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Sustainable Operations Management: The Case Study of Savana

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Resumo

A Sustentabilidade é um conceito que tem desempenhado um papel central no contexto empresarial. A necessidade de responder às novas tendências do mercado tem levado as empresas a reestruturar as suas estratégias, incorporando princípios de sustentabilidade na gestão das operações. Neste sentido, são desenvolvidas práticas de gestão de operações sustentáveis para estabelecer o equilíbrio entre as dimensões ambiental, social e económica, assegurando simultaneamente a competitividade empresarial.

Esta investigação procura analisar de que forma os princípios de sustentabilidade são integrados nas decisões estratégicas de operações da Savana, uma empresa portuguesa a operar no setor do calçado. Para identificar as principais práticas de sustentabilidade aplicadas e os desafios emergentes, foi adotada uma metodologia predominantemente qualitativa, complementada com entrevistas a diferentes colaboradores da empresa.

A análise dos resultados permite compreender como foi implementada pela empresa a transição para um modelo de economia circular, destacando iniciativas como a utilização de materiais reciclados, a otimização dos processos produtivos e a participação em projetos com uma elevada componente inovadora. Para além disso, identifica barreiras importantes, como a escassez de fornecedores e os elevados custos associados.

Em síntese, este estudo agrega e oferece contributos valiosos para as empresas que procuram, como a Savana, integrar a sustentabilidade nos seus processos e operações, minimizando os impactos ambientais e garantindo uma posição de liderança no mercado.

Palavras-chave: *Sustentabilidade, Gestão de Operações, Práticas de Gestão de Operações Sustentáveis, Economia Circular, Desafios da Sustentabilidade, Savana.*

Abstract

Sustainability is a concept that has assumed a central role in the business context. The need to respond to new market trends has driven companies to restructure their strategies, incorporating sustainability principles into operations management. In this sense, sustainable operations management practices are developed to establish a balance between the environmental, social and economic dimensions, while ensuring corporate competitiveness.

This research seeks to analyse how sustainability principles are integrated into strategic operations decisions at Savana, a Portuguese company operating in the footwear industry. To identify the main sustainability practices applied and the emerging challenges faced in this process, a predominantly qualitative methodology was adopted, complemented by interviews with different company employees.

The analysis of the results allows to understand how the transition to a circular economy model was implemented by the company, highlighting initiatives such as the use of recycled materials, the optimization of production processes and the participation in projects with a high innovative component. It also identifies key barriers, such as supplier shortages and the high associated costs.

In summary, this study aggregates and offers valuable insights for companies that seek, like Savana, to integrate sustainability into their processes and operations, minimising environmental impacts and ensuring a leading position in the market.

Keywords: *Sustainability, Operations Management, Sustainable Operations Management Practices, Circular Economy, Sustainability Challenges, Savana.*

Contents

Table of Figures

Table of Tables

List of Abbreviations

AHP – Analytic Hierarchy Process

APICCAPS – Associação Portuguesa dos Industriais de Calçado, Componentes, Artigos de Pele e seus Sucedâneos

B2B – Business to Business

CE – Circular Economy

CEO – Chief Executive Officer

CFO – Chief Financial Officer

CTCP – Centro Tecnológico do Calçado de Portugal

EU – European Union

GHG – Greenhouse Gas

OM – Operations Management

PaaS – Product-as-a-Service

PETA – People for the Ethical Treatment of Animals

SDGs – Sustainable Development Goals

SME – Small and Medium-sized Enterprise

SOM – Sustainable Operations Management

SSCM – Sustainable Supply Chain Management

TBL – Triple Bottom Line

WCED – World Commission on Environment and Development

Chapter 1

1. Introduction

1.1. Research Topic

Sustainability is a complex and multidisciplinary concept referring to the ability to meet current needs without compromising future generations. Given its evolution towards a more comprehensive paradigm that integrates environmental, social and economic dimensions, it is a concept increasingly applied in the business context to ensure long-term sustainable development (Paksoy & Deveci, 2023).

In this context, companies have faced increasing market pressure, creating the need to adapt and apply sustainability in strategic operations decisions, which led to the emergence of Sustainable Operations Management (SOM) practices. However, implementing more ecological practices has inherent challenges, so it is necessary to analyse what are the main barriers to this transition and associated impacts, in order to balance environmental responsibility with the social component and business viability.

1.2. Problem Situation and Motivation

For a more practical understanding of the application of sustainability in Operations Management (OM), a case study on a Portuguese company operating in the footwear industry was developed. This is an industry with a significant environmental impact due to the high consumption of resources and polluting processes, which is why it needs restructuring.

The analysis, therefore, focuses on Savana, a company that develops its activity in the footwear industry and that has incorporated a sustainable policy. Given the lack of research work on the subject and the emergence of this opportunity, this company proved to be the ideal candidate.

1.3. Research Definition

This study aims to analyse how Savana applies sustainability to strategic operations decisions. In this sense, the research question of this dissertation is: "How does Savana integrate sustainability principles into strategic operational decisions through the adoption of SOM practices?". In order to answer this question, it was essential to establish as objectives the identification of practices and challenges faced by Savana in implementing sustainability in its strategy and OM.

1.4. Methodology

The methodological approach adopted was predominantly qualitative. To answer the research question and the defined objectives, a systematic literature review was carried out, followed by a case study. This focused on Savana, a Portuguese small and medium-sized enterprise (SME) that operates in the footwear sector, recognised for its commitment to sustainability. Additionally, four interviews were conducted with employees in different positions within the company to collect data, covering various topics relevant to the research.

1.5. Dissertation Outline

This dissertation is structured into five chapters. The first chapter presents the motivation and objectives of the research, as well as an introductory overview of the structure and approach adopted. The second chapter defines the fundamental concepts of sustainability, provides a contextualization and evolution of the topic and presents the main practices and challenges faced in the implementation of SOM practices in the business context identified in academic studies. Subsequently, the third chapter describes the methodology used to conduct the research, clarifying the procedures for data collection. The fourth chapter analyses the main data and results obtained from the case study, regarding the practices and challenges faced in integrating sustainability into Savana's OM. Finally, in the fifth chapter, a discussion is made between the literature and the practical case analysed, the main conclusions of the investigation are summarised, and potential limitations and suggestions for future studies are outlined.

Chapter 2

2. Literature Review

2.1. Introduction to Sustainability

2.1.1. Sustainability and Sustainable Development

Sustainability has been a topic of discussion for many years in the most diverse fields. Despite the various existing definitions presented by different authors, there is a consensus among them regarding the core meaning of sustainability (Kreye, 2023; Nunes et al., 2023).

Starting by defining sustainability, it is a broad and multidisciplinary concept that addresses the prevention of system collapse, the conservation of biodiversity, the preservation of ecological balance and the role of humanity as part of the natural world. It is the concept that harmonizes development and the environment (Nunes et al., 2022; Rogers et al., 2008).

According to Mukherjee (2024), the core concept of sustainability can be understood through two key terms: continuity and futuristic. The first one refers to the effort to maintain something in its current state or to achieve and preserve a defined condition, not necessarily implying growth unless explicitly stated as sustainable growth. The second one refers to the emphasis that sustainability puts on long-term goals rather than short-term achievements, with a focus on creating or maintaining something with a vision toward the future, aiming for lasting outcomes. Together, these terms suggest that sustainability involves striving to maintain a certain state or capability for the long term.

Sustainability and sustainable development are frequently presented as key approaches for ensuring a harmonious balance between society, the economy and the environment. Although these terms are often used interchangeably, are rooted in the same core principles and integrate these same three dimensions, sustainability has a longer history, with multiple definitions and interpretations over time (Nunes et al., 2023).

Regarding Sustainable Development, the World Commission on Environment and Development (WCED), established in 1983 and led by then-Norwegian Prime Minister Gro Harlem Brundtland, released in 1987 the report *Our Common Future*, now widely recognised as a defining moment for sustainability. The report, also known as *Brundtland Report*, introduced the concept of sustainable development, describing it as development that seeks to fulfil present needs while safeguarding the ability of future generations to meet their own. As a result, ensuring sustainable development is essential to fight the unsustainability that economic growth imposes on nations (Kreye, 2023; Nunes et al., 2023).

2.1.2. Evolution of the Concept of Sustainability

The origins of the concept can be traced back to 1798, when Thomas Malthus, an economist and a country pastor in England, wrote *An Essay on the Principle of Population*, in which he warned about the high population growth in relation to the available natural resources. Since then, several theories have been developed, some supporting and others challenging the Malthusian thought, which combined have allowed to conclude that his theory is valid in the long term. In other words, in the short term, human ingenuity can offer temporary solutions to face the challenges of the coming years, but in the long term,

resources will inevitably run out. The definition of sustainability, therefore, is related to the time span of a few human generations (Rogers et al., 2008).

Nevertheless, it was only in the 20th century that sustainability began to take shape as an integrated concept, especially with the advance of industrialisation, which brought both economic prosperity and environmental degradation. The 1972 United Nations Conference on the Human Environment, held in Stockholm, highlighted the importance of environmental protection, leading to the creation of the United Nations Environment Programme and the strengthening of environmental institutions in several countries. Another significant milestone was the *Brundtland Report*, which introduced the definition of sustainable development mentioned earlier and which emphasised the interdependence between economic growth, social equity and environmental preservation (Rogers et al., 2008).

Global summits can be seen as important milestones in pursuit of balancing these dimensions, and their impacts play significant roles in global policymaking on sustainability. In the 1990s, the concept was expanded during the United Nations Conference on Environment and Development in Rio de Janeiro, also known as the Earth Summit. This event resulted in initiatives such as *Agenda 21* and the conventions on climate change and biodiversity that happened in following years. From then on, sustainability ceased to be a concern restricted to environmentalists and became a priority in global, local and business policies (Rogers et al., 2008).

More recently, the United Nations Sustainable Development Summit, held in September 2015 in New York, adopted the mission of "Transforming our world: the *2030 Agenda* for Sustainable Development". The *2030 Agenda* established 17 Sustainable Development Goals (SDGs), the achievement of which should transform the world into a sustainable and worthy planet to live in by 2030, associated with 169 related targets (Figure 1). The United Nations Development Programme aims to support nations to integrate the SDGs, meant

and applicable for all people across the globe, and capture all elements of sustainability, including issues such as justice and equity, into their national development plans and policies (Mukherjee, 2024).

Figure 1 - Sustainable Development Goals (SDGs)

Source: United Nations (2015)

Environmental, Social, and Economic Pressures

Over time, humanity has been evolving through countless inventions, but the impact and pressure of these has been growing every day, which has increased the advancement of sustainability as a global concern. This pressure emerges from the need to balance economic development with environmental preservation and social equity, identifying and respecting the safe limits of natural ecosystems, the so-called "planetary boundaries" (Mukherjee, 2024; Nunes et al., 2023).

Environmental pressures are reflected in increased climate change, high levels of air and water pollution, deforestation, increased greenhouse effect with the release of gases such as carbon emissions into the atmosphere and the

exhaustion of natural resources due to society's high consumerism, highlighting the consequences of exceeding planetary limits. In the social sphere, some challenges are faced, such as poverty, increased social inequality and limited access to essential resources like drinking water, sanitation and electric power, which cause local populations to move in search of better conditions and greater inclusion. Finally, at an economic level, other challenges have been faced, such as high population growth and increased consumption in relation to existing natural resources, increased industrialisation and crises in responding to the basic needs of developing countries (Mukherjee, 2024; Nunes et al., 2023; Rogers et al., 2008).

The expectation is that pressure will continue to increase, given the forecast growth, between 2020 and 2050, of relevant factors, such as population growth to 9.7 billion inhabitants, an increase of more than 120 billion tons of material extraction and a rise to 80 billion tons of greenhouse gas (GHG) emissions (Figure 2) (Government of Portugal, 2017).

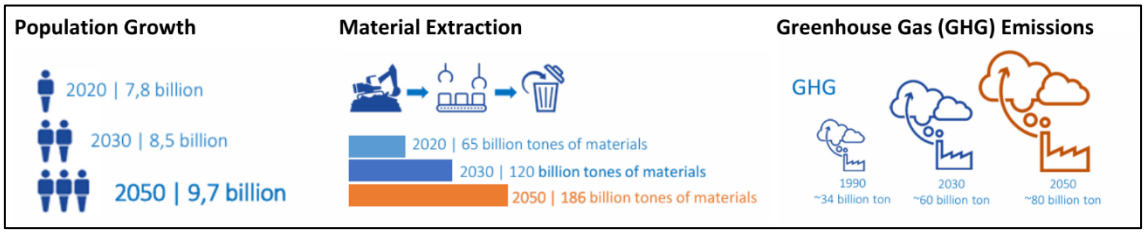

Figure 2 - Population Growth, Material Extraction and Greenhouse Gas Emissions estimates

Source: Adapted from "Leading Transition: Action Plan for Circular Economy in Portugal 2017-2020", Government of Portugal (2017)

2.1.3. The Triple Bottom Line (TBL)

Awareness of sustainability has grown significantly over the past decades, and it has been defined as encompassing the three dimensions of the Triple Bottom Line (TBL): environmental, social, and economic. Analysing each of the

dimensions, environmental sustainability primarily focuses on energy efficiency and reducing pollution, while social sustainability is centred on improving employees' working conditions and overall well-being. In contrast, the economic dimension emphasises topics such as sales performance and profit growth (Shou et al., 2019).

The TBL incorporates the planet, people, and profit, which can be integrated into the three pillars of sustainability, and it is an essential and measurable framework for understanding sustainability. John Elkington, the founder of the British consultancy SustainAbility, proposed that businesses should be preparing three different bottom lines. The first is the traditional profit metric, reflecting a company's financial health. The second considers the people aspect, evaluating the organisation's social responsibility and impact. The third measures the company's commitment to the planet, assessing its environmental responsibility. This approach emphasises a balanced assessment of financial, social, and environmental performance over time (Kreye, 2023; Le & Nguyen, 2024; Nunes et al., 2022).

Carter and Rogers's (2008) conceptualization of organisational sustainability also points out the connections between environmental, social, and economic dimensions. These authors highlight that incorporating these TBL goals within business practices is crucial to ensure the long-term economic viability of both the firm and its supply chain. Firms must not only engage in social and environmentally responsible practices but also recognise that positive financial gains can be achieved through these efforts (Gimenez et al., 2012; Le & Nguyen, 2024).

By using this framework, the companies' management can assess the ecological and social impacts of their decisions while aligning them with financial objectives. In this context, the TBL is an essential and measurable framework for understanding sustainability (Le & Nguyen, 2024; Waqar et al., 2024).

The complexity of sustainability as a theoretical concept gains real meaning when applied to company operations. The concept of sustainability emerges in OM, which corresponds to the implementation of sustainability principles, through the establishment of practices and decisions with the objective of balancing the three dimensions of TBL in business operations.

2.2. Sustainable Operations Management (SOM)

2.2.1. Definition of SOM

Since the industrial revolution, there have been many technological advances that have promoted countless advantages in production processes and allowed a substantial increase in production efficiency (Behl et al., 2023). With the arrival of new tools and machines, such as the steam engine, and the advent of electricity, a major transformation of production processes occurred, and the concept of OM emerged (Mukherjee, 2024).

OM is a crucial function that enables companies to improve production process efficiency, cost and service performance, and ensure product reliability (Shou et al., 2019). In other words, OM encompasses many activities ranging from design and operations planning to control and continuous improvement, enabling companies to manage the production and delivery of goods and services, with the aim of improving effectiveness and efficiency in operations (Mukherjee, 2024).

The improvements in processes' efficiency went hand in hand with growing concerns about impacts on environmental sustainability. This led to the onset of SOM as a response to emerging challenges and the adoption of sustainable practices (Behl et al., 2023).

Kleindorfer et al. (2005) define SOM as a set of skills and concepts that enable structuring and managing business processes so as to obtain competitive returns, without sacrificing the needs of stakeholders, and considering the impact of operations on society and the environment.

Organisations face multiple pressures to implement SOM, namely due to concerns on climate change and the need to control carbon and GHG emissions. Following the 2015 United Nations Climate Change Conference in Paris, there has been an increase in the adoption of SOM practices to mitigate these emissions (Geng et al., 2024).

Nonetheless, firms should see SOM as a win-win system that improves environmental and social outcomes, as well as bringing internal and external benefits. Instead of considering sustainable practices as just a cost to comply with regulations, they should be seen as competitive levers (Longoni & Cagliano, 2016).

2.2.2. SOM practices

As previously mentioned, firms have been adopting SOM practices to minimise environmental impacts, improve process efficiency and respond to increasing stakeholder and regulatory pressures. These practices can be organized into different categories. (Adebanjo et al., 2016; Ageron et al., 2012).

a) Sustainable Supply Chain Management (SSCM)

The environmental sustainability of an organisation depends on the adoption of Sustainable Supply Chain Management (SSCM) practices (Ageron et al., 2012; Bouchery et al., 2024). These include measures such as selecting sustainable suppliers, material traceability and reverse logistics, ensuring more responsible production. It also covers the management of environmental risks in

the supply chain, which is essential to mitigate expected negative impacts (Gimenez et al., 2012).

Supplier selection is an important step in improving supply chain efficiency and mitigating potential risks associated with supply disruptions. Some companies choose to make this selection based on criteria related to suppliers' sustainability and resilience. Companies use multicriteria decision-making methods to facilitate the process of assessing and selecting suppliers, such as the Analytic Hierarchy Process (AHP), and implement integrated approaches through technological tools to balance the defined objectives. Finally, companies can perform audits and request certifications from suppliers, ensuring transparency in the process and compliance with regulations (Alikhani, 2025).

Carter and Rogers (2008) define SSCM as the strategic and transparent integration of an organisation's social, environmental and economic objectives into the management of its business processes, with the aim of improving its long-term economic performance and that of its supply chain. The sustainable responsibility of business partners plays a fundamental role in the development and success of business operations, and it is essential that all involved apply environmental criteria and promote responsible corporate behaviour. In this context, companies should encourage suppliers to adopt sustainable practices and recognise the importance of solving environmental problems. Without the adoption of SSCM practices throughout the supply chain, organisational sustainability becomes unfeasible and environmental benefits are reduced (Ageron et al., 2012; Carter & Rogers, 2008).

b) Sustainable Production and Waste Management

Sustainable production involves the implementation of processes that reduce the consumption of natural resources and minimise the generation of waste, promoting increased efficiency and mitigating environmental impacts. Growing concerns about excessive waste generation have driven strategies for a

sustainable and resilient transition (Aziz Khan et al., 2024; Forid Islam et al., 2024). Throughout their operations, some companies choose to use renewable energy, processes with lower consumption and polluting emissions, the reuse of products and water, promoting better waste management and more sustainable processes (Government of Portugal, 2017).

c) Circular Economy (CE)

The concept of Circular Economy (CE) is an alternative to the traditional linear economic model that turns natural resources into waste through production, following a "take-make-consume-dispose" pattern. The aim is to minimise waste, optimize the use of resources and reduce environmental impacts through regenerative and restorative processes. This is achieved through practices that promote global sustainability, emphasising the need for an integrated approach that considers the economy as a closed system, which interacts in a balanced way with the environment (De Felice et al., 2024; Forid Islam et al., 2024; Kumar et al., 2024).

CE is based on four fundamental principles: (1) Design products and systems for durability and repairability, extending their lifespan; (2) Reuse of products and components, preventing them from becoming waste, which encourages practices like sharing, refurbishing and repurposing; (3) Recycling, which involves decomposing products and materials at the end of their life and repurposing them to create new products, closing the loop in the material cycle and reusing resources to reduce the extraction of raw materials; (4) Resource efficiency, optimizing the use of materials and energy at every stage of a product's lifecycle (Barbhuiya et al., 2024; Kumar et al., 2024).

One of the fundamental concepts of this approach are the 3Rs: Reduce, Reuse and Recycle. Reduce means reducing the consumption of raw materials and the generation of waste. Reuse consists of extending the useful life of products, using them more than once for the same purpose. Finally, Recycle

involves transforming waste into new materials or products, promoting the reinsertion of resources into the production chain. These principles guide sustainable practices in order to minimise environmental impacts and promote the efficient use of materials. With the evolution of the CE concept, the 3R model expanded to the 9R model, which also includes Refuse, Rethink, Repair, Refurbish, Remanufacture and Recover. This model is more comprehensive and seeks to make production processes even more sustainable and efficient. (Forid Islam et al., 2024; Valencia et al., 2023).

Furthermore, the CE paradigm supports the sustainability of manufacturing companies through the implementation of other practices, such as industrial symbiosis to optimize the use of resources, the adoption of innovative business models such as Product-as-a-Service (PaaS) and the sharing economy, the production of energy from biomass, reducing dependence on fossil fuels, and the integration of circular practices with environmental and socioeconomic goals, including the reduction of emissions (Forid Islam et al., 2024; Kumar et al., 2024).

In summary, CE follows a hierarchy of resource use that prioritizes reuse, reconditioning and repair before remanufacturing, followed by recycling. Energy generation through combustion should be a last option before landfill, which is considered the least desirable option. This sequence ensures the preservation of the value and quality of the product throughout its life cycle, while promoting greater energy efficiency, reflecting the fundamental principles of the CE (Figure 3) (Barbhuiya et al., 2024).

Figure 3 - The Circular Economy model: less raw material, less waste, fewer emissions

Source: European Parlement Research Service (2023)

2.3. Sustainability in Strategic Operations Decisions

2.3.1. Application of Sustainability to Strategic Operations Decisions

Sustainability must be incorporated into companies' operations and strategic decisions, enhancing transparency and collaboration between partners along the supply chain. Its integration can impact the dimensions of the TBL, leading to competitive advantages and long-term benefits (Carter & Rogers, 2008; Gimenez et al., 2012).

In recent years, the European Union (EU) has promoted business sustainability through ambitious policies, with the *European Green Deal* being one of the main milestones of this transformation. Launched in December 2019, it aims to achieve GHG emissions neutrality by 2050 and reduce these emissions by

50% to 55% by 2030, requiring structural changes in business operations. The agreement consists of a strategic plan to transform the European economy into a sustainable, efficient and competitive model, and its impact on companies' strategic operations can be observed in different dimensions. In terms of energy efficiency and emissions reduction, the industrial sector, responsible for 20% of EU emissions, is required to adopt greener production processes, while the transport sector must reduce its emissions up to 90% by 2050, boosting investments in sustainable mobility. Furthermore, with only a minority (12%) of European industry materials coming from recycling, adopting circular economy practices is essential to reduce waste and optimize resources. To enable this transition, a high level of investment in sustainable industrial processes innovation, renewable energy sources and modernization of production infrastructures is required (European Commission, 2019; Olczyk & Kuc-Czarnecka, 2025).

Incorporating these measures into strategic operations is not only limited to regulatory requirements but also offers significant opportunities for innovation and sustainable economic growth. While requiring a reformulation of business strategy, sustainability has become an essential strategic factor, driving the competitiveness and economic viability of organisations at a global level (European Commission, 2019).

2.3.2. Challenges of SOM practices

a) Financial Barriers

One of the main challenges in adopting SOM practices by companies is the lack of financial resources. The high initial costs of acquiring sustainable equipment and technologies, the need for continuous investment and the difficulty in accessing financing constitute barriers to the implementation of these

practices, particularly in the case of SMEs. (Abdul Basit et al., 2024; Aziz Khan et al., 2024).

b) Technological Barriers

The lack of access to advanced technologies and the difficulty of integrating new sustainable solutions into production processes are some of the recurring challenges in the adoption of SOM practices by companies. The lack of adequate technological infrastructure to support advanced technologies, the shortage of skilled workforce and emerging data security challenges also limit the implementation of green and innovative measures (Abdul Basit et al., 2024; Aziz Khan et al., 2024).

c) Cultural and Organisational Barriers

At the organisational level, resistance to change and the absence of a sustainable corporate culture make it difficult for companies to implement more ecological practices, even if these practices bring long-term competitive benefits (Abdul Basit et al., 2024; Aziz Khan et al., 2024). The involvement of management and all employees is essential to incorporate such measures and carry out organisational changes (Adebanjo et al., 2016).

d) SSCM Barriers

In relation to the supply chain, resistance and lack of commitment from suppliers can be considered a barrier to the effective implementation of sustainable strategies. Suppliers' unwillingness to invest in more sustainable processes makes it difficult to implement these practices and compromises the sustainability of the entire supply chain (Abdul Basit et al., 2024; Aziz Khan et al., 2024).

e) Regulatory and Institutional Barriers

As for regulatory barriers, the complexity and inconsistency of environmental regulations make it difficult to adopt sustainable practices. The lack of clear regulation and effective oversight, as well as government incentives to promote sustainability, are some of the factors that discourage companies from investing in greener solutions, which constitutes a significant barrier to the implementation of sustainable practices (Abdul Basit et al., 2024; Aziz Khan et al., 2024).

Companies may also face other barriers such as the lack of effective metrics to measure the impact of adopting sustainable practices and market resistance to accepting higher product prices (Abdul Basit et al., 2024; Aziz Khan et al., 2024). Finally, another challenge is to ensure the balance between competitiveness, innovation and business economic viability in the long term (Gunasekaran & Spalanzani, 2012; Magon et al., 2018).

2.3.3. Impacts of SOM practices

Companies that adopt SOM practices can expect them to have an impact on their performance (Adebanjo et al., 2016). These are increasingly essential factors for organisational success and their impact goes beyond compliance with environmental regulations, influencing operational efficiency, corporate reputation and market competitiveness (Gunasekaran & Spalanzani, 2012; Magon et al., 2018).

In terms of the environment, sustainable practices contribute to improving companies' environmental performance by reducing their ecological footprint. More efficient management of resources and minimising waste throughout the supply chain are some of the factors that promote and positively impact sustainability. It is estimated that a CE model could lead to an annual 2 to 4%

reduction in GHG emissions in the EU, reinforcing the role of sustainability-oriented strategies in mitigating climate change and reducing environmental impact (Gimenez et al., 2012; Government of Portugal, 2017; Shou et al., 2019).

In relation to the social sphere, sustainable initiatives implemented by companies tend to promote improvements in the working conditions and safety of their employees. Furthermore, they contribute to increase corporate reputation and strengthening ties with stakeholders, creating a positive social impact. The transition to a CE model is also expected to generate between 1 and 3 million jobs in the EU by 2030, demonstrating its potential to create employment opportunities through circular business models and sustainable innovation (Gimenez et al., 2012; Government of Portugal, 2017; Shou et al., 2019).

Finally, at the economic level, the relationship between the implementation of sustainable practices and financial performance is more complex. On the one hand, such practices enhance the optimization of resources, which contributes to the reduction of inherent operational costs. Furthermore, improving the company's reputation, by indirectly driving increased sales, also creates financial benefits for the company. On the other hand, these initiatives may imply an increase in initial costs owing to challenges in production management and the implementation of safety measures. Estimates suggest that the transition to a CE model could bring annual gains of €1.8 billion to the EU, highlighting its potential to boost financial growth and increase resource efficiency. It is important to note that despite the initial increase in costs in the short term, these may be offset by benefits, such as reduced financial and regulatory risks, in the long term (Gimenez et al., 2012; Government of Portugal, 2017; Shou et al., 2019).

In summary, the adoption of sustainable practices positively impacts the environmental and social performance of companies, even though the economic benefits may not be immediate (Gimenez et al., 2012; Shou et al., 2019). Nevertheless, integrating sustainability into business strategy is essential to

ensure competitiveness, innovation and long-term economic viability (Gunasekaran & Spalanzani, 2012; Magon et al., 2018).

Chapter 3

3. Methodology

The methodology adopted for this analysis was predominantly qualitative. This approach allows to explore and understand the meanings that individuals and groups attribute to complex social and human phenomena, through a detailed analysis, based on emerging questions, data collection in a natural environment and the inductive identification of patterns (Creswell & Creswell, 2018).

3.1. Systematic Literature Review

The bibliographic review was written using the databases *Scopus*, *ScienceDirect*, *Google Scholar* and *Emerald Insight*, using search terms such as: *Sustainability*, *Sustainable Operations Management*, *Sustainable Operations*, *Operations Management*, *Barriers*, *Challenges*, *Impact*, *Sustainable Practices* and *Circular Economy*, isolated or combined with each other. In addition, other articles and books provided by the Supervisor were also consulted.

A systematic literature review allows to organise and synthesize large volumes of information in a rigorous and transparent way, answering research questions and identifying gaps in knowledge, throughout an in-depth survey of studies with rigorous criteria (Jesson et al., 2012). In this sense, to ensure the relevance and timeliness of the analysis, were selected studies published between 2005 and 2025, written in English, and when convenient their bibliographic references were consulted to complement the information. These were evaluated based on their title and abstract, excluding all those that did not fit the theme and

purpose of the work. In summary, diverse references were analysed, including articles, books, reports and institutional websites.

3.2. Case Study

With the intention of conducting a more detailed investigation into the integration of sustainability into business operations, it was decided to carry out a case study. This approach was chosen because it allows for the thorough exploration of one or more cases, in a certain context and period, collecting data from multiple sources, such as interviews, observations and documents, and presenting a description and analysis of the related themes (Creswell & Creswell, 2018).

The case focuses on SAVANA CALÇADOS, S.A., a Portuguese company in the footwear industry, and aims to explore the adoption of sustainable practices in OM, the main challenges faced and the impacts generated. This company, also referred to as Savana throughout this work, was selected based on its policy and ongoing commitment to sustainability, from the adoption of innovative and environmentally friendly materials to the implementation of sustainable practices in production. Its presence in the European market, the integration of advanced technologies and the international recognition for its practices contribute to making it a relevant example for investigating the integration of sustainable practices into strategic operational decisions.

There were other factors that were considered in the selection of this company, namely the sector in which it operates. The footwear industry has a significant environmental impact, due to the high consumption of resources and polluting processes, which requires analysis and restructuring. Also, the scarcity of research work on the subject applied to this company and the emergence of

this opportunity for collaboration contributed to Savana being the ideal candidate for the preparation of this study.

3.3. Data Collection

Interviews are the main tool adopted for data collection in qualitative analyses, and a structured format allows information to be obtained in a controlled and objective manner (Alsaawi, 2014).

To get a better understanding of the company and collect more complete information, a visit to its facilities was carried out, complemented by interviews with four employees with different roles: CEO (Chief Executive Officer), CFO (Chief Financial Officer), Commercial Manager and Production Operator.

With the aim of understanding the company's sustainable practices and assessing employees' views on the integration of sustainability into the company's strategic decisions, bringing together different perspectives on the management of sustainable operations in the company, these were carried out in person, in January 2025, in a structured and open format. The average duration of each interview was approximately thirty minutes.

In this sense, the scripts of the interviews were prepared in advance, designed and customized, outlining the objectives and questions according to the role of the interviewees (Appendices). Despite the diversity of questions, in general all scripts follow the same thematic sequence. The first questions refer to the function performed and the company's motivation to adopt sustainable practices. In a second part, questions are asked about the sustainability practices implemented by the company and how they influence the execution of tasks. Finally, questions are asked about the challenges faced and the company's strategic objectives.

In this context, the interviewees' responses were meticulously transcribed for data processing. Subsequently, the information obtained was grouped by themes according to the research objectives, in order to be incorporated into the results and data analysis presented in the next chapter of this work.

In conclusion, the methodology of this research enables to analyse the integration of sustainability into operations, identifying its main challenges and impacts. The combination of the literature review with the case study and the collection of primary data through the elaboration of interviews contributes to a better understanding of the role of sustainable practices in strategic decisions and business competitiveness.

Chapter 4

4. Results and Data Analysis

4.1. Company context

Founded in 1988, SAVANA CALÇADOS, S.A., is a company dedicated to the production of footwear for children and adults, located in Felgueiras, in the north of Portugal. Its main objective is to offer excellent products, developed by a dynamic and ambitious team, using the best technologies and materials available on the market.

Currently, the company operates with different brands in the footwear industry, however its main business segment is private label. This SME exports around 98% of its production to Europe, in a business to business (B2B) model.

In relation to its mission, the company prioritizes meeting the needs and expectations of consumers, seeking to achieve continuous improvement of its products, processes and employees. With the intention of consolidating its position in the global market, it is governed by ethical practices and values, including quality, responsibility, sustainability and commitment.

4.2. Production Process

The production process consists of seven stages and the factory is organised into distinct areas, identified by specific colours. With a maximum production capacity of 1000 shoes per day and around 150 workers, the company ensures that, throughout the entire process, the necessary technique and

knowledge are present and that the requirements of the materials used, essential to guarantee the quality of the final product, are met (Figure 4).

Figure 4 - The Seven Stages of the production process of Savana

Source: Adapted from Savana Shoe Factory (2025)

The production process begins with the creation of a design, combining market trends and creativity. Subsequently, a prototype of the shoe model is designed for future industrialisation, supported by advanced technologies, and the cutting is carried out, either in the traditionally or automatically. The sewing stage, responsible for more than half of the production time, is more complex and involves several processes, both automated and manual. When assembling, the shoe takes shape and it is ready to receive the sole. Finally, during the finishing process, the shoe is finished and packaged according to the order specifications.

4.3. Application of Sustainability

The need to integrate sustainability into Savana's operations arose mainly due to the increased market demand for sustainable products (Table 1). Therefore, the company had to adapt to meet customer expectations, keep up with the market and ensure its competitiveness.

Since 2017, the company has been committed to integrating sustainability throughout its production process, highlighting it as a fundamental element of its strategy. For this reason, it has invested in materials, equipment and training that allow for more sustainable production in line with its goals.

With the intention of being pioneers in reconciling sustainability and fashion, Savana created the New.ve brand. This aims to create 100% vegan

footwear, made from sustainable products, reaching a wider range of customers. Its meaning "new version of the world" is related to the change that the company intends to make in the industry and in the world, by introducing sustainability practices in its operations.

Currently, the company is already sought after by customers because of its know-how in terms of sustainable materials. Brands that identify with the adopted sustainability policy end up contacting Savana to jointly produce new products. Thus, Savana works in partnership with several companies, both in terms of supply chain and project development.

	Interviewees
Key enablers	"The market increasingly values sustainability. (...) Clients who are in the sustainability business always look favourably on businesses in which most of the waste generated by the industry is recycled and reused. (...) In order to be viable, companies have to be aligned with the needs of the market and, although we, as a company, are also concerned with sustainability, in a way it is the market that is increasingly looking for products that are more sustainable and that cause less harm to the planet. (...) it was because of a potential vegan client that we started the production based on sustainability principles." , **CEO** "The awareness that we would have to adapt, since the market was demanding this type of product.", **CFO** "We started to apply these measures more as we think it is the future and we wanted to be pioneers in several projects and show that sustainability can be applied to fashion. (...) New.ve was born from a need to be pioneers in creating a brand that is sustainable as well.", **Commercial Manager** "The company's primary motivations in making these changes were mainly ecological.", **Production Operator**

Table 1 - External pressures for the adoption of SOM practices by Savana

Source: By the author (2025)

4.3.1. SOM Practices

Savana has adopted several SOM practices in different areas of its production process (Table 2). This reflects the company's commitment to sustainability as a fundamental part of its strategy.

a) Suppliers

In terms of supplier selection, the company seeks to work with increasingly environmentally friendly materials. The selection is made carefully and based on transparency, fair competition and the best interests of the company.

For the most part, Savana establishes initial contact with its suppliers at international fairs, where it always seeks to find differentiated and sustainable products. Subsequently, the respective technical sheets are requested and verified, this being a crucial step to guarantee compliance with the standards and values followed by Savana throughout the entire supply chain and to ensure the sustainability of the production process. After this analysis and certification, suppliers that do not meet the requirements are excluded from the process, while those that do meet the requirements are involved in a collaborative process of selection, purchase, development and presentation of products.

The search for suppliers that offer high-quality and ecological materials is a determining factor for Savana. Hence, the agreement is only concluded if they have a sustainability policy that meets the company's expectations.

b) Infrastructures

Regarding the infrastructure and equipment used by Savana, gradual adaptation has been introduced to make the production process more ecological. From the need to carry out internal reforms to the implementation of new

technologies, several changes were made so that operations could be more sustainable.

In recent years the company's existing lamps have been replaced by LED lamps, which has enabled a reduction in energy consumption from 400w to 100w. Solar panels were also purchased and installed on the roof of the company, which allow it to be almost 100% autonomous during the longest periods of sunshine, reaching certain peaks during the day when it is still able to sell energy to the grid.

Furthermore, through a light meter control system and the transparent tiles that cover the factory ceiling, the lamps, which have a side sensor, can measure the level of luminosity and adapt their intensity, ensuring that the light inside the factory is always constant. In the sunniest months, the company manages to reduce electricity consumption and costs by around 60 or 70%.

Other measures involved changing the company's vehicle fleet to use only electric vehicles, contributing to the reduction of fossil fuel consumption. To enable this initiative, charging stations were implemented.

It is also important to highlight that throughout the company's infrastructure, whether in the factory or in the offices, there are properly signposted recycling stations. The company seeks to appeal to the social and environmental responsibility of its employees, through reducing and recycling waste.

c) Production and Operations

In the production area, some equipment and machinery, over 20 years old, were replaced by newer ones with lower consumption. This change allowed a reduction in expenses estimated to be around 30 to 50% of what was previously consumed, performing the same function.

For example, the cabins used to finish shoes, which previously used water, were replaced by new cabins equipped with their own nets, meaning that the use

of water is no longer necessary. In this way, this investment permitted significant savings in the consumption of this resource.

Another example is the acquisition of automatic scratching machines. Although it was still necessary to use manual scoring machines to make certain models, this acquisition brought about a significant reduction in paper consumption and waste.

The company also attempts to integrate more sustainable, recycled and naturally derived materials into its production process, resulting in a more ecological product. The use of raw materials obtained from waste and the development of a water-based glue, that is less harmful to the environment than traditional solvent-based glues with a high environmental impact. While contributing to improve air quality in the workplace, these are some of the steps the company is taking towards a better, greener future.

d) Initiatives and Projects

Within the scope of the use of recycled materials, it was possible to identify different practices employed by Savana and projects in which it participates. To this end, it has implemented several innovative solutions, for example the inclusion in its production of biodegradable leathers free of heavy metals, skin from apple waste and recycled plastics, soles and skin produced from reused coffee grounds, recycled foam, bamboo insoles and linings made from organic and recycled cotton.

Continuous research into more environmentally friendly alternatives has led to the discovery of sustainable materials and techniques, such as “carob tex”, a 100% organic material composed of 80% carob, 20% cellulose waste and natural rubber. Given the carob production capacity in Portugal, the company seeks to benefit from the opportunity to transform this raw material into a natural and versatile fabric to integrate into the production of its footwear. Another sustainable approach is “tennis ball skin”, which consists of incorporating fabrics

and adopting soles made from recycled tennis balls and natural rubber, reducing the environmental impact.

Savana also explores other sustainable leather options, such as "palm skin", a fabric made entirely from palm waste, which may include an ecological lining made from recycled cotton. Other innovative materials are also used, such as "pottery waste skin", composed of 100% organic cotton and residues from pottery, and "grape skin", made from 9% grape waste, 40% organic cotton and 51% water-based polyurethane.

As for projects, BioShoes4All stands out, a notable and innovative initiative in the footwear industry, led by APICCAPS[1] and coordinated by CTCP[2], partners of the company. This program represents a milestone in innovation and sustainable production for the footwear industry and allows Savana to test biodegradable and recyclable materials to later integrate into its production, in particular, for the New.ve brand. Its main objectives are to promote the transition of the footwear industry to the bioeconomy and circular economy, calculate and reduce the carbon footprint and develop innovative and sustainable solutions.

In addition, Savana, in partnership with other companies, also participates in the development of products from various industries waste, such as cork and coffee grounds, in the production of a thermoplastic material and composting to integrate the soles of shoes. Another project involves producing a shoe made from old, used shoes. Upon arrival at the factory, the old shoes are washed with water without detergent so as not to contaminate the network, then they are cut and a fabric sheet is sewn together. The remaining 25% of wasted materials are reused and incorporated into the soles, making this a 100% circular project.

[1] Associação Portuguesa dos Industriais de Calçado, Componentes, Artigos de Pele e seus Sucedâneos

[2] Centro Tecnológico do Calçado de Portugal

It is also important to highlight that, in 2024, the company was also recognised by *Forbes* magazine as the producer of the New.ve brand with People for the Ethical Treatment of Animals (PETA) Approved Vegan certification, standing out for its commitment to ethical and sustainable practices in the production of footwear free of ingredients of animal origin and without animal testing.

In the social sphere, Savana is involved in several causes and projects, being present at a number of events related to sustainability. The "Little Hands" project, for example, is a sustainable and supportive initiative developed to support a local African community. In this context, the footwear is made from recycled capulana fabrics, a tree typical of the region, and the profits from its sales are used to supply essential goods and ongoing support to the community.

Another project with social concerns is "Braille & Sustainability", which consists of creating shoes with labels in Braille, allowing visually impaired people to identify product features independently. This project, which won the Metal Shoe 2023 competition, demonstrates Savana's commitment to initiatives aimed at a more just and inclusive society.

SOM Practices	Interviewees
Suppliers	"Our suppliers are the basis for our materials and they have been increasingly developing products with recycled raw materials or with waste from their own production.", **CEO** "New materials are tested in the product, prioritizing the closest suppliers to reduce the carbon footprint.", **CFO** "The selection of suppliers is made carefully."; "(…) we are developing fabrics in partnership (…) to try (…) to make a completely national production.", **Commercial Manager**
Infrastructures	"We had to make some internal renovations.", **Commercial Manager** "Due to the installation of solar panels, we were able to reduce energy consumption and costs during the months with most sun exposure/sunshine, reducing the electricity bill by 60 or 70%.", **CEO** "During the longest periods of sun, the solar panels allow the company to be almost 100% energy autonomous. In fact, there are peaks in the day when it is and it can even sell energy to the company.", **Commercial Manager** "Regarding the lamps, we have already made three changes. At first, we used 400W, then we replaced them with LED lamps that used 180W and a few years later we replaced them with these lamps that we have now, which have the same intensity or perhaps even a little bit more than the previous ones and only use 100W.", **CEO** "The lamps have a side sensor that, depending on the energy of the sunlight that enters through the transparent tiles, automatically adapts its intensity. This way, the light inside the factory is constant.", **Commercial Manager** "Also has three electric vehicles, contributing to reducing fuel consumption.", **CEO** "The company has recycling stations throughout its facilities.", **Commercial Manager**
Production and Operations	"We replaced equipment with high energy and water consumption.", **CFO** "We replaced some equipments that were over 20 years old with more modern ones that use 30% or at most 50% of what the ones we had before (...) they perform exactly the same functions but with much less consumption.", **CEO** "The shoe finishing booths, which used to use water, were replaced with booths with nets that do not require water.", **Commercial Manager** "We acquired automatic scouring machines, greatly reducing paper consumption.", **Commercial Manager** "The company started adopting more sustainable materials, from raw materials, to water-based glues, threads, etc.", **Production Operator** "Regarding the production, we try to use recycled materials as much as possible.", **Commercial Manager** "One of our medium-term goals is to replace solvent-based glues with water-based ones throughout the production process.", **CFO** **"**The goal is to reduce solvent-based glue consumption by at least 50% this year.", **CEO**
Initiatives and Projects	"The company is involved in several projects. (...) we are involved in the BioShoes4All program, in partnership with CTCP (...) it is a program in which all participating companies have signed a protocol committing themselves to become more sustainable by 2026 (...) and we are calculating the environmental footprints, both in terms of leather products, synthetic products and those made from more sustainable raw materials.", **Commercial Manager** "We have a project with Tintex where we are developing products that are waste from various industries, namely cork, coffee grounds, tennis balls, etc.", **Commercial Manager** "A recent project is being developed in partnership with Valena, an Israeli brand that produces a thermoplastic material for soles, which aims to be a compostable product. Together, we created a shoe based on compostable materials. At the end of their life, these shoes are sent to specialized treatment stations, where composting is carried out in a controlled manner.", **Commercial Manager** "We are developing a project with a client, which consists of creating a shoe made from old shoes, supporting the EC. (...) 25% of the waste from old shoes is incorporated into the soles, meaning it's a 100% circular model.", **Commercial Manager**

Table 2 - SOM practices implemented by Savana

Source: By the author (2025)

4.3.2. Challenges

The adoption of sustainability practices by Savana implies facing numerous challenges, both environmental, economic and social (Table 3). Considering these emerging warnings, solutions are sought in order to balance the three dimensions and guarantee the viability of the company's activity.

a) Price

The main obstacle faced by Savana is the increase in the selling price of its products, associated with the growth in production costs, mainly because sustainable and natural raw materials themselves are more expensive. Any commitment to sustainability implies a change in the company's strategy, from the acquisition of materials and equipment to the adaptation of infrastructure and employee training, which leads to a high investment on the part of the company.

However, the company is convinced that, with the increasing demand for more environmentally friendly products, soon mass production could make the price more competitive.

For economic reasons, when the company expenses rise, the selling price of its products increase as well, guaranteeing a profit margin. Nevertheless, not all customers are willing to pay more, which poses a barrier for Savana. This seeks to raise awareness among both its customers and end consumers about sustainability, but many, despite liking its policy, do not consider the price attractive.

b) Suppliers

One of the main challenges to overcome is the shortage of suppliers. When requesting technical data sheets on the origin and sustainability of materials, it is often found that requirements are missing and that the documents do not

conform to reality. In addition, in Portugal the supply of these agents upstream in the supply chain is scarce and the prices charged are very high. Thus, it is often necessary to resort to suppliers in the rest of Europe or even further afield, such as Mexico and the USA, which makes it impossible to manufacture 100% national products.

c) Durability

Another obstacle is the lower resistance of shoes made from recycled materials. In fact, a shoe made from recycled materials may be less durable than a shoe made from new raw materials. Generally, the greater the incorporation of reused materials, the greater the loss of resistance of the shoe.

However, it depends on whether the integration of reused materials is done in the upper part of the shoe or in the soles. When on the soles, the loss of durability is not significant, while if it is on the upper part of the shoe, it can be considerable.

Footwear is a product that is subject to a lot of wear and tear and that flexes a lot, depending on the resistance of the raw materials used in its manufacture. In this sense, leather is a material that can last two to three times longer than synthetic and vegan materials. Although conventional leather footwear products have already offered more environmentally friendly solutions, these still have a very high price differential.

d) Production and Operations

In terms of factory operations, there are no significant challenges. Some sustainable materials, due to their characteristics and specifications, require more time to be worked. Nonetheless, as some operations and steps of the process are automated, the time taken to produce the footwear is practically the same. In other words, the process itself is similar, but it is done in a more sustainable way.

e) Waste Management

Regarding waste management, the company is faced with a lack of suitable and specialized solutions on the market for the disposal of waste other than plastic, metal, glass and cardboard. Therefore, much of its waste is not recycled, which results in a high amount of waste going to landfills. As such, changing the production process and the destination of waste is a challenge as there is no joint solution to this problem.

f) Lack of Financial Aids

The company benefits from the support of the government programs COMPETE 2030 and PORTUGAL 2030, co-financed by the EU, which encourage innovation and sustainability, driving the transition to a more efficient and less polluting model. However, this support is scarce, given the high costs that the company bears. The company believes that increasing incentives and support can be an essential factor in motivating it to continue investing in sustainability.

Challenges	Interviewees
Price	"The biggest challenge is the price because most people are available and like the concept, but the price is still not attractive to many customers. (...) It's necessary to bring the materials to more competitive price levels.", **CEO** "Any commitment to sustainability implies a change in the company's strategy, from the beginning: training human resources and investing in equipment and materials.", **CFO** "Above all, we need clients who value this type of product, as well as consumers.", **CFO** "The main challenges are the shortage of suppliers and the price.", **Commercial Manager** "These materials are much more expensive and the consumer is not well informed about the type of concept (...) there are customers who are willing to pay more, but there are others who are not.", **Commercial Manager** "Currently, the sustainability of the business, as it is not yet on a very large scale, generally results in a product that's more expensive than the traditional product.", **Commercial Manager**
Suppliers	"It's very difficult to find suppliers, because (…) when we ask for the technical datasheets, the requirements are not met.", **Commercial Manager** "The biggest difficulty is the shortage of suppliers, and it is often necessary to resort to Europe, Mexico and the USA.", Commercial Manager
Durability	"Products made with recycled and sustainable materials, in general, have lower resistance levels than conventional products. (...) Sustainable materials in footwear still have less durability when compared to traditional ones.", **CEO** "As a rule, the greater the integration of recycled or reused materials, the shorter the durability of the shoe.", **CEO** "In terms of resistance, a shoe made with waste materials has less resistance than a leather shoe. When we use these materials in cutting, their resistance is much lower. Therefore, the important thing would be finding a material that was as good as leather, that was breathable and that was biodegradable.", **Commercial Manager**
Production and Operations	"Some sustainable materials, due to their characteristics and specifications, require more time to be processed. However, the process is done in a similar way, except for the materials that are different.", **Production Operator**
Waste Management	"One of our goals is to separate and recycle our industrial waste and ensure that as little as possible goes to landfill. (...) Most of our waste goes to landfill. We need to find alternative solutions to waste management.", **CEO** "The main challenges are changing the production process and the destination of the waste. There is still no joint solution to this problem in the industry.", **CFO**
Lack of Financial Aids	"This transition involves a large investment, but often there are no financial aids available, it is the company itself that bears the costs and implements the products and machinery to ensure a more sustainable solution.", **Commercial Manager**

Table 3 - Challenges faced in the implementation of SOM practices by Savana

Source: By the author (2025)

As we have seen, Savana, through an innovative and pioneering approach in the footwear industry, adopts several SOM practices in its processes, which

impact its strategic decisions. Despite the challenges faced, it seeks to mitigate them and continue its activity in a competitive manner in the market. The company's objective is to produce a sustainable product with greater added value, balancing sustainability with customer needs.

Chapter 5

5. Discussion and Conclusions

5.1. Discussion

Sustainability is a complex concept that seeks to balance environmental preservation with social development and economic growth. It is increasingly applied in the business context, as it is necessary to ensure long-term sustainable development (Paksoy & Deveci, 2023).

In this context, Savana's analysis of data and results highlights its commitment to sustainability, as well as the integration of its principles into its strategy. Given the evolution of the concept, the company has had to adapt to meet the increased demand in the market for sustainable products by society. The interviewees emphasise that, despite considering the social responsibility factor, the company's main motivation for this transition was economic so it could guarantee competitiveness in the market.

In accordance with what is advocated by Waqar et al (2024), companies must seek to contribute to the reduction of environmental impacts, promote social responsibility and ensure the viability of their businesses, thus ensuring harmony between the three dimensions of TBL. Hence, the need arose for Savana to apply sustainability to OM, which consequently led to the development of SOM practices.

In line with SOM standards, Savana has been implementing more ecological practices, remodelling its infrastructures and embracing different

social causes and projects. The analysis reveals that the company already applies many of the theoretical guidelines highlighted in chapter 2.2.2..

Regarding supplier selection, the requirement for certifications and the assessment based on strict sustainability criteria by the company are in line with the recommendations in the literature on SSCM. However, it would be important to evaluate whether the monetary advantages from buying raw materials abroad are outweighed by eventual negative environmental impacts, such as pollution linked to materials transportation.

On the other hand, the analysis highlights that Savana's strategy is aligned with the CE's principles. As argued by De Felice et al. (2025), the transition from a linear model to a circular model empowers the reduction of waste and the optimization of resources. The company applies this approach through various practices, from recycling, reusing materials and developing innovative solutions, which allow for sustainable production and better waste management, minimising its environmental footprint.

The company's projects and initiatives demonstrate how its sustainable policy goes beyond operations and production processes, encompassing innovation and the social dimension. The BioShoes4All program, in which Savana participates meets SDGs numbers 4, 7, 9, 11, 12, 13, 14 and 15, established by the EU (Figure 1). The policy is, then, aligned, with the arguments present in the literature review that defend that sustainability must be incorporated into all dimensions of a company (Mura et al., 2024).

As might be expected given chapter 2.2.3., Savana faces some challenges in this process. In financial terms, the analysis reveals that, as a SME, the company faces the barrier of high costs. As defended in the literature review, the company also believes that the transition to sustainable practices can generate financial benefits and increase its competitiveness in the long term. Nevertheless, the analysis of the data shows that high investment, combined with consumer

resistance to price increasing are significant barriers that must be overcome as soon as possible.

From the point of view of technological barriers and cultural and organisational barriers there were no identifiable significant challenges. There was a positive reception from all workers in implementing the new practices. Training was provided on how to work with the new materials and equipment, which facilitated a warm welcome by all.

Regarding the issues of regulatory and institutional barriers, both the literature and data analysis state that the absence of adequate incentives is a challenge. The lack of sufficient support represents a significant obstacle to the adoption of more sustainable practices (Abdul Basit et al., 2024).

In addition, other specific challenges, which are not included in the literature review, are highlighted in the analysis of results, such as the shorter durability of shoes made from reused materials. In fact, this is a topic that is expanding and still requires a lot of research, which may also justify the company's difficulty in finding viable solutions and alternatives.

Leather is a material that can be more durable than synthetic and vegan materials. This fact raises the question of what is more sustainable: a shoe made from natural and recycled products or one that lasts longer and reduces levels of consumerism.

According to Le and Nguyen (2024), the implementation of ecological practices has an impact on the companies' strategy. In fact, since 2017, Savana has seen a 95% reduction in water pollution levels, as well as a 70% reduction in energy costs. Furthermore, another impact was the increase in its search for clients with sustainable policies, becoming a reference in the market. Overall, the analysis of the results emphasises that this transition has a positive impact at an environmental and social level, even though, at a financial level it is more difficult to assess as this implies a cost-benefit analysis and a long-term impact is considered.

By comparing the literature review and the analysis of Savana's data and results, it is possible to confirm that the sustainable practices adopted by the company are in line with the recommendations previously recognised in the theory. This demonstrates the applicability of theoretical concepts in practice and in the business context.

5.2. Conclusions

The study suggests that market demand for sustainable products has been increasing, forcing companies to adapt and carry out strategic restructuring. This implies a high investment, whether in terms of infrastructure, processes, material or employees training, which requires a prior cost/benefit assessment to ensure the viability of the business. In the case of the Savana company, there has been an adjustment to the current reality and anticipated trend that moves towards a greater demand for sustainable materials and greater social responsibility.

The company has demonstrated in its operations the implementation of several SOM practices. The careful selection of suppliers, the modification of infrastructure, the alignment of processes and operations to a circular model and participation in sustainable development projects, in addition to ensuring regulatory compliance, allow the company to stand out as a pioneer in the production of footwear in an innovative and ecological way. This sustainable policy is an increasingly crucial factor for customers, positively impacting the company's reputation and competitiveness.

Throughout this process, it is possible to identify the emergence of numerous challenges. The main barriers faced by Savana are high production costs, a shortage of suppliers, the shorter lifespan of shoes made from recycled materials, the lack of solutions for waste management and the lack of

governmental support and financial incentives for the adoption of sustainable practices. That is why the company seeks to mitigate these challenges in the best possible way, to achieve a balance between durability, price and sustainability in the production of its shoes.

In short, it is concluded that Savana integrates sustainability principles into strategic operational decisions through the adoption of SOM practices. Despite emerging warnings, the company seeks to balance environmental, social and economic dimensions, consolidating a long-term sustainable business model.

5.2.1. Suggestions for Improvement

As part of this research, it was possible to identify a number of areas with potential for improvement, therefore, with a view to enhance the sustainable performance of Savana, the following strategies are suggested:

1) Develop innovative and more efficient recycling solutions for materials other than plastic, metal, paper and glass. The company may choose to work in partnership with companies specialized in waste management, seeking to minimise landfill deposits;
2) Find sustainable and innovative solutions to enable lower production costs, in order to make the selling price of products more competitive and attractive to customers;
3) Invest in the development of sustainable materials that offer greater durability, without compromising the animal environment;
4) Invest in education and awareness, among both employees and customers, about the importance of sustainability, encouraging the practice of sustainable habits, including more environmentally conscious purchases.

It is recommended that the company continues to invest in the development of research projects with its partners, so as to find more sustainable and innovative solutions. Moreover, the Company must remain constantly updated on industry trends to detect potential opportunities for strategic investments.

5.2.2. Research Limitations

To conclude this study, it is important to mention limitations of the results obtained. Since this is an analysis of a single company, one limitation of this study is that it is not possible to make comparisons with other companies.

5.2.3. Recommendations for Further Research

The research focuses on the analysis of the case study of the company Savana, therefore, in future investigations it would be relevant to analyse other companies, including those from other industries, as well as different agents in the supply chain. Analysing a larger sample could provide broader insights into the application of SOM practices in different contexts.

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

During the preparation of my written work/thesis, Sustainable Operations Management: The Case Study of Savana, ChatGPT was used for the following tasks: generating summaries and refining language, with the prompts used listed at the end of the document in the Prompts List section. After using this tool/service, 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.

Prompts List:

1. Rewrite the following information to improve clarity and flow of the text.
2. Correct the grammar of the following information, according to UK English.
3. Summarise this interview without changing its content.

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Appendices

Appendix I - Interview directed to the CEO

1. What is the company's position and vision on the importance of sustainability in operations management?
2. Since 2017, Savana has incorporated sustainability into its production process and has continually explored increasingly sustainable innovative alternatives. What did motivate the company to adopt such practices?
3. How does the company currently integrate sustainability principles into its production practices and supply chain management?
4. What are the main impacts and results achieved with the adoption of sustainable practices in operations?
5. What are the main challenges and difficulties faced by the company in adopting these practices? How has the company sought to mitigate such adversities?
6. In your opinion, what are the main risks and opportunities that a company like Savana faces in the context of sustainable development?
7. Do you believe that a company's sustainable policy can be a determining factor in both consumers' purchasing decisions and in terms of differentiation from the competition?
8. How do you assess sustainability as a long-term competitive factor?
9. How does the adoption of a sustainable policy by the company impact strategic decisions in operations?
10. What are the company's goals and future projects associated with sustainability in production operations?

Appendix II - Interview directed to the CFO

1. Since 2017, Savana has incorporated sustainability into its production process and has continually explored increasingly sustainable innovative alternatives. What did motivate the company to adopt such practices?
2. What are the main financial challenges faced by the company associated with investments in sustainability?
3. What are the financial impacts felt by the company with the adoption of sustainable practices in operations? Has the company significantly increased its operating costs? Have there been improvements in your financial performance?
4. Is there currently any resistance, from a financial point of view, to continuing to develop sustainable practices? How has the company sought to mitigate such adversities?
5. What are the financial metrics used to assess the impact of sustainable practices on the company?
6. How does developing a culture based on sustainability principles impact the company's goals and strategy?
7. How do you assess sustainability as a long-term competitive factor?

Appendix III - Interview directed to the Commercial Manager

1. How does the adoption of a sustainable policy by the company impact strategic decisions in operations?
2. Since 2017, Savana has incorporated sustainability into its production process and has continually explored increasingly sustainable innovative alternatives. What did motivate the company to adopt such practices?
3. How was this adaptation made and what were the main changes in the production process? Was there a need to adapt methodologies, technologies or acquire new equipment?
4. How does the company currently integrate sustainability principles into its production practices and supply chain management?
5. What are the main challenges and difficulties faced by the company in adopting these practices? How has the company sought to mitigate such adversities?
6. What are the main impacts and results achieved with the adoption of sustainable practices in operations?
7. In terms of the supply chain, how are suppliers selected, particularly with regard to sustainability and the use of innovative materials?
8. How is waste management carried out in the production process?
9. What criteria and metrics are used to assess the impact of sustainable practices on the performance of production processes?
10. How is the efficient integration of new sustainable materials into production lines ensured without compromising the quality or design of the footwear?
11. How does sustainability impact production processes in terms of efficiency and quality?

12. What are the company's medium and long-term goals in terms of sustainability in production operations?

Appendix IV - Interview directed to the Production Operator

1. What tasks do you perform in the company?
2. Since 2017, Savana has incorporated sustainability into its production process. How was this adaptation made and what were the main changes in operations? Was there any need for training?
3. Are you aware of the sustainability practices implemented in the factory? If so, which ones?
4. Do you notice changes in processes due to the adoption of sustainable practices, such as reducing waste or using eco-friendly materials?
5. What are the biggest challenges you face in performing your tasks? How do you seek to combat such adversities?
6. Do you believe that sustainability can bring benefits to the factory and workers?
7. What improvements would you recommend to make processes more sustainable and efficient?