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Citation for published version:
Almeida, F & Wasim, J 2023, 'Eco-innovation and Sustainable Business Performance: Perspectives of SMEs in Portugal and the UK', *Society and Business Review*, vol. 18, no. 1, pp. 28-50. https://doi.org/10.1108/SBR-12-2021-0233

Digital Object Identifier (DOI):
10.1108/SBR-12-2021-0233

Link:
Link to publication record in Heriot-Watt Research Portal

Document Version:
Peer reviewed version

Published In:
Society and Business Review

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Download date: 04. Oct. 2023

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Journal:	*Society and Business Review*
Manuscript ID	SBR-12-2021-0233.R2
Manuscript Type:	Research Paper
Keywords:	innovation, corporate sustainability, eco-innovation, sustainable performance, Sustainable Development

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Eco-innovation and Sustainable Business Performance: Perspectives of SMEs in Portugal and the UK

ABSTRACT

Purpose

Eco-innovation has been identified as a source of gaining a competitive advantage on a global scale. To build upon that, this quantitative study in the context of Small and Medium-sized Enterprises (SMEs) aims to deepen the understanding of eco-innovation and investigates the impact of having a clear eco-innovation strategy on a company's sustainability and performance.

Design/methodology/approach

A sample of 249 SMEs located in Portugal and the UK participated and a structural equation modelling (SEM) was applied to explore the relationship among the constructs.

Findings

The findings reveal that both internal and external factors influence the design of an eco-innovation strategy. However, the relevance of external factors seemed to be more significant for Portuguese SMEs. This study concludes that products/processes eco-innovations and green innovations systems are determinants for sustainable performance in SMEs. In contrast, the environmental technologies and organisational eco-innovation dimensions are not determinants. This is observed both in Portuguese and UK SMEs.

Originality/value

Most studies in the field tend to explore the role of eco-innovation in large organisations. This study takes a different approach by exploring its impacts on the sustainable business performance of SMEs. Furthermore, it combines data from two countries which constitutes a strength and gives the opportunity to explore this phenomenon empirically.

Keywords: innovation, corporate sustainability, eco-innovation, sustainable performance, sustainable development

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1. Introduction

In recent years, environmental problems have become an issue of global interest, and there is a growing awareness and debate in the literature about it (Geng & He, 2021; Wong, 2010). However, the environment continues to suffer the consequences of our actions. According to the United Nations (UN, 2019), biodiversity loss, increased desertification, and climate change have affected people's lives. This is because of the increased occurrence of respiratory diseases caused by water and garbage pollution, deterioration of the quality of life in cities, and intensification of flooding, among others. These occurrences are especially amplified in the most vulnerable geographical areas where the living conditions are more precarious.

The development of society should not be at the cost of depleting environmental resources. In this perspective, Emina (2021) establishes that a fundamental pillar is that development should seek to meet the needs of the present without compromising the ability of future generations to meet their own needs. Thus, the concept of sustainable development emerges, seeking to harmonise current and future needs to build an inclusive, sustainable, and resilient prospect for people and the planet. Guo et al. (2020) support this viewpoint, recommending a policy combination of innovation and environmental policies to address the difficulties of long-term growth. Furthermore, sustainable development is comprised of three pillars; the environment, the economy, and society (Dalampira & Nastis, 2020; Mensah, 2019; Purvis et al., 2019). The sustainability of these three pillars is given by their correct balance.

Environmental protection is unequivocally an integral part of the sustainable development process. Several studies state that the damage caused by human activities to the environment is incompatible with sustainability and must be mitigated (Halpern et al., 2019). In this sense, the concept of sustainable development implies limits on the exploitation of environmental resources and depends on the planet's ability to absorb the effects of human activities. However, each country's path to achieving sustainability is not necessarily the same. It must be tailored to the needs and problems of each country.

The challenge of sustainable development is not exclusive to government entities. The application of sustainability in management has been considered of great importance for business success. In this area, empirical studies like Ameer & Othman (2012) and Nappi & Rozenfeld (2015) have emerged, highlighting positive correlations between sustainability and business success. Furthermore, these actions contribute to the development of corporate social responsibility (Carroll, 2021; Maali et al., 2021). The impact caused by companies on the environment reflects in their market of operation and shapes public opinion regarding the image of an organisation. As a result, companies have begun to incorporate the environmental dimension into their business strategy and invest in procedures that reduce the impact of their activities which cause ecological concerns. This view is also shared by Alam & Islam (2021) when they state that the investment in sustainable practices reflects positively on the creation and strengthening of the image of companies.

According to Williams et al. (2017), corporate sustainability is an evolving, creative, and systemic process. This is a process increasingly valued by investors and consumers. Consequently, companies are expected to be able to generate profit and simultaneously contribute to the achievement of social and environmental goals by integrating social responsibility. In this context, Wolf (2014) highlights the constant search for better relationships with customers, suppliers, and employees, allowing companies to increase their investments in sustainable practices that would enable them to add value to their products. Therefore,

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corporate sustainability should minimises production waste and increases overall productivity and corporate reputation, thus increasing its competitive advantage.

In light of the aforementioned arguments, this study aims to explore the impact of eco-innovation practices on the sustainable business performance of SMEs. Two empirical scenarios were considered in this study based on the geographical locations. These scenarios were chosen considering the need to conduct an empirical study into specific countries in which SMEs were a key element of the business structure and decisive for the economic growth of these countries. In Portugal, small businesses dominate, representing 99.3%, being the second country in the European Union where their weight is higher, only behind Italy (Eurostat, 2019). In the United Kingdom, the number of small businesses was slightly smaller, totalling 98.4% of the companies. However, in both countries, the number of SMEs is over 99.5% (i.e., in Portugal, they represent 99.9%, while in the UK, it is 99.7%). This demonstrates the relevance of the business structure of SMEs in these two countries to explore the role of eco-innovation. This study adopts the definitions of Dias Angelo et al. (2012) and Kemp (2010), in which a multidimensional view of eco-innovation is proposed namely for its organisational, process, and product components.

This study contributes to the eco-innovation literature by developing an understanding of the contribution of eco-innovation dimensions to the sustainable performance of SMEs. Previous studies developed by Maletic et al. (2021) and Marín-Vinuesa et al. (2020) lack a contextual focus on SMEs. However, it is recognised that in recent years there have been studies such as Goli et al. (2020), Padilla-Lozano & Collazzo (2022) and Pan et al. (2021) that focus on the role of corporate social responsibility initiatives in SMEs in which the perspective of eco-innovation is explored. However, these studies do not measure the impact of these policies on the sustainable business performance of SMEs. Furthermore, we also contribute to the work of Thomas et al. (2021), which despite focusing exclusively on SMEs and green innovation in Italian SMEs, does not assess the impact of these dimensions on the sustainable business performance of these organisations. A similar issue is found in a study by Hang et al. (2022), which uses only a sample of Pakistani SMEs. Accordingly, our study presents an innovative approach by focusing its analysis on SMEs and simultaneously diversifying it by adding a comparative element considering two European countries, strengthening the generalisability. A questionnaire was developed and answered by 249 innovation officers or chief executive officers (CEOs) of these SMEs to test the proposed conceptual model of this research.

The rest of this manuscript is organised as follows: Initially, a theoretical framework is considered on corporate sustainability and eco-innovation themes. These elements are fundamental for presenting the hypotheses considered in this study. Next, the methodology of the study is presented, highlighting the methods employed and the strategy for data collection and analysis. After that, the results are presented and discussed in relevance to the evolution of theoretical and practical knowledge about eco-innovation in SMEs. Finally, the conclusions are drawn, and the study's limitations are also addressed, with some indications for future development.

2. Background

2.1 Corporate sustainability

Corporate sustainability can be seen as the set of actions that a company takes to respect the environment and promote the sustainable development of society (Meuer et al., 2020). Therefore, for a company to be considered environmentally and socially sustainable, it must adopt ethical practices that simultaneously

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promote its economic growth without harming the environment. Mahmood & Bashir (2020) advocate that in addition to respecting the environment, corporate sustainability can positively change a company's image among consumers. This is a relevant factor given the increase in environmental problems generated by disordered growth in recent decades, which has made consumers more aware of the importance of environmental protection.

The concept of corporate sustainability can be framed and classified according to several theories. The instrumental theory initially proposed by Friedman (1970) and complemented by Reinhardt et al. (2008) oriented corporate sustainability to maximise long-term value. This model argues that companies focus on social activities as a way to achieve economic objectives. The model was later extended by Hart (1995) by looking at strategies to gain competitive advantage and by Murray & Montanari (1986), in which corporate sustainability is seen as a marketing tool. The political theory looks at the social responsibility of organisations as a way for them to exercise their power over society (Davis, 1960). This view was later extended by Donaldson & Dunfee (1994) by arguing that implicitly there is an implied contract between the firm and society. Integrative theories have emerged as a model in which one seeks to satisfy social demands. At this level, we highlight the public responsibility of organisations based on the law (Preston & Post, 1975) and also the need to promote balanced management of stakeholders' interests (Mitchell et al., 1997). Finally, we emphasise the ethical theories in which it is argued that companies focus on the right way to achieve the good of society, in which sustainable development is sought (Gladwin et al., 1995) and the orientation of the activities of organisations for the common good and progress (Garriga & Melé, 2004).

In recent decades, the holistic view of corporate sustainability has gained prominence. Porter & Kramer (2006) presented corporate sustainability as a triple bottom line of economic, social, and environmental dimensions. Therefore, companies should view their activities as a way to promote economic performance in the long term while avoiding behaviour that may be socially or environmentally harmful in the short and long term. The model proposed by Porter & Kramer (2006) allows issues related to sustainability not to be seen in isolation as they are affected by financial performance, reputation, or interaction with other stakeholders.

Given that most problems cannot be solved without companies' active participation and involvement, they are an integral part of society and the ecosystem within which they operate. Hence, various stakeholders (e.g., governments, companies, people) must be involved in this process. Adrian et al. (2013) highlight that companies recognise the importance of corporate sustainability. This is often driven by the growing need to communicate their activities' social, environmental, and economic impact. They are beginning to replace corporate philanthropy with an integrated ethical strategy in which sustainability is a fundamental pillar in their strategy, promoting a constant dialogue among all stakeholders. Organisations committed to sustainability need leadership that promotes sustainability in all business areas through a long-term vision and effective communication from the top (Thakhathi et al., 2019). In addition, Wolf (2014) highlights the role of engaging stakeholders throughout the value chain, while Kunz (2020) adds the importance of motivating employees to achieve it. Hence, sustainability manages to assume itself as a positive and favourable framework, where organisations can strengthen relationships with workers, suppliers, customers, and the community, to obtain a competitive advantage that translates into value creation. Additionally, Stojcic (2021) looks at the role of incentives in promoting eco-innovation and considers that organisations require both supply and demand-side incentives.

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Large companies, mainly in the industrial sector, as reported in Haanes et al. (2012) and Iqbal & Keay (2019), invest the most in sustainability and have been implementing well-defined strategies in recent years, while SMEs are at the opposite extreme. The barriers associated with implementing corporate sustainability in SMEs are generally related to the widespread belief that these companies have little impact and that to be considered accurate if compared to the isolated environmental impact of a single SME. However, the greater impact of companies of this profile is in their cumulative effect because of their large number. Furthermore, Das et al. (2020) report that social and environmental practices are mostly neglected in emerging markets that are under tremendous pressure to achieve short-term economic growth. The potential of applying corporate sustainability practices cannot be overlooked as it can offer them critical competitive advantages. Haskas et al. (2021) suggest that sustainability can be more easily integrated into small businesses, which will allow them to become more flexible and adaptable in the face of intensely dynamic markets.

2.2 Eco-innovation

The concept of eco-innovation has captured the attention of several academics and has been used in conjunction with other associated terms such as sustainable innovation and green innovation. Initially, the concept of eco-innovation was introduced by Fussler & James (1996). They stated that this type of innovation seeks to add value for customers and the business while significantly decreasing environmental impacts. Kemp & Pearson (2007) note that an environmental innovation should be comparative, considering the state of the art of relevant alternatives. According to Kemp & Pearson (2007), simply reducing environmental impacts cannot be considered an eco-innovation if the innovation introduced is not better than what is available in the market. This way, activities developed that will not result in a reduction of environmental impacts are not considered.

The literature addresses the factors facilitating the development, investment, and adoption of eco-innovation. Identifying the key determinants that motivate firms to develop and/or adopt eco-innovative solutions are essential, especially for policymakers who want to implement efficient instruments to promote eco-innovation. This is also highlighted by Liao & Liu (2021), and Ritala & Almpanopoulou (2017), who suggest that knowledge of these factors is crucial for establishing an eco-innovation strategy. In this study, the division of drivers into two main categories (i.e., internal and external) as proposed in Bossle et al. (2016) is adopted. Internal drivers refer to internal resources and characteristics of organisations that facilitate an eco-innovative attitude. This includes: industry characteristics related to the typology of the organisations and the business sector (Cai & Li, 2018), external market orientation, in which the organisation emphasises the role it plays to identifying the needs and desires of consumers and creating products that satisfy them (Peris et al., 2020; Triguero et al., 2017), and the adoption of environmental systems that aim at the continuous improvement of a company's environmental performance (Brogi & Menichini, 2019; Tseng et al., 2021). Environmental regulation (Doran & Ryan, 2012), market pressures arising from society's increased environmental awareness, particularly through the realisation of how our actions cause short, medium, and long-term impacts (Sumrin et al., 2021; Sun & Sun, 2021), and collaborative partnerships in which we highlight initiatives carried out in partnerships between several organisations and civil society (Araújo & Franco, 2021; Sanchez-Henriquez & Pavez, 2021) are all contributing elements that stimulate and promote eco-innovation. The knowledge about the facilitators of eco-innovation adoption conducted to the proposal of the following hypotheses:

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H1a: *Internal drivers contribute positively to eco-innovation strategy setting*

H1b: *External drivers contribute positively to eco-innovation strategy setting*

Eco-innovation can be classified according to several typologies. Rennings et al. (2006) framework propose two types of classifications: technical eco-innovations and organisational eco-innovations. Technical eco-innovations seek to propose new products or processes to avoid or reduce environmental impact. In comparison, organisational eco-innovations strive to redesign organisational processes and structures to reduce environmental impacts. Later, Kemp & Pearson (2007) extend this framework by including two new components related to environmental technologies, which include technologies for controlling and solving pollution problems, and green innovation systems. Together these two frameworks provide a model consisting of four dimensions: (i) environmental technologies; (ii) organisational eco-innovation; (iii) product/process eco-innovations; and (iv) green innovation systems. These four dimensions have been progressively studied with empirical evidence. Noteworthy studies in the context include; Salem et al. (2020), which look at the role of environmental technologies in improving organisations' competitiveness, Ceptureanu et al. (2020) and Thomas et al. (2021), suggesting that eco-organisational innovation updates an organisation's management processes through new eco-methods to improve business performance by supporting necessary changes in business practices, Pecorari & Lima (2020) look at the role of eco-innovation considering the role of new products essentially and in Dahn & Yusof the role of process eco-innovation is essentially explored. Lastly, Kasztelan et al. (2020) look at the importance of innovation systems as a strategy for green growth. Finally, innovation strategy is presented in Eiadat et al. (2008) and Wijethilake et al. (2018) as an antecedent dimension of eco-innovation performance in an organization in its multiple components. In this sense, and to assess the impact of innovation strategy on promoting eco-innovation, the following hypotheses were defined:

H2a: *Innovation strategy contributes positively to the emergence of environmental technologies*

H2b: *Innovation strategy contributes positively to organisational eco-innovation*

H2c: *Innovation strategy contributes positively to product/process eco-innovation*

H2d: *Innovation strategy contributes positively to green innovations systems*

Innovation processes that emphasise sustainability have assumed preponderance in several countries (Mazzanti, 2018; Miranda et al., 2021). For a more convergent analysis of eco-innovation concepts and their unfolding in the company context, a field measurement is necessary, establishing factors pertinent to the development of sustainable practices grouped by their similarities. The final desired consequence of eco-innovation is improving a company's performance. This goal has also been recognised in the literature by Cheng et al. (2014), Hojnik et al. (2017), Kalash (2021), Maletic et al. (2021), and Marín-Vinuesa et al. (2020). Positive associations between eco-innovation and firm performance in dimensions such as the creation of competitive advantage, return on investment, increased market share, increased sales, and profitability are recognised in these papers. However, when we look specifically within the context of SMEs in Europe, the number of studies is limited. Klewitz et al. (2012), Rabal-Conesa et al. (2021) and Zhai et al. (2018) mention that promoting eco-innovation in SMEs needs different types of intermediaries (e.g., public and private), especially those with low absorptive capacity. The empirical work by Zhang & Walton (2017) based on data from New Zealand confirms that eco-innovation has a positive effect on firm

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performance and that the most significant benefits are obtained by SMEs that affect more organisational resources. A similar conclusion is reached by Singh & Chakraborty (2021), considering a sample of SMEs located in India. Thomas et al. (2021) also explore the role of eco-innovation on the performance of organisations, considering the influence of stakeholders in establishing relationships between customers and suppliers. Finally, in Alraja et al. (2022), it is further suggested that COVID-19 offers an opportunity for SMEs to have a more positive environmental stance and that this will be a contributing factor to better sustainable performance. The role of eco-innovation for SMEs is also evident, although its quantitative demonstration is limited. Accordingly, the following hypotheses were established to explore the role of the four types of innovation proposed by Kemp & Pearson (2007) in sustainable performance:

H3a: *Environmental technologies contribute positively to the sustainable performance of SMEs*

H3b: *Organisational eco-innovation contributes positively to the sustainable performance of SMEs*

H3c: *Product/process eco-innovation contributes positively to the sustainable performance of SMEs*

H3d: *Green innovations systems contribute positively to the sustainable performance of SMEs*

Figure 1 summarises the various hypotheses previously established and builds the conceptual model of the research.

<Insert Figure 1 here>

3. Methodology

A survey was developed and shared with SMEs in Portugal and the UK. The survey was shared by email with SMEs registered with the Small Business Support Institute in both countries. Data collection took place between 6th September 2021 and 18th October 2021. During these six weeks, three emails were sent to companies: the first one to explain the background of this study and the last two to reinforce the request for responses. A total of 271 responses were received, of which 148 were from Portugal and 123 were from the UK. However, after analysing, removing those responses with more than 50% of null answers from the sample was necessary to achieve meaningful representation. Thus, and after this phase, the final sample size is 249 responses (133 from Portugal and 116 from the UK). The survey is composed of four control variables: (i) country; (ii) company size; (iii) company age; and (iv) industry. Table 1 shows the distribution of respondents. More than half of the companies are small companies and have been in business for less than ten years. Information Technology (IT) is the most represented industry, followed by Manufacturing and Health Services. Answers from industries with low representation, such as Agribusiness, Renewables, or Food and Gas were grouped in a single class (i.e., others). In total, these industries represent less than 10% of the sample.

<Insert Table 1 here>

The survey structure, with the respective questions and authors supporting each of them, is presented in Table 2. Each dimension has between 3 and 5 questions. In total, the survey consists of 35 questions. A Likert scale consisting of 7 levels (i.e., strongly disagree, disagree, somewhat disagree, neutral, somewhat agree, agree, strongly agree) was used. This type of scale has been used in innovation studies, such as Desidério et al. (2020) looking at models of innovation in university-business interactions and Eisele (2017)

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exploring the role of leadership in organisational innovation.

<Insert Table 2 here>

Structural equation modelling (SEM) was adopted to explore the relationship (e.g., regression coefficients or path coefficients between observed and/or latent variables) between the defined constructs and to explore the role of eco-innovation in the sustainable performance of SMEs in Portugal and the UK. SEM provides a very general and convenient framework for statistical analyses that include several traditional multivariate procedures, particularly factor analysis, regression analysis, discriminant analysis, and canonical correlations. SEM is a quantitative technique widely used in the field of economic and social sciences and has several advantages such as working simultaneously with estimation and measurement, estimation of direct and indirect effects of explanatory variables on response variables, robustness due to relaxation of assumptions compared to least squares regression model, and interpretative ease of results (Martínez-López et al., 2013).

The SEM was mapped and tested using Stata v.15, and to assess the reliability of the estimation process, the following measures were used to analyse variable consistency, convergent validity, and discriminant validity.

- Comparative fit index (CFI) measures the relative improvement in fit going from the baseline model to the postulated model;
- Tucker-Lewis index (TLI) measures a relative reduction in misfit per degree of freedom
- Goodness of fit index (GFI) measures the proportion of variance accounted for by the estimated population covariance
- Standardised root mean square residual (SRMR) represents the square root of the difference between the residuals of the sample covariance matrix and the hypothetical model
- Root mean square error of approximation (RMSEA) measures the discrepancy due to approximation per degree of freedom.

4. Results

In the first phase, a descriptive statistical analysis of the variables under study was performed for each dimension. Figure 2 presents the average responses received on the importance of internal and external factors in designing an eco-innovation strategy. The findings show that both factors are equally important. The most relevant internal factor is the company's sector of activity and is a crucial element in designing the innovation strategy, while the most pertinent external factor is market pressures. Figure 3 presents two radial graph windows: window A allows us to explore the relative importance of the eco-innovation strategy in the various dimensions of eco-innovation (e.g., environmental, organisational, products/processes, and green innovations systems); whereas window B allows us to explore the impact of each of these dimensions on sustainable performance. The results of window A (Figure 3) show a relatively homogeneous distribution of the relative importance of the eco-innovation strategy in all dimensions of eco-innovation, particularly the role of the eco-innovation strategy in the introduction of new environmental technologies. However, the results of window B (Figure 3) show opposite and heterogeneous behaviour. The findings reveal that adopting environmental technologies, organisational eco-innovation, and product/process eco-innovation contributes decisively to improving a company's social performance. In these variables, the average response was 6.694. However, the role of these dimensions is less relevant for the increase in the

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economic performance of these organisations, as revealed by the variables ETSP1, OISP1, PISP1, and GISSP1, which present an average of 5.322.

<Insert Figure 2 and Figure 3 here>

Next, the correlational analysis of the SEM constructs was performed, as shown in Table 3, which presents their mean, standard deviation, and correlations. The fit statistics are also presented at the bottom of the table indicating that $\chi 2 = 683.946$ (df = 248), $\chi 2$ / df = 2.758, CFI is 0.929, TLI is 0.912, GFI is 0.906, SRMR is 0.037, and RMSEA is 0. 076. The average variance extracted (AVE) are between 0.639 and 0.792 and the compositional reliability (CR) is higher than 0.75, which indicates an acceptable value for the convergence of the constructs. ID, ED, and ET are the constructs with the highest mean scores, although ET has the second-highest standard deviation of all constructs. Only SP has a higher standard deviation than ET.

<Insert Table 3 here>

The evaluation of the structural model is performed in Table 4. Only two of the ten hypotheses formulated in the model were rejected (p-value ≥ 0.05). As accepted hypotheses allow to conclude that: both internal and external factors have a positive effect on eco-innovation strategy ($\lambda = 0.408$, $p < 0.01$; $\lambda = 0.381$, $p < 0.01$), eco-innovation strategy has a positive effect on the emergence of environmental technologies, organizational eco-innovation practices, product and process eco-innovation, and green innovation systems ($\lambda = 0.338$, $p < 0.01$; $\lambda = 0.323$, $p < 0.01$; $\lambda = 0.372$, $p < 0.01$; $\lambda = 0.340$, $p < 0.01$), and both product/process eco-innovation and green innovation systems have a positive effect on sustainable performance ($\lambda = 0.265$, $p < 0.05$; $\lambda = 0.278$, $p < 0.05$).

<Insert Table 4 here>

Finally, the impact of the respondent's country of origin (i.e., Portugal and the United Kingdom) on the perceived importance of the constructs was also analysed. For this purpose, a hypothesis test was applied considering a significance level of 0.05, which aims to assess whether the difference between the two sample means (i.e., Portugal and the United Kingdom) is different. The results of this analysis are presented in Table 5. Only in the ED construct the mean difference in the two countries is distinct, indicating that the external drivers are more valued by Portuguese SMEs in designing an eco-innovation strategy.

<Insert Table 5 here>

5. Discussion

SMEs enhance sustainable practices of innovation by developing more sustainable processes, such as the use of biodegradable materials and the recycling of their products. The designing of eco-innovation strategy considers the organisation's sector of activities, the market orientation, the adoption of environmental systems, and the internal competencies. As recognised in Hermundsdottir & Aspelund (2021), innovation practices aimed at sustainable bases are a source of competitive advantage since they can give an edge in supplying improved materials and products to the market. However, external drivers are equally relevant in this process. This study evidenced the relevance of environmental regulations, market pressures, collaborative partnerships, and the positioning of competitors. According to Helfat & Peteraf (2009), the

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ability of a company to adapt to the changing environment and to change it in its favour, transforming opportunities into a competitive advantage, are determining characteristics for the survival and growth of organisations. The empirical evidence in this study confirms the evolutionary perspective of innovation advocated by Bogers et al. (2019). They argue that innovation arises through a systemic process that refers to the interrelationship and dynamic interaction among the different actors and internal/external factors that influence the innovation process. Additionally, Rua & França (2016) note that Portuguese SMEs are recognised as having a high entrepreneurial orientation with a strong focus on export processes, which may help explain the greater relevance given by Portuguese SMEs in this study to external drivers. Entrepreneurial orientation is relevant for understanding the strategic posture of an organisation to develop actions for innovation, proactivity, and risk propensity (Wales et al., 2021).

Companies that do not embrace innovation in their business strategy risk becoming uncompetitive due to obsolete products and processes. Innovative firms are a requirement for a dynamic and competitive economy. As pointed out by Langendahl et al. (2016), organisations must adapt to the changing environment under the force of necessity for survival when it comes to sustainable innovations. The findings revealed that defining an eco-innovation strategy is key to introducing and developing environmental technologies, the emergence of organisational eco-innovation, the launch of product/process eco-innovation, and the development of green innovations systems. Although there is no primary definition for corporate sustainability, the topic involves the development of organisations in a social and environmental context that focuses on natural and human capital. This study confirms the view of Guo et al. (2020) and Silvestre & Tirca (2019), highlighting that companies' management started considering adapting to new market demands and requirements through revolutionary technologies that can make the foundations of many of the current industries obsolete. SMEs find sustainability as a way to differentiate themselves from the traditional market by constituting a source of competitive advantage concerning organisations that are not yet adequate.

The findings revealed that the dimensions of eco-innovation do not contribute equally to sustainable performance. In sustainable performance, the components of economic, environmental, and social performance were considered. Product/process eco-innovation and green innovations systems contribute decisively to the sustainable performance of SMEs. These results are in line with the study carried out by Beraha et al. (2018). They argue that a company cannot be innovative without being flexible, as production flexibility consists of efficiently managing its production resources according to external demands. While the need to deliver performance and customer satisfaction at the product level becomes evident, Foroudi et al. (2016) argue that products must respond to customers' emotional aspirations. Equally relevant to understanding the sustainable performance of an SME is the adoption of green innovations systems which can be understood as alternative production and consumption systems that are more environmentally friendly than existing ones. It involves changes in production technologies, knowledge, organisation, institutions and infrastructure, and possibly changes in consumer behaviour. Several studies explore this phenomenon in SMEs, such as organic farming and renewable energy-based energy systems (Dudek & Wrzaszcz, 2020).

On the contrary, the results of this study concluded that the adoption of environmental technologies and organisational eco-innovation does not have a significant impact on sustainable performance. Barbieri & Santos (2020) point out that innovation in eco-products is usually inspired by advanced green technologies, which shorten product life cycles and increase competition. In the policy dimension, it is perfectly

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justifiable that incentives arise for the development and diffusion of environmentally sustainable technologies, in which responsible technological innovation is sought to be a commitment of companies. The results of this study do not contradict this view but allow us to conclude that its benefits on sustainable performance are not immediate and must be framed in a broader social challenge, not limited to the attitude of an SME alone. Also, organisational eco-innovation implemented by SMEs has no relevant effects on sustainable performance. In Henri & Journeault's (2009) view, eco-organisational innovation refers to upgrading organisational management processes through a new and eco-method to improve business performance by supporting necessary changes in business practices. Organisational innovations can span the entire value chain, requiring the commitment of a broad set of actors and cooperation between firms. The results of this study contradict the findings revealed by Wang et al. (2021), who demonstrated that eco-organisational innovations affect firm performance. However, the focus of this study is not exclusive to SMEs. Furthermore, the development of innovative processes in organisations with rigid organisational structures is more costly and complex. On the other hand, those organisations with flexible hierarchical structures, well-integrated functions, and horizontal communication and information flow can more efficiently develop and deploy innovative processes and businesses (Pierre & Fernandez, 2018).

6. Conclusions

Due to legislative determinations and market influence, intense environmental pressures have turned eco-innovation into an essential strategic tool for achieving sustainable development. The search for competitive advantages in a global market makes SMEs strive to mobilise knowledge, technological skills and experience to improve or create new products, production and distribution methods. In this sense, eco-innovation can be used as a tool to support differentiation and generate sustainable competitive advantage in organisations. However, eco-innovation practices must be broader than just developing economically viable strategies and practices because innovation also needs to incorporate social and environmental issues. In summary, the achievement of sustainable performance must be multidimensional in which the economic, environmental, and social dimensions are essential to be considered.

This study identified that the internal and external drivers contribute in a similar way to the design of an eco-innovation strategy. Nevertheless, due to the propensity of Portuguese SMEs to open up abroad through export processes, it was possible to identify that the external factors related to market pressures, collaborative partnerships, positioning of competitors and environmental regulations are significantly more relevant for Portuguese SMEs. In both countries (Portugal and the UK), the eco-innovation strategy is a determining factor for the emergence and development of environmental technologies, creating a structure that facilitates organisational eco-innovation, the launch and development of eco-innovation products/processes, and the implementation of green innovation systems. However, not all dimensions of eco-innovation contribute similarly to the sustainable performance of SMEs. Products/processes eco-innovations and green innovations systems are two critical determinants for sustainable performance. At the same time, environmental technologies and organisational eco-innovation seemed to have no significant impact on the sustainable performance of SMEs.

6.1 Theoretical implications

This study contributes to the development of theory in the field of eco-innovation, particularly in the context of SMEs. In the conceptual dimension, this study addresses the research gap in the area whose studies like Maletic et al. (2021) and Marín-Vinuesa et al. (2020) focus the analysis of eco-innovation on the

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performance of organisations with greater financial resources and turnover. Therefore, this study contributes to analysing this phenomenon from the perspective of SMEs. Furthermore, and considering studies that focus exclusively on SMEs, this research is relevant in two ways. From one perspective, studies by Padilla-Lozano & Collazzo (2022) and Pan et al. (2021) consider that eco-innovation is an important element for SMEs but do not conclude on the relative quantitative relevance of one of its dimensions. From another perspective, the quantitative empirical studies conducted by Thomas et al. (2021) and Hang et al. (2022) consider only one geographical context. Therefore, this study is relevant to understanding the relative importance of eco-innovation dimensions considering two countries, i.e. Portugal and the UK.

6.2 Implications for policy and practice

Policy and practice implications are essential elements in a study in the field of environmental sustainability. Eco-innovation is currently perceived as a factor that creates new sources of economic growth and is an effective instrument for addressing environmental problems. It is relevant to state this study comes in a context where European and national recovery and resilience plans that are in the early stages of implementation. This research helps SMEs understand the relative importance of internal and external elements in developing an eco-innovation strategy. It gives valuable information, particularly for Portuguese SMEs, by emphasising the larger importance of external factors compared to UK SMEs. This study also contributes to determining the relative importance of the components of the eco-innovation strategy for the emergence of sustainable performance, allowing SMEs to concentrate on the most critical factors.

6.3 Study limitations and further research opportunities

This study presents some relevant limitations to explore. The business sector may be a determining factor for exploring the eco-innovation practices promoted by SMEs, which was not explored in this study. In this sense, we suggest that future studies should consider a longitudinal analysis by sector, which would allow exploring its relevance. Considering the role that open innovation can play in the growth of SMEs, future research should investigate how open innovation practices might be an enabler for executing an eco-innovation strategy for SMEs to achieve better long-term results. It is also considered relevant to decompose the sustainable performance construct considering a more holistic approach, in which social and environmental sustainability are considered simultaneously since both are interrelated and must be solved together to achieve business sustainability. Finally, this study did not explore the sustainable culture and awareness in SMEs and its possible outcomes on society and the environment. Consequently, it would be relevant in the future to explore knowledge about the motivations of the top leadership of sustainable organisations and their differences from non-practising organisations.

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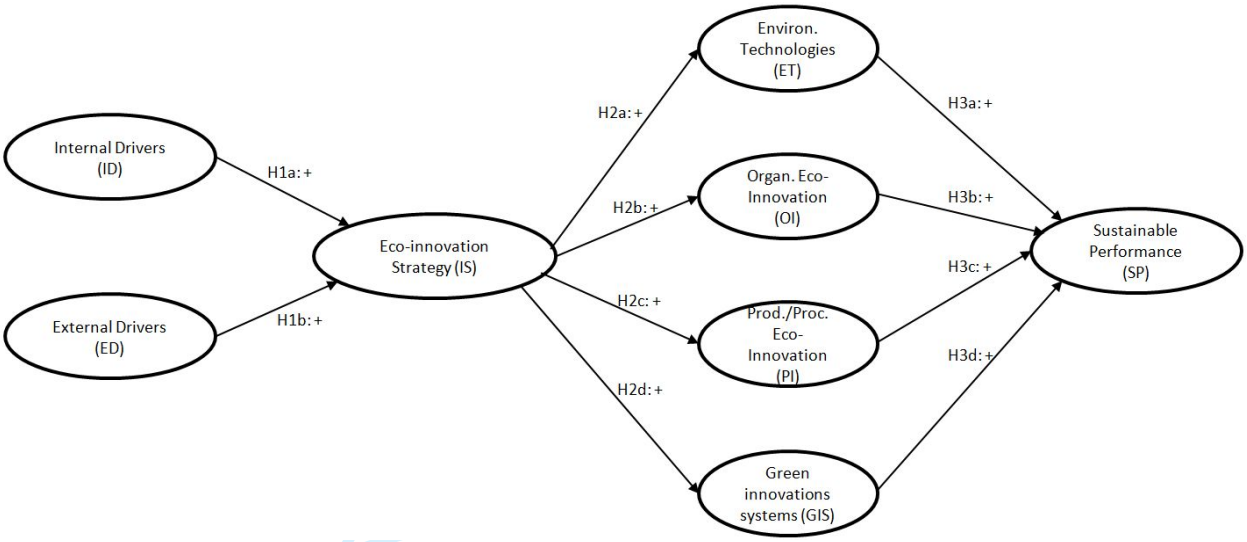

Figure 1. Conceptual model

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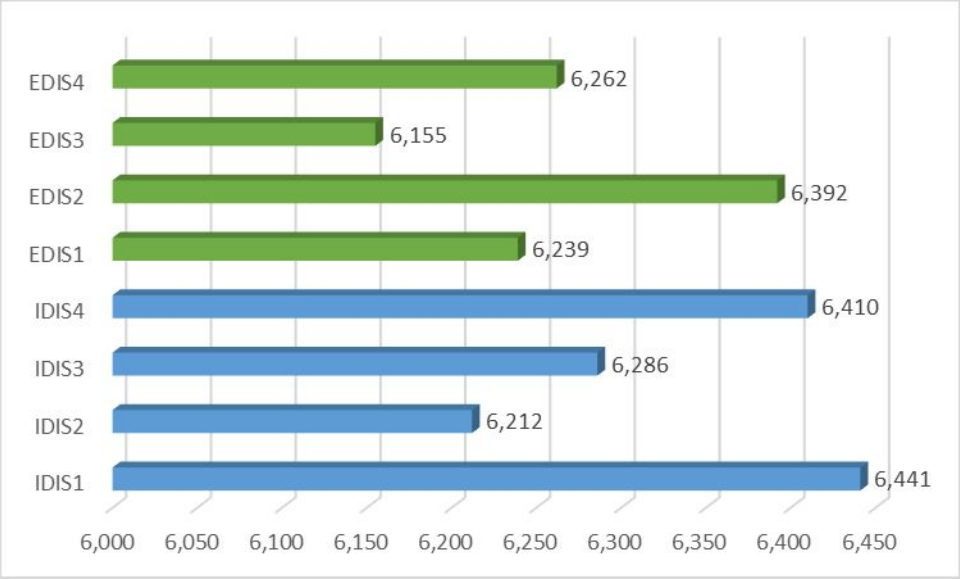

Figure 2. Importance of internal and external drivers

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Figure 3. Importance of eco-innovation strategy

Table 1. Profile of respondents

Dimension	Frequency	
	n	%
Country		
Portugal	133	46.59
United Kingdom	116	53.41
Company size		
Micro	95	38.15
Small	127	51.00
Medium-sized	27	10.84
Company age		
<5 years old	92	36.95
5-10 years old	62	24.90
10-15 years old	35	14.06
>15 years old	60	24.10
Industry		
Information Technology	67	26.91
Manufacturing	53	21.29
Health Services	36	14.46
Tourism	23	9.24
Retail	22	8.84
Financial Services	16	6.43
Education	14	5.62
Others	18	7.23

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Table 2. Survey structure

ID	Question	Authors
IDIS1	The sector of a business plays a significant role while designing an eco-innovation strategy	Cai & Li (2018)
IDIS2	The market orientation of a business plays a significant role while designing an eco-innovation strategy	Peris et al. (2020) Triguero et al. (2017)
IDIS3	The adoption of environmental systems play a significant role while designing an eco-innovation strategy	Brogi & Menichini (2019) Tseng et al. (2021)
IDIS4	Key internal competencies are determinants for a company's eco-innovation strategy	Buhl et al. (2016)
EDIS1	Environmental regulations play a significant role in shaping an eco-innovation strategy	Doran & Ryan (2012) Rennings & Rammer (2011)
EDIS2	Market pressures play a significant role in defining an eco-innovation strategy	Sumrin et al. (2021) Sun & Sun (2021)
EDIS3	Collaborative partnerships play a significant role in defining an eco-innovation strategy	Araújo & Franco (2021) Sanchez-Henriquez & Pavez (2021)
EDIS4	The positioning of competitors is a determinant for a company's eco-innovation strategy	Yao & Fang (2018)
ISET1	The eco-innovation strategy is a key to introduce new environmental technologies	Kemp & Pearson (2007) Yusuf et al. (2018)
ISET2	The eco-innovation strategy is critical to the in-house development of new environmental technologies	Kemp & Pearson (2007) Yusuf et al. (2018)
ISET3	The eco-innovation strategy is fundamental for the external acquisition of new environmental technologies	Kemp & Pearson (2007) Yusuf et al. (2018)
ISOI1	The eco-innovation strategy fosters an inclusion/change of organisational processes	Kemp & Pearson (2007) Ceptureanu et al. (2020) Thomas et al. (2021)
ISOI2	The employees of an organisation share the vision of their eco-innovation strategy	Kemp & Pearson (2007) Delmas & Pekovic (2018) Thomas et al. (2021)
ISOI3	The eco-innovation strategy is an important element for an organisation to foster knowledge management practices	Kemp & Pearson (2007) Liao & Liu (2021)
ISPI1	The eco-innovation strategy can contemplate the development of new eco-products	Kemp & Pearson (2007) Pujari (2006)
ISPI2	The eco-innovation strategy promotes external inclusion of new eco-products	Kemp & Pearson (2007) Pujari (2006)
ISPI3	The eco-innovation strategy promotes the adoption of sustainable environmental processes	Kemp & Pearson (2007) Khan et al. (2021)
ISPI4	The eco-innovation strategy changes processes to meet environmental legislation requirements	Kemp & Pearson (2007) Doran & Ryan (2012)
ISPI5	The eco-innovation strategy assesses the sustainability of manufacturing processes	Kemp & Pearson (2007) Vallet & Tyl (2019)
ISGIS1	The eco-innovation strategy promotes the inclusion of the technological change in society	Kemp & Pearson (2007) Dogaru (2020)
ISGIS2	The eco-innovation strategy develops support infrastructure	Kemp & Pearson (2007) Del Rio et al. (2016)
ISGIS3	The eco-innovation strategy promotes organisational changes in the way the organisation operates	Kemp & Pearson (2007) Del Rio et al. (2016)
ETSP1	The adoption of environmental technologies contributes towards increasing the economic performance	Maletic et al. (2021)
ETSP2	The adoption of environmental technologies contributes towards improving the environmental performance	Maletic et al. (2021)
ETSP3	The adoption of environmental technologies contributes	Maletic et al. (2021)

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	towards improving the social performance	
OISP1	Organisational eco-innovation contributes towards increasing the economic performance	Cheng et al. (2014) Hojnik et al. (2017)
OISP2	Organisational eco-innovation contributes towards improving the environmental performance	Cheng et al. (2014) Hojnik et al. (2017)
OISP3	Organisational eco-innovation contributes towards improving the social performance	Cheng et al. (2014) Hojnik et al. (2017)
PISP1	Product/process eco-innovation contributes towards increasing the economic performance of a company	Cheng et al. (2014) Hojnik et al. (2017)
PISP2	Product/process eco-innovation contributes towards improving the environmental performance of a company	Cheng et al. (2014) Hojnik et al. (2017)
PISP3	Product/process eco-innovation contributes towards improving the social performance of a company	Cheng et al. (2014) Hojnik et al. (2017)
GISSP1	Green innovations systems eco-innovation contributes towards improving the economic performance of a company	Chen (2014) Marín-Vinuesa et al. (2020)
GISSP2	Green innovations systems eco-innovation contributes towards improving the environmental performance of a company	Chen (2014) Marín-Vinuesa et al. (2020)
GISSP3	Green innovations systems eco-innovation contributes towards improving the social performance of a company	Chen (2014) Marín-Vinuesa et al. (2020)
GISSP4	Green innovations systems are integrated into our company's values and culture	Chen (2014) Wang (2019)

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Table 3. Measurement model assessment

	Mean	Std. dev.	Cross-construct correlations							
			ID	**ED**	**IS**	**ET**	**OI**	**PI**	**GIS**	**SP**
ID	6.337	0.107	1							
ED	6.262	0.098	0.698	1						
IS	6.152	0.260	0.571	0.512	1					
ET	6.316	0.396	0.344	0.239	0.487	1				
OI	6.227	0.067	0.422	0.220	0.389	0.288	1			
PI	5.993	0.231	0.410	0.173	0.305	0.327	0.380	1		
GIS	6.180	0.241	0.295	0.238	0.380	0.471	0.333	0.292	1	
SP	6.091	0.571	0.233	0.210	0.372	0.264	0.305	0.289	0.272	1
		CR	0.847	0.812	0.867	0.778	0.752	0.818	0.789	0.881
		AVE	0.712	0.692	0.733	0.646	0.639	0.695	0.657	0.792
		Fit statistics	$\chi^2 = 683.946$ (df = 248); χ^2 / df = 2.758; CFI = 0.929; TLI = 0.912; GFI = 0.906; SRMR = 0.037; RMSEA = 0.076							

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Table 4. Structural model assessment

Hypothesis	Relationship	Estimate	p-value	Decision
H1a	ID → IS	0.408	$< 1*10^{-3}$	Accepted
H1b	ED → IS	0.381	$< 1*10^{-3}$	Accepted
H2a	IS → ET	0.338	$< 1*10^{-3}$	Accepted
H2b	IS → OI	0.323	$< 1*10^{-3}$	Accepted
H2c	IS → PI	0.372	$< 1*10^{-3}$	Accepted
H2d	IS → GIS	0.340	$< 1*10^{-3}$	Accepted
H3a	ET → SP	0.197	0.073	Rejected
H3b	OI → SP	0.210	0.068	Rejected
H3c	PI → SP	0.265	0.025	Accepted
H3d	GIS → SP	0.278	0.016	Accepted

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Table 5. Difference of the mean between the samples of Portugal and the United Kingdom

Construct	Mean (PT)	Std. dev. (PT)	Mean (UK)	Std. dev. (UK)	p-value	Decision
ID	6.349	0.115	6.321	0.132	0.078	Rejected
ED	6.327	0.078	6.220	0.124	$< 1*10^{-3}$	Accepted
IS	6.123	0.231	6.176	0.289	0.115	Rejected
ET	6.258	0.325	6.343	0.466	0.101	Rejected
OI	6.231	0.078	6.220	0.059	0.208	Rejected
PI	5.995	0.210	6.048	0.257	0.079	Rejected
GIS	6.220	0.262	6.162	0.229	0.064	Rejected
SP	6.131	0.672	5.998	0.511	0.078	Rejected

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