft an elaborate plan to interact with the clients, and it also provides a guide on which future management decisions can be based off. The three pillars of the company's product range are the following:

<u>Raw Recycled Cotton</u>

The main product to be produced is bales of raw recycled cotton. This product is obtained by breaking down scraps of textiles in order to obtain fibers fit to be spun into yarn by Spinning Manufacturers. The tearing line effectively breaks down the fabric scraps into fibers so that no piece of fabric is found among the output fibrous material. However, the presence of small pieces of yarn in the output material can happen. A high content of yarn pieces into the fibrous material adversely affects both the spinning efficiency and yarn quality and lead to an increase of breaking strength irregularity of yarns. Spinning Manufacturers are aware of this fact so in order for them to compromise the environmental and economic sustainability of the yarns, and the quality of the yarns a mixture of virgin cotton and recycled cotton has to be created.

The amount of mixing that the Spinning factory will have to do will depend on the purpose of the yarn. If the intention is high fashion clothing then a 25 tex yarn from 20 % recycled cotton/80 % virgin cotton. As the percentage of recycled cotton increased the number of irregularities among the yarn increases and its strength slightly decreases. This does not mean that recycled cotton does not have a place in the Clothing industry. Pure recycled cotton is used as the raw materials for socks with almost no difference to virgin cotton socks. There is a vast market for our product since it is also used in the manufacture of materials such as gauze bandage fabrics, kitchen cloths, and cleaning cloths to name a few. Such fabrics have a short lifetime and their requirements involve absorbency rather than high strength and uniformity.

One revolutionary environmentally friendly factor is the separation of colours of the scraps pre-tearing so that the fibers produced are already dyed. This saves money for our clients by allowing them to bypass the dyeing phase of the supply line. The environment is also beneficiated by this since thousands of litters of water and harmful dyes will not be used.

Synthetic Fabrics Mixes

The other main product of the company is Shredded Synthetic Mixes. Synthetic materials, such as Polyester or Nylon, can only be fully recycled into a closed-loop economy system after being melted into pellets. However, such process requires expensive complex machinery which needs large floor space and specialized workers. For this reason, our company will focus on the open-loop side of recycling of Synthetic Fibers, which is the sale of shredded synthetic mixes to be sold as insolation material, from automakers to construction. A future integration of a production line of synthetic pellet is in the table in order to fulfil the mission of the company and increase our product range.

Organic Materials

The last pillar of our product line is the Organic materials. This line includes fibers such as Jute, Wool and Sisal. This fibers have the special characteristic of being torn, re-spun, and knitted and fed back into the system with a much smaller lost in quality than cotton. This means that our fibers can compete in the market with virgin fibers and offer no limitation to our clients pool.

10.2 Place

The product will be distributed through the use of two different distribution mediums; Selling Directly and Selling through a Reseller/intermediary. The distribution strategy will be a selective distribution strategy, that is, a strategy where a manufacturer's product or service is available from more than one channel partner, but the product is not accessible from all businesses that market the category of product. This strategy fits the "push" approach that should be given in these circumstances where the "channel" has to be educated and awareness created which means close contact with the partners and close sales.

Since the product's supply is limited and new to the market, serving an untapped section of the market a direct selling approach is the first step to make. This approach also grants a more personal feel of the market due to the direct interaction with the customers. This way the company can easily adapt to the changes and desires of the market, providing a quick way to swiftly adapt to the market needs.

The second distribution strategy to be followed by the company is the sale though a reseller and intermediaries. This strategy will take a back seat at the beginning of the operations, becoming more important as the company grows in size and volume, since this method transfers the sale costs, receiving only a portion of the final sales price, but the company can focus on manufacturing the best product at the lowest cost. Though to minimize loss of profit margin, we will focus on *one-level* distribution channels, which is the number of intermediaries between the manufacturer and the consumer will be, at most, one. To reach as many clients as possible a small network of commercial agents, or salesmen, will also be subcontracted. These salesmen will not be employed by the company but instead will be independent contractors that receive a small cut of each sale, ensuring the risk of the operation is slightly shared between the manufacturer and the reseller.

10.3 Pricing

Pricing plays a key role in the marketing mix. The reason for this importance is that where the rest of the elements of the marketing mix are cost generators, price is a source of income and profits. Through pricing, the organization manages to support the cost of production, the cost of distribution, and the cost of promotion. Pricing is a complex elements, which needs to reflect supply and demand, which are respectively connected to the value of the product and what the consumer perceives as the value of the product.

The company will follow a product line pricing strategy, which consists developing product lines and introducing price steps. This is due to the nature of the production of the company, where all the raw materials are given at the same rate and processed using, more or less, the same machinery

10.4 Promotion

Promotion consists on a blend of marketing tool that a company uses to persuasively communicate its value proposition in order to increase customer value and build relationships with the customer, with the ultimate goal of increasing the amount of purchases and consumption of the product by the customer. A company must shape the promotion tools and strategy to better fit the composition and nature of its client pool (Kotler & Armstrong, 2012). Hence, the company will use as a communication strategy, the strategy that better plays the strengths of the company, a *push* strategy. This strategy involves "pushing" the product through marketing channels to final consumers. The company directs its marketing activities (primarily personal selling and trade promotion) toward channel members to induce them to carry the product and promote it to final consumers. This strategy also better fits the resources and brand recognition of the company, as well as the Business-to-business nature of the company, as *pull* or *push-pull* strategies require an extensive of resources. In fact, due to economic problems, many consumer-goods companies have been decreasing the brand-building pull portions of their mixes in favor of more push.

Henceforth, a set of communications goal have to be established to ensure the aforementioned strategy is fulfilled.

Communication goals:

- To improve product's demand
- To inform of the product's existence
- To educate on the benefits of the product
- To increase client interest in the area/niche
- To promote company brand awareness
- To create proximity with the clients
- To get feedback about the product
- To maintain relationships with the clients
- To create a recommendation /referral trend within the target population

To fulfill this communications objectives the company will use the unique characteristics of an arsenal of promotional tools, which are personal selling, sales promotion, public relations, and direct marketing. These tools will be implanted as following, with the respective costs present in a section bellow.

Personal Selling

Sales Team: composed of 2 elements, a sale force more than enough due to the geographic proximity and cluster density of the of the target segment, which will meet with potential clients and inform them about the products characteristic and the strategic benefits they can acquire with the company's product.

Building clients and potential clients relations

Sales Promotion

Creation of a first time buyer incentive: A key component in the marketing campaign, consisting of a collection of short-term incentives designed to stimulate the sale of the company's products. This incentive is composed of a discount of

Sampling distribution: This consumer trade promotion tool is implemented in order to persuade the consumer to carry more units than the normal amount. Due to the nature of our client pool, the two main problems that accompany this tool, *forward buying* by wholesalers and *diverting*, are not a problem. This project will be a tool that will aid the labour of the sales team.

Trade Shows: For many new businesses that want to make a splash to a targeted audience, especially in the B2B world, trade shows are an important tool, although the cost is a bit steep for a new business. The presence in a few key trade shows would not only increase the number of clients, but increase brand and product awareness.

Direct Marketing

Formation of a database with customer's data: Direct marketing must be integrated with other communications and channel activities. (Kotler and Armstrong, 2012). Therefore, this tool will serve as a support for the other communication tools. Thus, a database will be compiled with customer data, such as experiences with the company and the customer profile, in order to better understand how to communicate with them and tailor a strategy especially for those clients – something possible due to the small size of the company's client pool. This database will also help measure the campaign's success by calculating, between other, the average customer longevity, average customer annual expenditure, and

average gross margin, minus the average cost of customer acquisition and maintenance, discounted for the opportunity cost of money.

Public Relation

Corporate Communications: Promoting the understanding of our product and the benefits of adopting it through external communications. This tool, which seeks to stimulate the relations between company and customers in order to promote the company's image and products, will be a clutch to the direct marketing, sales promotion and direct selling tools. By creating synergies between the different communications tools the company seeks to maximize the reach and impact of its communications. Hence the focus of this tool will be on the events the company will participate, such as the trade shows.

10.5 Marketing Budget

Regarding the marketing budget, the company will allocate the money based on the necessities of the market. With the small client pool and the high order volume per client, the bulk of the budget will go to personal selling and the remaining tools created to aid this method. The personal selling is quite central due to the product's specialization and uniqueness, in which the company has to explain in detail all the information necessary to the buyer's decision. The main target of this company, spinning factories, will not become one time buyers, but instead initiate a relationship with the company for the supply of the raw materials, since one of the focal points of the product is the creation of a green yarn product line. This facts create a necessity of methods that create bonds and relationships that are rather personal, something mass marketing and advertisement methods are not able to accomplish. The budget will be constructed according to the *affordable method.* This method was chosen due to the embryonic state of the company, which both lacks historic records of previous years and the capital to construct a more detailed marketing budget.

The next tables show the percentage of the marketing budget that will be allocated to each promotional tool and the monetary expenses of each tool.

Table 4 shows the marketing budget throughout the time scope of the project. To define a budget, the company assumed a 5% value from the sales in each year.

	2019	2020	2021	2022	2023	2024
Amount spent in Marketing	11.146€	15.762€	19.961€	21.446€	21.664€	21.884€

Table 4 – Value of Marketing Budget   Source: Author

11 Organization structure and staff

11.1 Organization Chart

Defining the organizational structure is a mandatory step when structure an organization as it provides a company with a visual representation of how it is shaped and how it can best move forward in achieving its goals. For it to be efficacious it needs to clearly delineate the employee's job and how it fits within the overall system.

As see in the Figure 9 the organizational chart assumes a vertical way and follows a functional organizational structure, where there are two hierarchical levels: Strategic, and Operational and Sales. The first relates to the organizational strategic and financial decisions, both performed out by the CEO. The Operational level is the one where the factory floor workers are divided. Finally the Sales level is composed by the sales team and customer relation team.

```
                    ┌──────────────┐
                    │     CEO      │
                    └──────────────┘
                           │
             ┌─────────────┴─────────────┐
     ┌──────────────┐            ┌──────────────┐
     │  Sales Team  │            │ Factory Team │
     └──────────────┘            └──────────────┘
```
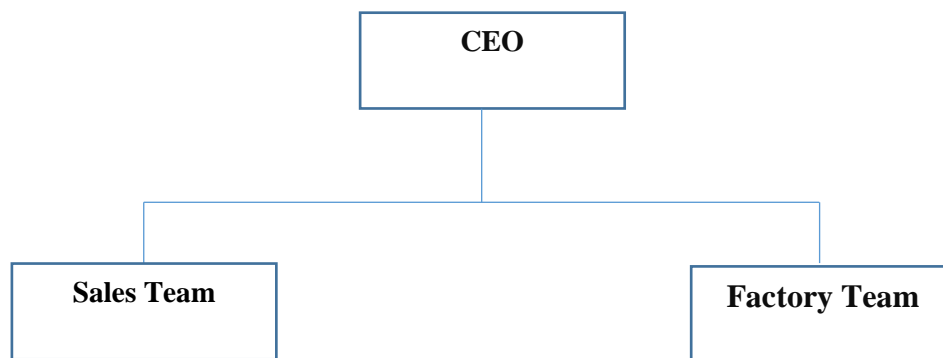
Figure 9- Company's Organizational structure   Source: Author

Function	Main Responsibilities
CEO	Make Strategic Decisions
	Set Marketing Policies
	Manage Finances
	Acquire funding
	Coordination and management of the staff
	Manage Recruitment
	Oversee relations with stakeholders
Sales Team	Pursue and procure new customers
	Manage client portfolio
	Manage marketing/direct sales
Factory Team	Operate machinery on the factory ground

Table 5 - Employee's function description <u>Source</u>: Author

11.2 Remuneration policy

The company will be located in a large manufacturing facility with an operations floor and an office area. In the operations floor there will be six work posts. They will all have the qualifications to do all the functions necessary and will be allocated between posts, as the shift manager will see fit. The work schedule will be from 9am to 6pm with a 1-hour lunch break in between, so shifts are necessary. The workweek will therefore be comprised of 40 hours, divided by 8 hours in 5 workdays - Monday to Friday.

The full details of the remunerations, including subsidies and state taxes, are in Annex 11. The monthly remuneration values will be the following:

Function	Gross Remuneration
CEO	750€
Sales and Marketing	750€
Operations	700€

Table 6 - Staff Gross Remuneration Source: Author

12 Implementation Requisites

In order to organize and schedule this project the Gant methodology was applied to the company's tasks or activities. This method was chosen due to its major advantages as it allows teams to define problems visually. On a single table, we have all the list of work to be done, the schedule to maintain and the resources involved. A complex project can be distilled into a work breakdown structure with a clear schedule so that the tasks are easy to tackle. The project is divided into 13 tasks and the over 16 weeks. The timeline is in undefined dates due to the uncertain date which projects usually start.
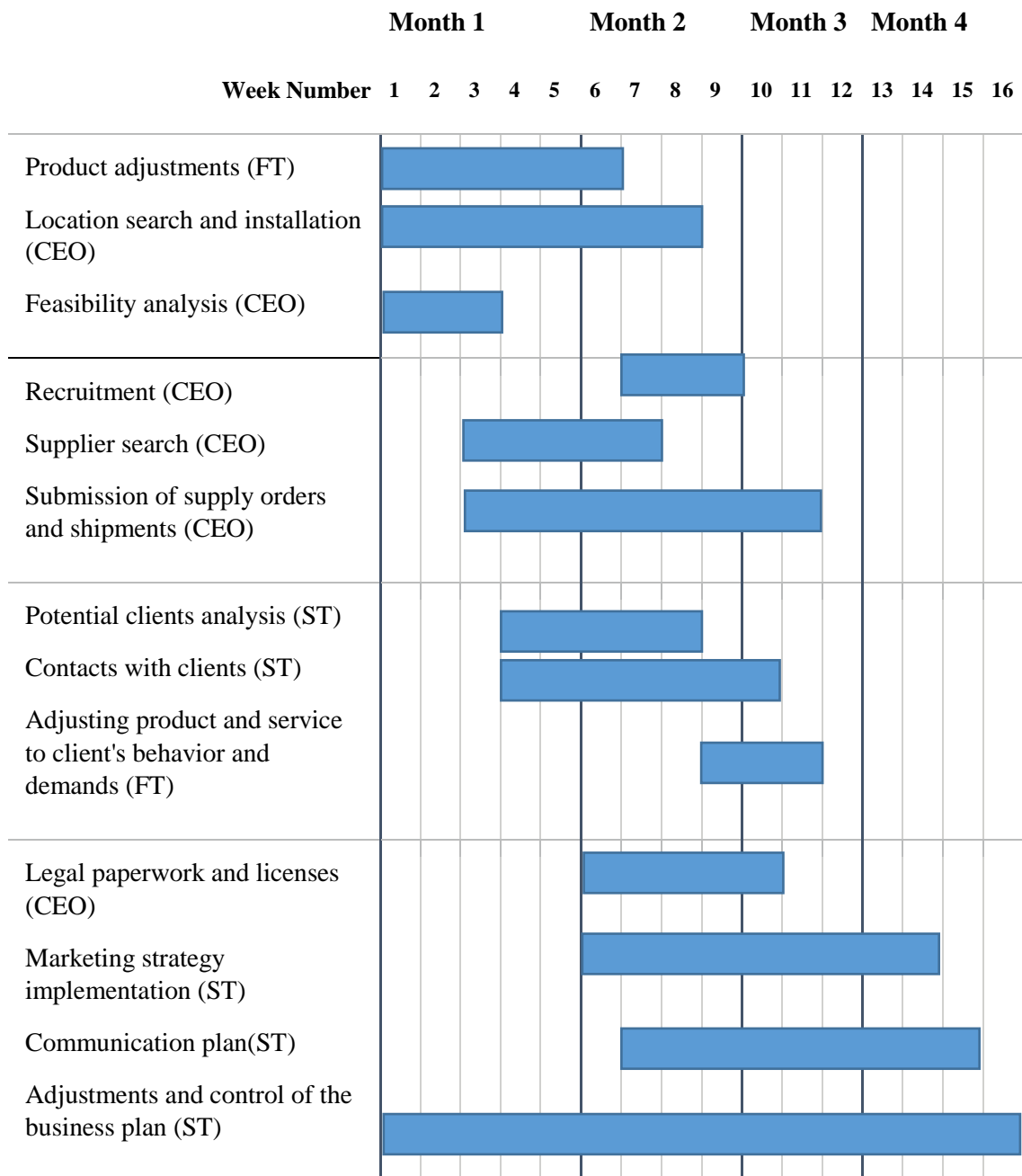
Figure 10 - Gant Diagram Source: Author

13 Economic and Final Evaluation

13.1 Main Assumptions

This chapter's aim is to access the project's financial and economic viability. A number of assumptions were made in order to develop the economic and financial valuation with the objective of obtaining a current scenario. The project's duration is of six years, with a starting date for simplification's sake on 1st January 2019, on a 12 months per year basis.

The Project's economic and financial decisions assume a sales context confined to the Portuguese national level, more specifically the Vale do Cávado and Ave area. With the exception of the imported machinery, all the prices are based on Portuguese quotations.

The values for the economic parts of the assumption (such as inflation, GDP growth, etc) were all based on a report by Banco de Portugal titled *Projeções para a economia portuguesa: 2018-2020,* and the values of VAT and other taxes were based on Portuguese law and were assumed to stay stable during the timeframe of the project.

Other Assumptions:

Assumptions	
Average Collection period (days)	30
Average payment period (days)	30
Average stockage period (days)	30
Loan interest rate Medium-Long Term	4,83%
Risk Free rate in Portugal - Rf	3,10%
Expected Market Return = (Rm*-Rf)	15,00%
Market Risk Premium (RU - Rf	11,90%
Beta U of the industry	0,78

Table 7 - Assumptions Source: Author

13.2 Sales Forecast

In order to obtain the sales forecast for future years a set of assumption were made. First it had to be established the number of clients under contract for the waste management service for a year (line Quantities sold in Waste Management Service – Table 8). Then those numbers were crossed with the average production fiber waste per year, giving the total tonnage per year of recycled materials produced at the facilities, and thus, the inventory to be sold to the yarn spinners.

The author assumes that virtually every kilogram of will be bought by the yarn spinners, and thus, there is no stock accumulation. This can be safely assumed due to the magnitude of the numbers in this industry, were orders are in the tones, and therefore the risk of this project is of not being able to satisfy all the orders instead of not being able to sell all the stock.

Regarding the waste management side of the business, the author assumed a very modest scenario, present in Table 8 bellow. In this projection, the company starts with five *micro* clients and two small clients. It was then applied a 10% growth rate to the number of clients.

SALES	2019	2020	2021	2022	2023	2024
Annual increase of prices		1,01%	1,02%	1,02%	1,02%	1,02%
Recycled Cotton per Kg	**169.813**	**229.176**	**289.734**	**311.814**	**314.985**	**318.189**
Quantity sold	61.750	82.500	103.250	110.000	110.000	110.000
Price per Unit	2,75	2,78	2,81	2,83	2,86	2,89
Shredded Synthetic Material	**42.750**	**59.093**	**75.766**	**80.402**	**81.219**	**82.045**
Quantity sold	85.500	117.000	148.500	156.000	156.000	156.000
Price per Unit	0,50	0,51	0,51	0,52	0,52	0,53
Organic Materials per Kg	**7.750**	**10.606**	**13.520**	**14.431**	**14.578**	**14.726**
Quantity sold	7.750	10.500	13.250	14.000	14.000	14.000
Price per Unit	1,00	1,01	1,02	1,03	1,04	1,05
Waste Management Service	**12.600**	**16.364**	**20.204**	**22.265**	**22.492**	**22.720**
Quantity sold	7	9	11	12	12	12
Price per Unit	1.800,00	1.818,25	1.836,74	1.855,42	1.874,29	1.893,35
TOTAL	**232.913**	**315.239**	**399.224**	**428.912**	**433.274**	**437.680**

Table 8 - Sales and Quantities Source: Author

13.3 Investment

The biggest investment will be in the machinery and vehicles needed to operate the business. The three main machines are a Textile Shredder, a Textile fibers opener and cleaner, and a baler. The vehicles needed are a forklift capable of lifting up to 4 meters, and a cargo van. Besides this critical components there will also be needed some investment to buy the office supplies for the office part of the facility where the

admiration and sales team will operate. The company will therefore make capital expenditures (CAPEX) of 71.500€, of which 69.500€ are for the machinery and vehicles required. After that period no further investment is needed, as the machines come with 5 years of warranty (within the temporal scope of this project) therefore not needing any expenditure on spare parts or replacements. Regarding the timing of the investments, there will only be significant in the year 0, year 2 and year 3, the remaining years the investment is negligible.

13.4 Financing

As it can be seen in the Table 9, the company has an investment necessity of 82.600€, of which 40.000€ will come from capital from the founders. This capital will allow the company to reduce the amount of capital necessary to ask in a loan, and thus, reducing the risk and exposure to the financial market. The remainder 42.600€ will be acquired through a 3 year bank loan. For that it was chosen the solution offered by *Santander* with an EAR of 5,83% (See Annex 13 for the bank loan details).

	2019	2020	2021	2022	2023	2024
INVESTMENT	82.118	0	4.008	1.420	180	181
Funding Necessities	**82.100**	**0**	**4.000**	**1.400**	**200**	**200**
FUNDING SOURCES						
Operational Cash Flow	13.717	64.583	116.411	134.024	136.348	138.666
Capital	40.000	-	-	-	-	-
Bank Loans	50.000	-	-	-	-	-
TOTAL	103.717	64.583	116.411	134.024	136.348	138.666

Table 9- Investment needed and sources of investment Source: Author

13.5 Income Statement Analysis

As it can be seen in the table 10, there is a growth of all income statement indicators throughout every year of the timeframe of this analysis. This is due to a business model that guarantees cheap raw materials and sells them to a market eager for the products made with those materials. All amounts in the income statement have in account the inflation evolution.

The unique nature of this project's main raw material supply means that the way Costs of Goods sold and Materials consumed was calculated by assuming a margin of

90%, the remainder 10% are to consider any materials that have to be bought to resellers of textile fibers waste in order to satisfy demand spikes. Concerning the amount spent in Supplies and Services Received, they are due to the expenses with the maintenance of the infrastructure (water, electricity, rent), the amount spent on fuel, insurances, communications services and marketing expenses, explained in the Marketing chapter. Regarding the personnel expenses, they comprise of one salary of the CEO/Administrator, three salesmen and marketers, and six operational personnel who operate the machinery and vehicles (see personnel expenses in annex 11). The expenses of amortizations and depreciation are due to the depreciation of the assets calculate with the straight-line method. Interest expenses are explained in the financing plan in the Annex 13.

	2019	2020	2021	2022	2023	2024
Sales	232.913	315.239	399.224	428.912	433.274	437.680
Cost of Goods Sold and Materials Consumed	34.001	45.434	57.096	61.817	62.445	63.080
Supplies and services received	37.798	42.280	46.930	48.873	49.557	50.252
Personnel Expenses	140.364	140.364	140.364	140.364	140.364	140.364
Impaired Debt to Receive	5.730	7.755	9.821	10.551	10.659	10.767
EBITDA	**20.750**	**87.162**	**154.834**	**177.858**	**180.907**	**183.984**
Amortizations and depreciations	8.815	8.815	8.815	8.815	8.815	8.688
EBIT	**11.934**	**78.347**	**146.019**	**169.043**	**172.092**	**175.297**
Interest rates received	129	460	1.047	1.697	2.434	3.186
Interest rates payed	2.928	2.928	1.952	976	0	0
PROFIT BEFORE TAXES	**9.136**	**75.879**	**145.114**	**169.764**	**174.527**	**178.483**
Income Taxes	1.919	15.935	30.474	35.651	36.651	37.481
NET INCOME	**7.217**	**59.945**	**114.640**	**134.114**	**137.876**	**141.001**

Table 10- Income Statement Source: Author

13.6 Balance Sheet Analysis

Regarding the balance sheet as it can be seen there is an exponential growth of both assets and equity.

Non-current assets are due the equipment and vehicles necessary for the activity of the company. They decrease over the years due to the depreciation of said assets. Current assets include inventories, clients, and Cash and Deposits. Inventories' value reflects the 30 days inventory policy established in the assumptions. Clients is the money

to be received by the clients, whose payment period is established in the assumptions (30 days). Finally the final item in this section, Cash and deposits, regards the amount of cash the company has in hand.

About Equity, it comprises of money injected by the partners (in the Common Equity line), reserves, which is the previous year net profit minus the any dividends paid, which are none in the scope of this analysis. This means this line is just the accumulated net profit over the years of the scope of the analysis. Finally the Net profit line is, as its name suggests, the net profit of that year.

Lastly, the non-current liabilities reflect the loan contracted in year 0 with a 3 year payment period, so this line only has data for the first 3 years due to the end of year 3 the loan is fully repaid, and the value is therefore 0. Current Liability concern the money to be paid to the by the company and the money owned by the company to the State.

13.7 Financial Indicators

In the Table 11 are a set of economic and financial indicators to demonstrate how the company's performance and its financial situation.

The project's growth rate starts out strong and then stabilizes near zero at the end of the scope of the analysis, a normal indicator in any startup. In opposite direction the liquid rentability of sales starts at a very low rate before stabilizing at 34%.

Regarding the Financial indicators, the Return on Investment (ROI), an indicator that evaluates the efficiency of the investment by measuring the amount of return of an investment relative to its cost, it is positive throughout the years and above the rate of return of riskless investments - making this investment an attractive opportunity.

The Return on Equity (ROE) indicator measures the amount of net income returned as a percentage of the shareholder's equity, therefore being a great profitability indicator. This indicator stays at very attractive percentages before stabilizing at the end of the project's timeframe, due to the lack of reinvestment, consequently this reflects the great profitability of the project. The Financial Autonomy's high values, which towards the end of the timeframe of the project reach 90%, and steady growth indicates that the company is not dependent on external creditors.

Regarding the risk indicators, which reflect the capacity of the project to increase operating income by increasing revenue. By analyzing these indicators, we can conclude

that this project is a high-risk project due to the great potential danger from forecasting risk, where a relatively small error in forecasting sales can be magnified into large errors in cash flow projections.

INDICATORS	2019	2020	2021	2022	2023	2024
Growth rate of the Business		35%	27%	7%	1%	1%
Liquid rentability of sales	5%	21%	31%	33%	34%	34%
FINANCIAL INDICATORS						
Return On Investment (ROI)	10%	34%	38%	31%	24%	20%
Return on Equity (ROE)	23%	56%	51%	37%	28%	22%
Financial autonomy	43%	61%	75%	84%	88%	90%
RISK INDICATORS						
Gross Margin	172.759	243.288	315.159	339.668	342.935	346.232
Operational Leverage	968%	282%	202%	189%	187%	186%
Financial Leverage	118%	103%	100%	99%	98%	98%

Table 11 - Financial Indicators Source: Author

13.8   Project Evaluation – Feasibility

The CAPM model was used in order to obtain the Investors Required Rate of Return. In order to obtain the rate of the equity cost (Re), it was necessary to determine the values of the risk-free rate in Portugal, the Portuguese Risk Premium, and the Beta unlevered of the Environmental and Waste Services Industry (Source Damodaran 2018).

As it is possible to see in the table below, the NPV 502.760€, so the project covers the initial investment and minimum return required by investors, and still generates financial surpluses. Regarding the Internal Rate of Return (IRR), which represents the maximum profitability rate of project, it is at 524.47%, which is higher than the discount rate, by a large margin, and thus it is extremely profitable and an attractive project for the investors. The payback period of the investment is 503 days.

Investor Perspective (values in euros)	2019	2020	2021	2022	2023	2024
Free Cash Flow to Equity	-16.802	51.214	101.544	123.297	144.588	146.991
Riskless Interest rate	3,10%	3,13%	3,16%	3,20%	3,23%	3,26%
Market premium	15,00%	15,00%	15,00%	15,00%	15,00%	15,00%
Discount Rate R = Rf + Bu*(Rm-Rf)	14,80%	14,83%	14,86%	14,90%	14,93%	14,96%
Adjustment factor	1	1,148	1,319	1,515	1,742	2,002
Actualized Flows	-16.802	44.599	76.986	81.359	83.016	73.412
Cumulative Actualized Flows	-16.802	27.797	104.783	186.143	269.159	342.571
Net Present Value (NPV)	480.266					
Internal Rate of Return (IRR)	374,99%					
Pay Back period	503	Days				

Table 12- Investor Perspective Source Auhor

The project's perspective follows the same rationalities as the investors' perspective, with a few differences. This perspective considers the Free Cash Flow to Firm, which is the net value of cash after expenses, investments and taxes in the Working Capital. It also contemplates the WACC rate, which represents the average of the costs of financing through debt or with equity, which is weighted by its proportionate use, therefore giving a more realistic approach to the project. As it can be seen in the table below, the WACC is always above the Ru (show in X), which means that the company can get into debt due to the low cost of utilizing this capital. The payback period of the investment is 751 days.

Project perspective (values in euros)	2019	2020	2021	2022	2023	2024
Free Cash Flow to Firm	-63.874	70.808	120.162	140.940	144.588	146.991
WACC	13,86%	20,05%	24,03%	25,72%	25,75%	25,79%
Adjustment factor	1	1,201	1,489	1,872	2,354	2,961
Actualized Flows	-63.874	59.163	81.497	76.665	63.063	51.392
Cumulative Actualized Flows	-63.874	-4.711	76.785	153.450	216.514	267.906
Net Present Value (NPV)	271.340					
Internal Rate of Return (IRR)	145,71%					
Pay Back period	751	Days				

Table 13- Project's Perpective Source: Author

13.9 Sensitivity Analysis

Despite this Business Plan being done to the in order to be as accurate as possible, there may be a few deviations and external changes. Therefore, to try to understand the sturdiness of the project to such changes a sensitivity analysis is necessary. Two scenarios, an optimistic and a pessimistic were considered, each with a variation of 10% of the sales and 10% of the Expenses – with the former having a positive variation and the latter a negative variation of those variables. As one can see in the Table 14 even in the pessimistic scenario the NPV is greater than zero, the IRR and Payback Period are still well above the minimum levels. However the great swings between scenarios shows, as also noted in the Financial Indicators section, that the project has a big risk due to those fluctuations.

Scenario	Pessimist	Normal	Optimist
Δ Sales and Expenses	-10%	0%	+10%
NPV	183.379	480.266	545.663
IRR	71,73%	374,99%	662%
Payback	3 years and 3 months	1 Year and 5 months	1 year and 3 Months

Table 14 - Sensitivity Analysis Source: Author

14 Conclusions

The purpose of this thesis is to design a business plan and feasibility analysis of creating a recycling plant that focuses on an unexplored segment of the market – textile fibers for yarn spinners. Having ended this Business Plan it's important to summarize the main finding of this thesis.

As shown in the literature review, the entire textile industry is starting to change in order to stay relevant and profitable in the medium run. These tendencies show that this industry is starting to adopt a sustainable supply chain system in order to be able to reduce costs, appease the transforming consumer demands, and in order to create a resilience to supply shortages in the future, reducing the risk of the industry. In fact, circular economies and sustainable supply chains may be the future of all industries in order for them to survive a scenario with an increasing consumer goods demand with depleting and scarce resources.

The innovative approach allows the yarn spinners to open a line of *green* products, which will provide them with a product that can satisfy the increasingly important ecologically aware consumers.

The project will be also located in the main hub of textile industry in Portugal, the *Vale do Cávado e Ave* area, therefore being close to the clients in both end of the business – the waste management segment and the recycling segment.

The company's business plan and feasibility analysis conclusions reveals that an initial investment of 70.138€ will bring positive results since the first year of operation. In that scenario, in a 6 years' project duration, the company will meet its financial goals turning the project feasible with a Net Present Value of 480.266€, an Internal Rate of Return of 374,99% and a Payback Period of 751 days. The sensitivity analysis show that in all drawn scenarios, the project is viable, however due to its very abrupt changes from scenario to scenario, and by analyzing the financial indicators, we can conclude that project has a very high risk factor, but it is still very rewarding. In conclusion, by analyzing these factors and the project financial analysis, it is possible to conclude its viability.

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Luís Fernando Alves Pereira
Business Plan: Recycling plant of post-industrial waste of the textile industry

16 Annexes

Annex 1 - Employment rate of recent graduates
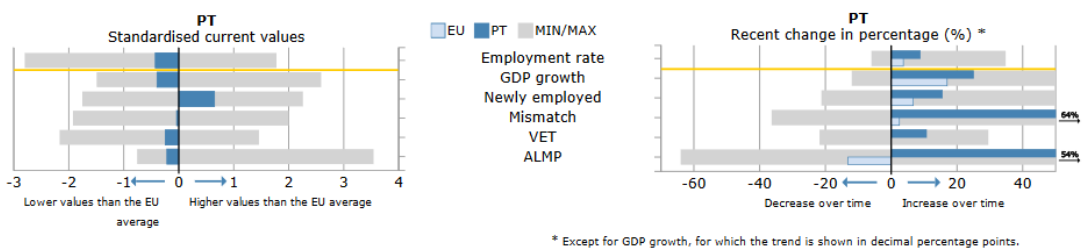
Annex 2 - Tertiary education attainment
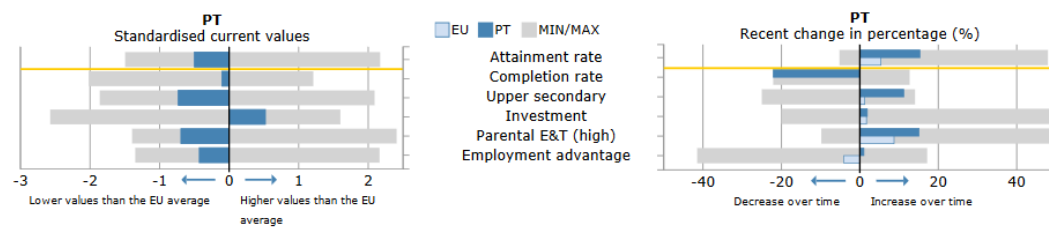
Annex 3 - Exports of goods and services and external demand

Exports of goods and services and external demand | Annual rate of change, per cent
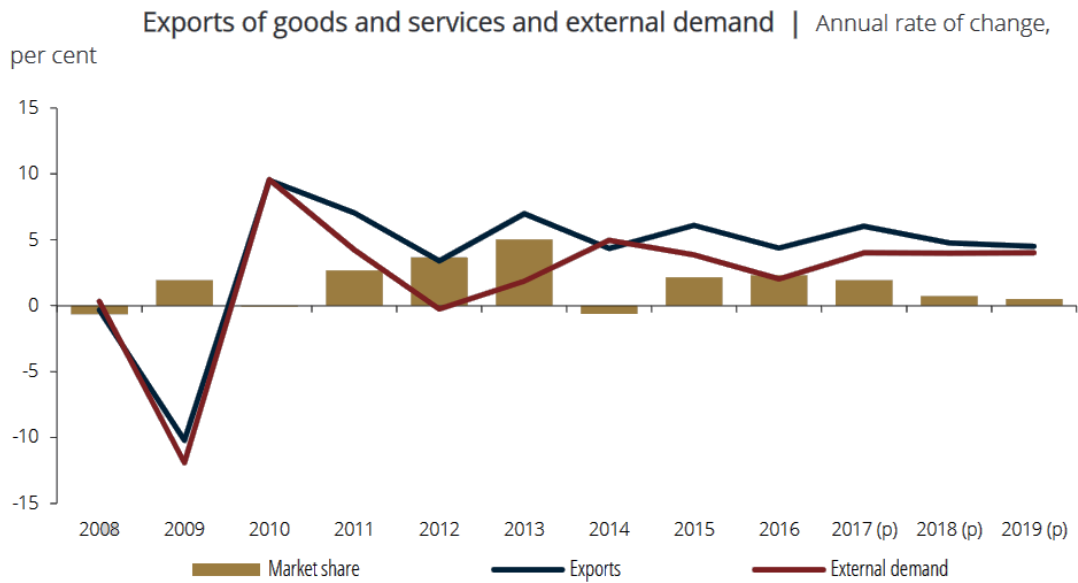
Annex 4 - Global Networked Readiness Index for Portugal

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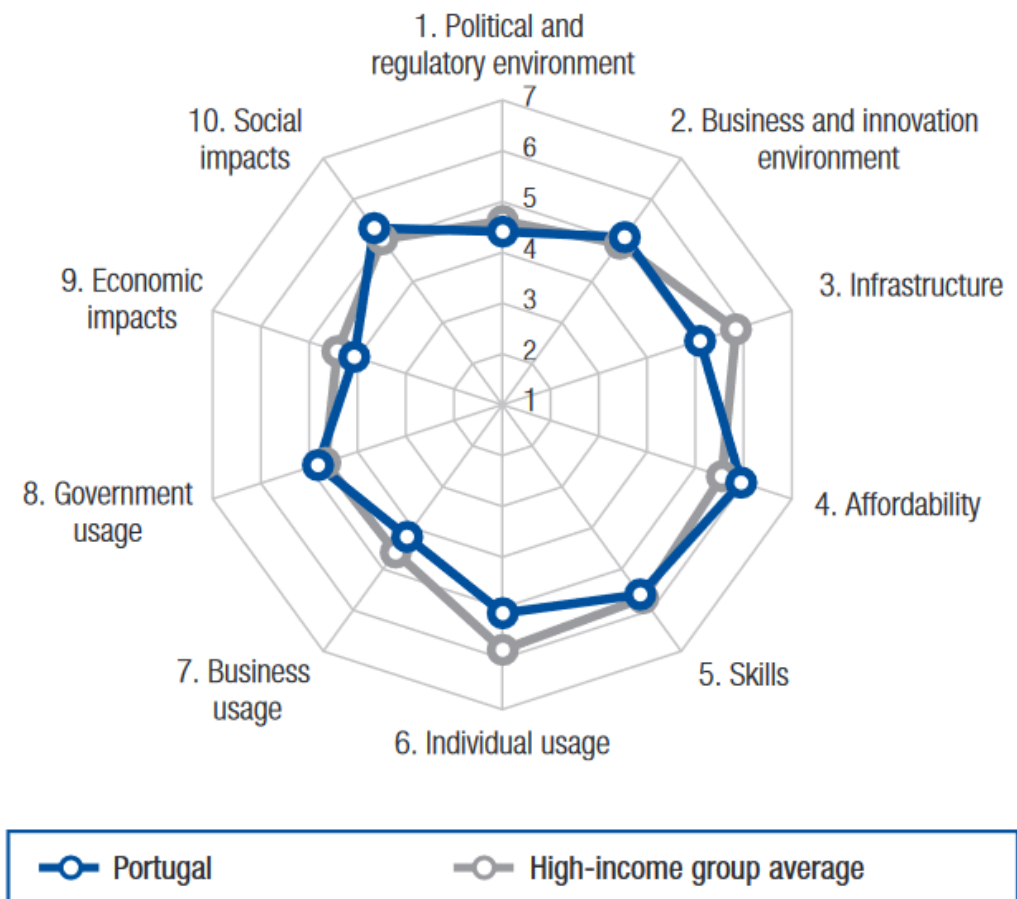
Annex 5 - Projections of Banco de Portugal for Portuguese Economy: 2017-2019

Table 1 · Projections of Banco de Portugal: 2017-19 | Annual rate of change, per cent

	Weights	March 2017 projections				EB December 2016			
	2016	2016	2017[p]	2018[p]	2019[p]	2016[p]	2017[p]	2018[p]	2019[p]
Gross domestic product	100.0	1.4	1.8	1.7	1.6	1.2	1.4	1.5	1.5
Private consumption	65.8	2.3	2.1	1.4	1.4	2.1	1.3	1.4	1.3
Public consumption	18.1	0.8	0.2	0.5	0.2	1.0	0.0	0.4	0.2
Gross fixed capital formation	14.8	-0.3	6.8	5.0	4.8	-1.7	4.4	4.3	4.5
Domestic demand	98.8	1.5	2.5	1.8	1.7	1.2	1.5	1.7	1.6
Exports	40.2	4.4	6.0	4.8	4.5	3.7	4.8	4.6	4.4
Imports	39.1	4.4	7.3	4.8	4.7	3.5	4.8	4.9	4.4
Contribution to GDP growth, net of imports (in p.p.)[a]									
Domestic demand		0.5	0.8	0.7	0.7	0.4	0.5	0.6	0.6
Exports		0.9	1.0	0.9	0.9	0.8	0.9	0.8	0.9
Employment[b]		1.6	1.6	1.0	1.1	1.5	1.0	0.9	1.0
Unemployment rate		11.1	9.9	9.0	7.9	11.0	10.1	9.4	8.5
Current plus capital account (% of GDP)		1.7	1.0	1.1	1.2	1.1	0.9	0.9	1.1
Goods and services account (% of GDP)		2.2	1.4	1.3	1.4	2.2	1.9	1.8	1.8
Harmonised index of consumer prices		0.6	1.6	1.5	1.5	0.8	1.4	1.5	1.5

Sources: Statistics Portugal and Banco de Portugal.
Notes: (p) – projected, (p.p.) – percentage points. For each aggregate, this table shows the projection corresponding to the most likely value, conditional on the set of assumptions considered.
(a) The demand aggregates net of imports are obtained by subtracting an estimate of the imports needed to meet each component. The calculation of import content was based on data for 2005. For more information, see the Box entitled 'The role of domestic demand and exports in economic activity developments in Portugal', in the June 2014 issue of the *Economic Bulletin*.
(b) Total employment, in number of individuals according to the national accounts concept.

Annex -

Annex 6 - Porter's Five Forces

Porter Five Forces	Force Classification	Very Low	Low	Medium	High	Very High
				Contribution to the Force		
Threat of new entrants						
Investment needed	High					x
Economies of Scale	Medium			x		
Switching cost for the clients	Medium				x	
Incumbency Advantages	Medium		x			
Difficulty of access to distribution channels	Medium			x		
Difficulty of access to the necessary technology	Medium		x			
Competition	Low	x				
		1	4	6	4	5
Force Global Value				2,86		
Bargaining Power of Suppliers						
Number of Suppliers	High					x
Suppliers Dimension	Low		x			
Substitutes for Supplier products	High				x	
Average volume of purchases to the suppliers	Low	x				
Client face high switching costs	Low	x				
Product is important input to buyer	High				x	
Legal Framework		x				
		3	2		8	5
Force Global Value			2,5			
Barganing Power of Buyers						
Cost of switching for other product	High				x	
Industry standardization	Very High					x
Available information	Medium			x		
Pirce Sensibility	High				x	
Buyer Concentration	High				x	
Backward integration	Very Low	x				
Average volume of purshases	Medium			x		
		1		6	12	5
Force Global Value				3,4		
Threat of Substitutes						
Buyers switching costs to substitute	High				x	
Products with similar functions	High				x	
Substitute has good price-performance	Very High					x
					8	5
Force Global Value					4,3	
Rivalry among Existing Competitors						
Number of competitors	Low		x			
Firms are equal size	Medium			x		
Products and Services have direct substitutes	Very High					x
Number of Suppliers	High				x	
Exit Barriers	High				x	
			2	3	8	5
Force Global Value					3,6	

Annex 7 - Financial Assumptions

Assumptions	
Currency Unit	Euros
Initial year of the project	2019
Average Collection day	30
Average payment day	30
Average stockage day	30
VAT Rate	23,00%
Social Security Tax	23,75%
Corporate Income Tax	21,00%
Loan interest rate Medium-Long Term	4,83%
Risk Free rate in portugal - Rf	3,10%
Expected Market Return = (Rm*-Rf)	15,00%
Market Risk Premium (RU - Rf	11,90%
Beta U of the industry	0,78

Annex 8 - Sales projections

Sales						
	2019	2020	2021	2022	2023	2024
Anual increase of prices		1,01%	1,02%	1,02%	1,02%	1,02%
SALES						
Recycled Cotton per Kg	**169.813**	**229.176**	**289.734**	**311.814**	**314.985**	**318.189**
Quantity sold	61.750	82.500	103.250	110.000	110.000	110.000
Price per Unit	2,75	2,78	2,81	2,83	2,86	2,89
Shredded Synthetic Material	**42.750**	**59.093**	**75.766**	**80.402**	**81.219**	**82.045**
Quantity sold	85.500	117.000	148.500	156.000	156.000	156.000
Price per Unit	0,50	0,51	0,51	0,52	0,52	0,53
Organic Materials per Kg	**7.750**	**10.606**	**13.520**	**14.431**	**14.578**	**14.726**
Quantity sold	7.750	10.500	13.250	14.000	14.000	14.000
Price per Unit	1,00	1,01	1,02	1,03	1,04	1,05
Waste Management Service	**12.600**	**16.364**	**20.204**	**22.265**	**22.492**	**22.720**
Quantity sold	7	9	11	12	12	12
Price per Unit	1.800,00	1.818,25	1.836,74	1.855,42	1.874,29	1.893,35
TOTAL	**232.913**	**315.239**	**399.224**	**428.912**	**433.274**	**437.680**

Annex 9 - Cost of Goods Sold and Materials Consumed

Cost of Goods Sold and Materials Consumed							
MATERIALS COST	MARGIN	2019	2020	2021	2022	2023	2024
Recycled Cotton per Kg	90,00%	16.981	22.918	28.973	31.181	31.499	31.819
Shredded Synthetic Material	90,00%	4.275	5.909	7.577	8.040	8.122	8.205
Organic Materials per Kg	90,00%	775	1.061	1.352	1.443	1.458	1.473
Waste Management Service	5,00%	11.970	15.546	19.194	21.152	21.367	21.584
Total Material Cost		34.001	45.434	57.096	61.817	62.445	63.080
VAT	23,00%	7.820	10.450	13.132	14.218	14.362	14.508
TOTAL Material + VAT		41.822	55.883	70.228	76.034	76.808	77.589

Annex 10 - Supplies and External Services

Supplies and External Services							
	Monthly Value	2019	2020	2021	2022	2023	2024
Expenses Growth Rate		1,4%	1,7%	1,7%	1,7%	1,7%	1,7%
Marketing Expenses		11645,63	15761,97	19961,19	21445,60	21663,70	21884,02
Office Material	8,37	100,45	101,86	103,59	105,35	107,14	108,96
Rent	880	10560,00	10707,84	10889,87	11075,00	11263,28	11454,75
Electricity	450	5400,00	5475,60	5568,69	5663,35	5759,63	5857,54
Water	80	960,00	973,44	989,99	1006,82	1023,93	1041,34
Fuel	600	7200,00	7300,80	7424,91	7551,14	7679,51	7810,06
Comunications	64,05	768,60	779,36	792,61	806,08	819,79	833,72
Insurances	96,92	1163,00	1179,28	1199,33	1219,72	1240,45	1261,54
TOTAL		37797,68	42280,15	46930,18	48873,06	49557,43	50251,94
VAT		5364,78	6349,14	7361,27	7749,78	7847,83	7947,22
TOTAL + VAT		43162,46	48629,29	54291,45	56622,84	57405,26	58199,16

Annex 11 - Personnel Expenses

PERSONNEL EXPENSES						
NUMBER OF EMPLOYEES	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Adminstration	1	1	1	1	1	1
Comercial and Marketing	3	3	3	3	3	3
Operational	6	6	6	6	6	6
TOTAL	**10**	**10**	**10**	**10**	**10**	**10**
Base Monthly pay	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Adminstration	750	750	750	750	750	750
Comercial and Marketing	750	750	750	750	750	750
Operational	700	700	700	700	700	700
Anual Pay	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Adminstration	10.500	10.500	10.500	10.500	10.500	10.500
Comercial and Marketing	31.500	31.500	31.500	31.500	31.500	31.500
Operational	58.800	58.800	58.800	58.800	58.800	58.800
TOTAL	**100.800**	**100.800**	**100.800**	**100.800**	**100.800**	**100.800**

Other personnel expenses		**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Social Security							
Administration	23,75%	2.494	2.494	2.494	2.494	2.494	2.494
Personel	23,75%	21.446	21.446	21.446	21.446	21.446	21.446
Accident Insurance	3,00%	3.024	3.024	3.024	3.024	3.024	3.024
Food Allowence	105,00	12.600	12.600	12.600	12.600	12.600	12.600
Total Other personnel expenses		**39.564**	**39.564**	**39.564**	**39.564**	**39.564**	**39.564**
TOTAL PERSONNEL EXPENSES		**140.364**	**140.364**	**140.364**	**140.364**	**140.364**	**140.364**

Retentions			**2019**	**2020**	**2021**	**2021**	**2023**	**2022**
Social Security								
Administration	11,00%		1.155	1.155	1.155	1.155	1.155	1.155
Personal	11,00%		9.933	9.933	9.933	9.933	9.933	9.933
Personal income tax Retention	15,00%		15.120	15.120	15.120	15.120	15.120	15.120
TOTAL Retentions			**26.208**	**26.208**	**26.208**	**26.208**	**26.208**	**26.208**

Annex 12 - Working Capital

WORKING CAPITAL						
	2019	**2020**	**2021**	**2022**	**2023**	**2024**
Total Necessities						
Security Reserves	2.000	2.000	2.000	2.000	2.000	2.000
Clients	23.874	32.312	40.920	43.963	44.411	44.862
Stock	2.833	3.786	4.758	5.151	5.204	5.257
TOTAL	**28.707**	**38.098**	**47.678**	**51.115**	**51.614**	**52.119**
Total Resources						
Suppliers	5.888	7.094	8.331	8.857	8.964	9.073
State	10.315	18.415	22.562	23.986	24.188	24.393
TOTAL	**16.203**	**25.509**	**30.892**	**32.842**	**33.152**	**33.466**
WC	**12.504**	**12.590**	**16.786**	**18.273**	**18.462**	**18.653**
Investment in WC	**12.504**	**86**	**4.197**	**1.487**	**190**	**191**

Annex 13- Funding

FUNDING						
	2019	**2020**	**2021**	**2022**	**2023**	**2024**
Funding Necessities	**82.100**	**0**	**4.000**	**1.400**	**200**	**200**
FUNDING SOURCES						
Operational Cash Flow	13.717	64.583	116.411	134.024	136.348	138.666
Capital	40.000					
Bank Loans	50.000					
TOTAL	**103.717**	**64.583**	**116.411**	**134.024**	**136.348**	**138.666**
LOAN						
Capital in debt at the begining of the year	50.000	50.000	33.333	16.667		
Interest Rate	6%	6%	6%	6%		
Anual Interest Rate	2.916	2.916	1.944	972		
Anual Repayment	0	16.667	16.667	16.667		
Stamp Duty (0,4%)	12	12	8	4		
Serviço da dívida	2.928	19.594	18.618	17.643		
Amount in debt	50.000	33.333	16.667	0		

Number of years in the loan	3
Interest rate	5,83%

Annex 14 - Income Statement

INCOME STATEMENT					
	2019	**2020**	**2021**	**2022**	**2023**
Sales	232.913	315.239	399.224	428.912	433.274
Cost of Goods Sold and Materials Consumed	34.001	45.434	57.096	61.817	62.445
Supplies and services received	37.798	42.280	46.930	48.873	49.557
Personnel Expenses	140.364	140.364	140.364	140.364	140.364
Impaired Debt to Receive	5.730	7.755	9.821	10.551	10.659
EBITDA	**20.750**	**87.162**	**154.834**	**177.858**	**180.907**
Amortisations and depreciations	8.815	8.815	8.815	8.815	8.815
EBIT	**11.934**	**78.347**	**146.019**	**169.043**	**172.092**
Interest rates received	129	460	1.047	1.697	2.434
Interest rates payed	2.928	2.928	1.952	976	0
PROFIT BEFORE TAXES	**9.136**	**75.879**	**145.114**	**169.764**	**174.527**
Income Taxes	1.919	15.935	30.474	35.651	36.651
NET INCOME	**7.217**	**59.945**	**114.640**	**134.114**	**137.876**

Annex 15 - Cash Flows Map

Cash Flows						
	2019	**2020**	**2021**	**2022**	**2023**	**2024**
Operational Cash flows						
Operational Results	9.428	61.894	115.355	133.544	135.953	138.484
Amortisations and depreciations	8.815	8.815	8.815	8.815	8.815	8.688
TOTAL	**18.243**	**70.709**	**124.170**	**142.359**	**144.768**	**147.172**
Investment and Disinvestment in Op. Fund						
Operating Fund	-11.980	99	-4.008	-1.420	-180	-181
OPERATING CASH FLOW	**6.264**	**70.808**	**120.162**	**140.940**	**144.588**	**146.991**
Investment in Fixed Assets						
Fixed Assets	-70.138	0	0	0	0	0
Free cash-flow	**-63.874**	**70.808**	**120.162**	**140.940**	**144.588**	**146.991**
Cumulated Cash Flows	**-63.874**	**6.934**	**127.096**	**268.036**	**412.624**	**559.615**

Annex 16 -Critical Point

CRITICAL POINT						
	2019	**2020**	**2021**	**2022**	**2023**	**2024**
Sales	232.912,50	315.239,44	399.223,88	428.912,02	433.274,06	437.680,45
Materials Cost	34.001,25	45.433,57	57.095,94	61.816,52	62.445,19	63.080,26
Margin	**198.911,25**	**269.805,87**	**342.127,94**	**367.095,50**	**370.828,86**	**374.600,19**
Critical Point	**218.937,98**	**223.699,76**	**228.836,93**	**231.402,87**	**232.202,48**	**232.864,86**

Annex 17 - Balance Sheet

Balance Sheet						
	2019	2020	2021	2022	2023	2024
ASSETS						
Non-Current Assets	**61.323**	**52.508**	**43.693**	**34.878**	**26.063**	**17.375**
Tangible Assets	61.323	52.508	43.693	34.878	26.063	17.375
Current Assets	**54.540**	**130.140**	**257.040**	**390.496**	**538.507**	**689.350**
Inventories	2.833	3.786	4.758	5.151	5.204	5.257
Clients	23.874	32.312	40.920	43.963	44.411	44.862
Cash and Deposits	27.833	94.042	211.362	341.381	488.893	639.231
TOTAL ASSETS	**115.863**	**182.648**	**300.733**	**425.373**	**564.570**	**706.725**
EQUITY						
Common Equity	40.000	40.000	40.000	40.000	40.000	40.000
Reserves		7.217	67.162	181.802	315.916	453.792
Net Profit	7.217	59.945	114.640	134.114	137.876	141.001
TOTAL EQUTY	**47.217**	**107.162**	**221.802**	**355.916**	**493.792**	**634.793**
EQUITY						
Common Equity	40.000	40.000	40.000	40.000	40.000	40.000
Reserves		7.217	67.162	181.802	315.916	453.792
Net Profit	7.217	59.945	114.640	134.114	137.876	141.001
TOTAL EQUTY	**47.217**	**107.162**	**221.802**	**355.916**	**493.792**	**634.793**
LIABILITIES						
Non-Current Liabilities	**50.000**	**33.333**	**16.667**	**0**	**0**	**0**
Long term Loans	50.000	33.333	16.667	0	0	0
Current Liabilities	**18.646**	**42.153**	**62.265**	**69.458**	**70.778**	**71.932**
Suppliers	7.082	8.709	10.377	11.055	11.184	11.316
State	11.564	33.443	51.888	58.403	59.593	60.616
TOTAL LIABILITIES	**68.646**	**75.486**	**78.931**	**69.458**	**70.778**	**71.932**
TOTAL LIABILITIES + ASSETS	**115.863**	**182.648**	**300.733**	**425.373**	**564.570**	**706.725**

Annex 18 - WACC Application

WACC APPLICATION						
	2019	**2020**	**2021**	**2022**	**2023**	**2024**
Liabiities	50.000	33.333	16.667	0	0	0
Equity	47.217	107.162	221.802	355.916	493.792	634.793
TOTAL	97.217	140.495	238.468	355.916	493.792	634.793
% Liabilities	53,94%	25,67%	7,57%	0,00%	0,00%	0,00%
%Equity	46,06%	74,33%	92,43%	100,00%	100,00%	100,00%
Re	24,59%	24,62%	24,65%	24,68%	24,72%	24,75%
WACC	**13,91%**	**19,68%**	**23,19%**	**24,68%**	**24,72%**	**24,75%**