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Shifting to a Circular Business Model

A Case in the Portuguese Textile Industry

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Católica Porto Business School
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Resumo

A crescente urgência dos desafios ambientais e sociais está a levar as empresas a repensarem modelos de negócio e a adotarem princípios de economia circular. No setor têxtil, intensivo em recursos e gerador de resíduos, esta transição é simultaneamente necessidade e oportunidade de inovação e competitividade.

Esta dissertação analisa a transição para modelos de negócio circulares através de um estudo de caso da Vaz da Costa, empresa têxtil portuguesa com mais de seis décadas de atividade e presença internacional. O objetivo é compreender como integra a circularidade na estratégia e operações e identificar desafios e oportunidades desse processo.

A investigação segue uma metodologia qualitativa que combina análise documental, dados financeiros da base SABI e entrevista semiestruturada com representantes da empresa. A interpretação foi descritiva e comparativa, apoiada nos frameworks ReSOLVE e Circular Business Model Canvas, para mapear práticas e avaliar áreas de melhoria.

Os resultados preliminares apontam progressos no uso de fibras recicladas e orgânicas, na eficiência hídrica e energética e em acabamentos de menor impacto. Persistem desafios ligados à transparência da cadeia de fornecimento, à escalabilidade das inovações e à resposta à procura crescente por têxteis sustentáveis.

Palavras-chave: Economia circular; Modelos de negócio circulares; Indústria têxtil; Sustentabilidade; Estudo de caso.

Número de palavras: 9956

Abstract

The growing urgency of environmental and social challenges is prompting firms to rethink business models and adopt circular economy principles. In the textile sector, which is resource-intensive and waste-generating, this transition is both a necessity and an opportunity for innovation and competitiveness.

This dissertation examines the transition towards circular business models through a case study of Vaz da Costa, a Portuguese textile company with more than six decades of activity and a consolidated international presence. The aim is to understand how the organisation integrates circularity into strategy and operations and to identify the main challenges and opportunities of this process.

The research follows a qualitative methodology combining document analysis, financial data from the SABI database, and one semi-structured interview with company representatives. Data interpretation was carried out in a descriptive and comparative manner, supported by the ReSOLVE framework and the Circular Business Model Canvas, to map practices and assess areas for improvement.

Preliminary results indicate progress in the use of recycled and organic fibres, water and energy efficiency, and lower-impact finishing. Challenges remain regarding supply-chain transparency, the scalability of innovations, and responses to the growing demand for sustainable textiles.

Keywords: Circular economy; Circular business models; Textile industry; Sustainability; Case study.

Number of words: 9956

List of Abbreviations

BMC – Business Model Canvas
CBM – Circular Business Model
CBMC – Circular Business Model Canvas
CE – Circular Economy
CO_2 – Carbon Dioxide
EEA – European Environment Agency
EMF – Ellen MacArthur Foundation
EPR – Extended Producer Responsibility
EU – European Union
GHG – Greenhouse Gases
GOTS – Global Organic Textile Standard
GRS – Global Recycled Standard
KPI(s) – Key Performance Indicator(s)
OCS – Organic Content Standard
Scopes 1–3 – Emission categories under the GHG Protocol (direct, energy-related, indirect)
SDGs – Sustainable Development Goals
SME(s) – Small and Medium-sized Enterprise(s)
STeP – Sustainable Textile & Leather Production by OEKO-TEX®
UNEP – United Nations Environment Programme
WWTP – Wastewater Treatment Plant

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Introduction

The growing pressure of environmental, social, and economic challenges has brought the concept of circular economy to the centre of business and policy discussions. Moving away from the traditional linear model of "take–make–dispose," the circular economy seeks to decouple growth from resource consumption by promoting reuse, recycling, regeneration of materials, and product life extension. Among the various industries affected by this paradigm shift, the textile sector occupies a particularly critical position. Characterised by high levels of resource intensity, environmental impact, and global supply chain complexity, it has become one of the main targets of regulation, consumer scrutiny, and sustainability-driven innovation.

Within Europe, and particularly in Portugal, the textile and clothing industry is of major economic and social relevance. It is largely composed of small and medium-sized enterprises (SMEs) that are strongly export-oriented and deeply embedded in industrial clusters. This configuration creates both pressures and opportunities: firms face intense cost and lead-time constraints, while at the same time dealing with increasing regulatory and consumer demands to reduce their environmental footprint and to adopt circular practices.

In this context, companies are increasingly urged to adopt circular business models that create value while minimising waste and resource consumption. However, the transition from theory to practice remains a challenge, as it requires rethinking production processes, product design, partnerships, and even the relationship with consumers. This raises the following research question: How do Portuguese textile SMEs integrate circular economy principles into their business models, and what challenges and opportunities emerge in this process?

This dissertation focuses on Vaz da Costa, a Portuguese textile company with more than sixty years of experience and a strong international presence, especially in the European home textiles market. The company has positioned

itself as a producer committed to sustainability, having introduced practices such as the use of organic and recycled fibres, water- and energy-efficient processes, and eco-friendly finishing technologies. Nonetheless, like many firms in the industry, Vaz da Costa faces limitations related to supply chain transparency, customer awareness, and the scalability of circular solutions.

The objective of this research is to analyse the process of transition of Vaz da Costa towards a circular business model. More specifically, it aims to characterise the company's sustainability practices, compare them with industry best practices, identify the main barriers and opportunities, and propose recommendations for further integration of circular principles into the business strategy.

Despite the growing body of research on circular economy, important gaps remain. Existing studies have primarily focused on large multinational fashion brands or global fast-fashion retailers, leaving fewer insights into how SMEs—such as those that dominate textile production in Portugal—are adapting to circular economy demands. Much of the research also remains at a conceptual or policy level, with fewer empirical case studies examining how circular strategies are implemented in practice. Furthermore, while consumer-oriented initiatives such as resale and rental have been widely analysed, less attention has been paid to home and industrial textiles, which represent significant segments of the Portuguese industry.

By addressing these gaps, this dissertation contributes to the literature with empirical evidence from a Portuguese textile SME, offering insights into how circularity is embedded in a traditional yet internationally competitive sector. At the same time, the study provides practical recommendations for managers and policymakers engaged in the circular transition.

This dissertation is structured into four main chapters. Following this introduction, Chapter 1 presents the literature review, outlining the main concepts and models of the circular economy and their application to the textile

industry. Chapter 2 details the research methodology,. Chapter 3 introduces Vaz da Costa and presents the empirical findings. Chapter 4 provides the analysis and discussion of results, applying the selected frameworks and comparing the company's practices with sectoral best practices. Finally, the conclusion summarises the main findings, highlights the study's limitations, and offers recommendations for both academic research and managerial practice.

Chapter 1

Literature Review

1.1. Circular Economy – Concepts and Definitions

The concept of circular economy has its roots in the recognition that Earth's resources are finite and that industrial systems must evolve beyond the traditional linear "take–make–dispose" paradigm. The idea of closed-loop systems was first discussed by Boulding (1966), who described the Earth as a "spaceship" with limited resources, stressing the necessity of developing cyclical processes of production and consumption. Later, Pearce and Turner (1990) were among the first to formally introduce the term circular economy into academic literature, framing it as a new economic model that internalises environmental costs and emphasises reuse and recycling. Similarly, Stahel (1982, 2010) advanced the notion of the "performance economy," advocating product-life extension, reuse, and service-based business models as means to reduce resource consumption. These early contributions laid the foundation for what has become a rapidly expanding field of research and practice.

Building on this foundation, recent decades have seen a surge of definitions and conceptualisations of circular economy, reflecting different emphases on environmental, economic, and systemic perspectives. According to Kirchherr, Reike and Hekkert (2017), circular economy can be understood as "an economic system that replaces the 'end-of-life' concept with reducing, reusing, recycling, and recovering materials" (p. 223). Geissdoerfer et al. (2017) describe it more broadly as "a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops." In contrast, policy institutions tend to frame the concept more

practically: the European Parliament (2023) defines circular economy as a model of production and consumption based on sharing, leasing, reusing, repairing, refurbishing, and recycling materials for as long as possible. More recently, Figge (2023) revisited the conceptual debate, highlighting its multi-level scope (micro, meso, macro) and its explicit alignment with sustainable development goals.

1.2. Circular Business Models

The adoption of circular economy principles at the company level requires a fundamental rethinking of how value is created, delivered, and captured. Traditional linear business models are built on resource extraction, short product lifecycles, and disposal, while circular business models (CBMs) integrate strategies such as reuse, recycling, resource recovery, and product life extension into the organisational logic. In essence, CBMs represent the operationalisation of circular economy at the microeconomic level.

The concept of business models has been widely discussed in management literature. Osterwalder and Pigneur (2010) popularised the Business Model Canvas (BMC), a visual and structured tool that identifies key components of value creation, including value proposition, key activities, key resources, partners, customer segments, channels, revenue streams, and cost structures. While powerful, this framework reflects a largely linear understanding of value flows.

To adapt the BMC to circular economy principles, Lewandowski (2016) developed the Circular Business Model Canvas (CBMC). His model introduces two additional components—Take-Back Systems and Adoption Factors—which address the need for reverse logistics and highlight organisational, market, and regulatory enablers for circularity. By integrating these elements, the CBMC provides companies with a practical tool to redesign their models in alignment with circular economy practices.

Other authors have expanded this discussion. Geissdoerfer et al. (2020) carried out a systematic review of CBM frameworks, classifying and comparing models such as Lewandowski's CBMC, Mentink's (2014) Business Cycle Canvas, and the Adapted Sustainable Business Model Canvas proposed by Bocken et al. (2018). Their analysis highlights both the diversity of tools available and the convergence around the idea that CBMs must embed closing, slowing, and narrowing resource loops.

Further, Bocken and Ritala (2024) emphasise that circular business model innovation is not limited to incremental changes but can act as a "game changer" when companies redesign their value proposition to systematically slow, close, narrow, and regenerate resource flows. This approach expands the focus from recycling to systemic innovation, including product-as-a-service models, product life extension strategies, and ecosystem regeneration.

The common thread across these contributions is the recognition that circular business models are not static templates but dynamic processes of adaptation and innovation. Their application in practice, particularly in resource-intensive industries such as textiles, requires both strategic commitment and operational capabilities to embed circularity across the value chain.

1.3. Analytical Frameworks

Although the concept of circular economy provides broad principles for sustainability and resource efficiency, its effective application at the company level requires structured frameworks that enable managers and researchers to analyse and evaluate business practices. Frameworks help translate theoretical concepts into actionable strategies and provide consistency for comparative studies. Among the most widely recognised instruments are the ReSOLVE

framework, developed by the Ellen MacArthur Foundation (2015), and the Circular Business Model Canvas (CBMC) proposed by Lewandowski (2016).

These tools are particularly relevant for analysing how companies in resource-intensive industries such as textiles integrate circular principles into their business models.

1.3.1.The ReSOLVE Framework

The ReSOLVE framework offers a comprehensive set of strategies for organisations seeking to implement circular economy principles. It structures circularity into six distinct but interconnected action areas:

- Regenerate – Shift to renewable energy and materials, restore ecosystems, and increase natural capital.
- Share – Maximise product utilisation through sharing, reuse, and prolonging product lifetimes.
- Optimize – Increase efficiency by removing waste and adopting advanced technologies.
- Loop – Keep products and materials in closed loops through recycling, remanufacturing, and reuse.
- Virtualize – Deliver utility virtually rather than physically (e.g., digital services instead of physical products).
- Exchange – Replace old materials and technologies with advanced, sustainable alternatives.

Regenerate	Shift to renewable energy and materials Reclaim, retain, and restore health of ecosystems Return recovered biological resources to the biosphere
Share	Share assets (eg cars, rooms, appliances) Reuse/secondhand Prolong life through maintenance, design for durability, upgradability etc
Optimise	Increase performance/efficiency of product Remove waste in production and supply chain Leverage big data, automation, remote sensing and steering
Loop	Remanufacture products or components Recycle materials Digest anaerobically Extract biochemicals from organic waste
Virtualise	Dematerialise directly (eg books, CDs, DVDs, travel) Dematerialise indirectly (eg online shopping)
Exchange	Replace old with advanced non-renewable materials Apply new technologies (eg 3D printing) Choose new product/service (eg multimodal transport)

Table 1 - The ReSOLVE framework: six action areas for businesses and countries moving towards a circular economy.
Source: Ellen MacArthur Foundation (2015), via ResearchGate.

As illustrated in table 1, the ReSOLVE framework provides a clear structure for analysing how companies can embed circular economy principles into their business models.

1.3.2. Circular Business Model Canvas (CBMC)

The Circular Business Model Canvas builds on Osterwalder and Pigneur's (2010) Business Model Canvas, a widely used tool for mapping value creation. Recognising the limitations of the BMC in addressing sustainability, Lewandowski (2016) added two new elements—Take-Back Systems and Adoption Factors—to better capture the dynamics of circular models.

- Take-Back Systems include reverse logistics, recycling schemes, and closed-loop product flows.

- Adoption Factors capture the enabling conditions, such as organisational culture, regulatory context, and consumer acceptance.

This adaptation ensures that the CBMC not only describes how a business operates but also evaluates how effectively it embeds circular principles across its value chain.

The ReSOLVE framework and the CBMC complement each other in analysing circularity. While ReSOLVE provides a high-level perspective on strategies that organisations can adopt to embed circularity, the CBMC offers a practical, operational tool for mapping and redesigning business models. In this study, ReSOLVE will be used to evaluate the breadth of circular strategies adopted by Vaz da Costa, whereas the CBMC will allow a structured analysis of how these strategies are reflected in the company's value creation logic. The combination of these frameworks ensures both conceptual breadth and practical depth, making them particularly suitable for assessing the transition of a textile company towards a circular business model.

1.3.3. Other Frameworks for Circular Business Models

Several models have been proposed to analyse sustainability-oriented business models. This section briefly introduces four of the most relevant: the Triple Layered Business Model Canvas, the Flourishing Business Model Canvas, the Value Mapping Tool, and the sustainable business-model pattern taxonomy.

1.3.3.1. Triple Layered Business Model Canvas

The Triple Layered Business Model Canvas (TLBMC), developed by Joyce and Paquin (2016), extends Osterwalder and Pigneur's (2010) original business model

canvas by adding two new layers. Alongside the traditional economic layer, which describes value creation, delivery, and capture, the TLBMC introduces an environmental layer, mapping material and energy flows, life-cycle stages, and ecological hotspots, and a social layer, highlighting stakeholder relationships, equity issues, and social value distribution.

The TLBMC enables a more holistic evaluation of business models by linking value propositions with both upstream and downstream impacts. In the context of the textile industry, it is particularly relevant for mapping how fibre choice, dyeing and finishing processes, or distribution networks contribute to environmental performance, while simultaneously assessing the social dimension of worker well-being and community impacts. However, its application in SMEs can be constrained by data intensity, as robust analysis requires detailed life-cycle data and stakeholder engagement that smaller firms may struggle to provide.

1.3.3.2. Flourishing Business Model Canvas

The Flourishing Business Model Canvas (FBMC), proposed by Upward and Jones (2016), adopts a "strong sustainability" perspective by situating the firm within broader socio-ecological systems. It builds on multi-capital thinking, emphasising natural, social, and human capitals alongside financial value, and explicitly considers the long-term well-being of people and the biosphere.

The FBMC helps organisations articulate their purpose and reflect on potential areas of value destruction as well as creation. In the textile sector, it can be used to guide strategic discussions on adopting regenerative fibres, redesigning products for longevity, or embedding repairability into business models. While the FBMC is powerful in aligning business purpose with sustainability goals, its normative orientation makes it less operational for short-term decision-making. Without complementary tools or metrics, it can remain at a conceptual level.

1.3.3.3. Value Mapping Tool

The Value Mapping Tool (VMT), introduced by Bocken, Rana, and Short (2015), provides a workshop-based framework for identifying value captured, missed, destroyed, and opportunities for new value across different stakeholder groups. It is particularly effective at surfacing trade-offs and tensions, such as where value creation for one stakeholder (e.g., consumers) may result in value destruction for another (e.g., workers or the environment).

In the textile sector, the VMT can reveal missed opportunities such as post-consumer loops not yet explored (repair, resale, or take-back systems), or destroyed value caused by the use of hazardous chemicals in finishing processes. Its participatory nature makes it highly suitable for SMEs, since it can be conducted with internal teams and partners without requiring advanced quantitative data. However, the tool does not provide a detailed operational blueprint and is best combined with more structured canvases such as the CBMC or TLBMC.

1.3.3.4. Business-Model Pattern Taxonomy

Lüdeke-Freund et al. (2018) synthesised a taxonomy of 45 business-model patterns supporting sustainability-oriented innovation, organised in categories such as closing resource loops, slowing flows, industrial symbiosis, product-service systems, and renewable substitution. In the textile industry, patterns like take-back schemes, leasing, remanufacturing, and resource recovery are especially relevant, as they offer practical options for operationalising circular strategies. The taxonomy illustrates the diversity of pathways for firms but also shows the need for contextualisation, since not all patterns are feasible for SMEs with limited resources.

Together, these frameworks enrich the analysis of business model innovation by integrating environmental and social value, yet they also present limitations: the TLBMC and FBMC are resource-intensive and more suited to large organisations, the VMT facilitates stakeholder dialogue but requires complementary tools, and the taxonomy provides actionable guidance but demands careful adaptation. For these reasons, this dissertation adopts ReSOLVE and the Circular Business Model Canvas as the main frameworks, as they are widely recognised, structured yet flexible, and feasible for SMEs like Vaz da Costa. The remaining models are acknowledged to highlight the breadth of literature and to inform the discussion and recommendations but are not applied in full due to the scope of this single-case study.

1.4. Circular Economy in the Textile Industry

The textile and apparel industry has become a focal point in discussions of the circular economy due to its significant environmental footprint and complex global supply chains. According to the European Environment Agency (2019), textiles are the fourth largest contributor to environmental pressures in Europe, after food, housing, and transport, with high levels of greenhouse gas emissions, water use, and land use. Globally, the sector consumes around 79 billion cubic metres of water annually and is responsible for about 10% of carbon emissions, exceeding the combined impact of international aviation and maritime shipping (UNEP, 2020). These figures underline the urgency of rethinking how textiles are designed, produced, used, and recovered at the end of life.

Early analyses, such as A New Textiles Economy (Ellen MacArthur Foundation, 2017), highlighted the alarming statistic that every second, a truckload of textiles was landfilled or incinerated, while less than 1% of clothing fibres were recycled into new garments. More recent perspectives are more systemic: the Ellen MacArthur Foundation (2021) estimates that circular models

such as resale, rental, repair, and remaking could represent up to 23% of the global fashion market by 2030, generating USD 700 billion while avoiding significant waste and emissions. Similarly, the UNEP (2023) stresses the need for coordinated value-chain action, including eliminating hazardous substances, scaling fibre-to-fibre recycling, and embedding renewable or recycled materials in mainstream production.

At the European level, the European Commission (2022) launched the EU Strategy for Sustainable and Circular Textiles, which sets a 2030 vision where all textile products must be durable, repairable, recyclable, and largely made from recycled fibres. The policy also introduces Extended Producer Responsibility (EPR), obliging brands to finance collection and high-quality recycling. Complementing this, the EEA (2024) highlights the ongoing destruction of unsold textiles, showing the persistence of linear practices and the need for stronger reuse and recycling infrastructure.

These developments illustrate the urgency of moving beyond the linear "fast fashion" model, characterised by rapid turnover and disposability, to a circular approach that slows, closes, narrows, and regenerates material loops. Circular strategies prioritise eco-design, renewable fibres, safe chemistry, closed-loop systems, and product-life extension (Stahel, 2010).

Corporate initiatives illustrate both opportunities and challenges. Stella McCartney has pioneered biomaterials such as Mylo (mushroom-based leather) and long-term collaboration with the Ellen MacArthur Foundation, demonstrating credible luxury fashion experiments, though limited in scale. H&M has introduced in-store "Loop Machines" and global garment collection schemes, but these recycle only a fraction of its output, leading to accusations of greenwashing (Wicker, 2022). Adidas has worked with Parley for the Oceans to produce footwear from recycled ocean plastics, a widely publicised initiative but one that represents only a small share of total production (Adidas, 2023). These

cases show how companies can advance awareness and feasibility, but also how initiatives risk being symbolic rather than systemic.

Technological innovation remains crucial. Fibre-to-fibre recycling, such as Renewcell's process converting cotton and viscose waste into new fibres, has drawn major attention but faces financial fragility, as shown by Renewcell's 2024 bankruptcy (Business of Fashion, 2024). Other firms, including Worn Again and Carbios, pursue chemical recycling of blended fabrics, tackling a key technical barrier (Sandin & Peters, 2018). Yet these technologies are energy-intensive and their benefits depend on renewable energy and safe chemistry (EEA, 2024; UNEP, 2023).

At the consumption stage, rental platforms like Rent the Runway and resale platforms such as Vinted and Depop extend garment lifespans and reduce demand for virgin fibres. These align with the ReSOLVE strategies of Share and Virtualise, but their climate benefits depend on displacement effects—if second-hand purchases do not replace new ones, gains are limited (EEA, 2023).

At the end-of-life stage, collection and EPR schemes are central. The EU Waste Framework Directive requires separate collection of textile waste by 2025, with producers financing recycling infrastructure. Despite these measures, the EEA (2024) notes that destruction of unsold and returned textiles persists, underlining the need for stricter enforcement.

Despite progress, barriers remain: fast-fashion dynamics undermine uptake of durable products (Fletcher & Tham, 2019); greenwashing erodes trust (de Freitas Netto et al., 2020); global supply chains reduce traceability (Köksal et al., 2017; Köhler et al., 2021); and circular models often involve higher costs and long payback periods (Pal & Gander, 2018; EEA, 2019). Yet opportunities also exist, from digital resale platforms and biomaterials to EU regulatory pressure.

SMEs, which dominate textile production in Portugal and Europe, are part of this transition. Carvalho, Lopes and Sousa (2021) found that cluster dynamics and client demands encourage eco-innovation in Portuguese SMEs, though

financial and technical limitations constrain scale. Bernardino, Santos and Silva (2025) reported that most initiatives focus on efficiency, waste reduction, and product-life extension, while advanced practices such as take-back systems remain rare. Koszewska (2018) showed that Eastern European SMEs face resource gaps but exploit niche markets to differentiate. Similarly, Pal and Gander (2018) noted that despite growing interest, SMEs face barriers of cost and supply-chain complexity.

Overall, SMEs are progressing incrementally, with achievements in efficiency and certification but major challenges in financing, scalability, and integration.

1.5. Research Gap and Relevance

The literature on circular economy increasingly addresses the textile industry, given its significant environmental impact and potential for circular transition (European Environment Agency, 2019; UNEP, 2020). Research has documented environmental burdens across the textile value chain, consumer behaviour challenges, and emerging innovations such as fibre-to-fibre recycling, resale platforms, and rental services (Sandin & Peters, 2018; Fletcher & Tham, 2019). Furthermore, European policy initiatives, including the EU Strategy for Sustainable and Circular Textiles (European Commission, 2022), demonstrate the strategic importance of embedding circular principles into the sector.

Despite these advances, several gaps remain in the literature. First, most studies focus on multinational fashion brands or global fast fashion retailers, providing only limited and fragmented insights into how small and medium-sized enterprises (SMEs), which dominate textile production in countries like Portugal, are adapting to circular economy demands. Although recent research has begun to examine Portuguese and European SMEs (Carvalho et al., 2021; Bernardino et al., 2025; Koszewska, 2018; Pal & Gander, 2018), these studies remain scarce, emphasise resource efficiency and certification, and give less

attention to how circularity is operationalised at the business-model level. Second, much of the research remains at a conceptual or policy level, with fewer detailed empirical case studies examining the translation of circular principles into organisational strategy and operations. Third, while consumer-oriented initiatives such as resale and rental have been widely analysed, there is still limited focus on industrial and home textiles, segments where circularity may present distinct challenges and opportunities compared to apparel.

This dissertation addresses these gaps by providing an in-depth case study of Vaz da Costa, a medium-sized Portuguese textile company with over six decades of history and a strong international presence. Unlike global fast fashion retailers, Vaz da Costa operates primarily in home textiles and fashion fabrics, offering a valuable perspective on how smaller firms in traditional clusters adapt circular economy principles to their operations and supply chains. The relevance of this research is therefore twofold: academically, it contributes to the literature by linking established conceptual frameworks with empirical evidence from an SME context; practically, it provides insights and recommendations for textile companies facing similar challenges, while also supporting broader discussions on competitiveness and sustainability in the European textile sector.

In summary, while circular economy and business models have been extensively conceptualised, further empirical studies are needed, particularly in SMEs and across different textile segments. By analysing Vaz da Costa as a case study, this dissertation advances knowledge on the practical implementation of circular business models in the textile industry.

Chapter 2

Methodology

2.1. Data Collection

The data collection strategy was designed to address the central research question of this dissertation: How do Portuguese textile SMEs integrate circular economy principles into their business models, and what challenges and opportunities emerge in this process? To answer this question, the study adopts a qualitative case study approach, which is particularly suitable when the objective is to examine contemporary phenomena in depth and within their real-life context (Yin, 2018). This method enables the use of multiple sources of evidence and is widely applied in sustainability research to capture the organisational, strategic, and operational dimensions of circular business model adoption.

The selected case is Vaz da Costa, a traditional Portuguese textile company classified as a small and medium-sized enterprise (SME). With over sixty years of history and a strong international presence, particularly in home textiles and fashion fabrics, the company represents the type of firm that dominates Portuguese textile production and provides a relevant context to investigate circular practices. First, it operates within a traditional industrial cluster in the Norte region, where SMEs dominate textile production in Portugal. Second, it has demonstrated engagement with sustainability through the adoption of eco-friendly materials and process efficiency improvements, which makes it a relevant case for exploring circularity in practice. Third, access to the company was facilitated through professional contacts, allowing the researcher to conduct several interviews and obtain internal information not readily available in public

sources. In addition, Vaz da Costa is recognised as a benchmark in the Portuguese textile sector, combining long-standing experience with an openness to innovation, which increases the relevance of the case for both academic and managerial audiences.

Data collection followed a dual approach, combining secondary and primary sources. On the secondary side, a systematic review of peer-reviewed literature was carried out using databases such as Scopus, Web of Science, Google Scholar, and EBSCO, focusing on studies related to circular economy, circular business models, and their application to the textile industry. Grey literature was also consulted, including reports from the European Commission, the Ellen MacArthur Foundation, and the European Environment Agency. Regarding the focal company, information was gathered from the SABI database and the company's official website, complemented by its social media channels (LinkedIn and Facebook), which were particularly useful to trace the company's history, ongoing activities, and communication of its own brand BOVI. Further contextual insights were obtained from industry news sources, particularly Jornal Têxtil, which regularly reports on developments in the Portuguese textile sector and provided additional information on Vaz da Costa's market presence and strategic positioning.

On the primary side, three semi-structured interviews were conducted with different company representatives between April and September 2025. The first interview was held with the Commercial Director, focusing on the company's history, organisational structure, and production processes, and providing the basis for the company overview presented in Chapter 3. The second interview included both the Administrator and the Commercial Director, addressing the objectives of the dissertation and following the semi-structured guide (Appendix A), with questions on strategy, supply chain, eco-design, and innovation. During this session, some specific questions on sustainability were redirected to the Sustainability, Environment and Certifications Manager, who participated in the

third interview. This final session provided detailed insights into ongoing initiatives in eco-design, waste reduction, resource efficiency, and long-term ambitions regarding circularity.

Each interview lasted approximately between 40 and 60 minutes and was conducted in person at the company's headquarters in Guimarães. During these visits, the researcher also carried out direct observation of operations, including production processes, quality control procedures, and interactions with clients and employees in the showroom and administrative areas. The use of appropriate safety equipment during the factory tour enabled access to restricted production zones, ensuring a first-hand understanding of how operations are organised. This observational evidence, combined with interview data and internal documents (presentations, sustainability communications, and policy guidelines shared by the company), provided a richer and more contextualised perspective on Vaz da Costa's practices.

By combining secondary data (literature, institutional reports, corporate sources, social media, and industry news) with primary evidence (three semi-structured interviews, site visits, and document analysis), this research ensured data triangulation and enhanced the robustness of the case study, providing a reliable basis for analysing Vaz da Costa's transition towards a circular business model.

2.2. Search Strategy

The literature search followed a structured process using Boolean logic and carefully defined keywords. The initial searches applied combinations such as "circular AND economy", "circular AND business AND model"*, and "circular AND economy AND textile". Filters were set to restrict results to academic journal articles and literature reviews written in English, prioritising works

published between 2015 and 2024, to capture the most recent developments in the field.

From an initial pool of over 10,000 results across databases, relevance was narrowed by focusing on studies addressing the implementation of circularity at the organisational level, with particular attention to the textile and apparel industry. Preference was given to articles with a high number of citations, as well as those published in journals with strong reputations in the fields of management, sustainability, and environmental sciences. Policy documents and industry reports were selected when they provided context-specific insights, particularly within the European and Portuguese context.

In parallel, information was collected from non-academic sources, mainly official websites of organisations such as the European Commission, Ellen MacArthur Foundation, and Portuguese business councils, to integrate the most recent policy developments and industry commitments into the analysis. For Vaz da Costa specifically, the SABI database provided structured financial and operational data, while the company's website and press coverage offered insights into strategic positioning and sustainability discourse.

2.3. Data Analysis

The analysis of collected information follows a two-stage process. In the first stage, data from secondary sources are synthesised to produce a descriptive profile of Vaz da Costa, including its history, organisational structure, financial indicators, and sustainability initiatives. This descriptive baseline establishes the context for applying circular economy concepts.

In the second stage, the information is interpreted through two recognised frameworks:

- The ReSOLVE framework (Ellen MacArthur Foundation, 2015), which groups circular strategies into six dimensions: Regenerate, Share, Optimise, Loop, Virtualise, and Exchange.
- The Circular Business Model Canvas (CBMC) (Lewandowski, 2016), which adapts the traditional Business Model Canvas by incorporating elements such as take-back systems and adoption factors, thereby offering a more comprehensive tool to evaluate how circularity is integrated into the company's business model.

The combined use of these frameworks ensures both conceptual breadth and operational depth. ReSOLVE provides a systemic perspective on the strategic dimensions of circularity, while the CBMC maps how these strategies translate into the company's value creation, delivery, and capture mechanisms.

2.4. Limitations

The methodological design of this dissertation presents certain limitations. First, the study is based on a single case, which restricts the possibility of statistical generalisation. Nevertheless, as argued by Yin (2018), the value of case studies lies in analytical generalisation, whereby findings contribute to theoretical development and provide insights transferable to similar contexts.

Second, reliance on secondary data carries the risk of bias, as information disclosed by the company may overemphasise positive achievements. This limitation was mitigated through triangulation with primary data obtained from interviews and external sources, but it cannot be fully eliminated.

Third, although the interviews provided valuable insights, the study would benefit from multiple perspectives within the company, particularly from employees directly involved in sustainability practices. Time and access

constraints, however, limited the possibility of conducting more interviews within the scope of this dissertation.

Fourth, the availability of quantitative data was incomplete. While information on certifications, water and energy use, and chemical recovery was provided, detailed data on the company's carbon footprint (Scopes 1–3) and the precise share of sustainable fibres in production were not accessible, limiting the ability to fully quantify environmental impacts.

Finally, the results should be interpreted within the specific context of a Portuguese medium-sized company operating in the home textiles segment. As such, they cannot be generalised to other areas of the textile industry, particularly fast fashion, where business models and supply chain dynamics differ significantly.

Chapter 3

Case Study

3.1. Company Overview

Founded in 1960 in Guimarães, Vaz da Costa S.A. is a family-run textile company that has grown from a small weaving operation into a medium-sized enterprise with international presence. Over more than six decades, the company has continuously invested in production capacity and process technology, enabling it to provide services in fabric dyeing, finishing, and embroidery. This combination of technical expertise and quality control has positioned Vaz da Costa as a relevant player in the Portuguese and European textile industry (see Figure 1).

Figure 1 - Logo of Vaz da Costa.
Source: Company website (accessed 8 Aug 2025).

The company's activities are diversified but strongly concentrated in home textiles (bed, bath, and table linen) and fashion fabrics. Within this portfolio, Vaz da Costa operates across two main business areas:

- Own brand – BOVI: a premium brand distributed in more than 35 countries, focusing on bed, bath, table and home accessories.
- Private label and contract manufacturing: production for international fashion and home textile retailers, allowing stable revenue flows and long-term partnerships.

Vaz da Costa serves both B2B clients, such as European fashion and home retailers (e.g., Zara, Mango, El Corte Inglés, Jonh Lewis), and B2C customers through its brand BOVI, which is sold in specialised premium stores across Europe and North America.

The company employs 240 workers and exemplifies the profile of a Portuguese medium-sized textile enterprise: rooted in a traditional industrial cluster while maintaining an outward-oriented strategy. Its evolution illustrates the ability to adapt to changing market conditions, respond to client requirements, and gradually incorporate sustainability and circular economy practices into its operations.

3.2. Financial and Operational Profile

The financial and operational profile of Vaz da Costa S.A. reflects the characteristics of a medium-sized Portuguese textile company with stable activity and an international orientation. According to SABI data (2019–2023), Vaz da Costa has maintained consistent financial performance over the past five years (Table 2). Turnover grew steadily from €21.4 million in 2019 to €31.1 million in 2022, before declining slightly to €29.1 million in 2023. Operating and net results remained positive throughout the period, demonstrating the company's ability to manage costs and maintain profitability despite sector volatility. The workforce increased gradually from 198 employees in 2019 to a peak of 246 in

2022, stabilising at 237 in 2023. This trajectory illustrates resilience in the face of challenges such as raw material price fluctuations and the COVID-19 pandemic, while also highlighting the importance of exports in sustaining growth.

Year	*Turnover / Operating Revenues (€)*	*Operating Result (€)*	*Net Result (€)*	*Employees*
2019	21,434,190	2,964,406	2,782,643	198
2020	22,630,196	3,489,978	3,102,818	213
2021	26,151,458	3,563,622	3,150,706	233
2022	31,146,116	4,818,884	4,349,451	246
2023	29,120,688	3,489,978	2,867,513	237

Table 2 - Financial and operational indicators of Vaz da Costa (2019–2023).

Note. Values expressed in euros (€). Data retrieved from the SABI database (2024).

Export activity has been decisive in stabilising results, with France, Spain, Germany, and the United Kingdom representing the main European markets, alongside a growing presence in the United States.

Profitability indicators also reveal positive operating margins, which, in the context of the textile industry's narrow margins, point to prudent cost management and positioning in segments of higher added value, notably through the premium brand BOVI. The balance sheet shows moderate leverage and adequate liquidity, enabling the company to invest in machinery upgrades, energy efficiency, and eco-friendly finishing processes.

Operationally, Vaz da Costa is organised as a semi-vertical company, carrying out weaving, dyeing, finishing, embroidery, and product development within its own facilities. This integration provides control over key stages of textile production and reduces dependence on external subcontractors. It also allows the company to supply both intermediate fabrics to fashion clients and finished products for its home textile brand BOVI, thereby combining flexibility in client service with internal quality assurance.

3.3. Sustainability and Circular Practices

In recent years, Vaz da Costa has progressively integrated sustainability and circular economy principles into its business model. The strategy has focused on combining efficiency gains in production processes with environmental and social responsibility, in line with European policy goals for the textile industry. The initiatives can be grouped into six main areas.

3.3.1. Sustainable Materials and Certifications

Vaz da Costa has progressively incorporated sustainable fibres such as organic cotton, recycled polyester, and European Flax linen. Although the precise volumes are not publicly disclosed, the company has committed to gradually increasing their share in production. This commitment is supported by internationally recognised certifications:

- GOTS (Global Organic Textile Standard): ensures organic fibre content and strict social and environmental criteria throughout the supply chain.
- OCS (Organic Content Standard): verifies the presence and amount of organic material in a product.
- GRS (Global Recycled Standard): certifies recycled content, chain of custody, and responsible social, environmental, and chemical practices.
- OEKO-TEX® Standard 100: guarantees that textiles are tested for harmful substances and safe for human health.
- OEKO-TEX® STeP: evaluates environmental performance, occupational health and safety, and social responsibility at the production site.
- European Flax: certifies flax fibre produced with low environmental impact in Europe.

- Vegan Certification: confirms that no animal-derived inputs are used.

Strategically, these certifications are essential for accessing international markets, ensuring compliance with client requirements (notably Inditex/Zara), and safeguarding the company's credibility by mitigating risks of greenwashing through external verification.

3.3.2. Energy and Carbon Management

Energy efficiency and decarbonisation are central to Vaz da Costa's long-term strategy. Two photovoltaic parks installed at the Azurém and Fermentões sites cover between 25% and 45% of annual electricity needs, generating over 4,290 MWh cumulatively by early 2023 and avoiding nearly 28 t of CO_2 emissions per month. In 2022, the company invested €1 million in a biomass boiler to replace natural gas in finishing operations, using pellets from industrial waste as fuel. This not only reduces dependence on fossil fuels but also illustrates a circular approach by valorising waste from other industries.

Forklifts are being progressively replaced with electric models, further reducing direct emissions. While Vaz da Costa reports monitoring indicators such as total energy consumption, energy intensity, and CO_2 emissions, the company has not yet publicly disclosed a complete carbon footprint aligned with Scopes 1–3 of the GHG Protocol.

3.3.3. Water Management

Water management is critical in textile finishing. Vaz da Costa has implemented a closed-loop system that recovers condensates, cooling water, rainwater, and soda solutions. Production planning is optimised to reuse washing waters, reducing demand for freshwater. Between 2012 and 2024, water

consumption intensity decreased by 26.3% (litres per kilogram of fabric processed). Future projects include a biological wastewater treatment plant (WWTP) and the reuse of desizing water with CO_2 neutralisation, both of which are expected to further reduce the company's freshwater dependency.

3.3.4. Chemicals and Waste

The company has invested heavily in chemical efficiency. A flagship initiative is the recovery of caustic soda used in textile processing, which reduced consumption per tonne of fabric by 56.6% between 2012 and 2024. This practice reduces both the purchase of virgin chemicals and the environmental burden of effluents, demonstrating clear alignment with circular economy principles. Waste minimisation is also pursued by reusing fabric scraps as inputs in production (e.g., as rastilhos) and by treating dyeing by-products for recycling whenever possible.

3.3.5. Sustainable Processes and Finishing

Innovation in processes highlights the company's capacity to combine quality and sustainability. The adoption of Avitera® dyes, developed by Huntsman, enables dyeing at lower temperatures and with shorter cycle times, thereby reducing energy consumption by 30%, CO_2 emissions by 30%, and water use by 50% compared with conventional dyeing methods. In addition, digital textile printing significantly reduces water and dye consumption, while enabling smaller, customised production runs that help to avoid overproduction. Eco-friendly finishing processes, such as non-toxic and water-repellent coatings, enhance durability and product safety while reducing environmental impact.

3.3.6. Social and Organisational Practices

Sustainability is embedded in the organisational culture of Vaz da Costa. The company operates an integrated management system covering quality, occupational health and safety, environment, and chemical management. Employees are engaged through environmental training, internal newsletters on sustainability, and awareness initiatives. One example is the annual Tree Day, in which employees participate in planting trees in the community, symbolising the company's commitment to environmental regeneration and social involvement. Vaz da Costa also collaborates with local schools and institutions in Guimarães, strengthening its ties with the community and supporting education. Social responsibility is further reinforced through OEKO-TEX® STeP certification, which audits and validates fair labour practices and safe working conditions.

3.4. Challenges and Opportunities

Although Vaz da Costa has made significant progress in integrating circular economy practices, the transition continues to face structural challenges. One of the main obstacles concerns the financial burden of sustainability investments. As highlighted during the interviews, "our location and the lack of space limit the type of investments we can make; these are investments of millions and they do not always have an immediate return" (Company interviews, 2025). The installation of the biomass boiler in 2022 exemplifies this dilemma: while it represented a €1 million investment with long-term benefits, it required careful prioritisation to balance environmental gains with financial sustainability.

Another difficulty is linked to the physical constraints of the company's facilities. The Azurém site is now surrounded by residential buildings, which not only limits expansion but also increases the need for strict monitoring of externalities. As one manager explained, "noise has to be controlled because

there are houses nearby and new buildings are being constructed" (Company interviews, 2025). This reality complicates the installation of infrastructure such as a biological wastewater treatment plant, forcing the company to seek alternative solutions.

The supply chain also presents challenges. Although the company works with certified suppliers and undergoes external audits, full traceability remains difficult to achieve. As noted in the interviews, "we rely on suppliers' certifications, but we cannot always control what happens upstream" (Company interviews, 2025). This highlights the effort required to align all partners with the same sustainability standards.

On the technological side, the company has advanced with solutions such as digital printing, Avitera® dyes, and soda caustic recovery. However, other innovations are less mature. Fibre-to-fibre recycling of blended fabrics is not yet viable at scale, and processes such as CO_2 neutralisation of desizing water are still in development. As expressed internally, "we have a plan for water, but these are multi-million investments, so we must be rigorous in choosing what to implement" (Company interviews, 2025).

Despite these constraints, Vaz da Costa also benefits from important opportunities. Its positioning in the premium home textiles segment provides a clear advantage, since customers in this market are increasingly attentive to sustainability. This is particularly relevant for BOVI, whose products combine quality and environmental responsibility. Regulation also creates momentum: the EU Strategy for Sustainable and Circular Textiles (2022) and the forthcoming Extended Producer Responsibility (EPR) obligations by 2025 align with initiatives already underway at the company, such as pilot take-back schemes and chemical recovery.

Finally, the organisational culture strengthens the transition. Employees are involved through training and environmental awareness initiatives, including the symbolic Tree Day, where staff participate in planting activities with the local

community. As one respondent emphasised, “we want employees to feel part of the sustainability journey” (Company interviews, 2025).

In short, Vaz da Costa’s journey towards circularity is shaped by a complex interplay of challenges and opportunities. The company must navigate financial and technological constraints, supply chain uncertainties, and spatial limitations, while capitalising on regulatory momentum, market demand for sustainable products, and a supportive organisational culture.

Chapter 4

Analysis and Discussion

4.1. Application of the ReSOLVE Framework

The ReSOLVE framework structures circular economy strategies into six action areas: Regenerate, Share, Optimise, Loop, Virtualise, and Exchange. This section applies the framework to the case of Vaz da Costa, using publicly available information. Where company-specific practices are not explicitly disclosed, gaps and points for confirmation are highlighted. As shown in Table 3, the company demonstrates strong engagement in some dimensions while others remain underdeveloped.

ReSOLVE action area	Practices identified at Vaz da Costa	Status
Regenerate	Biomass boiler (€1M, 2022); photovoltaic parks (25–45% of electricity needs); recovery of condensates, rainwater, soda, cooling water	✓
Share	Pilot take-back schemes with Inditex for unsold/returned textiles; BOVI brand programme with Portuguese retailers to collect end-of-life household textiles (bed linen, towels), repurposed as industrial rags or reintegrated into production	✕ / partial
Optimise	Avitera® dyes (–30% energy, –30% CO_2, –50% water); digital textile printing; soda caustic recovery (–56.6% per tonne); gradual electrification of forklifts	✓
Loop	Internal reuse of fabric scraps (rastilhos); treatment and recovery of dyeing by-products; planned biological WWTP and CO_2 neutralisation of desizing water	✓ / planned
Virtualise	No initiatives identified (no digital substitution of products or services)	✕
Exchange	Replacement of fossil gas with biomass; eco-friendly finishing processes (non-toxic, water-repellent); use of organic and recycled fibres	✓

Table 3 - Application of the ReSOLVE framework to Vaz da Costa.
Source: Author's elaboration based on company interview (2025) and internal presentation (2025).

In terms of Regenerate, the company has implemented significant measures to reduce fossil fuel dependency and promote renewable resources. The installation of a €1 million biomass boiler in 2022 replaced natural gas in finishing operations, using pellets sourced from industrial waste and thereby valorising a by-product of other industries. Two photovoltaic parks at the Azurém and Fermentões sites now cover between 25% and 45% of annual electricity needs, avoiding nearly 28 tonnes of CO_2 emissions per month and generating more than 4,290 MWh cumulatively by 2023. Additional initiatives include the recovery and reuse of water streams such as condensates, rainwater, and cooling water, contributing to the regeneration of natural systems by reducing freshwater consumption.

The Share dimension, although less developed, has gained visibility through emerging take-back schemes. Vaz da Costa participates in pilot programmes with major clients such as Inditex, whereby unsold or returned home textiles are collected and directed to certified recycling partners under the Global Recycled Standard (GRS). For its own BOVI brand, the company has launched a small-scale initiative with Portuguese retailers that allows customers to return defective or end-of-life household textiles, particularly bed linen and towels. These are repurposed either as industrial rags or reintegrated into production as raw material for new products. While still limited in scale, such programmes represent an important step towards aligning with forthcoming EU Extended Producer Responsibility (EPR) obligations for textiles, due to take effect by 2025.

Under Optimise, Vaz da Costa demonstrates consistent investment in efficiency and process innovation. The adoption of Avitera® dyes allows dyeing at lower temperatures and shorter cycle times, reducing water use by 50%, CO_2 emissions by 30%, and energy consumption by 30% compared with conventional processes. Digital textile printing has also been introduced, significantly reducing dye and water use while enabling smaller production runs, thus minimising overproduction. Furthermore, the recovery of caustic soda has

decreased its consumption by 56.6% per tonne of fabric between 2012 and 2024, exemplifying optimisation in chemical management.

The Loop strategy is evident in the company's efforts to reintegrate materials into production. In-house textile waste is reused as input (e.g., rastilhos), while dyeing by-products are treated and, where possible, recycled. Planned projects, including the construction of a biological wastewater treatment plant and the reuse of desizing water with CO_2 neutralisation, further illustrate Vaz da Costa's commitment to closing material loops within its operations.

The Virtualise dimension remains absent, as the company does not currently employ digital solutions to substitute physical products or services (e.g., online platforms for virtual fashion or product-as-a-service models). This gap highlights an area for potential future development, particularly as digitalisation advances in the textile industry.

Finally, Exchange is reflected in the company's adoption of more sustainable inputs and technologies. The integration of organic and recycled fibres and the development of eco-friendly finishes, including non-toxic and water-repellent coatings, demonstrate how Vaz da Costa is replacing conventional, resource-intensive practices with more sustainable alternatives.

Taken together, these initiatives show that Vaz da Costa has made notable progress in embedding circular economy practices across its operations. While some areas, such as Virtualise, remain underdeveloped, the company's investments in renewable energy, chemical recovery, water reuse, take-back schemes, and sustainable finishing place it on a credible path towards a more circular business model.

4.2. Application of the Circular Business Model Canvas (CBMC)

The Circular Business Model Canvas (CBMC), adapted from Osterwalder and Pigneur's (2010) original framework by Lewandowski (2016), integrates two additional dimensions—Take-Back Systems and Adoption Factors—allowing a more comprehensive analysis of circularity in business models. Its application to Vaz da Costa provides insights into how value is created, delivered, and captured in practice, and to what extent circular strategies are embedded in the company's operations. As summarised in Table 4, the company demonstrates strong performance in value proposition, key resources, and activities, while take-back systems and digitalisation remain less developed.

<table>
<tr>
<td rowspan="3">Key Partners
• Inditex and other B2B clients;
• Certified suppliers;
• Recycling partners;
• Local schools/ institutions in Guimarães</td>
<td>Key Activities
• Weaving,
• Dyeing,
• Finishing,
• Embroidery;
• Sustainable finishing
• Digital textile printing;
• Soda recovery</td>
<td rowspan="3">Value Proposition
• Premium home textiles (mainly bed and table linen);
• Emphasis on quality,
• Durability,
• certified fibres (GOTS, OCS, GRS, European Flax)
• Eco-friendly finishes</td>
<td>Customer Relationships
• Long-term trust in B2B contracts;
• Brand loyalty in B2C;
• Sustainability
• Certifications increasingly valued by customers</td>
<td rowspan="3">Customer Segments
• B2B: private labels and distributors (≈75% of sales);
• B2C: BOVI brand in premium markets (≈25%, goal 30%); exports to 35+ countries (EU, US)</td>
</tr>
<tr>
<td>Key Resources
• Vertically integrated facilities;
• Skilled workforce (240 employees);
• BOVI brand reputation;
• Sustainability certifications;
• Photovoltaic parks and biomass boiler</td>
<td>Channels
• International retailers and distributors;
• Premium stores;
• Corporate website and social media (limited online direct sales)</td>
</tr>
<tr>
<td>Take-Back Systems
• Pilot scheme with Inditex for unsold/returned textiles;
• BOVI take-back in Portugal for end-of-life bed/table linen, repurposed as rags or secondary raw material</td>
</tr>
<tr>
<td colspan="3">Cost Structure
• Raw materials, energy, and labour costs;
• Investments in sustainability (biomass boiler, solar);
• certification and audit costs</td>
<td colspan="3">Revenue Streams
• Private label contracts (≈75% of turnover);
• BOVI brand sales with higher margins (≈25%, target 30%);
• Exports to premium markets</td>
</tr>
<tr>
<td colspan="6">Adoption Factors
• Dedicated management team (quality, environment, safety, chemicals); employee training; Tree Day engagement; external audits (Inditex GTW); EU regulation as driver</td>
</tr>
</table>

Table 4 – *Application of the Circular Business Model Canvas (CBMC) to Vaz da Costa*
Source: Author`s elaboration based on company interviews (2025), sustainability presentation (2025).

Vaz da Costa's value proposition centres on premium home textiles, particularly bed and table linen, with quality, durability, and sustainability as differentiating factors. While contract manufacturing for private labels still represents the majority of sales, the BOVI brand reflects the company's ambition to expand in high-margin premium segments by emphasising certified materials, eco-friendly processes, and elegant design.

The company serves diverse customer segments: B2B clients such as private labels, distributors, and global retailers, and B2C consumers who purchase BOVI products through premium retailers in more than 35 countries. Distribution relies mainly on international partners and specialised retailers, complemented by a growing online presence via the corporate website and social media platforms. Customer relationships rely on trust and consistent quality, with sustainability adding value in premium markets. As one interviewee noted, "customers increasingly ask about certifications, they want guarantees that what we claim is verified" (Company interviews, 2025).

Key activities include weaving, dyeing, finishing, and embroidery, supported by innovations such as digital textile printing and Avitera® dyes. Key resources comprise vertically integrated facilities, a skilled workforce of 240 employees, and a broad portfolio of certifications (GOTS, OCS, GRS, OEKO-TEX Standard 100, OEKO-TEX STeP, European Flax, Vegan) that reinforce environmental and social responsibility. The BOVI brand and long-standing reputation for quality also constitute strategic intangible assets.

Partnerships with international retail groups, suppliers of certified fibres and chemicals, and local institutions in Guimarães are crucial for market access and compliance with sustainability standards through external audits, including Green to Wear.

Revenue streams derive primarily from private-label manufacturing (around 75% of sales), while BOVI contributes about 25% with a strategic goal of 30%. This dual structure provides stability through B2B contracts while capturing

higher margins in B2C premium markets. The cost structure is driven by raw materials, energy, labour, and sustainability investments (e.g., biomass boiler, photovoltaic parks, certifications).

Regarding take-back systems, Vaz da Costa participates in client programmes where unsold or returned textiles are collected and channelled to certified recycling partners. In parallel, a small-scale initiative for BOVI allows Portuguese consumers to return end-of-life bed and table linen in selected outlets, which are repurposed into rags or reintegrated into production as secondary raw material.

Adoption factors reveal organisational and cultural drivers of circularity. A dedicated management team oversees quality, environment, safety, and chemical management. Employees are engaged through sustainability training, internal communication, and initiatives such as Tree Day. Regular audits by international clients provide accountability and mitigate greenwashing risks, while EU regulations and premium consumer demand strengthen the business case for sustainability.

In sum, the CBMC analysis shows that Vaz da Costa has consolidated its value creation around sustainability and quality, supported by strong resources and partnerships that underpin its positioning in premium markets. While take-back systems are still at an early stage and digital substitution (Virtualise) remains absent, the company demonstrates a coherent trajectory towards a circular business model that integrates environmental, social, and economic dimensions.

4.3. Comparative Discussion with Literature

The case of Vaz da Costa illustrates how a medium-sized Portuguese textile company is gradually integrating circular economy principles, in line with insights from the academic literature. The application of the ReSOLVE framework revealed significant advances in Regenerate, Optimise, Loop, and Exchange, echoing Kirchherr et al. (2017) and Geissdoerfer et al. (2017), who note

that most SME initiatives begin with resource efficiency, renewable energy, and incremental improvements.

Investments in biomass energy, photovoltaic parks, and the recovery of water and chemicals confirm Stahel's (2010) argument that product-life extension and regenerative systems are pillars of the "performance economy." They also reflect the eco-efficiency highlighted by Sandin and Peters (2018) and Fletcher and Tham (2019), who stress the role of technological innovation in reducing environmental pressures. Vaz da Costa shows how such innovations can be operationalised within the constraints of a smaller firm.

Compared with global players such as H&M or Adidas, whose large-scale initiatives have drawn both attention and criticism (Ellen MacArthur Foundation, 2017; Wicker, 2022), Vaz da Costa's actions are more modest in scale. However, unlike some multinationals accused of greenwashing (de Freitas Netto et al., 2020), the company benefits from external certifications (GOTS, OCS, GRS, OEKO-TEX®) and audits (Inditex Green to Wear), which strengthen credibility and align with Geissdoerfer et al.'s (2017) view that independent verification is crucial for building trust.

The CBMC analysis also highlights organisational and social dimensions. Employee engagement programmes, partnerships with schools, and initiatives such as Tree Day connect with Bocken et al.'s (2015) "value mapping" tool, which stresses that circularity is both technological and cultural. This contrasts with much of the literature, which focuses mainly on material flows while overlooking the softer elements of organisational change (Lüdeke-Freund et al., 2018).

One distinctive contribution of Vaz da Costa is the implementation of take-back systems, rarely explored in SMEs. Pilot collaborations with Inditex and selective BOVI retailers illustrate how reverse logistics and Extended Producer Responsibility (EPR) can be adapted to home textiles. This responds directly to the gap identified by Bernardino et al. (2025), who found Portuguese firms still at an early stage of structured circular strategies.

At the same time, the absence of Virtualise initiatives mirrors Köhler et al.'s (2021) observation that digitalisation remains marginal in SME-driven circular models. Virtual prototyping or digital platforms may represent future opportunities, but these are not yet in place.

Overall, Vaz da Costa confirms key findings in the literature, particularly on resource efficiency, certification, and incremental innovation, while extending knowledge by showing how financial and spatial constraints shape the circular transition of SMEs.

4.4. Summary of Findings

The analysis of Vaz da Costa reveals a medium-sized Portuguese textile company that has progressively incorporated circular economy principles into its operations, while facing structural constraints typical of SMEs. The application of the ReSOLVE framework showed clear strengths in the dimensions of Regenerate, Optimise, Loop, and Exchange, driven by investments in renewable energy, eco-efficient technologies, and chemical and water recovery systems. These initiatives confirm the company's alignment with broader industry trends that emphasise resource efficiency and regenerative practices. However, Share remains underdeveloped, and Virtualise is absent, highlighting areas for future progress.

The Circular Business Model Canvas analysis provided a more granular view of how circularity is embedded into the firm's business model. Vaz da Costa balances stability from private-label manufacturing with value creation through its premium brand BOVI. The company's certifications (e.g., GOTS, OEKO-TEX®, STeP, Vegan) and external audits reinforce credibility and mitigate the risk of greenwashing. Social and organisational initiatives, including employee engagement and community partnerships, extend the scope of circularity beyond technical measures, reflecting a holistic approach to sustainability.

The comparative discussion with the literature confirms that Vaz da Costa follows the typical SME trajectory of incremental circular innovations, but also shows originality in areas such as take-back systems and chemical recovery. At the same time, the absence of virtualisation and limited consumer-facing circular models reflect the broader challenges faced by SMEs in digitalisation and demand-shaping.

In summary, the findings indicate that Vaz da Costa has laid strong foundations for a circular business model, with tangible progress in energy, water, and material efficiency, supported by social and organisational practices. Nevertheless, achieving full integration will require advances in digitalisation, consumer engagement, and supply chain traceability, as well as overcoming financial and spatial constraints.

Chapter 5

Conclusion

The urgency of transitioning towards a circular economy has placed companies at the centre of sustainability debates. While the circular economy has been widely explored at conceptual and policy levels, empirical research on how Portuguese small and medium-sized enterprises (SMEs) implement circular strategies remains scarce. This gap is particularly relevant in the textile sector, which is one of the most resource-intensive industries in Europe and a cornerstone of the Portuguese economy. Within this context, this dissertation examined how Vaz da Costa, a medium-sized textile company based in Guimarães, incorporates circular principles into its business model, seeking to answer the central research question: How do Portuguese textile SMEs integrate circular economy principles into their business models, and what challenges and opportunities emerge in this process?

The findings show that Vaz da Costa has already integrated significant circular practices. Progress is visible in the use of sustainable raw materials, a portfolio of internationally recognised certifications, and the adoption of resource-efficient technologies. Notable initiatives include the installation of a biomass boiler and photovoltaic parks, advanced water and chemical recovery systems that close internal loops, and the introduction of eco-friendly dyes and digital printing processes that reduce energy and water consumption. Social and organisational practices, such as employee training and partnerships with local institutions, further reinforce a holistic approach to sustainability.

Through the ReSOLVE framework, the company shows strong alignment with Regenerate, Optimise, Loop, and Exchange, while Share remains underdeveloped and Virtualise is absent. The Circular Business Model Canvas highlights the dual structure of private-label manufacturing and the premium

BOVI brand, while also pointing to opportunities in take-back systems and consumer engagement.

Despite these achievements, the study reveals persistent challenges. Structural barriers in the textile industry, such as fast fashion dynamics and global supply chain complexity, limit traceability and the scaling of circular innovations. Financial constraints, compounded by the high upfront costs of sustainability investments, were emphasised during interviews. As one manager noted, projects such as wastewater treatment plants require "millions of euros" and demand rigorous prioritisation to ensure long-term returns. These constraints illustrate the delicate balance SMEs must strike between competitiveness and sustainability.

This dissertation contributes to the literature by bridging theoretical frameworks with empirical evidence from a Portuguese SME, an underexplored context in circular economy research. From a managerial perspective, it offers practical insights into how traditional textile firms can embed circularity, demonstrating both opportunities and trade-offs.

Limitations must be acknowledged. The focus on a single case limits the generalisation of results, and data gaps remain in areas such as carbon footprint measurement and the precise share of recycled fibres. Future research could extend the analysis to multiple SMEs across the Portuguese textile cluster, compare results internationally, or examine consumer perceptions of circular initiatives in home textiles.

In conclusion, Vaz da Costa illustrates how SMEs in traditional industries can move towards circular business models. Its trajectory shows that even resource-intensive sectors can integrate sustainability into their core strategy, provided there is a combination of technological innovation, organisational commitment, and stakeholder collaboration. While challenges remain, the company's progress suggests that circularity is not only a path to environmental responsibility but also a strategic lever for long-term competitiveness in the global textile industry.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of my written work/thesis, "Shifting to a Circular Business Model: A Case in the Portuguese Textile Industry", ChatGPT was used for the following tasks:

- Support in the initial formulation of the Research Question and research objectives.
- Suggestions for the structure of the index and organization of chapters.
- Assistance with formatting bibliographic references in APA 7 style.
- Reformulation and shortening of text (clarity, conciseness, and linguistic accuracy).
- Translation and linguistic revision (Portuguese ⇄ English).
- Summarising academic articles, highlighting the most relevant insights, and identifying what could be applied in the literature review.

With the prompts used listed at the end of the document in the Prompts List section. After using this tool, I reviewed and edited the content as necessary, and I take full responsibility for the content of the work presented.

I also declare that I am aware of and respect the Artificial Intelligence Rules of Conduct of Católica Porto Business School.

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Appendices

Appendix A – Interview Guide

1. Strategy and Commitment to Sustainability

- Does the company have a formal sustainability strategy?
- Is it aligned with goals such as the Sustainable Development Goals (SDGs)?
- Is there a team or person responsible for sustainability?
- What long-term targets exist regarding carbon neutrality or circularity?

2. Circular Economy and Resource Management

- Are there initiatives for recovering and reusing waste (e.g., fabric scraps, dyeing water)?
- What approximate share of your products uses recycled or organic materials?
- Do you have data (even approximate) on reductions in water, energy, or waste consumption in recent years?
- Are there systems for product take-back or reuse at end of life?

3. Suppliers and Clients

- What criteria are used to select suppliers?
- Do you work with certified suppliers (e.g., GOTS, OEKO-TEX, ISO 14001)?
- Is raw material traceability ensured? To what extent?
- Do your clients value sustainability, or do price and design matter more?

- Do you notice differences between domestic and international clients in this respect?
- Has sustainability had a direct impact on BOVI sales?
- What types of clients do you work with?

4. Reporting and Certifications

- Which environmental or social certifications does the company currently hold?
- Have you been audited by external entities in terms of sustainability?
- Do you publish sustainability or environmental reports?

5. Internal Culture and Employees

- What type of training or awareness programmes are provided to employees?
- Are workers involved in waste reduction or eco-innovation initiatives?
- Are there internal incentives for good environmental practices?

6. Innovation and Future

- Are you developing innovative products or processes linked to sustainability (e.g., biodegradable fabrics, dry dyeing, digital printing)?
- What are the main challenges you face when trying to make the business more circular?
- If you had more resources, what would you implement in the coming years?

7. Indicators and KPIs

- What are the main indicators used to measure environmental and social performance?
- Can you estimate the percentage of recycled/organic fibres used annually?
- Do you have figures on water or energy reductions achieved through innovations?
- Do you use any type of carbon emissions calculation (e.g., carbon footprint)?

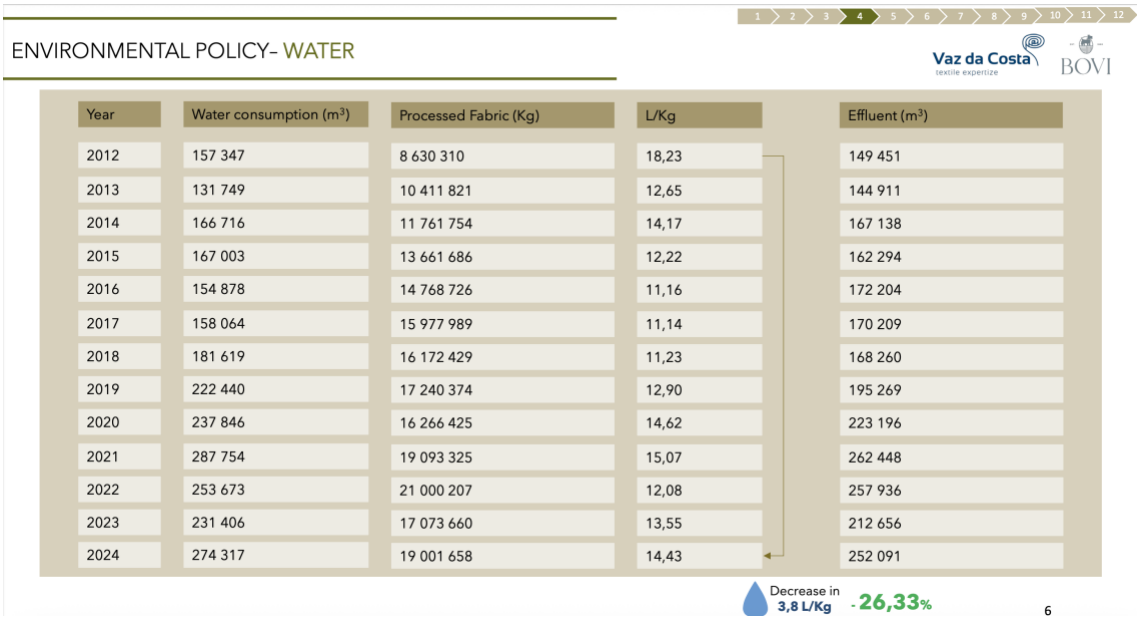
8. Barriers and Opportunities

- What prevents you from advancing faster in sustainability (e.g., costs, suppliers, regulation, internal culture)?
- What opportunities do you see for circular economy integration in your sector?

9. Concrete Examples

- Can you share any project or product that you consider a clear example of circularity?
- Has there been an internal success or failure case that marked your sustainability journey?

Appendix B – Extracts from Sustainability Presentation (Vaz da Costa, 2025)



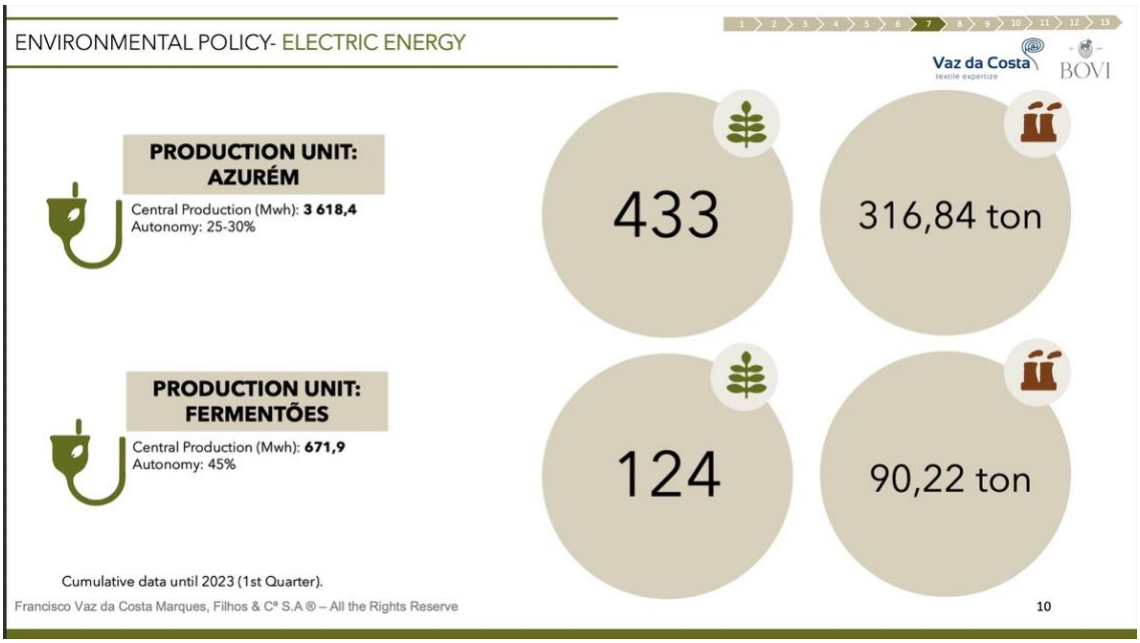
ENVIRONMENTAL POLICY- WATER

Vaz da Costa textile expertize · BOVI

Year	Water consumption (m³)	Processed Fabric (Kg)	L/Kg	Effluent (m³)
2012	157 347	8 630 310	18,23	149 451
2013	131 749	10 411 821	12,65	144 911
2014	166 716	11 761 754	14,17	167 138
2015	167 003	13 661 686	12,22	162 294
2016	154 878	14 768 726	11,16	172 204
2017	158 064	15 977 989	11,14	170 209
2018	181 619	16 172 429	11,23	168 260
2019	222 440	17 240 374	12,90	195 269
2020	237 846	16 266 425	14,62	223 196
2021	287 754	19 093 325	15,07	262 448
2022	253 673	21 000 207	12,08	257 936
2023	231 406	17 073 660	13,55	212 656
2024	274 317	19 001 658	14,43	252 091

Decrease in 3,8 L/Kg -26,33%

6



ENVIRONMENTAL POLICY- ELECTRIC ENERGY

Vaz da Costa textile expertize · BOVI

PRODUCTION UNIT: AZURÉM

Central Production (Mwh): **3 618,4**
Autonomy: 25-30%

433

316,84 ton

PRODUCTION UNIT: FERMENTÕES

Central Production (Mwh): **671,9**
Autonomy: 45%

124

90,22 ton

Cumulative data until 2023 (1st Quarter).

10

ENVIRONMENTAL POLICY- ELECTRIC ENERGY

Vaz da Costa textile expertize BOVI

Installation of two photovoltaic parks with a total of **1823 modules.**

PRODUCTION UNIT: AZURÉM

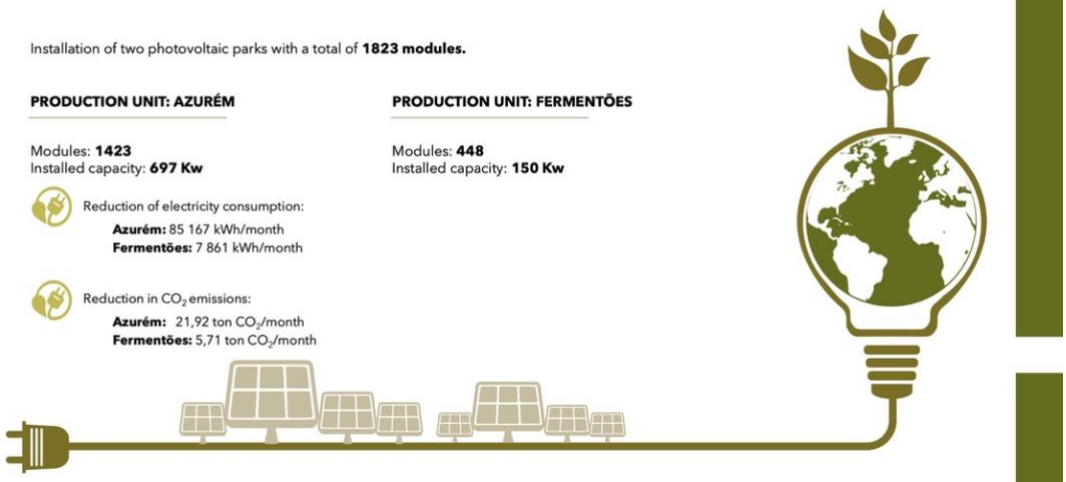
Modules: **1423**
Installed capacity: **697 Kw**

PRODUCTION UNIT: FERMENTÕES

Modules: **448**
Installed capacity: **150 Kw**

Reduction of electricity consumption:
Azurém: 85 167 kWh/month
Fermentões: 7 861 kWh/month

Reduction in CO_2 emissions:
Azurém: 21,92 ton CO_2/month
Fermentões: 5,71 ton CO_2/month

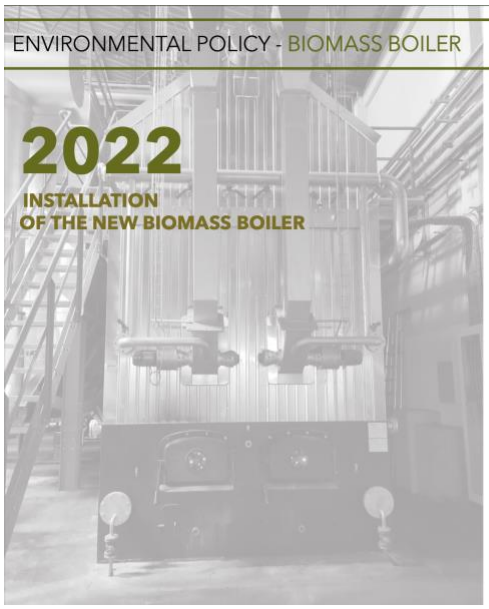


ENERGY CONSUMPTION - HIGHER EFFICIENCY

Vaz da Costa textile expertize BOVI

Year	Eletricity (Kwh)	Energy Self-Production (Kwh)	Natural Gas (m^3)	Processed Fabric (Kg)	Eletricity Kwh/Kg	Natural Gas m^3/Kg
2012	2 399 344	0	2 246 825	8 630 310	0,28	0,26
2013	2 665 506	0	2 679 039	10 411 821	0,26	0,26
2014	2 882 788	0	2 801 199	11 761 754	0,25	0,24
2015	3 082 930	0	3 275 669	13 661 686	0,23	0,24
2016	3 253 561	0	3 442 803	14 768 726	0,22	0,23
2017	3 386 118	0	3 472 515	15 977 989	0,21	0,22
2018	3 752 841	0	3 395 343	16 172 429	0,23	0,21
2019	3 992 027	0	3 590 607	17 240 374	0,23	0,21
2020	4 678 087	0	4 535 422	16 266 425	0,29	0,28
2021	5 363 521	0	4 588 190	19 093 325	0,28	0,24
2022	5 331 914	552 301	4 530 125	21 000 207	0,25	0,22
2023	4 826 789	722 047	1 761 564	17 073 660	0,28	0,10
2024	4 401 025	697 894	2 495 569	19 001 658	0,23	0,13

ENVIRONMENTAL POLICY - BIOMASS BOILER



2022

INSTALLATION OF THE NEW BIOMASS BOILER

- Reduction of fossil fuel consumption (natural gas);
- Biomass is a clean and inexhaustible energy, as it is renewable;
- It is low polluting, emitting no carbon dioxide (according to the natural carbon neutral cycle);
- Solid biomass ash is less aggressive for the environment;
- The use of biomass enables sustainable land clearance;

ENVIRONMENTAL POLICY

Caustic Soda Recovery

Principle of Operation:
Evaporation of the water present in the effluent of the Mercerizing Machine.

Caustic Soda 28°Bé → **Caustic Soda 48°Bé**

16

ENVIRONMENTAL POLICY - CAUSTIC SODA RECOVERY

Around **60%** reduction in the **purchase of caustic soda.**

Alkaline water resulting from evaporation used again in the Mercerizing Machine.

Less polluting effluent.

Utilization of the water used for the condensation of caustic soda for use in the production process.

Lower acid consumption for effluent pH correction.

Contamination-free heating steam.

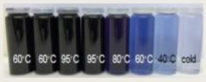
ENVIRONMENTAL POLICY - CAUSTIC SODA RECOVERY

Year	Kg Caustic Soda	Kg Mercerized Fabric	Ratio Kg Fabric/ Kg Caustic Soda	Ratio Kg Caustic Soda/ Kg Fabric
2016	2 121 579	3 965 435	1,87	0,53
2017	2 405 854	4 300 157	1,79	0,56
2018	2 424 294	4 177 597	1,72	0,58
2019	2 316 904	3 762 233	1,62	0,62
2020	1 422 213	3 393 986	2,39	0,42
2021	1 119 082	4 303 142	3,85	0,26
2022	936 741	4 432 767	4,73	0,21
2023	1 040 210	4 126 578	3,97	0,25
2024	979 851	4 110 526	4,19	0,23

LESS CONSUMPTION OF CAUSTIC SODA - 56,6%

In 2016 with 1 Kg of soda we processed 1.87 Kg of mercerized fabric, in 2024 with 1 Kg of soda we processed 4,19 Kg of mercerized fabric.

ENVIRONMENTAL POLICY – EFFICIENT DYEING



Conventional washing

"Avitera SE" washing

Sustainable reactive dyeing

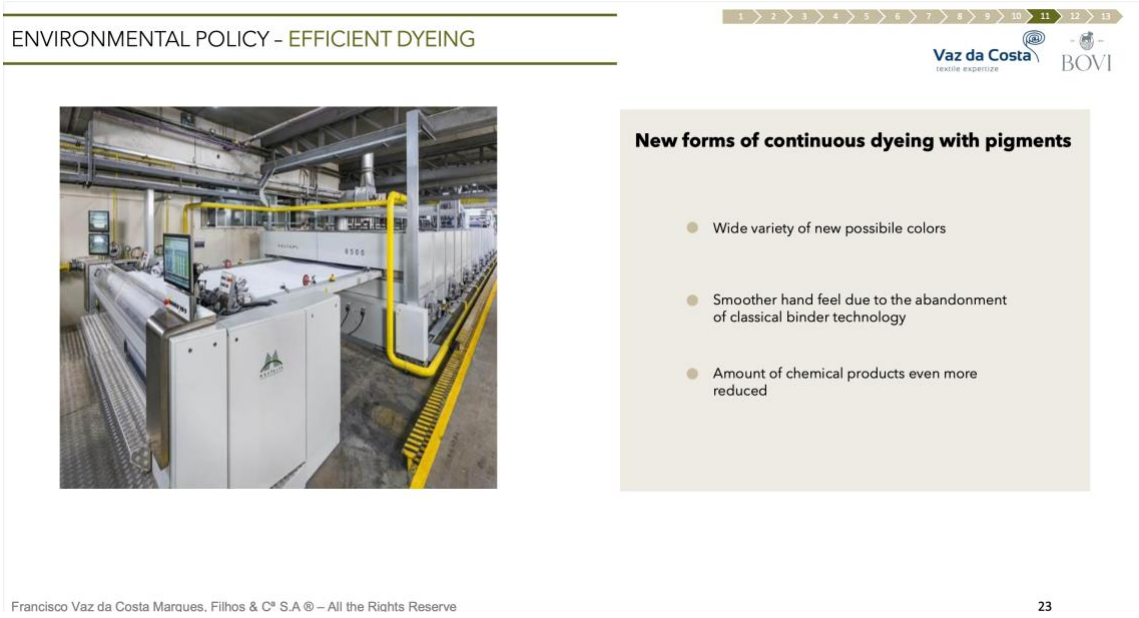
- High fixation rates;
- Introduction of new products and technologies, such as "Avitera" dyestuffs which allows shorter washing profiles, with reduction of water consumption up to 50% when compared with conventional washes;
- High results in all fastness tests.

ENVIRONMENTAL POLICY – EFFICIENT DYEING

- **Sustainable reactive dyeing**
  - Temperatures of 60°C, instead of the traditional 95°C, allow us to reduce:
    - 30% energy consumption
    - 30% emitted CO_2

Why?
FVCM uses sustainable reactive dyes that meet all dyeing requirements at lower temperatures.

21



Appendix C – Prompts List

Below are examples of prompts used during the preparation of the thesis, grouped by category:

Research Question & Objectives

"Give me a list of possible research questions and objectives for a thesis that analyses the case of a Portuguese textile SME."

Structure and Chapters

"Suggest an index and chapter organization for my Master's thesis."

APA References

"Check if this reference is already in APA 7 style and, if not, what do I need to add or change?"

Text Revision & Shortening

"Reformulate this paragraph to make it more concise and academic."

Translation

"Translate this from Portuguese to English."

Summarising Articles

"In this article, what do you think could be added to the literature review, and what do you highlight as most relevant for the case of a Portuguese textile SME?"