Master

Management and Industrial Strategy

Master´s Final work

Dissertation

Sustainability-oriented innovation and sustainable corporate performance

An empirical analysis on Portuguese firms

Miguel Serrano Mota Lopes

October - 2024

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Supervisor

Professor Sara Martins Gonçalves

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Abstract

In recent years, as environmental and social challenges have grown, markets and economic agents have been acknowledged both as contributors to these problems, requiring changes to the dominant economic paradigm, and as part of the solution, being well-placed to drive positive change towards sustainability (Mittelstaedt and Kilbourne, 2008). As a result, businesses have been encouraged to pursue a sustainable development approach by directing internal processes and capabilities, such as innovation, towards facilitating the transition to sustainability (Adams et al., 2016). This relationship has garnered significant interest from academics, managers, and policymakers and, consequently, there has been an emergence of related concepts in the literature, namely corporate sustainability, sustainability-oriented innovation and sustainable corporate performance.

The present research aims to characterize the Sustainability Oriented Innovation (SOI) of Portuguese firms and examine the relationship between SOI and the dimensions of sustainable corporate performance, namely economic performance, environmental performance and social performance.

This study followed a descriptive-exploratory and mono-method quantitative approach, by using a single data collection technique and a corresponding quantitative analytical procedure. The data was collected through an online questionnaire, sent to a random sample of Portuguese firms in a cross-sectional time horizon, achieving 126 complete responses.

The results of the study demonstrate a considerable adoption of Sustainability-oriented Innovation by the Portuguese firms. In particular, the findings revealed a higher adoption of SOI in large corporations and in firms who followed an Environmental Management System. The results also revealed considerable differences in the level of Sustainable Innovation across the various industries of activity.

In addition, the results of the study show that sustainability-oriented innovation is positively related with the three dimensions of sustainable performance, as revealed by the positive and significant results of the regression analysis.

This research contributed to the characterization of sustainability-oriented innovation (SOI) in Portuguese firms, making it the first study to examine the concept in the corporate landscape of the country, to the best of our knowledge, contributing to an area that has received limited attention within the broader field of innovation and corporate sustainability. This study also addressed the research gap by examining the relationship between Sustainability-oriented innovation on the dimensions of sustainable performance.

These findings offer important practical implications. Firstly, the characterization of SOI across the various industries of activity and firm dimensions, provides helpful information for the policy makers shaping legal frameworks of particular sectors. Additionally, the results allow us to suggest that executive management should prioritise developing innovative capabilities aimed towards sustainable goals and implement an effective mechanism to foster the development of innovative and sustainable solutions.

Keywords: Corporate Sustainability, Sustainability-Oriented Innovation, Sustainable Innovation, Sustainable Performance and Organizational Performance

Resumo

Nos últimos anos, à medida que os desafios ambientais e sociais aumentaram, os mercados e os agentes económicos foram reconhecidos como contribuintes para estes problemas, exigindo mudanças ao paradigma económico dominante, e como parte da solução, estando bem posicionados para impulsionar mudanças positivas no sentido da sustentabilidade (Mittelstaedt e Kilbourne, 2008). Consequentemente, as empresas têm sido incentivadas a adotar uma abordagem de desenvolvimento sustentável, orientando os processos e capacidades internas, como a inovação, para facilitar a transição para a sustentabilidade (Adams et al., 2016). Esta relação tem suscitado um interesse significativo por parte de académicos, gestores e decisores políticos e, consequentemente, tem havido um surgimento de conceitos relacionados na literatura, nomeadamente sustentabilidade empresarial, inovação orientada para a sustentabilidade e desempenho empresarial sustentável.

A presente investigação tem como objetivo caraterizar a Inovação Orientada para a Sustentabilidade (IOS) das empresas portuguesas e examinar a relação entre a IOS e as dimensões do desempenho empresarial sustentável, nomeadamente o desempenho económico, o desempenho ambiental e o desempenho social.

Este estudo seguiu uma abordagem quantitativa descritivo-exploratória e mono-método, recorrendo a uma única técnica de recolha de dados e a um procedimento analítico quantitativo correspondente. Os dados foram recolhidos através de um questionário online, enviado a uma amostra aleatória de empresas portuguesas num horizonte temporal transversal, tendo-se obtido 126 respostas completas.

Os resultados do estudo demonstram uma adoção considerável da Inovação orientada para a Sustentabilidade por parte das empresas portuguesas. Em particular, os resultados revelaram uma maior adoção da IOS nas grandes empresas e nas empresas que seguiam um Sistema de Gestão Ambiental. Os resultados também revelaram diferenças consideráveis no nível da Inovação Sustentável entre as várias indústrias de atividade.

Para além disso, os resultados do estudo mostram que a inovação orientada para a sustentabilidade está positivamente relacionada com as três dimensões do desempenho sustentável, como revelam os resultados positivos e significativos da análise de regressão.

Esta investigação contribuiu para a caraterização da inovação orientada para a sustentabilidade (IOS) nas empresas portuguesas, tornando-se o primeiro estudo a examinar o conceito no panorama empresarial do país, tanto quanto é do nosso conhecimento, enquanto contribuiu para uma área que tem recebido pouca atenção no âmbito do campo mais vasto da inovação e da sustentabilidade empresarial. Este estudo também abordou a lacuna de investigação ao examinar a relação entre a inovação orientada para a sustentabilidade e as dimensões do desempenho sustentável.

Estas conclusões têm implicações práticas relevantes. Em primeiro lugar, a caraterização da IOS nos vários sectores de atividade e nas dimensões das empresas fornece informações úteis para os decisores políticos que definem quadros legais para sectores específicos. Além disso, os resultados permitem-nos sugerir que a gestão executiva deve dar prioridade ao desenvolvimento de capacidades inovativas orientadas para objetivos sustentáveis e implementar um mecanismo eficaz para promover o desenvolvimento de soluções inovadoras e sustentáveis.

Palavras-chave: Sustentabilidade Empresarial, Inovação Orientada para a Sustentabilidade, Inovação Sustentável, Desempenho Sustentável e Desempenho Organizacional

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My sincere thanks to all of you!

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Chapter 1 – Introduction

1.1 Context and scope of the research

In recent years, upon the growing environmental and social concerns, we have seen an emergence of the concept of sustainability, reflecting a critical change in global thinking. This phenomenon has made firms rethink their overall strategy and conduct in business operations.

This integration of sustainability into organizational concerns, lead to the emergence in the literature of the Corporate Sustainability (CS) concept, having its roots in Stakeholder Theory developed by Freeman (1984) and the Brundtland Report definition of "sustainable development" (WCED, 1987).

Based on the definition of Schaltegger et al (2013), corporate sustainability concerns the successful market-oriented realization and integration of the Triple Bottom Line challenges (economic, social and environmental).

According to Delai and Takahashi (2013), sustainable development actions and initiatives have become vital aspects for any organization, with many authors approaching the issue by discussing the business case for corporate sustainability, including Dyllik and Hockerts (2002) and Salzmann et al. (2005). The business case for corporate sustainability is often used to provide motivations for an organization to integrate aspects of sustainability into its business processes (Asif et al., 2011).

The debate on Corporate Sustainability was later broadened to include the effect of innovation in achieving sustainability objectives. Initially, this focus on companies directing their business activities towards sustainability through innovation was focused only on achieving eco-innovations and gradually developed into a more holistic view of sustainability, integrating the environmental, economic and social dimensions. Thus, leading to the emergence of new terms such as Sustainability-oriented innovation.

Sustainability-oriented innovation (SOI) or sustainable innovation, brings to the fore a question about the sustainable value that can be created by pursuing sustainability-oriented innovation activities.

Although prior literature has discussed the isolated effect of both sustainability practices and innovation on organizational performance, there were only a few empirical studies assessing the effect of Sustainability-oriented innovation on the dimensions of sustainable performance (economic, environmental and social). Moreover, prior studies, namely of Maletic et al. (2015, 2021) only considered two factors to classify SOI, which is not considered sufficient for an in-depth analysis of sustainability-oriented innovation (Chipulu and Baxter, 2023).

Therefore, although there is some empirical evidence suggesting that SOI is linked to an organization's performance outcomes, the interrelation between sustainability-oriented innovation and the dimensions of sustainable performance still needs to be further explored (Bacinello et al., 2019; Maletic et al., 2021).

1.2 Research questions and Objectives of the study

Accordingly, this study aims to contribute to the previously presented discussion by answering the following research questions:

- What is the degree of Sustainability-oriented Innovation adoption in Portuguese firms?
- What is the relationship between Sustainability-oriented Innovation and economic performance?
- What is the relationship between Sustainability-oriented Innovation and environmental performance?
- What is the relationship between Sustainability-oriented Innovation and social performance?

In this manner, enabling us to achieve the following objectives: (1) characterize the sustainable innovation of Portuguese firms and (2) examine the relationship between sustainability-oriented innovation and the dimensions of sustainable corporate performance, namely economic performance, environmental performance and social performance.

1.3 Methodology

To achieve the presented objectives and provide an answer to the research questions, this study followed a descriptive-exploratory and mono-method quantitative approach, by examining the variables using a single data collection technique (survey) with a corresponding quantitative analytical procedure (Saunders et al., 2023).

The survey was developed using Qualtrics web-based software and was sent to a random sample of active Portuguese firms, obtained from Orbis Companies database. A total of 126 responses were considered in the research. The data was further treated and analysed using IBM SPSS Statistics 25 software.

1.4 Relevance of the research

This research aims to characterize the sustainability-oriented innovation (SOI) of Portuguese firms, making it the first study to examine the concept in the corporate landscape of the country, to the best of our knowledge, contributing to an area that has received limited attention within the broader field of innovation and corporate sustainability.

In addition, this study aims to examine the relationship between Sustainability-oriented Innovation and the dimensions of sustainable corporate performance. Although prior literature has discussed the isolated effect of both sustainability practices and innovation on organizational performance, there were only a few empirical studies assessing the effect of Sustainability-oriented innovation on the dimensions of sustainable performance. Furthermore, previous studies, specifically by Maletic et al. (2015, 2021),

only took into account two factors to classify SOI, which is considered insufficient for a comprehensive analysis of sustainability-oriented innovation (Chipulo and Baxter, 2023).

This research will also contribute to the validation of the novel measurement scales developed by Chipulo and Baxter (2023) and Maletic et al. (2015), concerning SOI and the dimensions of sustainable performance, respectively.

This study also aims to offer significant practical contributions. Firstly, the characterization of SOI in Portuguese firms, namely across the various industries of activity and firm dimensions, will provide helpful information for policy makers shaping legal frameworks of particular sectors, as well for individual investors or funds planning to integrate sustainability considerations into their portfolio strategy. Furthermore, the analysis of the relationship between Sustainability-oriented Innovation and the dimensions of sustainable corporate performance will offer valuable insights to managers focused on long-term value creation and competitive advantage through the incorporation of sustainability into their business strategy.

1.5 Structure of the document

The present study is divided into the following chapters: Introduction, Literature Review and Conceptual framework, Methodology, Data Analysis, Discussion of Results and Conclusions (including Contributions, Limitations and Suggestions for Future Research).

The introduction presents a brief contextualisation of the topic, followed by a list of the research problem, objectives and research questions, as well as the identification of the academic and business relevance. Subsequently, the literature review presents the reader what is already known regarding the research topic and the evolution of its main concepts. The theoretical model that guides the study is also presented, as well as the research hypotheses.

Afterwards, the followed methodology is displayed, defining the type of study, population and sample, data collection, questionnaire and data processing. The results are further analysed and discussed in the following chapter, characterising the sample and assessing the validation of the research hypotheses. The final chapter contains the conclusions, contributions, limitations and suggestions for future research.

Chapter 2 - Literature review

This research is placed based on three main concepts, namely: Corporate Sustainability, Sustainability-Oriented Innovation (SOI) and Sustainable Corporate Performance. In the following sub-sections, the main definitions and dynamics of these concepts, as well as the relationship between Sustainability-Oriented Innovation and Sustainable Performance, are presented and discussed.

2.1 Corporate Sustainability

The origins of the Corporate sustainability concept can be traced back to Stakeholder Theory developed by Freeman (1984), which argued that companies should consider the interests of a broader range of stakeholders (such as employees, customers, suppliers, and communities) rather than focusing merely on shareholders.

The concept is also related to the definition of "sustainable development", firstly mentioned on the Brundtland Report (WCED, 1987) as "development that meets the needs of the present without compromising the ability of future generations to meet their needs". The concept appeared for the first time in general management literature in 1995, by the work of Gladwin, Kennelly and Krause, however, the construct would only be operationalized 10 years later (Montiel and Delgado-Ceballos, 2014). In 2005, Bansal defined "corporate sustainable development" as a tri-dimensional concept encompassing economic prosperity, social equity and environmental integrity, popularized in the literature as the triple bottom line (TBL).

Obtaining a commonly agreed Definition for Corporate sustainability (CS) has been a challenge for managers and researchers alike, given the great proliferation of definitions in recent years. Some scholars identify the concept of Corporate sustainability only in terms of its social and environmental dimensions, while others, view it as a synonym to environmental management (Montiel and Delgado-Ceballos, 2014). However, the most widely acknowledged definition concerns the successful market-oriented realization and integration of the Triple Bottom Line challenges (economic, social and ecological) (Schaltegger et al., 2013).

Corporate Sustainability can also be defined as: "the ability of a firm to nurture and support growth over time by effectively meeting the expectations of diverse stakeholders" (Neubaum and Zahra, 2006: p. 6) and "the contribution to sustainable development by delivering simultaneously economic, social, and environmental benefits" (Hart and Milstein, 2003: p. 56).

Furthermore, the term corporate sustainability (CS) appeared mostly interchangeably in the literature with the term corporate social responsibility (CSR), however, the terms are considered by some researchers to have different connotations and backgrounds. CSR is limited to the socio-environmental aspects of business activities, meaning that CSR commitment contributes only partly to sustainable development (Swarnapali, 2017). Corporate sustainability, however, encompasses all the triple bottom line dimensions mentioned above, integrating the CSR concerns in the business level.

The openness to accept different types of definitions during the early stages of CS field may have contributed to a richer discussion in the field and encouraged its development (Montiel and Delgado-Ceballos, 2014).

According to Delai and Takahashi (2013), sustainable development actions and initiatives have become vital aspects for any organization, with many authors approaching the issue by discussing the business case for corporate sustainability, including Dyllik and Hockerts (2002) and Salzmann et al. (2005). The business case for sustainability is often used to provide motivations for an organization to

integrate aspects of sustainability into its business processes (Asif et al., 2011). A key starting point of this integration, is the inclusion of stakeholders and their respective demands, helping organizations understand their key environmental and social impacts (Rocha et al., 2007). This way, organizations are confronted with environmental and social issues in their decisions, not only to consider moral and legal responsibility, but also to ensure sustainable economic success (Maletič et al., 2015).

2.2 Innovation and sustainability

In general, innovation can be defined as an idea, a practice, or a material artefact that is perceived as new by the respective adoption unit (Rogers, 1995). The importance of innovation in business is rarely disputed, being regarded in mainstream management as the key to achieve competitive advantage and growth, as it contributes to the emergence of new products/services, the revitalization of the company and even in assuring its survival in the competitive landscape (Adams et al., 2016).

Upon the growing environmental and social concerns, markets and economic agents have been identified has both part of the problem, requiring changes to the dominant economic paradigm, and as part of the solution, being correctly positioned to effect positive change towards sustainability (Mittelstaedt and Kilbourne 2008). This way, businesses have been encouraged to find means of achieving sustainable economic growth by directing innovation at helping them transition to sustainability, receiving this relationship considerable interest from academics, managers and policy-makers (Adams et al., 2016).

The debate on companies directing their business activities towards sustainability through innovation was initially focused only on eco-innovations. Eco-innovations represent new or enhanced processes, organizational forms, as well as products or technologies that are beneficial to the environment in that they reduce or avoid negative environmental impacts (Klewitz and Hansen, 2013).

This discussion gradually developed into a more holistic view of sustainability, integrating the environmental, social and economic dimensions, leading to the emergence of new terms such as “sustainability-oriented innovation”, “sustainable innovation” and “‘sustainability related innovation” (Kneipp et al., 2023; Klewitz and Hansen, 2013).

2.3 Sustainability-oriented Innovation

With the rising importance of innovation in scientific research to pursue social and environmental objectives, in addition to economic ends, the concept of sustainability-oriented innovation has gained prominence (Urbinati et al., 2023).

Sustainability-oriented Innovation (SOI), or sustainable innovation, has been defined in the existing literature in a multitude of ways, despite its mainstream study being youthful. For example, Tello & Yoon (2008) define sustainable innovation as “the development of new products, processes, services and technologies that contribute to the development and well-being of human needs and institutions while respecting natural resources and regeneration capacities”. Furthermore, Hansen (2012) defines

SOI as the commercial introduction of a new or improved product (service), product-service system, or pure service which – based on a traceable (qualitative or quantitative) comparative analysis – leads to environmental and (or) social benefits over the prior version's physical life-cycle, relating only to the product/service dimension of the concept.

According to more recent research, Sustainability-oriented innovation (SOI) consists in making intentional changes to an organization's philosophy and values, as well as to its products, processes and organizational structures, to serve the specific purpose of creating and realizing social and environmental value, in addition to economic returns (Adams et al, 2016).

We can thus verify the consensus between researchers to integrate the triple bottom line considerations (economic, social and environmental) into the conceptualization of SOI.

Adams et al. (2016) theorize SOI as a gradual transformation process towards sustainability, starting as a response to regulatory stimuli with incremental change and culminating with deep-seated change at the large-scale systems level.

According to the authors, this process can be divided into three distinct contexts, namely: Operational optimization, Organizational transformation and Systems building.

Operational optimization, or Eco-efficiency, reflects an internally oriented perspective on sustainability, referring to a 'doing the same things but better' approach. This perspective is directed towards reducing environmental and social harm through reactive, incremental improvements, driven by compliance or proactively pursuing efficiencies. These activities are characteristically technical, stand-alone and inward-looking. Examples of innovation activities in this stage include: reducing the intensity of resource use, better waste management or pollution capture/control, and eco-design.

Organizational transformation, or New market opportunities, is characterized by the desire to create shared value and deliver wider benefits for society by developing novel products, services or business models. Reflects the mindset shift from "doing less harm" to "doing good by doing new things". In this context, innovation and sustainability are purposely coordinated within the firm, implying a growing SOI culture in which sustainability becomes embedded as a cultural and strategic norm. Examples of innovation activities in this stage include: systematically looking to identify, explore and integrate the views of stakeholders and sourcing sustainable materials from alternative suppliers.

Systems building, or Societal change, builds on the philosophy that sustainability cannot be thought as the effort of a single firm and can only be properly accomplished at the global level, embedded in the network of relations in which sustainability value is created collaboratively, rather than individually. It can be seen, in terms of sustainability, as the set of actions that shift a system – a city, a sector, an economy – onto a more sustainable path (Draper 2013). Examples of innovation activities in this stage include: developing workable relationships with a range of private, public and civil society partners (such as NGOs and governments).

Most organizations have incorporated the practices of sustainable innovation in the context of operational optimization. However, fewer have engaged the wider implications of the sustainability orientation (Adams et al., 2016).

The debate on organizations that strive to achieve the goals of sustainable development through innovation is also mostly focused on a limited range of innovation types (namely products, processes and technologies) and in the context of eco-innovations (Adams et al., 2016; Klewitz and Hansen, 2013).

Even though the terms "SOI" and "eco-innovations" are often used interchangeably in the literature, eco-innovation only considers environmental and economic dimensions while, sustainability-oriented innovation embraces these as well as the broader social and ethical dimensions (Charter and Clark, 2007).

Furthermore, Urbinati et al. (2023), relate the concept of Sustainability-oriented innovation to Open innovation, given their similar orientation towards the engagement of external stakeholders and the innovation capabilities they develop. The literature on SOI also suggests that the concept been acknowledged mostly by large corporations, with prior research mainly covering sustainability-oriented innovation in sizable firms. Nonetheless, Small and Medium enterprises (SMEs) are being increasingly recognized as contributors to sustainable development (Klewitz & Hansen, 2013).

The authors Przychodzen and Przychodzen (2018), in a study evaluating the main factors differentiating sustainable-innovation at the firm level, also found that the intensity of sustainable innovation is significantly associated with the sector in which the firm operates, with rising level of environmental footprint acting as moderating predictor.

Despite the opportunities that Sustainability-Oriented Innovation can bring for firms, some studies suggest it can cause complexity (i.e., achieving multidimensional objectives for sustainability targets beyond generating only revenues), calling for changes in innovation resources and capabilities to solve the associated challenges (Urbinati et al., 2023). Critics to SOI also state that the sustainability orientation can incorporate bigger risk into the market success of an innovation, with the possibility to generate "directional risks", relating to the uncertain environmental and social impact of the innovation in the long term (Erik G. Hansen, 2012).

2.4 SOI measurement

The literature presents various ways to categorize and measure SOI. The authors Klewitz and Hansen (2013), after a systematic literature review covering 84 articles, classified practices of sustainability-oriented innovation into 3 levels, namely: product, process and organizational. Each level of innovation aims at achieving sustainable corporate performance at the triple bottom line dimensions (economic, social and environmental). Despite the concise synthesis of SOI literature and the important theoretical and practical implications, this study only considered small and medium enterprises (SMEs) and did not provide a valid instrument to measure SOI in firms.

In 2015, in a study concerning the relationship between SOI practices and organizational performance, the authors (Maletič et al.) divided SOI practices into: sustainability-oriented product and process deployment (SOPPD) and sustainability-oriented innovation competencies deployment (SOICP). These constructs were operationalized from the literature concerning eco-innovation, stakeholder integration, business process improvements and sustainability and organizational learning, given that an appropriate scale for measuring SOI practices was not available at the time of the study. Despite providing a validated measurement instrument, with only two factors, this scale is not considered sufficient for an in-depth analysis of sustainability-oriented innovation (Chipulu and Baxter, 2023).

In a recent study, David Baxter and Maxwell Chipulu (2023), developed a new survey scale for measuring sustainability-oriented innovation. The validated scale includes elements from the triple bottom line, with Environmental considerations further broken down into carbon footprint, pollution, and materials life cycle. The scale also separates capability ("could we do it"), evaluation ("do we measure it"), and performance ("do we put it into practice in our products and services, and operations"). The authors also incorporated strategy, partnerships and demand dimensions into the scale, making it a holistic measurement model.

2.5 Sustainable Corporate Performance

Organizational performance is one of the most widely debated topics in business and management literature (Maletič et al., 2021).

In the early stages of corporate performance theory, companies primarily focused on financial outcomes, such as profit, return on assets (ROA), return on equity (ROE) and economic value added (EVA) (Lin and Kuo, 2011; Antony and Bhattacharyya, 2010).

The emergence of Stakeholder Theory by Freeman (1984) and the Tripple bottom line framework by Elkington (1997) and Bansal (2005), contributed to a pivotal shift in the understanding of corporate performance, by suggesting the integration of the interests of a broader range of stakeholders (such as employees, customers, suppliers, and communities) and the expansion of corporate performance to also include non-financial components. This view was corroborated by several authors, also suggesting that different performance dimensions must be combined to get a balanced and complete view of the organization's performance (Fauzi et al., 2010; Chenhall and LangfieldSmith, 2007).

As a response, a more balanced approach to performance measurement emerged in the literature, including financial and non-financial performance measures, with the addition of cause-and-effect relationships between the various measures and a better linkage between performance measurements and organization strategy (Fauzi et al., 2010; Maletič et al., 2021). According to Maletič et al. (2015), the key in developing these models is to construct the multiple organizational performance measures so that they are properly integrated and directed towards achieving organizational goals and strategy.

Fauzi et al. (2010), based on corporate social performance and corporate financial performance, proposed a multi-dimensional concept of triple bottom line (TBL) as sustainable corporate performance, incorporating the triple bottom line dimensions: financial/economic, social and environmental. According to the authors, a company's performance concerns not only the shareholders but also a broader range of parties or groups within society, as viewed from the stakeholder perspective (Fauzi et al., 2010).

The measurement of Sustainable Corporate Performance from this Tripple bottom line perspective, offers a comprehensive view of how businesses influence financial, social and environmental aspects, determining their role in promoting corporate sustainability (Tiep Le & Hieu Tham, 2024). This perspective has been demonstrated and applied by authors such as: Al-Shammari et al. (2022) and Tiep Le & Hieu Tham (2024).

Furthermore, Maletič et al. (2015) in a study investigating the relation between Sustainable innovation practices and organizational performance, extended the sustainable corporate performance to also include the quality and innovation dimensions, going beyond the triple bottom line considerations.

2.6 Sustainability-oriented innovation and Organizational Performance

The relationship between innovation and organizational performance, as well as the relationship between sustainability and organizational performance, has been well documented in recent literature. The importance of innovation in products, organizational structures, and business methods has been proven to be crucial in achieving environmental, economic, and social outcomes (Neutzling et al., 2018).

The adoption of sustainable practices has also been shown to contribute to increased competitiveness, expansion of markets and the growth of the company's legitimacy, as well as in fostering opportunities for innovation and rapid learning. (Kneipp et al. 2023, Moore and Manring 2009). Khattak, Cavaliere, & Imran (2021), even go one step further, relating the adoption of sustainability practices with organizational survival and overall competitive advantage.

However, the link between Sustainability-oriented Innovation and organizational performance, particularly with regards to the dimensions of sustainable corporate performance, has only been scarcely analysed in the literature, mostly by the works of Maletič et al. (2014, 2015, 2021).

In the work of 2015, the authors investigated the effect of sustainability-oriented innovation practices in the overall organization performance, capturing data through means of a survey. The responses were obtained from both the manufacturing and service industries across five countries: Germany, Poland, Serbia, Slovenia and Spain.

The results of the research showed that sustainability-oriented innovation practices are positively associated with overall organizational performance (in the economic, social, environmental, innovation

and quality dimensions), thus supporting the hypothesis that the creation and deployment of SOI practices positively relates to organizational success (Maletič et al., 2015).

Authors such as Leal-Rodríguez et al. (2018) and Kneipp et al. (2023), further suggest that adopting practices that integrate innovation and sustainability can ensure organizational survival and generate competitive advantage in a way that substantially benefits the company's reputation and performance.

Prior studies also indicate that developing competencies that foster innovation for sustainable development can be perceived as the basis of competitiveness, enabling organizations to offer new products and services that create value for customers, therefore adapting to a rapidly changing environment faster than competitors (Hermundsdottir & Aspelund, 2021; Van kleef and Roome, 2007).

These literature findings also support insights from the eco-innovation literature, namely that eco-innovation, being a sub-set of sustainable innovation, helps firms meet government environmental requirements and consumer demands, thereby improving organizational performance, particularly in the environmental dimension (E. M. García-Granero et al. 2018; M. Sarfraz et al. 2022; Chipulo and Baxter, 2023).

Furthermore, Maletič et al. (2014) state that the relationship between sustainability-oriented innovation practices and organizational performance depends on contextual factors (e.g. environmental uncertainty, competitiveness) and institutional factors (e.g. country of origin). Thus, it becomes essential to recognize that within Europe there are some national differences in the approach that business takes towards sustainability related issues, due to the institutional arrangements and business systems characteristics (Matten and Moon, 2008).

Whereas management literature suggests that sustainability-related innovation can be a source of competitive advantage for organizations, empirical results are still not conclusive (Maletič et al., 2021; Lopez-Valeiras et al., 2015). Moreover, prior studies have begun to challenge the assumption of a unidirectional relationship between sustainability-oriented innovation and economic performance by introducing arguments for bidirectional causality (Maletič et al., 2015).

2.7 Conceptual framework and research Hypotheses

From the literature review, the research hypotheses were formulated, based on the concepts of Sustainability-Oriented Innovation and Sustainable Corporate Performance, as defined by Adams et al. (2016) and Fauzi et al. (2010), respectively (Table I). These hypotheses will be evaluated throughout the work (Table II).

Sustainability-oriented innovation will be evaluated according to the scale present in the research of David Baxter and Maxwell Chipulu (2023), allowing for the characterization of SOI in Portuguese firms.

The scale considers the dimensions: sustainable capability, sustainability evaluation, sustainable performance of new products and services, sustainability performance of operations, organizational partnerships for sustainability and sustainability strategy.

The dimensions of Sustainable corporate performance (economic, social and environmental) will be assessed based upon the measurement scales present in the research of Maletič et al. (2015).

Table I. Conceptual framework

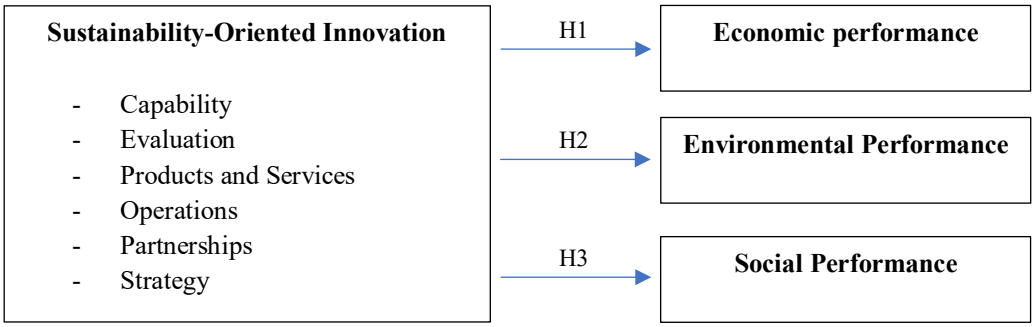
Concept	Definition	Authors
Sustainability-oriented innovation	Sustainability-oriented innovation (SOI) consists in making intentional changes to an organization's philosophy and values, as well as to its products, processes and organizational structures, to serve the specific purpose of creating and realizing social and environmental value, in addition to economic returns	Adams et al. (2016)
Sustainable corporate performance	Organizational performance evaluation that incorporates the economic, social and environmental dimensions (Triple bottom line)	Fauzi et al. (2010)

Source: Own work

Table II. Research Hypotheses

H1: There is a positive relationship between Sustainability-oriented innovation and Economic Performance.
H2: There is a positive relationship between Sustainability-oriented innovation and Environmental Performance.
H3: There is a positive relationship between Sustainability-oriented innovation and Social Performance.

Figure 1. Conceptual Framework



Source: Own work

Chapter 3 - Methodology

3.1 Type of study

The present study followed a positivist philosophy during its development. Positivism is characterized by the study of an objective reality, external and independent of individual perception, where observable and measurable facts are used in the development of testable hypothesis (Saunders et al., 2023). Furthermore, positivism aims towards a value neutral and detached way of conducting research, in which the researcher is expected to maintain an objective stance, in order to avoid influencing the given findings (Saunders et al., 2023).

With regards to the research approach, the deductive approach was selected, consisting in the development of a theory, deduced based upon existing literature, that is then subjected to rigorous testing (Saunders et al., 2023). Based upon the results, we can either corroborate or modify the proposed theory given their congruency, or lack thereof, with the initial premises (Saunders et al., 2023).

According to the nature of the research questions, this study has an exploratory-descriptive purpose, given its intention to investigate and describe a relatively unexplored topic or phenomenon of interest, providing detailed insights while identifying patterns or relationships that can inform further research (Saunders et al., 2023).

Furthermore, the mono-method quantitative was selected as a methodological choice, examining the relationships between variables by using a single data collection technique (survey) with a corresponding quantitative analytical procedure (Saunders et al., 2023).

The selection of a survey as a data collection strategy allowed for the accessible collection of standardized data from a large sample. The same research strategy is also found in similar research, particularly in the works of Maletič et al. (2014, 2015).

Lastly, the time-horizon of the study is defined as cross-sectional, as it focused on a particular moment in time, with only a moment of data collection (Saunders et al., 2023).

3.2 Population and sample

The target population of the study consisted of Portuguese firms. Due to practical constraints, only a sub-group of this population was considered, known as target-sample (Malhotra & Birks, 2007).

The sample of companies was obtained using a random probability sampling technique, where each case had the same probability of being selected, allowing for the statistical inference of data about the target-population (Saunders et al., 2023).

The Orbis Companies database was used to obtain the sample. All companies with active status, located in Portugal were considered and a proportional stratified random sample based on sector of activity was selected. A considerable sample size was chosen given that samples of larger absolute size, providing they are not biased, are more likely to be representative of their target population, known as the law of large numbers (Saunders et al., 2023).

After clearing the repeated and blank email cases, it was obtained the sample of 22.591 companies.

3.3 Data collection – Questionnaire

As previously mentioned, a structured self-completed online questionnaire was adopted for the primary data collection, developed using Qualtrics web-based software.

The questionnaire was elaborated based upon the surveys present in Maletič et al. (2015) and Baxter & Chipulu (2023). To ensure suitability with the target respondents, the questions were carefully translated and linguistically adjusted to Portuguese.

The questionnaire started with the cover letter indicating the purpose and the significance of the study in addition to the indication of the ideal respondents in the firm, namely the head of innovation activities and the general manager of the company.

It was followed by 4 characterization questions to profile the respondents, using nominal and ordinal scales, adopted from Maletič et al. (2015) and Baxter & Chipulu (2023).

The following section was composed of 24 multiple-choice questions measuring the independent variable, Sustainability-Oriented Innovation, adopted from Baxter & Chipulu (2023), concerning the dimensions: capabilities, evaluation, products and services, operations, partnerships and strategy. For this section, the measures were assessed based on a 7-point Likert scale (1- “It's never true” to 7- “it's always true”).

The last section was composed of 12 multiple-choice questions, adopted from Maletič et al. (2015), measuring the dependent variables: economic performance, environmental performance and social performance. A resulting four-item scale captured the extent to which organizations achieved economic success over the last 3 years, considering the growth in ROI, sales, profit and market share. A four-item scale measured environmental performance and captured the extent to which organizations achieved efficiency of material and energy consumption, over the last 3 years. Lastly, a four-item scale measured social performance from the employee perspective (satisfaction, motivation and turnover ratio), over

the last 3 years. The measures in this section were assessed based on a 4-point Likert scale (1- "Strongly disagree" to 4- "Strongly agree").

A pre-test of the survey was made in order to verify the validity, suitability and reliability of the proposed questions and scales and to detect any eventual flaws in the form and content (Saunders et al., 2023). To do so, the initial version of the questionnaire was sent to a convenient sample of 17 colleagues and personal acquaintances, respecting the characteristics of the target-population. After receiving the responses, several changes were introduced such as: the simplification of the Likert scales markings, the rectification of ambiguous and inaccurate terms and the overall simplification of form. The final version of the survey can be consulted on Annex 1.

The amended questionnaire with the cover letter was then distributed on the 3rd of July 2024 to the target sample of respondents using the Qualtrics built-in function of email invitations. Out of the 224 answers obtained, only 126 complete answers were considered.

3.4 Data treatment

The collected data, corresponding to the answers of the 126 validated questionnaires, was processed and analysed using IBM SPSS Statistics software.

Initially, some preliminary processing was carried out in terms of editing, coding and cleaning of data, including the creation of synthetic indexes, so as to represent the variables in the conceptual model. In total, 10 synthetic indices were created, corresponding to the following variables: Capability, Evaluation, Products and Services, Operations, Partnerships, Strategy, Economic performance, Environmental Performance, Social Performance and SOI (Sustainability-oriented innovation). These indexes were obtained by calculating the mean values of their corresponding items, the respective descriptive statistics are shown in Annex 3.

The reliability and internal consistency of these constructs were analysed, using for the effect the Cronbach's Alpha coefficient (α) (Saunders et al., 2023).

Moreover, descriptive statistics were used in order to obtain a characterization of the sample and the study variables, with means and standard deviations being calculated for the latter.

Lastly, in order to assess the research hypotheses, three linear regressions were calculated, evaluating the relationship between the independent variable (SOI) and the dependent variables (economic performance, environmental performance and social performance). The Linear regression method was selected for providing a straightforward method to understand how one variable (the independent variable) affects another (the dependent variable) by fitting a linear equation to observed data (Saunders et al., 2023).

Chapter 4 - Data analysis

4.1 Reliability and internal consistency analysis

To assess the reliability and internal consistency of the research variables, the Cronbach's Alpha coefficient (α) was employed. This coefficient, considers the ratio between the total variance explained by the index and the variance explained by each item belonging to the index, varying between 0 and 1, with values above 0.7 being considered acceptable (Saunders et al., 2023).

As shown in Table III, the results display all indexes with acceptable alpha coefficients, with values ranging from 0.803 to 0.966, with the lowest value for the variable Environmental Performance and the highest value for the variable Evaluation. Therefore, the alpha value for each construct was well above the recommended value of 0.70, which is considered satisfactory for exploratory research (Saunders et al., 2023).

Table III. Summary of the Reliability and Internal consistency Analysis

Indexes	Cronbach's Alpha (α)
Capability	.927
Evaluation	.966
Products and Services	0.915
Operations	.900
Partnerships	.852
Strategy	.956
Economic performance	.918
Environmental Performance	.803
Social Performance	.878
SOI	.861

4.2 Characterization of the sample

The sample is constituted by 126 Portuguese companies. In Table IV, the descriptive data of the firms is displayed, according to the industry of activity, the dimension (i.e. number of employees) and the adoption of an environmental management system. The table also contains national statistical information regarding Portuguese firms in 2022, allowing for an approximate comparison with the corresponding population of the sample (INE, 2024; Instituto Português de Acreditação, 2024).

Overall, we can see a fit between the data in the sample and the population. The discrepancies are mainly in 5 industries: the industries Agriculture, forestry, and fishing and Administrative and support

services are underrepresented in the sample while the industries Manufacturing, Transportation and storage and Other service activities are overrepresented.

In terms of organizational size, 70.6% the sample was made up of micro-enterprises, having 10 or fewer employees, 20.6% belonged to small-sized organizations, with 11 to 50 employees, 4.8% were medium-sized organizations, with 51 to 250 employees, and the remaining (4.0%) were large corporations with more than 250 employees.

Regarding the industry of activity, the most common industry in the sample is Other service activities (17.5%), followed by Manufacturing (14.3%), Construction (11.9 %), Wholesale and retail trade (11.1%) and Consultancy, scientific, technical, and similar activities (10,3%).

Pertaining to the Environmental management system, the greater part of the sample did not follow an environmental management norm (71.4 %), at the time of the data collection.

Table IV. Profile of the respondents in the sample

Industry	N	% of the sample	% of the population*
Agriculture, forestry, and fishing	1	0.8%	8,6%
Extractive industries	1	0.8%	0,1%
Manufacturing	18	14.3%	4,8%
Electricity, gas, steam, and air conditioning	2	1.6%	0,5%
Construction	15	11.9%	7,1%
Wholesale and retail trade	14	11.1%	15,1%
Transportation and storage	12	9,5%	3,0%
Accommodation and food service	5	4.0%	8,3%
Information and communication	3	2.3%	2,0%
Financial and insurance	4	3.1%	0,03%
Real estate	4	3.2%	4,3%
Consultancy, scientific, technical, and similar activities	13	10.3%	10,4%
Administrative and support services	2	1.6%	15,4%
Education	4	3.2%	4,4%
Human health and social activities	5	4.0%	8,1%
Arts, entertainment, and recreation	1	0.8%	3,1%
Other service activities	22	17.5%	4,9%
Total	126	100%	100%

No. of employees	Frequency	% of the sample	% of the population*
0-10	89	70.6%	96,3%
11-50	26	20.6%	3,1%
51-250	6	4.8%	0,5%
Over 250	5	4.0%	0,1%
Total	126	100%	100%

Environmental management system	Frequency	% of the sample	% of the population*
Yes	36	28.6%	0,001%
No	90	71.4%	0,999%
Total	126	100%	100%

*Data from 2022 (**Source**: INE and IPAC)

4.3 Characterization of variables

The variables in the conceptual model were characterised using an analysis of their means and standard deviation (Table V), interpreted by the corresponding measurement scales. Detailed information by variable is provided in Annex 2.

Observing the sub-scales of SOI, we can see that the highest mean value corresponds to Capability (5.23), while the lowest value corresponds to Operations (3.89). Regarding the standard deviation, the highest value corresponds to Evaluation (1.92), while the lowest value corresponds to Capability (1.57).

As shown by the results, the respondent´s organizations appeared to be adopting Sustainability-Oriented Innovation to a relatively strong extent, with the compound variable SOI presenting an elevated mean of 4.39.

Regarding the variable dimensions of corporate sustainable performance, the highest mean value corresponds to Social Performance (2.98), while the lowest value corresponds to Economic Performance (2.47). The sub-construct Economic Performance also presents the highest standard deviation (0.71), with the lowest value corresponding to Social Performance (0.55).

Table V. Descriptive statistics of the variables of the conceptual framework

Variable	Minimum	Maximum	Mean	Std. Deviation
SOI	1.00	7.00	4.39	1.33
Capability	1.00	7.00	5.23	1.57
Evaluation	1.00	7.00	4.15	1.92
Products and Services	1.00	7.00	4.12	1.77
Operations	1.00	7.00	3.89	1.71
Partnerships	1.00	7.00	4.37	1.67
Strategy	1.00	7.00	4.59	1.74
Economic Performance	1.00	4.00	2.47	0.71
Environmental Performance	1.00	4.00	2.79	0.57
Social Performance	1.00	4.00	2.98	0.55

The descriptive statistics representing the distribution of Sustainability-oriented Innovation across the demographic variables of the firms are displayed in Table VI and Table VII.

Concerning the dimension of the firm (Table VI), the higher mean value of SOI corresponded to large firms (5,75), with more than 250 employees, while the lowest value corresponded to micro-enterprises (4,21), having 10 or fewer employees.

With respect to the adoption of an Environmental management system (Table VI), the firms that adopt the system present a higher mean value of Sustainable Innovation (4.95) than those who do not (4.17).

In relation to the Industry of activity (Table VII), the higher mean values of SOI correspond to Extractive Industries (6,33), Electricity, gas, steam, and air conditioning (5,56), Financial and insurance (5,31), Education (5,18) and Manufacturing (4,75). The lower mean values of SOI represent the industries Accommodation and food service (2,76) and Human health and social activities (2,84).

Table VI. Distribution of SOI by number of employees and environmental management system

No. of employees	SOI	N	Std. Deviation
0-10	4.21	89	1.35
11-50	4.70	26	1.17
51-250	4.58	6	.93
Over 250	5.75	5	1.49
Total	4.39	126	1.332

Environmental management system	SOI	N	Std. Deviation
Yes	4.95	36	0.99
No	4.17	90	1.39
Total	4.39	126	1.33

Table VII. Distribution of SOI by Industry of activity

Industry	SOI	N	Std. Deviation
Agriculture, forestry, and fishing	3.86	1	.
Extractive industries	6.33	1	.
Manufacturing	4.75	18	1.12
Electricity, gas, steam, and air conditioning	5.56	2	1.02
Construction	3.93	15	1.35
Wholesale and retail trade	4.51	14	1.51
Transportation and storage	4.10	12	.62
Accommodation and food service	2.76	5	.58
Information and communication	3.99	3	1.84
Financial and insurance	5.31	4	1.25
Real estate	4.82	4	1.43
Consultancy, scientific, technical, and similar activities	4.61	13	1.01
Administrative and support services	4.17	2	1.48
Education	5.18	4	1.78
Human health and social activities	2.84	5	.96
Arts, entertainment, and recreation	4.93	1	.
Other service activities	4.56	22	1.44
Total	4.39	126	1.33

4.4 Hypothesis testing

4.4.1 Relation between SOI and Economic Performance

In order to answer the second research question and validate Hypothesis 1, which suggests a positive relationship between Sustainability-oriented innovation and Economic Performance, a Linear Regression was carried out. The results of which are detailed in Table VIII.

The dependent variable in this analysis was Economic Performance and the independent variable was SOI. The assumptions of the Linear Regression were previously checked and confirmed, considering the information present in Annexes 3 to 5.

As shown on Table VIII, the results of the regression analysis suggest that SOI has a positive and statistically significant relationship with Economic Performance ($\beta = 0.362$, $p < 0.001$), with a one standard deviation increase in SOI resulting in a 0.362 standard deviation increase in Economic Performance.

It can also be seen that the regression model has explanatory power, with the Adjusted R2 value of 0.124 indicating that the independent variables explain 12.4% of the total variation in the dependent variable. The model is also shown to be statistically significant in explaining the relationship between the variables ($F= 18.687$; $p<0.001$).

With the above presented results, we can conclude the confirmation of the first research Hypothesis, suggesting a positive relationship between SOI and Economic Performance.

Table VIII. Summary of the first regression analysis: SOI and Economic Performance

Dependent Variable: Economic Performance	
Independent Variable	SOI
Standardized Coefficient (β)	.362
R^2	0.131
Adjusted R^2	0.124
F	18.687
P-value	<0.001

4.4.2 Relation between SOI and Environmental Performance

In order to answer the third research question and validate Hypothesis 2, which suggests a positive relationship between Sustainability-oriented innovation and Environmental Performance, a Linear Regression was carried out. The results of which are detailed in Table IX.

In this analysis, Environmental Performance was constituted as the dependent variable and SOI as the independent variable. The assumptions of the Linear Regression were previously checked and confirmed, considering the information present in Annexes 6 to 8.

Considering the results on Table IX, the regression analysis suggests that SOI construct has a positive and statistically significant relationship with Environmental Performance ($\beta = 0.554$, $p < 0.001$), with a one standard deviation increase in SOI resulting in a 0.554 standard deviation increase in Environmental Performance.

It can also be seen that the regression model has explanatory power, with Adjusted R2 value of 0.301 indicating that the independent variables explain 30.1% of the total variation in the dependent variable. The model is also shown to be statistically significant in explaining the relationship between the variables ($F = 53.042$; $p < 0.001$).

With the above presented results, we can conclude the confirmation of the second research Hypothesis, suggesting a positive relationship between SOI and Environmental Performance.

Table IX. Summary of the second regression analysis: SOI and Environmental Performance

Dependent Variable: Environmental Performance	
Independent Variable	SOI
Standardized Coefficient (β)	0.554
R^2	0.307
Adjusted R^2	0.301
F	53.042
P-value	<.001

4.4.3 Relation between SOI and Social Performance

In order to answer the fourth research question and validate the Hypothesis 3, which suggests a positive relationship between SOI and Social Performance, a Linear Regression was carried out. The results of which are detailed in Table X.

In this analysis, Social Performance was constituted as the dependent variable and SOI as the independent variable. The assumptions of the Linear Regression were previously checked and confirmed, considering the information present in Annexes 9 to 11.

Considering the results on Table X, the regression analysis suggests that SOI has a positive and statistically significant relationship with Social Performance ($\beta = 0.448$, $p < 0.001$), with a one standard deviation increase in SOI resulting in a 0.448 standard deviation increase in Social Performance.

It can also be seen that the regression model has explanatory power, with Adjusted R2 value of 0.194 indicating that the independent variables explain 19.4% of the total variation in the dependent variable. The model is also shown to be statistically significant in explaining the relationship between the variables ($F = 29.649$; $p < 0.001$).

With the above presented results, we can conclude the confirmation of the third research Hypothesis, suggesting a positive relationship between SOI and Social Performance.

Table X. Summary of the third regression analysis: SOI and Social Performance

Dependent Variable: Social Performance	
Independent Variable	SOI
Standardized Coefficient (β)	0.448
R^2	0.201
Adjusted R^2	0.194
F	29.649
P-value	<0.001

Table XI. Summary of the assessment of the research hypotheses

Research hypotheses	
H1: There is a positive relationship between Sustainability-oriented innovation and Economic Performance.	Supported
H2: There is a positive relationship between Sustainability-oriented innovation and Environmental Performance.	Supported
H3: There is a positive relationship between Sustainability-oriented innovation and Social Performance.	Supported

Chapter 5 - Discussion of results

Concerning the first research objective, the analysis of data revealed a considerable adoption of Sustainable Innovation by the sampled firms.

The results revealed a higher mean value of SOI in large corporations (with more than 250 employees) in relation to micro, small and medium firms, in accordance with the current literature on Sustainable Innovation which suggests that the concept has been acknowledged mostly by sizable firms (Klewitz & Hansen, 2013). Nonetheless, Small and Medium enterprises (SMEs), revealed considerable values of Sustainable innovation.

In addition, the firms that followed an Environmental Management System, expectedly, presented higher mean value of Sustainable Innovation (4,95) than those who do not (4,17), being justified by the increased commitment and promotion of sustainability that can be achieved from the EMS (Weizhou Su et al., 2022).

Concerning the industry of activity, the results revealed considerable differences in the mean value of SOI across the different industries. The higher mean values of SOI were found in the Extractive Industries, Electricity, gas steam and air conditioning, Financial and insurance, Education and Manufacturing. These results are in accordance with the findings of Przychodzen and Przychodzen (2018), who found that the intensity of a firm´s sustainable innovation is strongly related with the sector in which the firm operates, with rising level of environmental footprint acting as moderating predictor.

Concerning the second research objective, the analysis of data revealed positive and significant relationships between sustainability-oriented innovation and the different dimensions of sustainable performance (economic, social and environmental), successfully supporting the hypotheses developed in the study.

The results of the first regression analysis, confirmed the premise that SOI is positively related to economic performance, as reflected by the positive and significant effect of the measures ($\beta = 0.362$, $p < 0.001$). As such, these findings allow us to corroborate prior literature, indicating that companies which incorporate sustainability into their innovation strategies are likely to observe improvements in their economic outcomes (Van kleef and Roome, 2007; Maletič et al., 2015; Maletič et al., 2021).

Moreover, the results support the view that developing innovation practices aimed at sustainable bases provide a source of competitive advantage, since they can give an edge in supplying improved products and services to the market, therefore adapting to a rapidly changing environment faster than competitors (Van Kleef and Roome; 2007; Hermundsdottir & Aspelund, 2021).

The present study also presents some evidence to support the business case for Corporate Sustainability by concentrating on the impact of sustainability-oriented innovation. Namely, the findings suggest that organisations can improve market success and reap economic benefits by developing their sustainable innovation capabilities (van Kleef and Roome, 2007).

The results of the second regression analysis, confirmed the hypothesis that SOI is positively related to environmental performance, as reflected by the positive and significant effect of the measures ($\beta = 0.554$, $p < 0.001$). These findings help to substantiate the empirical evidence found in prior studies in the literature, suggesting that sustainable innovation practices are an effective way of improving the environmental performance of the corporation and, to extent, enhance its overall performance (Maletič et al., 2015; Maletič et al., 2021).

This study also provides evidence supporting the findings of earlier research concerning the relationship between eco-innovation and environmental performance, given that eco-innovation can be identified as a sub-set of sustainable innovation (Chipulo and Baxter, 2023). Namely, that eco-innovation, including product, process and organizational, improves environmental performance, by helping firms meet increasingly challenging government environmental requirements and consumer demands (E. M. García-Granero et al. 2018; M. Sarfraz et al. 2022). The collective evidence

underscores the importance of integrating sustainable innovation into business strategies to achieve better environmental outcomes.

The results of the third regression analysis, confirmed the hypothesis that SOI is positively related to social performance, as reflected by the positive and significant effect of the measures ($\beta = 0.448$, $p < 0.001$). As such, these findings subscribe the empirical results of prior studies, namely Maletič et al. (2015, 2021).

Additionally, in conjunction with the findings of E. Kuzma et al. (2021), it can be pointed out that innovation, particularly when aligned with sustainability goals, positively impacts social performance by addressing social and environmental issues.

It is also crucial to understand that employees are the most important stakeholders in any improvement initiative aimed at improving business performance (Škerlavaj et al., 2007). As such, it is necessary to focus on intangible resources, such as employee involvement and engagement in sustainability initiatives, given it can lead to higher job satisfaction and better overall social performance results (Maletic et al., 2021).

The results of the present study also illustrate that Sustainability-oriented Innovation impacts the dimensions of sustainable performance in different ways. In accordance with Maletič et al. (2021), it appears that SOI influences environmental and social performance to a larger degree than economic performance.

Lastly, these results allow us to conclude on the positive relationship between SOI and the overall sustainable performance. In particular, it is possible to suggest that sustainability-oriented innovation is a valuable tool to address sustainability issues and create value, such as the value of new products and services brought to market and the value of cooperation with stakeholders (Maletic et al., 2015).

Chapter 6 – Conclusions, Theoretical and practical contributions, Limitations and Future research suggestions

6.1 Conclusions

The main objectives of this study were the following: to characterize the Sustainability-Oriented Innovation (SOI) of Portuguese firms and to examine the relationship between SOI and the dimensions of sustainable corporate performance, namely economic performance, environmental performance and social performance.

Regarding the first objective, the results demonstrate a considerable adoption of Sustainability-oriented Innovation by the Portuguese firms.

The findings revealed a higher adoption of SOI in large corporations (with more than 250 employees) in relation to micro, small and medium firms, in accordance with the current literature on Sustainable Innovation which states that the concept has greater prevalence in sizable companies. The firms that followed an Environmental Management System also presented a higher mean value of Sustainable Innovation than those who do not.

Considering the Industry of activity, the results revealed considerable differences in the level of Sustainable Innovation across the various industries. The higher values of SOI were found in the Extractive Industries, Electricity, gas, steam and air conditioning, Financial and Insurance, Education and Manufacturing. These findings are in accordance with previous research who found that Sustainable Innovation is strongly related with the sector in which a firm operates, presenting higher levels in sectors with rising level of environmental footprint (such as the Extractive Industries, Electricity and Manufacturing).

Regarding the second objective, the findings suggest that Sustainability-Oriented Innovation is positively related with the three dimensions of sustainable performance, as revealed by the positive and significant results of the regression analysis. Accordingly, this study provides empirical evidence indicating that organizations can benefit by developing innovation practices aimed at sustainable bases. These findings corroborate previous arguments stating that organizations can achieve competitive advantage by integrating innovation and sustainability.

With respect to the relationship between sustainable innovation and economic performance, the results of the study support the view that incorporating sustainability into innovation strategies, leads to observed improvements in the economic outcome of an organization, since it can give an edge in supplying improved products and services to the market, therefore adapting to a rapidly changing environment faster than competitors.

This study also provides evidence supporting the business case for Corporate Sustainability by focusing on the effects of sustainability-oriented innovation. Specifically, the findings indicate that organisations can enhance market success and achieve economic gains by strengthening their sustainable innovation capabilities.

Concerning the relationship between sustainable innovation and environmental performance, we can conclude that adopting sustainable innovation is an effective way of improving the environmental outcomes of the corporation and, to extent, enhance its overall sustainable performance, substantiating the empirical evidence found in prior studies in the literature.

With respect to the relationship between sustainable innovation and social performance, the present study contributes to prior literature by suggesting that innovation, when aligned with sustainability goals, positively impacts social performance by addressing social and environmental issues.

These results also support the argument that incorporating sustainability activities in product and process development can provide tools and mechanisms for organizations to enhance their economic benefits without affecting environment and communities.

This study further demonstrates that sustainability-oriented innovation affects the various elements of sustainable performance in distinct ways. The results demonstrate that SOI influences environmental and social performance to a greater extent than economic performance.

6.2 Theoretical and practical contributions

Concerning the theoretical contributions, this research contributed to the characterization of sustainability-oriented innovation (SOI) in Portuguese firms, making it the first study to examine the concept in the corporate landscape of the country, to the best of our knowledge, contributing to an area that has received limited attention within the broader field of innovation and corporate sustainability.

In addition, this study investigated the link between sustainability-oriented innovation and the dimensions of sustainable corporate performance. Although prior literature has discussed the isolated effect of both sustainability practices and innovation on organizational performance, there were only a few empirical studies assessing the effect of Sustainability-oriented innovation on the dimensions of sustainable performance. Moreover, prior studies, namely of Maletic et al. (2015, 2021) only considered two factors to classify SOI, which is not considered sufficient for an in-depth analysis of sustainability-oriented innovation.

Furthermore, this research contributed to the validation of the novel measurement scales developed by Chipulo and Baxter (2023) and Maletic et al. (2015), concerning SOI and the dimensions of sustainable performance, respectively.

The results of the present study also offer significant practical implications. Firstly, the characterization of SOI across the various industries of activity and the dimension of firms, provides helpful information for the policy makers shaping legal frameworks of particular sectors, as well for individual investors or funds planning to integrate sustainability considerations into their portfolio strategy.

It is also possible to suggest that executive management should prioritise developing innovative capabilities, which are essential for achieving and maximising the impact of sustainability initiatives on organisational performance. Accordingly, the capability of an organization to develop innovative and sustainable solutions (i.e. product, process, and business model innovations) can be viewed as a valuable organizational resource.

Therefore, managers focused on long-term value creation should implement an effective mechanism to foster this asset and allocate resources towards incorporating sustainability into their innovation strategy, in order to improve sustainable performance and secure competitive advantages.

6.3 Limitations of the study

Like all empirical studies, this research has certain limitations. Firstly, the use of perceptual scales in the survey to capture information, while common in research, presents some limitations that can affect the accuracy of the results. In particular, the subjectivity of the responses, given that the scale relies on the respondent`s personal perceptions, and the response bias, given that some respondents can consistently choose certain points of the scale.

Additionally, the elements considered in the scales of both Sustainability-oriented innovation and sustainable performance (economic, environmental and social), corresponded to the most pertinent in

the literature according to their corresponding authors. As such, its constituents were bounded by what constituted most relevant at the time of their composition.

6.4 Future research suggestions

The concepts addressed in the present study, given their relevance and relatively shallow coverage in the literature, provide various fruitful avenues for future research.

Considering the adopted scale for measuring Sustainability-oriented Innovation, the relationships between its variables can be assessed, including its most influential dimensions on the overall construct. Regarding the relationship between sustainability-oriented innovation and sustainable performance, future studies could also evaluate the most significant dimensions of the SOI scale in predicting sustainable performance or other outcomes, such as innovation and quality performance. Another research opportunity would be to investigate the factors that drive or hinder sustainability-oriented innovation in organizations.

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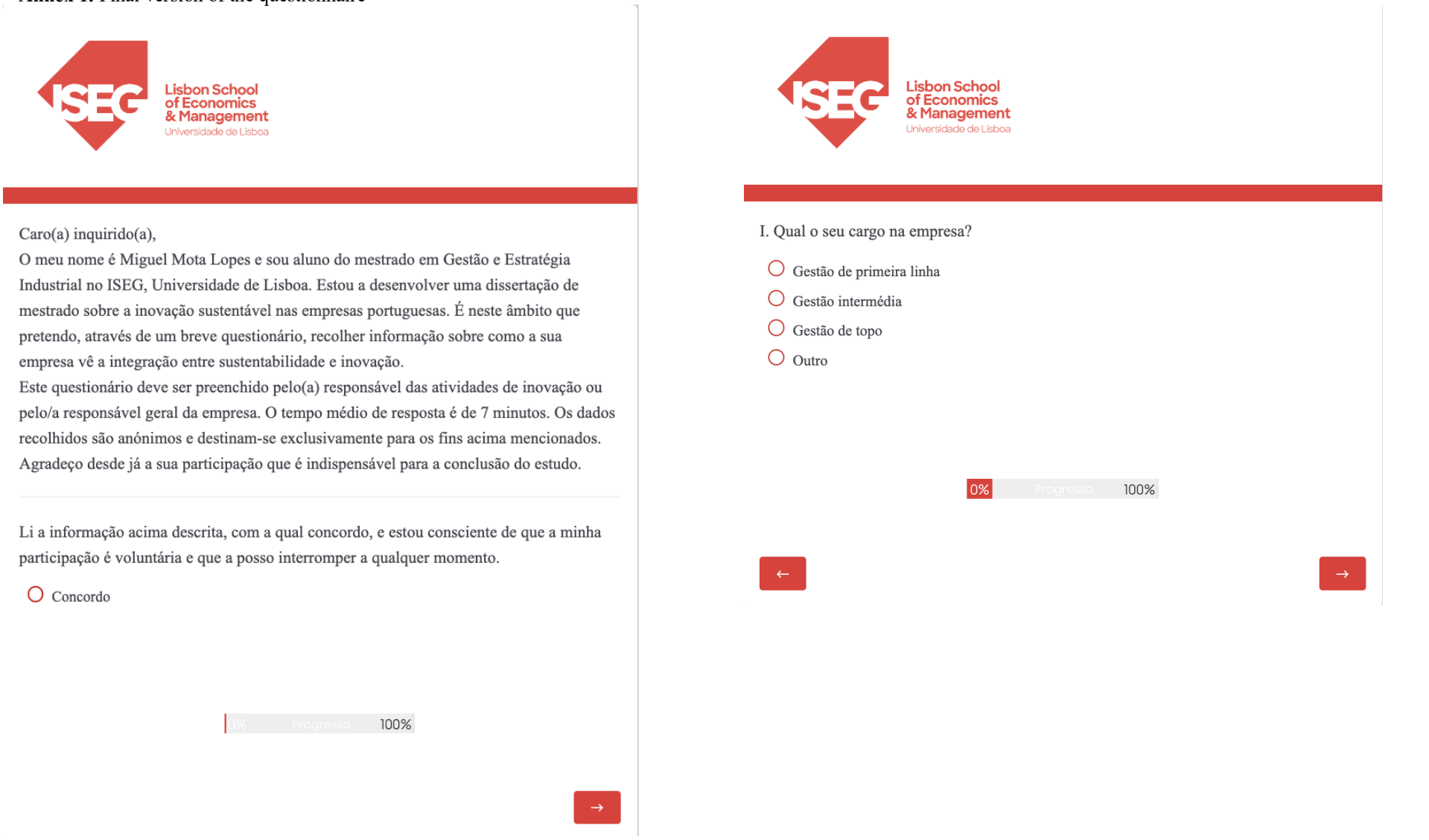
Annex 1. Final version of the questionnaire



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Caro(a) inquirido(a),

O meu nome é Miguel Mota Lopes e sou aluno do mestrado em Gestão e Estratégia Industrial no ISEG, Universidade de Lisboa. Estou a desenvolver uma dissertação de mestrado sobre a inovação sustentável nas empresas portuguesas. É neste âmbito que pretendo, através de um breve questionário, recolher informação sobre como a sua empresa vê a integração entre sustentabilidade e inovação.

Este questionário deve ser preenchido pelo(a) responsável das atividades de inovação ou pelo/a responsável geral da empresa. O tempo médio de resposta é de 7 minutos. Os dados recolhidos são anónimos e destinam-se exclusivamente para os fins acima mencionados.

Agradeço desde já a sua participação que é indispensável para a conclusão do estudo.

Li a informação acima descrita, com a qual concordo, e estou consciente de que a minha participação é voluntária e que a posso interromper a qualquer momento.

○ Concordo

0% Progresso 100%

→

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I. Qual o seu cargo na empresa?

○ Gestão de primeira linha
○ Gestão intermédia
○ Gestão de topo
○ Outro

0% Progresso 100%

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II. Quantos trabalhadores tem a sua empresa?

- ○ 0-10
- ○ 11-50
- ○ 51-250
- ○ Mais de 250

III. Em que indústria opera a sua organização?

IV. A sua organização segue uma norma de gestão ambiental como a ISO14001 ou outra?

- ○ Sim
- ○ Não

0% Progresso 100%

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Grupo 1. Qual o grau de concordância com as seguintes afirmações sobre as **competências existentes** na sua organização?
Considere a escala de 1 (Nunca é verdade) a 7 (É sempre verdade)

	1. Nunca é verdade	2.	3.	4.	5.	6.	7. É sempre verdade
A. Temos as competências necessárias para compreender plenamente os futuros efeitos da poluição provocada pelos nossos novos produtos ou serviços	○	○	○	○	○	○	○
B. Temos as competências necessárias para compreender plenamente o futuro ciclo de vida dos materiais dos nossos novos produtos e serviços, desde a extração de matérias-primas até à sua eliminação final	○	○	○	○	○	○	○
C. Temos as competências necessárias para compreender plenamente a futura pegada de carbono dos nossos novos produtos e serviços em utilização	○	○	○	○	○	○	○

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Grupo 2. Qual o grau de concordância com as seguintes afirmações sobre a **avaliação da sustentabilidade** realizada pela sua organização?
Considere a escala de 1 (Nunca é verdade) a 7 (É sempre verdade)

	1. Nunca é verdade	2.	3.	4.	5.	6.	7. É sempre verdade
A. Avaliamos os efeitos futuros da poluição provocada pela utilização dos nossos novos produtos ou serviços	○	○	○	○	○	○	○
B. Avaliamos o futuro ciclo de vida dos materiais dos nossos novos produtos e serviços, desde a extração de matérias-primas até à sua eliminação final	○	○	○	○	○	○	○
C. Avaliamos a pegada de carbono futura provocada pela utilização nossos novos produtos e serviços	○	○	○	○	○	○	○
D. Avaliamos a atual contribuição das nossas operações diárias para a poluição	○	○	○	○	○	○	○
E. Avaliamos o atual ciclo de vida dos materiais das nossas operações diárias	○	○	○	○	○	○	○
F. Avaliamos a atual pegada de carbono das nossas operações diárias	○	○	○	○	○	○	○

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Grupo 3. Qual o grau de concordância com as seguintes afirmações sobre o **desempenho sustentável dos novos produtos ou serviços** da sua organização?
Considere a escala de 1 (Nunca é verdade) a 7 (É sempre verdade)

	1. Nunca é verdade	2.	3.	4.	5.	6.	7. É sempre verdade
A. Os nossos novos produtos ou serviços produzirão zero poluição	○	○	○	○	○	○	○
B. O ciclo de vida dos materiais dos nossos novos produtos ou serviços será um ciclo fechado, sem necessidade de aterros	○	○	○	○	○	○	○
C. Os nossos novos produtos ou serviços terão uma pegada de carbono nula ou negativa	○	○	○	○	○	○	○
D. Os nossos novos produtos ou serviços são sustentáveis	○	○	○	○	○	○	○

0% Progresso 100%

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Grupo 4. Qual o grau de concordância com as seguintes afirmações sobre o **desempenho sustentável das operações** da sua organização?
Considere a escala de 1 (Nunca é verdade) a 7 (É sempre verdade)

	1. Nunca é verdade	2.	3.	4.	5.	6.	7. É sempre verdade
A. As nossas operações quotidianas produzem zero poluição	○	○	○	○	○	○	○
B. O ciclo de vida dos materiais das nossas operações quotidianas é um ciclo fechado; não há deposição em aterro	○	○	○	○	○	○	○
C. As nossas operações quotidianas têm uma pegada de carbono nula ou negativa	○	○	○	○	○	○	○
D. As nossas operações quotidianas são sustentáveis	○	○	○	○	○	○	○

0% Progress 100%

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Grupo 5. Qual o grau de concordância com as seguintes afirmações sobre as **parcerias organizacionais para a sustentabilidade**?
Considere a escala de 1 (Nunca é verdade) a 7 (É sempre verdade)

	1. Nunca é verdade	2.	3.	4.	5.	6.	7. É sempre verdade
A. Colaboramos com uma vasta gama de actores externos e partes interessadas	○	○	○	○	○	○	○
B. Os nossos objetivos de sustentabilidade são informados por um vasto leque de opiniões externas	○	○	○	○	○	○	○
C. Estamos dispostos a estabelecer novas parcerias para atingir os nossos objetivos de sustentabilidade	○	○	○	○	○	○	○

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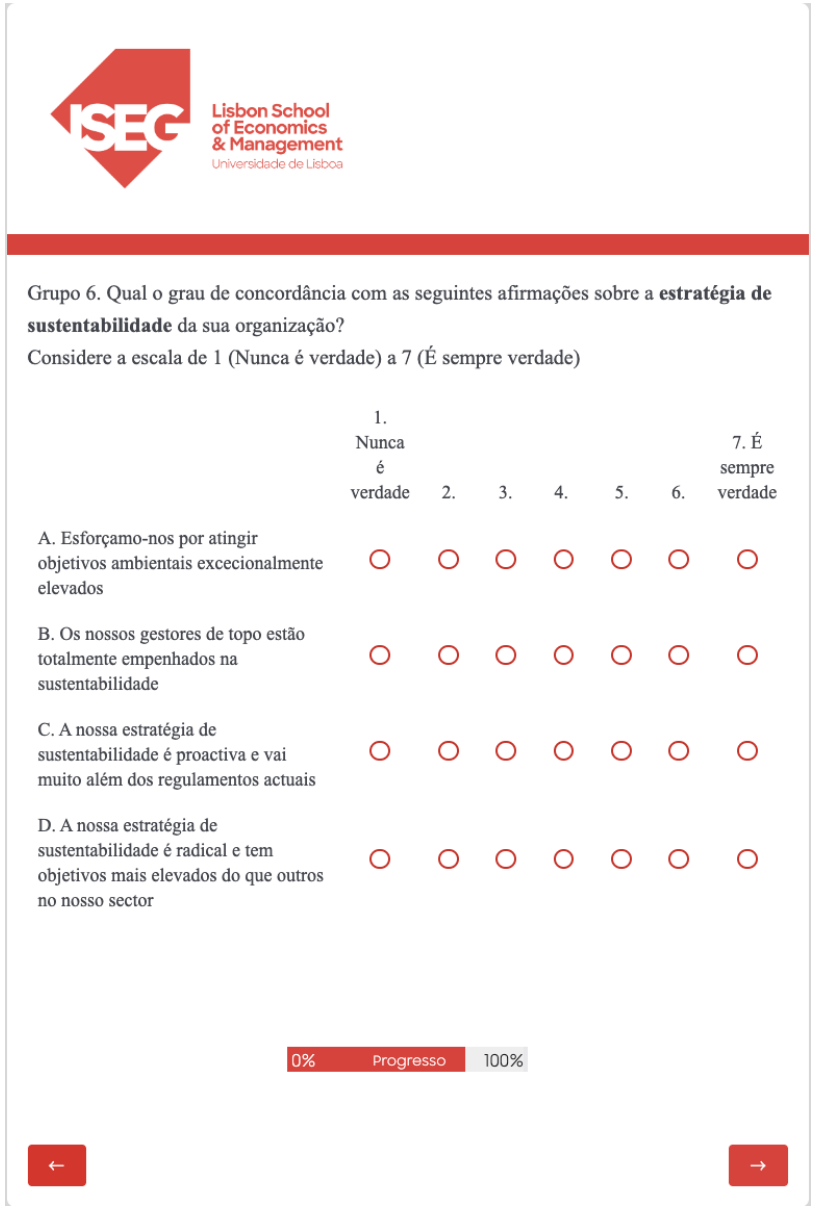

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Grupo 6. Qual o grau de concordância com as seguintes afirmações sobre a **estratégia de sustentabilidade** da sua organização?
Considere a escala de 1 (Nunca é verdade) a 7 (É sempre verdade)

	1. Nunca é verdade	2.	3.	4.	5.	6.	7. É sempre verdade
A. Esforçamo-nos por atingir objetivos ambientais excecionalmente elevados	○	○	○	○	○	○	○
B. Os nossos gestores de topo estão totalmente empenhados na sustentabilidade	○	○	○	○	○	○	○
C. A nossa estratégia de sustentabilidade é proactiva e vai muito além dos regulamentos actuais	○	○	○	○	○	○	○
D. A nossa estratégia de sustentabilidade é radical e tem objetivos mais elevados do que outros no nosso sector	○	○	○	○	○	○	○

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Grupo 7. Qual o grau de concordância com as seguintes afirmações sobre os **resultados financeiros/económicos** da sua organização?
Considere a escala de 1 (Discordo fortemente) a 4 (Concordo fortemente)

	1. Discordo fortemente	2. Discordo	3. Concordo	4. Concordo fortemente
A. O retorno do investimento (ROI) aumentou acima da média do sector nos últimos 3 anos	○	○	○	○
B. O crescimento das vendas aumentou acima da média do sector durante os últimos 3 anos	○	○	○	○
C. A taxa de crescimento dos lucros aumentou acima da média do sector durante os últimos 3 anos	○	○	○	○
D. A quota de mercado aumentou durante os últimos 3 anos	○	○	○	○

0% Progresso 100%

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Grupo 8. Qual o grau de concordância com as seguintes afirmações sobre os **resultados ambientais** da sua organização?
Considere a escala de 1 (Discordo fortemente) a 4 (Concordo fortemente)

	1. Discordo fortemente	2. Discordo	3. Concordo	4. Concordo fortemente
A. A eficiência do consumo de matérias-primas melhorou durante os últimos 3 anos	○	○	○	○
B. O consumo de recursos (energia térmica, eletricidade, água) diminuiu durante os últimos 3 anos (por exemplo, por unidade de rendimento, por unidade de produção, ...)	○	○	○	○
C. A percentagem de materiais reciclados aumentou nos últimos 3 anos	○	○	○	○
D. O rácio de resíduos (por exemplo, kg por unidade de produto, kg por trabalhador por ano) diminuiu nos últimos 3 anos	○	○	○	○

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Grupo 9. Qual o grau de concordância com as seguintes afirmações sobre os **resultados sociais** da sua organização?
Considere a escala de 1 (Discordo fortemente) a 4 (Concordo fortemente)

	1. Discordo fortemente	2. Discordo	3. Concordo	4. Concordo fortemente
A. A satisfação dos trabalhadores aumentou durante os últimos 3 anos	○	○	○	○
B. A motivação dos trabalhadores aumentou durante os últimos 3 anos	○	○	○	○
C. O desempenho em matéria de saúde e segurança melhorou durante os últimos 3 anos	○	○	○	○
D. A educação e a formação dos trabalhadores aumentaram nos últimos 3 anos	○	○	○	○

0% Progresso 100%

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Annex 2. Table with descriptive statistics of the Indexes and their respective Items

							Reliability and internal consistency analysis		
			Mean		Standard Deviation			Total item statistics	
Indexes	**Items**	**N**	**Item**	**Index**	**Item**	**Index**	**Cronbach's Alpha**	**Corrected Item-Total Correlation**	**Cronbach's Alpha if Item Deleted**
Capability	Capability_1	126	5.48	5.23	1.522	1.57	.927	.860	.893
	Capability_2	126	5.16		1.736			.874	.875
	Capability_3	126	5.05		1.770			.830	.914
Evaluation	Evaluation_1	125 [a]	4.19	4.15	2.173	1.92	.966	.917	.957
	Evaluation_2	125 [a]	4.04		2.053			.895	.959
	Evaluation_3	125 [a]	4.04		2.088			.888	.960
	Evaluation_4	125 [a]	4.35		2.068			.903	.959
	Evaluation_5	125 [a]	4.36		2.057			.842	.963
	Evaluation_6	125 [a]	4.01		1.998			.898	.960
Products and Services	Products_Services_1	126	3.69	4.12	1.940	1.77	0.915	.824	.884
	Products_Services_2	126	4.44		2.102			.743	.912
	Products_Services_3	126	3.79		1.996			.868	.868
	Products_Services_4	126	4.59		1.890			.797	.893
Operations	Operations_1	126	3.44	3.89	1.865	1.71	.900	.801	.863
	Operations_2	126	4.33		2.191			.716	.899
	Operations_3	126	3.50		1.909			.832	.851
	Operations_4	126	4.29		1.829			.779	.871
Partnerships	Partnerships_1	125 [a]	4.20	4.37	1.959	1.67	.852	.770	.746
	Partnerships_2	125 [a]	3.85		1.914			.781	.736
	Partnerships_3	125 [a]	5.01		1.825			.624	.881
Strategy	Strategy_1	126	4.80	4.59	1.811	1.74	.956	.884	.944
	Strategy_2	126	5.07		1.790			.878	.946
	Strategy_3	126	4.44		1.904			.930	.930
	Strategy_4	126	4.04		1.912			.876	.947
Economic performance	ECO_PRFRM_1	126	2.50	2.47	.807	.71	.918	.797	.899
	ECO_PRFRM_2	126	2.51		.797			.831	.887
	ECO_PRFRM_3	126	2.34		.771			.872	.873
	ECO_PRFRM_4	126	2.53		.777			.749	.914
Environmental Performance	ENVIR_PRFRM_1	120[a]	2.81	2.79	.677	.57	.803	.635	.744
	ENVIR_PRFRM_2	120[a]	2.68		.780			.651	.739
	ENVIR_PRFRM_3	120[a]	2.98		.635			.596	.764
	ENVIR_PRFRM_4	120[a]	2.75		.651			.597	.763
Social Performance	SOC_PRFRM_1	120[a]	2.93	2.98	.632	.55	.878	.738	.843
	. SOC_PRFRM_2	120[a]	2.91		.635			.768	.832
	SOC_PRFRM_3	120[a]	3.01		.655			.737	.844
	SOC_PRFRM_4	120[a]	3.08		.650			.705	.856
a. SOI	Capability	126	5.23	4.39	1.568	1.33	.861	.570	.851
	Evaluation	126	4.15		1.919			.659	.837
	Products_Services	126	4.12		1.771			.646	.839
	Operations	126	3.89		1.715			.640	.840
	Partnerships	126	4.37		1.677			.626	.842
	Strategy	126	4.59		1.743			.780	.814

Listwise deletion based on all variables in the procedure

Annex 3. Assumptions of the 1st Linear Regression

Test of Normality (1)	Independence of errors (2)	Residuals Statistics (3)	Collinearity Statistics (4)	
K-S Sig	Durbin-Watson (d)	Residual mean	Tolerance	VIF
0.200	2.062	.00000	1.000	1.000

Independent Variable: SOI

Dependent Variable: Economic Performance

(1) According to the analysis, the residuals do not significantly differ from a normal distribution (p=0,200; sig> 0.05), allowing us to conclude that the model variables are normally distributed (Saunders et al., 2023).

(2) With the Durbin-Watson test, the assumption of the independence of errors has been validated, since the test value is close to 2 (2.062) (Saunders et al., 2023).

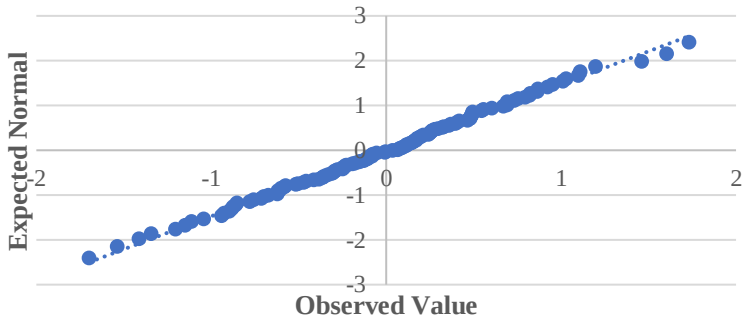
(3) With regards to residual statistics, the assumption of the nullity of the residual value is validated, given that the residual mean is 0.00000 (Saunders et al., 2023).

(4) The model confirms the inexistence of collinearity, considering that the Tolerance value is superior to 0,1 (1.000) and the VIF value is inferior to 10 (1.000) (Saunders et al., 2023).

Annex 4. Residual distribution assumption of the 1st Linear Regression

Q-Q Plot of Unstandardized Residual

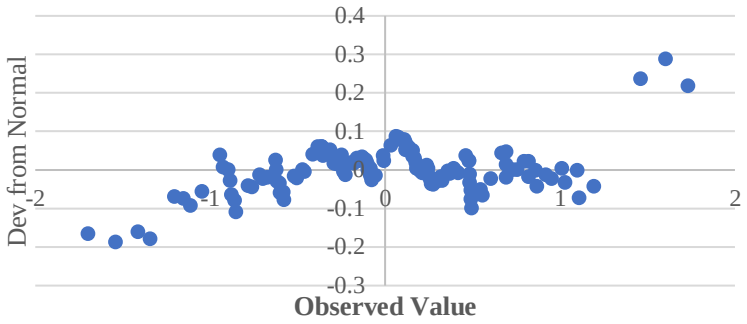
Dependent Variable: Economic Performance



(5) The graph shows that the errors are well distributed along the diagonal, satisfying the assumption of normality of the residuals.

Annex 5. Assumption of Homogeneity of Residual variance of the 1st Linear Regression

Detrended normal Q-Q plot of unstandardized residual
Dependent Variable: Economic Performance



(6) As we can see through the graph, the vast majority of the residuals are fixated around the value 0, satisfying the assumption.

Annex 6. Assumptions of the 2nd Linear Regression

Test of Normality (1)	Independence of errors (2)	Residuals Statistics (3)	Collinearity Statistics (4)	
K-S Sig	Durbin-Watson (d)	Residual mean	Tolerance	VIF
0.200	2.100	.00138	1.000	1.000

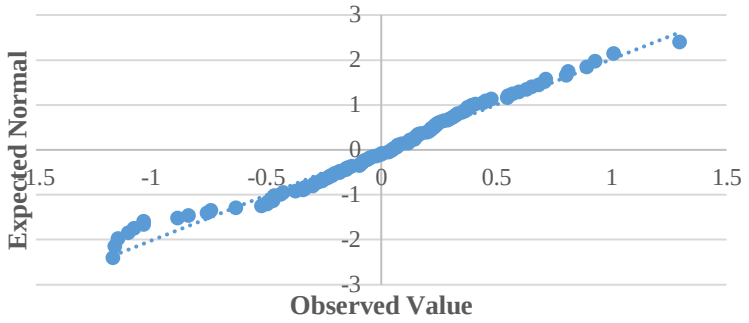
Independent Variable: SOI
Dependent Variable: Environmental Performance

(1) According to the analysis, the residuals do not significantly differ from a normal distribution (p=0,200; sig> 0.05), allowing us to conclude that the model variables are normally distributed (Saunders et al., 2023).
(2) With the Durbin-Watson test, the assumption of the independence of errors has been validated, since the test value is close to 2 (2.100) (Saunders et al., 2023).
(3) With regards to residual statistics, the assumption of the nullity of the residual value is validated, given that the residual mean is .00138 (Saunders et al., 2023).
(4) The model confirms the inexistence of collinearity, considering that the Tolerance value is superior to 0,1 (1.000) and the VIF value is inferior to 10 (1.000) (Saunders et al., 2023).

Annex 7. Residual distribution assumption of the 2nd Linear Regression

Q-Q Plot of Unstandardized Residual

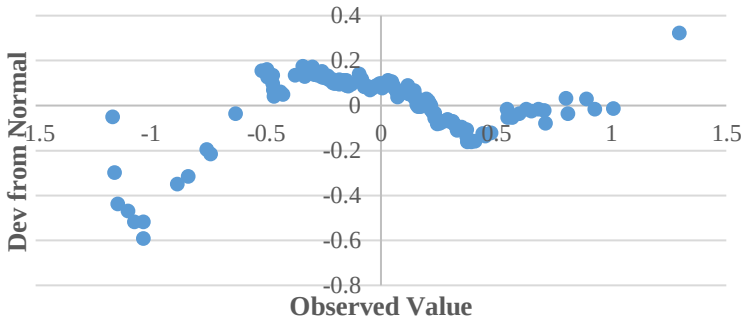
Dependent Variable: Environmental Performance



(5) The graph shows that the errors are well distributed along the diagonal, satisfying the assumption of normality of the residuals.

Annex 8. Assumption of Homogeneity of Residual variance of the 2nd Linear Regression

Detrended normal Q-Q plot of unstandardized residual
Dependent Variable: Environmental Performance



(6) As we can see through the graph, the vast majority of the residuals are fixated around the value 0, satisfying the assumption.

Annex 9. Assumptions of the 3rd Linear Regression

Test of Normality (1)	Independence of errors (2)	Residuals Statistics (3)	Collinearity Statistics (4)	
K-S Sig	Durbin-Watson (d)	Residual mean	Tolerance	VIF

0.200	1.658	-.00564	1.000	1.000

Independent Variable: SOI

Dependent Variable: Environmental Performance

(1) According to the analysis, the residuals do not significantly differ from a normal distribution (p=0,200; sig> 0.05), allowing us to conclude that the model variables are normally distributed (Saunders et al., 2023).

(2) With the Durbin-Watson test, the assumption of the independence of errors has been validated, since the test value is close to 2 (1.658) (Saunders et al., 2023).

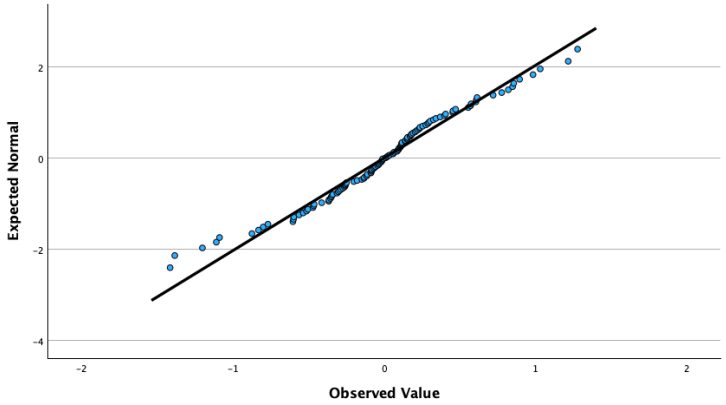
(3) With regards to residual statistics, the assumption of the nullity of the residual value is validated, given that the residual mean is -.00564 (Saunders et al., 2023).

(4) The model confirms the inexistence of collinearity, considering that the Tolerance value is superior to 0,1 (1.000) and the VIF value is inferior to 10 (1.000) (Saunders et al., 2023).

Annex 10. Residual distribution assumption of the 3rd Linear Regression

Q-Q Plot of Unstandardized Residual

Dependent Variable: Social Performance

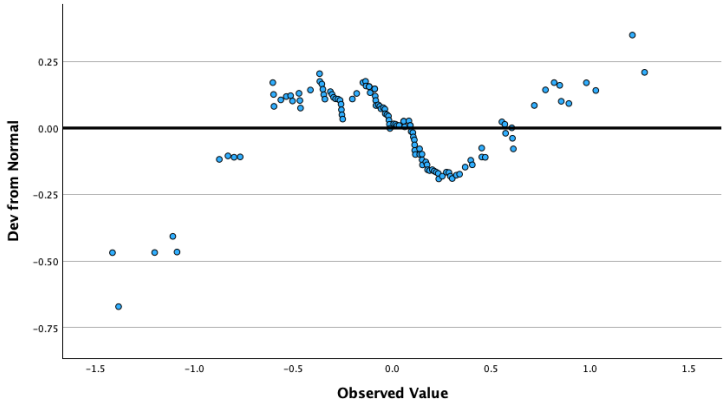


(5) The graph shows that the errors are well distributed along the diagonal, satisfying the assumption of normality of the residuals.

Annex 11. Assumption of Homogeneity of Residual variance of the 3rd Linear Regression

Detrended normal Q-Q plot of unstandardized residual

Dependent Variable: Social Performance



(6) As we can see through the graph, the vast majority of the residuals are fixated around the value 0, satisfying the assumption.