

**MESTRADO**  
ECONOMIA E GESTÃO INTERNACIONAL

# **FIRMS' INTERNATIONALIZATION AND THE ADOPTION OF SUSTAINABLE PRACTICES**

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**M**

2025



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Dissertation

Master in International Economics and Management

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2025

## Acknowledgments

Concluding a master's degree is always a demanding endeavour, but undertaking this journey while balancing professional responsibilities made it even more challenging and, at the same time, deeply rewarding. Therefore, this dissertation represents not only the conclusion of an academic goal, but also a personal achievement, reflecting the commitment and resilience that guided me throughout this process, which would not have been possible without the invaluable support of those who made this journey less daunting. Throughout this section, I express my sincere gratitude to all who supported me along the way.

First and foremost, I would like to express my sincere gratitude to my supervisor, Professor Ana Teresa Tavares Lehmann, for her exceptional guidance, insightful feedback and continuous encouragement throughout this process. Your expertise and dedication have been essential in shaping the direction of this work, and I am truly thankful for your generosity in sharing your knowledge and time.

I am also grateful to Professor Alicia Rodríguez Márquez for her availability, support, and valuable suggestions, especially in what concerns the econometric analysis of this dissertation.

To my friends and to my colleagues at Forvia, I am thankful for your support, understanding, and encouragement throughout this journey. Your presence made this path lighter, and your words were often the motivation I needed to keep going.

Finally, I dedicate my deepest gratitude to my family, in particular to my parents and my little brother, my true safe haven. Your love and belief in me gave me strength when I needed it the most.

To all who have directly or indirectly contributed to this dissertation, my sincere thanks.

Thank you.

## **Abstract**

This dissertation examines the relationship between firms' internationalization and the adoption of sustainable practices, while also assessing the dual role of innovation as both a direct determinant of such adoption and a moderator of the above mentioned relationship. Drawing on Stakeholder Theory, Resource-Based View (RBV) and on the Eclectic Paradigm (OLI framework), the study tests whether firms (multinationals and exporters) with greater international exposure are more likely to adopt sustainable practices due to external pressures from international stakeholders and the competitive advantages sustainability offers.

Using a large-scale, multi-country firm-level dataset including both developed and emerging economies, from the sixth round of the Business Environment and Enterprise Performance Survey (BEEPS), this study employs count data models, notably the negative binomial model, to test hypotheses which were developed based on state-of-the art literature.

The results reveal three key insights: (i) exporters adopt significantly more sustainable practices, confirming the role of foreign market pressures; (ii) multinational enterprises (MNEs), unexpectedly, show negative or even insignificant associations with adoption of sustainable practices, exposing institutional gaps and (iii) innovation stands out as the strongest driver, though its moderating role reveals a paradox, as resource trade-offs can dilute the exporter–sustainable practices link.

By disentangling exporters and MNEs, the study advances theoretical debates and provides robust evidence that sustainability outcomes depend on both international exposure and firms' internal capabilities. These findings carry important policy implications: exporters need targeted support to align innovation efforts with sustainable practices, while MNEs require stricter oversight to ensure their global presence translates into tangible environmental progress.

**Keywords:** Internationalization, Sustainable practices, Innovation, Multinational Enterprises (MNEs), Exporters, BEEPS.

**JEL Classification:** F23; F18; Q56; O32.

## Resumo

Esta dissertação analisa a relação entre a internacionalização das empresas e a adoção de práticas sustentáveis, avaliando o duplo papel da inovação como determinante direto e moderador. Com base na Teoria dos Stakeholders, na Resource-Based View (RBV) e no Paradigma Eclético (modelo OLI), o estudo testa se as empresas (multinacionais e exportadoras) com maior exposição internacional tendem a adotar práticas sustentáveis, em resposta a pressões externas de stakeholders internacionais e às vantagens competitivas que a sustentabilidade oferece.

Recorrendo a um conjunto de dados de grande escala, provenientes de economias desenvolvidas e emergentes, extraídos da sexta ronda do Business Environment and Enterprise Performance Survey (BEEPS), este estudo aplica modelos de dados de contagem, nomeadamente o modelo binomial negativo, para testar as hipóteses com base na revisão de literatura desenvolvida.

Os resultados revelam três conclusões principais: (i) os exportadores adotam significativamente mais práticas sustentáveis, confirmando o papel das pressões do mercado externo; (ii) as empresas multinacionais (MNEs), de forma inesperada, apresentam associações negativas ou mesmo insignificantes com a adoção de práticas sustentáveis, evidenciando lacunas institucionais e (iii) a inovação destaca-se como o principal motor, embora o seu efeito moderador revele um paradoxo, já que os trade-offs de recursos podem diluir a relação entre exportação e adoção de práticas sustentáveis.

Ao distinguir exportadores de MNEs, o estudo contribui para o debate teórico e fornece evidência robusta de que os resultados em sustentabilidade dependem tanto da exposição internacional como das capacidades internas das empresas. Estes resultados têm implicações importantes para a política: os exportadores necessitam de apoio direcionado para alinhar os esforços de inovação com as práticas sustentáveis, enquanto as MNEs carecem de uma supervisão mais rigorosa para garantir que a sua presença global se traduza em progressos ambientais concretos.

**Palavras-chave:** Internacionalização, Práticas sustentáveis, Inovação, Empresas multinacionais (MNEs), Exportadores, BEEPS.

**Classificação JEL:** F23; F18; Q56; O32.

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## **List of Acronyms**

BEEPS: Business Environment and Enterprise Performance Survey

CIS: Community Innovation Survey

EBRD: European Bank for Reconstruction and Development

ESG: Environmental, Social and Governance

FDI: Foreign Direct Investment

HC: Human Capital

IB: International Business

KBV: Knowledge-Based View

MNEs: Multinational Enterprises

Oa: Proprietary Rights and Intangible Assets

Oi: Institutional Assets

OLI: Ownership, Location and Internalization

Ot: Transaction Cost Minimizing Advantages

RBV: Resource-Based View

R&D: Research and Development

SDGs: Sustainable Development Goals

SMEs: Small and Medium-sized Enterprises

UN: United Nations

VIF: Variance Inflation Factor

WBG: World Bank Group

## Introduction

In recent years, there has been a marked increase in attention toward environmental concerns, including the green economy and sustainability efforts (Sorroche-del-Rey et al., 2022; Benito & Meyer, 2024; Xie et al., 2024). This growing awareness of environmental protection has driven countries, companies and international organizations to implement more green initiatives (Suarez-Perales et al., 2017). For instance, the United Nations Sustainable Development Goals (UN, 2015), outlined in “The 2030 Agenda”, established ambitious objectives in environmental, social and economic domains, urging all 193 member States to promote sustainable practices as part of a global transformation effort. Moreover, sustainability’s potential impact on firms’ long-term competitiveness and value creation has been duly highlighted in relevant literature (Eccles et al., 2014). The integration of sustainable practices not only helps companies reduce costs and risks but also enables them to stand out in increasingly competitive global markets (Porter & Kramer, 2019).

Sustainability practices are now seen as key drivers of innovation and market differentiation (Saxena et al., 2024), underscoring their growing relevance in an increasingly interconnected and competitive global economy. Given that many of today’s sustainability challenges and opportunities transcend national boundaries, understanding how firms respond increasingly requires a focus on the international dimension of business. In light of this, Buckley et al. (2017) and Ghauri et al. (2021) call for a reorientation of International Business (IB) research to focus on tackling 'grand challenges' and promoting 'sustainable development'. They emphasize the need for cross-disciplinary viewpoints and methods to reshape its influence, highlighting the significance of examining these two pillars together.

Following this plea, there is a growing recognition that multinational enterprises (MNEs) should not be seen solely as profit-maximizing entities, but rather as having complex effects (both positive and negative) on sustainable development (Shapiro et al., 2018).

Expanding into foreign markets offers companies the opportunity to discover new avenues for growth and enhance their competitiveness (Hojnik et al., 2018). Companies operating in foreign markets with higher environmental standards are often driven to enhance their environmental performance (Amer, 2023). As a result, internationalization may influence the implementation of sustainable practices, as firms aiming to enter into these markets must adopt sustainable practices to meet the stricter regulations that markets often impose on

international operations (Lee et al., 2023). Hence, understanding the relationship between international business and sustainability is essential, as both exporters and MNEs contribute to the global diffusion of sustainable practices, exporters by responding to external environmental pressures in foreign markets (Hanley & Semrau, 2022) and MNEs by strategically embedding sustainability across their operations and international value chains (Marano et al., 2024).

Furthermore, the role of innovation in the intersection of IB and sustainability remains a critical yet underexplored area (Chabowski et al., 2023). Existing research in IB has largely centered on analyzing and theorizing innovation as a key driver of competitive advantage and a determinant of organizational success, particularly within the context of MNEs (Vrontis & Christofi, 2021; Zhao et al., 2022). Zhao et al. (2024) position innovation as a central piece in the relationship between MNEs and sustainable practices, suggesting that innovation is an essential mechanism that enhances the implementation of sustainable practices in the context of IB, by connecting corporate goals with local and global challenges.

This dissertation seeks to contribute to the literature on IB and sustainable practices by addressing relevant gaps highlighted in existing research, as identified by Buckley et al. (2017) and Ghauri et al. (2021). On the one hand, it is unclear in previous literature whether internationalization has a positive or negative effect on sustainable practices (Nguyen & Adomako, 2022). Further empirical studies are needed to determine if and how internationalization affects sustainable practices' adoption (Suarez-Perales et al., 2017). On the other hand, much of the research on internationalization and sustainable practices focuses on developed countries (Kang, 2013; Ocelík et al., 2023). Few studies address the impact of internationalization on companies operating in emerging or developing economies, particularly in regions where environmental controls may be more permissive (Ko et al., 2021).

Understanding of the relationship between firms' internationalization and sustainable practices highlights the importance of examining the factors that influence this connection. In particular, this research aims to explore whether internationalization serves as a driver for the adoption of sustainable practices in firms, by focusing on the following research question: *Does internationalization drive the adoption of sustainable business practices?* In addition, the study explores the role of innovation both as a direct determinant of sustainable practices

and as a moderator of the relationship between internationalization and adoption of sustainable practices, through the subsidiary research questions: *Does innovation directly drive sustainable practices? and Does innovation have a moderating role in the way internationalization drives the adoption of sustainable practices?*

As for the methodological approach, the analysis relies on firm-level data from the sixth round of the Business Environment and Enterprise Performance Survey (BEEPS), a collaborative initiative between the European Bank for Reconstruction and Development (EBRD) and the World Bank Group (WBG), focusing on firms that completed the Green Economy module. To test the research hypotheses, the study employs a Negative Binomial regression model, suitable for modelling the count nature of the dependent variable while addressing the issue of overdispersion typically present in this type of data.

Leveraging the large-scale, multi-country BEEPS VI dataset covering over 30 emerging and developing economies, this study provides robust cross-country insights into sustainable practices across diverse institutional and sectoral contexts. The results reveal clear patterns: exporters adopt significantly more sustainable practices, driven by the discipline of competing in demanding international markets, while MNEs show negative or even insignificant associations, exposing institutional voids and risks of regulatory arbitrage. At the same time, innovation emerges as the strongest driver, with a moderating effect that nuances the link between internationalization and sustainability.

By distinguishing exporters from MNEs, this dissertation contributes to advancing theory relating IB and sustainability, delivers rare empirical evidence from a large and diverse multi-country context, and offers guidance for policymakers and managers to align innovation and internationalization with sustainable practices.

The dissertation's structure is as follows. Chapter 1 presents a comprehensive review of the literature, covering key concepts, theoretical frameworks and prior empirical studies, leading to the development of the hypotheses. Chapter 2 details the methodological approach, including data description, variables, and econometric specifications, followed by the presentation and discussion of results. Lastly, the final part of the dissertation outlines the main results, discusses their implications for policy and suggests avenues for future research.

## **Chapter 1. Literature Review and Hypothesis Development**

This chapter firstly provides a thorough examination of the key concepts and theoretical frameworks related to our research question, presenting a detailed and comprehensive review of both seminal and contemporary literature. Subsequently, this chapter reviews pertinent empirical literature, deriving the relevant hypotheses to be tested in Chapter 2.

### **1.1. Conceptual and Theoretical Background**

This section is organized into two main parts. Subsection 1.1.1 examines the fundamental concepts, while subsections 1.1.2 to 1.1.4 review the relevant theoretical frameworks that structure the research, notably Stakeholder theory, Network theory, the Eclectic Paradigm (with a focus on Ownership Advantages) and the Resource-Based View.

#### **1.1.1. Key Concepts: Sustainability, Internationalization, Exporting Company, Multinational Enterprise and Innovation**

*Sustainability* has emerged as a key focus in both societal discussions and organizational practices in recent years (Missimer & Mesquita, 2022). The term has its origins in a related concept proposed in 1987 by the Brundtland Commission, which defined sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p. 43). Since then, it has grown to encompass a broad range of applications affecting economic, environmental, and social dimensions, typically referred to as the Triple Bottom Line (Elkington, 1994; Winter & Knemeyer, 2013). This framework, also known as the "3 Ps" (people, profit, and planet), reflects the growing integration of sustainability into business practices (Gupta & Kumar, 2013).

However, despite its increasing relevance, sustainability remains a concept without a universally accepted definition, which has led to a wide range of interpretations in the literature. Misunderstandings and fallacies reinforce its ambiguity, leading some to see it as a "fuzzy notion" or an "all-purpose glue" without substantive content (Vogt & Weber, 2019). This conceptual vagueness can hinder meaningful discourse and dilute its effectiveness in addressing global challenges (Lazurko et al., 2024).

Even though there is this conceptual vagueness, it can be defined as the capacity of social-ecological systems to sustain and regenerate essential functions, operate within planetary boundaries and ensure intergenerational and intragenerational equity through the balanced integration of environmental, social and economic dimensions (Folke et al., 2016).

When applied to the corporate context, sustainability is defined as “meeting the needs of a firm’s direct and indirect stakeholders, without compromising its ability to meet the needs of future stakeholders as well” (Dyllick & Hockerts, 2002, p. 131). Even so, such formulations often lack a temporal dimension. To address this, Bansal & DesJardine (2014) emphasize the strategic challenge of managing the tension between short-term profitability and long-term resilience, highlighting sustainability as an inherently dynamic pursuit. Complementing these perspectives, Purvis et al. (2019) argue that sustainability is ultimately a normative concept rooted in the ethical commitment to maintain or improve desirable conditions over time, particularly through a moral responsibility toward future generations.

A decade ago, sustainability was not widely discussed in the business world, and only a limited number of companies considered implementing sustainable practices (Rodríguez et al., 2021). Nevertheless, recent research highlights a paradigm shift where sustainability is no longer optional, but an essential requirement driven by customer and stakeholder demands (Huang et al., 2022). This evolution underscores the need for companies to integrate sustainable practices as a main element of strategy, aligning operational and environmental objectives to remain competitive in the global market (Bhattacharyya, 2022).

As sustainability became a central theme in business strategy, internationalization has been identified as a significant driver, compelling firms to adopt sustainable practices in response to diverse global challenges and expectations (Kolk & Van Tulder, 2010).

***Internationalization*** can be defined as an “expansion of the company beyond its internal market to other regions or countries” (Kang, 2013, p. 101). This process often involves selling products or services in foreign markets or expanding to new geographic locations (Kafourous et al., 2008). However, internationalization is more than just geographic expansion. It is also a gradual and multidimensional process involving strategic, structural, and operational transformations (Luostarinen, 1979) and it can take both outward and inward forms (Welch & Luostarinen, 1988). As companies engage in international operations, they

progressively increase their global activities, acquiring knowledge and experience that enhance their ability to operate across borders (Bagheri et al., 2019).

Operationalizing the concept of internationalization, this dissertation will focus specifically on two modes of entry, associated to two types of key entities undertaking international operations: exporting firms and MNEs, each with its own strategic importance in approaching international markets. Exporters play a crucial role in connecting domestic production with global demand (Sala-Ríos et al., 2020), while MNEs drive deeper integration into international markets through localized operations and investments (Sinkovics et al., 2011).

***Exporting*** is considered the most widely used entry mode for companies beginning their internationalization process, often serving as the first step before progressing to other stages (Johanson & Vahlne, 1977). This preference can be attributed to exporting being a lower-risk entry mode, requiring fewer financial and human resources (González et al., 2022). On the one hand, this minimizes potential losses in case of failure, while on the other, it allows companies to adopt this strategy simultaneously across multiple markets (Schellenberg et al., 2017). While traditional exporting typically involves shipping products or services in foreign markets, extending its market reach beyond national borders, it is also important to consider non-traditional forms of exporting, such as the sale of goods and services to non-resident foreign consumers within the domestic territory, a common practice in sectors like tourism, education or health care (World Trade Organization, 2023).

In turn, a ***MNE*** is a company that controls assets or engages in value-added activities in at least one country besides the home country, typically through ownership of 10% or more of equity shares or voting rights in these assets (UNCTAD, 2022). At its core, it is a business engaged in foreign direct investment (FDI). It comprises a parent company that oversees foreign assets and its affiliated entities abroad (UNCTAD, 2022). MNEs are distinguished from exporters by their deeper integration into foreign markets, which allows them to benefit from proximity to local consumers, access to resources, and closer interactions with stakeholders (Sun et al., 2021). Consequently, MNEs often serve as key players in the global transition toward sustainable business practices, leveraging their scale and influence to address complex cross-border sustainability challenges (Cavusgil et al., 2020).

Another key factor enabling firms to adapt to evolving global challenges is ***Innovation***, which can be defined as “a new or improved product or process (or a combination thereof) that differs significantly from previous products or processes and that has been made available to potential users (product) or brought into use by the firm (process)” (OECD, 2018, p. 20).

According to the most well-accepted taxonomy in the literature, proposed by the Oslo Manual (OECD, 2018), there are two main types of innovation: product innovation and process innovation. Product innovation refers to the introduction of new or significantly improved goods or services, while process innovation encompasses improvements in production, distribution, or marketing practices, as well as organizational techniques.

Both product and process innovations play a crucial role in promoting sustainable practices within firms. The Oslo Manual OECD (2018) highlights that product and process innovations can contribute to addressing global challenges, including sustainability, while also enhancing firms' competitiveness and responding to market demands for greener solutions. Moreover, research by Cheng et al. (2023) emphasizes that process innovation is key to achieving long-term sustainability, as it allows firms to minimize their environmental footprint while maintaining profitability. Therefore, by fostering both product and process innovations, companies can align their operations with sustainable development goals and adapt to the shifting global market demands.

The growing complexity of sustainability challenges requires firms to go beyond internal innovation efforts. Traditional closed innovation models may limit the ability to develop breakthrough solutions for environmental and social issues (Prado et al., 2025). In this context, open innovation serves as a strategic imperative. Originally defined as “a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology” (Chesbrough, 2003, p.43), the concept has evolved. It is now understood as “a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model” (Chesbrough & Bogers, 2014, p.17). This approach fosters collaboration with various stakeholders to develop innovative solutions. As firms expand internationally, they are exposed to new ideas, technologies, and practices from foreign markets, which encourages

knowledge exchange and co-creation of sustainable solutions. This collaborative process is vital in the current global context, where environmental sustainability requirements and consumer demand for eco-friendly products are intensifying (Cai & Li, 2018).

### **1.1.2. The Role of Stakeholders and the Firm's Network in Shaping Sustainable Practices**

Stakeholder Theory plays a vital role in explaining why firms adopt sustainable practices. This theory highlights that, to survive and succeed, firms must align their strategies and actions with the interests of their stakeholders (Freeman et al., 2004; Donaldson & Preston, 1995). To effectively engage with its stakeholders, a company must understand and manage their interests, integrating them into its decision-making processes. This approach has broad implications, including its application to areas like sustainability (Mahajan et al., 2023).

A company's operations are interconnected with a network of stakeholder relationships. Broadly, stakeholders can be categorized into two types of groups: internal and external; and primary and secondary. Internal stakeholders are individuals who have a direct connection to the company, whereas external stakeholders do not have a direct relationship but are influenced by the company's activities in some capacity (Block et al., 2023). Academic findings suggest that the influence of stakeholder pressure regarding environmental practices on a firm's actions tends to be fairly predictable (Helmig et al., 2016; Holzer, 2008). Primary stakeholders, including employees, customers, and government entities, play a pivotal role in encouraging firms to adopt environmentally friendly practices (Bello- Pintado et al., 2023). Furthermore, secondary stakeholders, such as the media and nonprofit organizations, often shape public opinion, indirectly pressuring businesses to enhance their environmental management commitments (Konadu et al., 2020). These mechanisms emphasize the ways stakeholders compel organizations to fulfill their environmental expectations regarding products and services. The mimetic and normative aspects of stakeholder influence (DiMaggio & Powell, 1983) induce firms to respond appropriately to evolving societal attitudes toward environmental sustainability.

Internationalization expands firms' operations into foreign markets, exposing them to diverse stakeholder expectations and regulatory environments. Kolk et al. (2017) emphasize that MNEs face heightened scrutiny in global markets, where sustainable practices often become prerequisites for legitimacy and market access. These firms play a pivotal role in

achieving the Sustainable Development Goals (SDGs), particularly through stakeholder-driven strategies that address environmental and social challenges. Exporting firms also face significant pressures to adopt sustainable practices, though these pressures often arise indirectly. Martos-Pedrero et al. (2022) emphasize that efforts to enhance environmental performance and align operations with international standards can substantially improve export performance. Regulatory frameworks in target markets serve as key drivers, encouraging exporters to obtain sustainability certifications and implement eco-friendly practices to remain competitive (Singh et al., 2024).

Moreover, stakeholder relationships are not isolated but embedded in complex interorganizational networks. Drawing on Network Theory (Johanson & Mattsson, 1988) firms are conceptualized as actors within business networks where knowledge, trust, and influence circulate. In international contexts, these networks shape how firms perceive stakeholder expectations, gain legitimacy, and adopt sustainable practices (Andersson et al., 2002). Thus, stakeholder salience may vary depending on the firm's network position, and firms embedded in more central or dynamic networks are likely to be more responsive to environmental expectations (Papaluca & Tani, 2020).

### **1.1.3. Ownership Advantages and Sustainability**

Hymer (1976) introduced and developed the concept of advantage in the IB field. In his pioneering work, he argued that possessing advantages such as technological expertise, superior knowledge, or economies of scale was a key factor driving firms to expand internationally and, at the same time, gaining market power. These benefits allowed companies to surmount the difficulties linked to operating in international markets, allowing them to mitigate the costs of foreignness and achieve profitability abroad.

Building on Hymer's work (and on other contributions), Dunning (1977) developed the Eclectic Paradigm of International Production. According to this framework, a firm's international engagement, whether through FDI, exports, or licensing is driven by the interaction of Ownership, Location and Internalization (OLI) advantages, which together form the foundation of such paradigm.

Ownership advantages stem from holding distinctive assets, which provide firms with a competitive edge over local companies in foreign markets. These advantages can be

categorized into three types: Proprietary Rights and Intangible Assets (Oa), Transaction Cost Minimizing Advantages (Ot), and Institutional Assets (Oi). The first category, Oa, includes resources such as innovative capabilities, management expertise, and accumulated knowledge, which allow firms to distinguish themselves from competitors. Ot refers to the advantages that come from the efficient coordination of resources across borders, such as economies of scale, risk reduction through diversification, and the ability to take advantage of varying regulations and factor endowments in different countries. In turn, Oi encompasses both formal and informal governance mechanisms that shape the firm's operations, such as codes of conduct, corporate culture, and diversity in management.

Sustainability has become embedded within ownership advantages as a strategic source of competitive differentiation. Firms with strong sustainability-related capabilities, such as innovations in green technologies or sustainable production processes, can turn these assets into powerful ownership advantages. By pioneering eco-friendly practices, firms gain a competitive edge, improve market legitimacy, and secure long-term profitability (Ly, 2021). Moreover, sustainability-driven ownership advantages enable firms to capitalize on transaction cost minimizing advantages (Ot). By embracing sustainable practices, companies can realize cost savings through enhanced energy efficiency, minimized waste, and improved sustainable supply chain management, while also accessing new markets where consumers demand greener products and services (Feng et al., 2024).

In recent years, researchers have built upon Dunning's Eclectic Paradigm to integrate network and stakeholder perspectives (Narula & Verbeke, 2015). While Dunning argues that Ownership, Location and Internalization advantages determine firms' internationalization strategies, recent studies highlight that strategic alliances and stakeholder networks are crucial in strengthening these advantages, particularly in the context of sustainability and innovation (Melane-Lavado & Álvarez-Herranz, 2020). Within this evolution, Ownership Advantages have been reassessed not only in terms of Oa, such as innovation capacity, R&D intensity, and knowledge capital, but also in terms of their applicability across different entry modes. For both MNEs and exporters, these Oa are essential to establish differentiation, signal legitimacy in global markets, and adapt to regulatory and consumer sustainability expectations (Ahmadova et al., 2022; Shu et al., 2024).

Simultaneously, OI are increasingly shaped through active engagement with diverse stakeholders. Firms must embed transparency, ethics, and responsiveness into their practices to maintain legitimacy abroad, continuously evolving their institutional assets through meaningful stakeholder engagement (Lundan, 2018). Therefore, managing stakeholder networks strategically transforms complexity into resilience, turning sustainability from a challenge into a source of durable competitive edge (Grewatsch & Kleindienst, 2017).

#### **1.1.4. Leveraging Resources and Capabilities: Resource-Based View**

A complementary perspective offering a valuable framework for understanding how internationalized firms can drive the adoption of sustainable practices by leveraging their internal resources and capabilities is the Resource-Based View (RBV). According to the RBV, firms are conceptualized as bundles of resources that are heterogeneously distributed and persistently differentiated across organizations (Penrose, 1959; Wernerfelt, 1984).

Barney (1991) highlighted that firms possessing VRIO (Valuable, Rare, Inimitable, Organized) resources are better positioned to respond to market dynamics and stakeholder demands. Hart (1995) expanded the RBV by introducing the "natural-resource-based view," arguing that firms could achieve long-term competitiveness by developing capabilities related to environmental sustainability, such as pollution prevention and sustainable development. Firms adopting proactive environmental strategies, not only enhance their environmental capabilities, but also achieve dual goals of sustainability and competitiveness, contributing to improved legitimacy and financial performance (Aragón-Correa & Sharma, 2003).

Exporting firms and MNEs both rely on internal resources to navigate the complexities of international markets, yet their approaches differ in scope and scale. Exporting firms leverage innovation and environmental management systems to comply with international standards, such as eco-labelling and sustainability certifications, which are often prerequisites for market access (Ramon-Jeronimo et al., 2019). MNEs, on the other hand, extend these practices beyond their home countries, drawing on extensive resource bases that include advanced technologies, organizational capabilities, and supply chain networks. These resources enable MNEs to not only meet regulatory demands but also act as catalysts for promoting sustainability practices across industries and regions, reinforcing their competitive advantage (Kolk & Van Tulder, 2010).

Building on the RBV, the Knowledge-Based View (KBV) extends this perspective by positing that knowledge is the most strategically significant resource within firms (Spender, 1996). As a refinement of the RBV, the KBV emphasizes the processes through which firms generate, integrate, and apply knowledge as key mechanisms for achieving and sustaining competitive advantage (Grant, 1996). Innovative capabilities, including the ability to develop and implement sustainable business models, are underpinned by firm-specific knowledge assets and learning processes (Khan et al., 2024).

Complementing the KBV, the Dynamic Capabilities framework offers a deeper understanding of how firms respond to and capitalize on change. Defined as a firm's ability to sense opportunities to meet customer needs, seize those opportunities by mobilizing resources and capturing value, and continuously renew itself through transformation (Teece et al., 1997), these capabilities depend on firm-specific assets, such as technological, financial and reputational resources and on the firm's capacity to learn and manage internal and external processes. Rather than merely reacting to external change, firms with strong dynamic capabilities can anticipate and shape evolving environments. This ability is especially critical for firms operating within global value chains (GVCs) or engaged in export activities, as they must adapt proactively to volatile markets and growing sustainability demands (Vu, 2020).

## **1.2. Empirical Literature: Internationalization and the Adoption of Sustainable Practices**

This section explores empirical studies on the relationship between internationalization and sustainability, analysing how firms' global expansion influences their adoption of sustainable practices. The Table A.1. in Appendix summarizes the literature reviewed in this field, highlighting their samples, variables, methodologies and contributions to the literature.

As previously noted, internationalization is frequently linked to the enhancement of sustainable practices, driven by factors such as compliance with international standards, competitive pressures, and organizational learning. Aguilera-Caracuel et al. (2012), Forslid et al. (2018) and Park (2018) collectively argue that exposure to international markets incentivizes firms to adopt greener technologies, proactive environmental strategies and improved Environmental, Social and Governance (ESG) practices. Aguilera-Caracuel et al. (2012) attribute this to organizational learning, where firms leverage global experiences to integrate advanced sustainability practices. Similarly, Forslid et al. (2018) highlight that

exporting firms tend to invest in cleaner production methods, demonstrating lower CO<sub>2</sub> emissions per output. Park (2018) reinforces this view, showing that Korean MNEs prioritize sustainability to align with global reputational and regulatory expectations.

More recently, Barbosa (2024) provided sector-specific evidence in the agribusiness context, showing that firms with a stronger international orientation tend to achieve significantly better environmental and financial performance. This study highlights that internationalization serves as a driver for the adoption of sustainable practices, propelled by external competitive pressures and the sustainability demands of international markets. The results confirm that international exposure in the agribusiness sector not only improves environmental responsibility but also offers financial benefits, reinforcing the importance of sustainability as a strategic asset in competitive global environments.

Despite these potential benefits, internationalization poses significant challenges to the adoption of sustainable practices. Amer (2023) and Sorroche-del-Rey et al. (2022) emphasize the uneven capacity of firms to meet international environmental standards. Amer (2023) highlights the financial and operational burdens associated with compliance, which can lead firms to exploit less regulated markets, a practice known as regulatory arbitrage. Sorroche-del-Rey et al. (2022) suggest that internationalization's effects are not universally positive and depend on firms' resources and the regulatory landscapes of their target markets.

The relationship between internationalization and sustainability is often contingent on contextual factors such as industry, firm size, and host-country characteristics. For instance, large MNEs are more likely to benefit from economies of scale and resource availability, enabling them to adopt sustainable practices more effectively than SMEs (Forslid et al., 2018; Amer, 2023).

The development context in which firms operate further complicates this relationship. Evidence from Zhang et al. (2024) indicates that firms in developed countries are more likely to adopt advanced sustainability practices than those in developing economies. This disparity arises from stricter regulatory frameworks, higher stakeholder expectations, and greater access to financial and technological resources in developed nations. However, in weaker regulatory environments, institutional voids present significant challenges. As Garri (2022) observes, MNEs in such contexts often act as self-regulators, implementing sustainability strategies that not only address their operational impacts but also fill institutional gaps,

thereby contributing to sustainable development. This highlights the dual role of MNEs in both meeting global standards and addressing local institutional deficiencies.

Empirical evidence further underscores the differing sustainability outcomes between MNEs and exporters. Gómez-Bolaños et al. (2019) reported a significant positive correlation between the extent of internationalization and firms' environmental performance among a sample of 287 listed companies operating within the energy and utilities industries, suggesting that MNEs are more likely to adopt comprehensive sustainability practices than exporters. This advantage stems from MNEs' broader international exposure, which drives the adoption of ESG practices that align with global standards. Conversely, exporters often exhibit a lower propensity for environmental innovation. For instance, Chiarvesio et al. (2014) found that firms exporting to developed economies displayed limited environmental innovation compared to those targeting emerging markets. This suggests that the act of exporting alone does not necessarily encourage firms to enhance their sustainability efforts, as exporters may prioritize incremental improvements driven by immediate compliance needs rather than long-term, strategic investments in sustainability.

In synthesizing these findings, it becomes clear that the relationship between internationalization and sustainability is complex and depends on various factors, making it difficult to determine whether it is inherently beneficial or detrimental. Instead, its effects depend on firm-specific capabilities, the regulatory environment of host countries, and the development context in which firms operate. While MNEs often exhibit superior environmental performance due to their resource availability, global exposure, and capacity to adapt to international standards, exporters are generally less equipped to leverage internationalization as a pathway to sustainability. This divergence underscores the importance of differentiating between internationalization strategies (e.g. distinct entry modes) when analysing their impact on sustainability outcomes.

This analysis leads to hypothesize that:

**H1:** Firms' internationalization is positively associated with the adoption of sustainable practices.

H1 can be decomposed into the following two sub-hypotheses:

**H1a:** Being a MNE is positively associated with the adoption of sustainable practices.

**H1b:** Being an exporter is positively associated with the adoption of sustainable practices.

### **1.3. Empirical Literature: The Role of Innovation in the Relationship between Internationalization and Sustainable Practices**

Expanding on the prior discussion, this section explores the direct effect of innovation as a driver of sustainable practices, while also considering its moderating role in the relationship between internationalization and the adoption of sustainable practices.

#### ***Direct effect***

Innovation is a key enabler of sustainable practices, operating through multiple channels. Empirical evidence consistently demonstrates that firms engaging in innovation are more likely to implement sustainable practices. For instance, the meta-analysis conducted by Kuzma et al. (2020) consolidates evidence from 15 empirical studies and confirms that innovation has a significant positive impact on sustainability, especially when oriented toward economic and environmental dimensions.

At the firm level, different types of innovation present heterogeneous effects on sustainability. Sempere-Ripoll et al. (2020) show that radical innovations, as well as firms combining internal and external innovative activities, are particularly associated with stronger commitments to sustainability practices such as energy and resource efficiency, environmental compliance and voluntary initiatives. However, their study also highlights that context matters: firms in Central and Eastern European countries, despite engaging in innovation, reveal a weaker orientation towards sustainability compared to their Western counterparts, suggesting that institutional and regional factors may condition the innovation–sustainability link.

From the perspective of SMEs, Alraja et al. (2022) provide evidence during the COVID-19 crisis in Oman that technological innovation significantly supports the adoption of green practices. These, in turn, positively affect sustainable performance, although not all practices translate directly into measurable improvements. Their findings emphasize that aligning

technological and organizational innovations is essential for firms, particularly in times of disruption.

Focusing on process innovation, Moyano-Fuentes et al. (2018) demonstrate that firms engaging in internal process innovation show greater environmental involvement. Importantly, their study finds that the relative intensity of process innovation compared to competitors strengthens this relationship, while its effect diminishes over time, reflecting the temporal dynamics of institutional and competitive pressures. These insights suggest that innovation not only facilitates the adoption of sustainable practices but also interacts with firm positioning and the broader institutional environment.

Overall, innovation has a positive and multidimensional effect on sustainability, shaped by the type of innovation, institutional context, and temporal dynamics. This leads to formulate the following research hypothesis:

**H2:** Innovation is positively associated with the adoption of sustainable practices.

### ***Moderating effects***

Innovation also may play a pivotal and multifaceted role in moderating the link between internationalization and sustainable practices. As firms expand into international markets, they face increased scrutiny from global stakeholders and must align with stringent environmental regulations and sustainable development goals (Suarez-Perales et al., 2017). Innovation emerges as a key driver that enables firms to adapt to these demands while enhancing their competitive advantage. Research consistently demonstrates that firms with higher investment in Research and Development (R&D) and advanced technological capabilities are better positioned to implement proactive sustainability strategies.

For instance, Suarez-Perales et al. (2017) provide evidence from Spanish firms, showing that R&D investment and patenting activities are strongly associated with environmental proactivity. Firms operating in international markets tend to encounter stricter environmental standards, prompting them to innovate and adopt greener technologies. This aligns with Gonçalves et al. (2024), who emphasize the role of open innovation in fostering sustainability among MNEs. By engaging in collaborative innovation processes, MNEs leverage external expertise to address complex environmental challenges, such as pollution reduction and

energy efficiency, thus amplifying the positive relationship between international sales intensity and sustainability outcomes.

Tsukanova (2022) provides a nuanced understanding of how innovation moderates the relationship between internationalization and sustainable practices in small and medium-sized enterprises (SMEs). The study examines various innovation strategies, including internal R&D, external knowledge sourcing and collaborative partnerships, and shows how these strategies interact with international engagement to influence the adoption of green practices. Notably, the findings reveal a paradox: although innovation positively influences sustainability efforts, it can simultaneously weaken the relationship between export intensity and sustainable practices due to the resource-intensive nature of innovation processes, which may strain the limited financial and managerial capacities of SMEs. In other words, innovation in SMEs is not an unambiguous enabler but rather a double-edged sword, while it can enhance environmental performance, it may also divert critical resources away from other areas necessary for managing international expansion. Moreover, highlights important heterogeneities among SMEs, showing that the positive effects of innovation are more pronounced when firms benefit from supportive institutional environments, such as access to public funding, technical assistance, or collaborative networks. In the absence of such support, firms may struggle to sustain innovation efforts while simultaneously navigating the operational and regulatory complexities of international markets. This reinforces the notion that the effectiveness of innovation as a moderator is highly context-dependent and contingent on both internal capabilities and external support structures.

Complementing these findings, Hernández et al. (2022) show that, in 19 transition economies, innovation moderates the negative effects of institutional deficiencies on export intensity, suggesting that it acts as an adaptive mechanism that helps firms overcome structural barriers that also tend to hinder the implementation of environmental strategies. Marco-Lajara et al. (2023), in turn, demonstrate that international experience enables firms to acquire environmental knowledge, promoting eco-innovation; thus, it is not internationalization per se that improves sustainability performance, but the firm's ability to transform international exposure into learning mechanisms that drive environmental innovation. These studies emphasize the role of knowledge flows and absorptive capacity as key intermediaries in the relationship between internationalization, innovation, and sustainability.

This dissertation differs by including (although SMEs are the majority) both SMEs and MNEs, enabling a comparison of how innovation's moderating role changes with firm size, capabilities, and institutional support. This broader focus aims to offer a more comprehensive understanding of the complex relationship between internationalization, innovation, and sustainability across diverse contexts.

SMEs typically operate with fewer resources and may lack the scale advantages enjoyed by larger MNEs. This resource constraint affects their ability to simultaneously invest in innovation and comply with international environmental standards. Moreover, the uneven distribution of innovation capabilities across industries and geographic regions further exacerbates this disparity. Suarez-Perales et al. (2017) and Tsukanova (2022) both underscore the importance of institutional support, such as funding and access to technical expertise, in enabling SMEs to overcome these barriers. Without such support, SMEs may prioritize short-term survival over long-term sustainability, thus limiting the positive moderating effect of innovation.

In contrast, MNEs often demonstrate a stronger capacity to align innovation with sustainability objectives. Gonçalves et al. (2024) emphasize that internationalization provides MNEs with opportunities to adopt open innovation models, which facilitate the co-creation of sustainable solutions with external stakeholders. This approach not only enhances the adoption of advanced environmental practices but also enables firms to address global challenges such as climate change and resource scarcity. Zhao et al. (2024) further illustrate the critical role of MNEs in integrating sustainable innovation into their strategic frameworks. By aligning their innovation efforts with the United Nations SDGs, MNEs can achieve dual objectives of economic growth and environmental stewardship.

The literature also points to the role of industry-specific and geographic factors in shaping the innovation-sustainability relationship. Suarez-Perales et al. (2017) note that firms in environmentally sensitive industries, such as manufacturing and energy, are more likely to engage in innovation-driven sustainability practices due to higher regulatory pressures. Similarly, Gonçalves et al. (2024) observe that the intensity of international sales is positively correlated with sustainability efforts, particularly in sectors with high stakeholder visibility and environmental impact. Additionally, Hernández et al. (2022) observe that in transition economies, innovation moderates the negative effects of poor institutional quality on firms'

export intensity, particularly in sectors with high stakeholder visibility and environmental impact.

In summary, innovation plays a dual role in moderating the relationship between internationalization and sustainable practices: it enables firms to meet global environmental standards and enhance sustainability performance, yet it can also impose resource constraints that hinder effective management of international expansion. The extent of these benefits depends on factors such as firm size, resource availability, and institutional support. While MNEs are generally better equipped to use innovation as a pathway to sustainability, SMEs often face greater challenges balancing innovation efforts with the demands of internationalization. An overview table of the empirical literature reviewed in this section is provided in Appendix (Table A.2.)

Based on the theoretical and empirical literature, the following hypotheses are proposed:

**H3:** Innovation positively moderates the relationship between firms' internationalization and the adoption of sustainable practices.

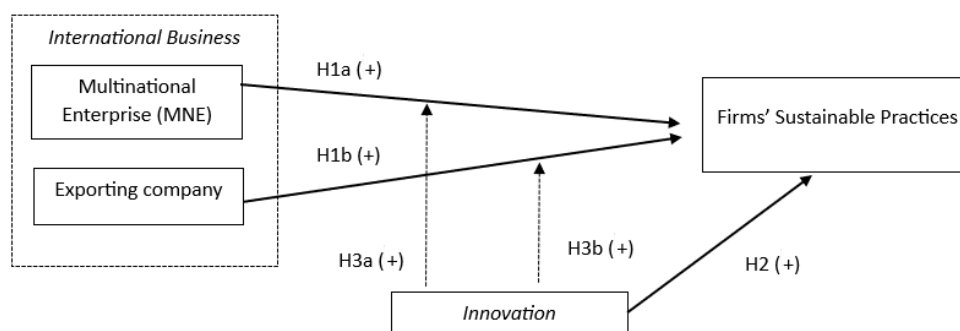
H3 can be decomposed into the following two hypotheses:

**H3a:** Innovation positively moderates the relationship between being a MNE and the adoption of sustainable practices.

**H3b:** Innovation positively moderates the relationship between being an exporter and the adoption of sustainable practices.

The framework in Figure 1 identifies the posited relationships.

**Figure 1.** Framework Proposed



**Source:** Own elaboration.

## Chapter 2. Econometric Analysis

This chapter outlines the methodological approach adopted to answer the research question and test the above identified hypotheses. The study employs an econometric model using data from BEEPS. Section 2.1. describes the BEEPS survey, the data selection criteria and section 2.2 details the variables used in the analysis and the econometric methodology applied.

### 2.1. Sample and Data

The BEEPS survey, a collaborative initiative between the European Bank for Reconstruction and Development (EBRD) and the World Bank Group (WBG), was first conducted in 1999–2000, covering approximately 4 100 firms in 25 Eastern European and Central Asian countries with the aim of providing systematic and comparable firm-level data across transition and developing economies. Initially designed to monitor the progress of post-socialist transition economies in Eastern Europe and Central Asia, the survey has since evolved to cover a broader range of countries and topics. Using a standardized questionnaire and uniform sampling methodology to collect comparable firm-level data across countries. The survey investigates a wide spectrum of topics related to the business environment and firm performance, such as business-government relations, access to finance, input costs, workforce composition, infrastructure, and critical areas including competition, training, technology adoption, R&D, and innovation (BEEPS, 2020). The data are gathered through face-to-face interviews with key firm representatives, typically managing directors, accountants and human resource managers, using standardized instruments to minimize measurement error and ensure data consistency across economies.

This research draws on the latest wave of data collection (2018–2020), referred to as the sixth round, which covers 41 economies and nearly 28000 enterprises of the EU, Eastern Europe, Central Asia and Middle East and North of Africa<sup>1</sup>, including both developed and developing countries. The diversity of the sample enhances the ability to conduct

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<sup>1</sup> Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Egypt, Estonia, Georgia, Greece, Hungary, Italy, Jordan, Kazakhstan, Kosovo, Kyrgyz Republic, Latvia, Lebanon, Lithuania, Malta, Moldova, Mongolia, Montenegro, Morocco, North Macedonia, Poland, Portugal, Romania, Russia, Serbia, Slovak Republic, Slovenia, Tajikistan, Tunisia, Turkey, Ukraine, Uzbekistan and West Bank and Gaza.

comparative analyses of firms operating in different economic and institutional environments.

Notably, this wave introduces a specialized Green Economy module focused on sustainable management practices and investments in environmental initiatives. As this module was not available in previous waves, the sixth round is particularly relevant for analysing how firms engage with green practices. Given that the focus of this dissertation is on the environmental strategies of multinational and exporting firms, it is essential to use data that captures these aspects comprehensively. Therefore, the analysis specifically targets firms whose managers completed the Green Economy module, enabling a focused examination of the relationship between internationalization and sustainable practices.

Although empirical research using BEEPS data to simultaneously examine the relationships between internationalization, innovation, and sustainable practices remains scarce, this gap underscores the pioneering nature of the present study. Notably, studies such as Tsukanova (2022) provide valuable empirical insights by directly addressing the interaction of these three dimensions, particularly within the context of SMEs. Building on this groundwork, the present study advances the literature by offering a more systematic exploration of how internationalization and innovation interact to influence firms' adoption of sustainable practices, thereby addressing a relevant gap and contributing to a deeper understanding of the phenomena under analysis.

Moreover, the robustness and versatility of BEEPS data have been demonstrated in a wide range of empirical studies beyond this field. For example, BEEPS has been used to investigate innovation dynamics (Petković et al., 2023; Reçica et al., 2019), firm productivity (Gogokhia & Berulava, 2021) and the interplay between home country institutions, innovation, and exports (Hernández et al., 2022). These diverse applications highlight BEEPS's capacity to provide rich, comparable firm-level data across countries and time, making it a valuable resource for advancing empirical research on firms' strategic and operational responses to external and internal challenges.

The construction of the working dataset began with a preliminary cleaning process of the original BEEPS VI data. Survey blocks unrelated to the core focus of this research were excluded. Specifically, sections C – Infrastructure and Services, T – Time Use of Top

Manager, G – Land and Permits and I – Crime were removed, streamlining the dataset to include only firms with information relevant to the study’s conceptual model.

Following this cleaning step, attention was directed to the temporal distribution of observations. The question labelled a20y, which captures the calendar year in which the firm’s last completed fiscal year ended, was used as a filter. A frequency table (Table B.1. in Annex) comparing each country with the responses to the a20y question, revealed that only in 2018 did the survey achieve comprehensive coverage across all 41 countries, with 24 501 observations representing approximately 88% of the total sample. Other years (2016, 2017 and 2019) exhibited incomplete or sparse country representation, limiting comparability.

Therefore, to ensure both temporal consistency and methodological comparability, while aligning with the approach adopted in prior research using BEEPS data (Fernandez, 2022), the analysis was restricted to observations from 2018 only. This decision ensures that all firms were surveyed under similar conditions and with full availability of the Green Module variables. As a result, the final analytical sample includes 24 501 firms surveyed in 2018 across 41 countries, offering a robust basis to explore the link between internationalization and environmental performance.

To further characterize the sample, the data were restricted to the year 2018 and filtered to include only firms that responded to the Green Module. Table 1 presents the number and percentage of firms in key categories such as multinational status, exporter status, and innovation activity, based on the restricted sample. Table 2 complements this by providing a breakdown of firms according to their country's development level, defined following the World Bank’s income classifications.

**Table 1.** Distribution of Firms by Key Characteristics

| Characteristic                   | n (Firms) | Sample Percentage |
|----------------------------------|-----------|-------------------|
| MNE                              | 1 916     | 7.91%             |
| Exporter                         | 6 953     | 28.72%            |
| Innovation activity <sup>2</sup> | 7 866     | 32.49%            |
| Completed Green Module (Total)   | 24 213    | 100%              |

**Source:** Own elaboration using Stata 18.

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<sup>2</sup> Firms that introduced product or process innovations or invested in external knowledge acquisition over the past three years.

As shown in Table 1, the sample offers a rich and diverse foundation for exploring the relationship between internationalization and sustainability. MNEs represent 7.91% of the firms, while 28.72% are exporters, offering relevant observations for the study of internationalization. Innovation activity is also notably present, with 32.49% of firms reporting engagement in at least one form of innovation. Moreover, Table 2 shows that the majority of firms in the sample 61.67% are located in developing countries, while 38.33% are in developed countries.

**Table 2.** Distribution of Firms by Development Level and Location

| Level of development/ Location | n (Firms) | Sample Percentage |
|--------------------------------|-----------|-------------------|
| Developed Countries            | 9 281     | 38.33%            |
| Developing Countries           | 14 932    | 61.67%            |
| Europe                         | 17 211    | 71.08%            |
| Africa                         | 4 037     | 16.67%            |
| Asia                           | 2 965     | 12.25%            |
| Total                          | 24 501    | 100%              |

**Source:** Own elaboration using Stata 18.

To complement the overview, Table B.2. in Annex presents the sectoral distribution of firms, allowing for a clearer understanding of the economic activities represented in the sample.

## 2.2. Variables

This section describes the variables used in the model. Table 3 below provides their definitions and outlines their expected relationship with the dependent variable.

The dependent variable in this research is **Sustainable Practices**, defined as a count of environmentally sustainable actions adopted by each firm. It is constructed by summing binary responses (“yes” = 1; “no” = 0) to ten specific questions from the Green Module of the BEEPS VI survey, which refer to measures implemented over the past three years to reduce environmental impact, such as energy consumption control and applying air pollution control measures. Each affirmative answer adds one point to the total, resulting in a composite indicator ranging from 0 to 10.

The exact wording of the questions used to build this variable is presented in Table B.3. (Annex). This construction follows similar approaches found in the literature (Bergantino et al., 2024; Tsukanova, 2022), where count variables are used to capture the extent of firms’ engagement with environmental practices.

On the other hand, the main independent variable is Internationalization, captured using two distinct binary variables that reflect a firm's exposure to international markets. The first variable, **Exporter**, identifies the exporting status of the firm and is captured through a binary variable, which takes the value of 1 if the firm sells any portion of its output abroad, either directly or indirectly, and 0 if its sales are exclusively domestic. This measure reflects whether a firm participates in international markets, consistent with prior empirical approaches (Gashi et al., 2014; Cieřlik et al., 2022). Several studies suggest that exposure to foreign markets may foster more sustainable behaviors, as international clients and regulations often impose stricter environmental requirements. In line with this, prior research (Aguilera-Caracuel et al., 2012; Forslid et al., 2018; Tsukanova, 2022) has found that exporting firms tend to engage more actively in environmental practices, supporting the expectation of a positive relationship with the dependent variable.

The second key independent variable is **MNE**, which captures the foreign ownership status of the firm. This variable is defined as a binary indicator that takes the value of 1 if the firm reports that at least 10% of its equity is held by a foreign entity and 0 otherwise. This operationalization is directly aligned with the widely recognized definition provided by the UNCTAD (2022). A positive relationship between multinational status and sustainable practices is expected, as MNEs often face stricter regulatory pressures in their home countries, operate under greater public scrutiny, and have better access to advanced technologies and managerial practices. This notion aligns with the already reviewed findings of Chiarvesio et al. (2014), Garri (2022), Park (2018) and Zhao et al. (2024), who argue that MNEs are more likely to internalize global sustainability standards and to diffuse environmentally responsible practices across borders.

The variable **Innovation** captures the firm's engagement in innovation over the past three years. It is operationalized through three binary indicators that reflect whether the firm introduced product innovations, process innovations, or invested in external knowledge acquisition. Each variable is coded as 1 if the firm responded "Yes" (to any of the three binary indicators) and 0 otherwise. This broader conceptualization follows the approach discussed earlier and aligns with prior empirical studies (Johansson & Lööf, 2008; Sime & Tadesse, 2025), which interpret innovation as the result of deliberate efforts to develop novel or improved products, enhance production processes, or integrate external knowledge sources. By distinguishing between these three dimensions, the variable captures both

market-oriented and efficiency-driven innovations, as well as the firm's openness to outside expertise, offering a more comprehensive understanding of innovation behavior. Innovation is expected to influence sustainability outcomes directly, as well as moderate the strength or direction of the relationship between internationalization and sustainable practices. Based on existing literature (Cai & Li, 2018; Cheng et al., 2023), a positive moderating effect is anticipated, as innovation-capable firms are generally better equipped to absorb sustainability-related knowledge and implement environmentally responsible strategies in response to global competitive pressures.

To ensure the robustness of the empirical analysis, a set of control variables is included to account for the potential influence of firm-specific characteristics on the likelihood of adopting sustainable practices. Firstly, **Firm Age** is introduced as a proxy for the experience and accumulated learning of the establishment, which can influence both international operations and innovation practices (Elango & Pattnaik, 2007). In line with this rationale, a positive relationship is expected between Firm Age and the adoption of sustainable practices, as older firms are more likely to have developed the necessary capabilities, routines, and legitimacy to implement environmental strategies effectively. Specifically, following prior studies (Oxelheim & Randøy, 2003), Firm Age is measured as the natural logarithm of the number of years the firm has been in operation, a transformation that mitigates issues of skewness in the raw age data and improves the distribution for econometric estimation (Weinberg & Abramowitz, 2008).

Secondly, **Firm Size** is controlled for, as it is frequently cited in the literature as a determinant of both internationalization and environmental behavior (Estrin et al., 2016; Singh et al., 2020). In line with recent empirical studies, the number of permanent, full-time employees at the end of the last fiscal year is used as a proxy for firm size, reflecting the establishment's human resources capacity (Kautonen et al., 2020), and providing a more stable, less volatile, measure of firm size than other alternatives, e.g. sales (Dang et al., 2018). Specifically, following standard practice, Firm Size is transformed using the natural logarithm to reduce skewness and ensure a more appropriate distribution for econometric estimation (Wooldridge, 2010). A positive relationship is expected between firm size and the adoption of sustainable practices, as larger firms tend to face greater institutional pressure, public scrutiny, and stakeholder expectations regarding environmental responsibility. Moreover, they generally possess more slack resources and organizational capacity to implement eco-

innovations and comply with environmental regulations (Gallo & Christensen, 2011; Wang et al., 2018).

Thirdly, **Stakeholder pressure** is included as a control variable, given its relevance in influencing firms' adoption of sustainable practices. Following Bello- Pintado et al. (2023) and Konadu et al. (2020), it is expected that firms facing external environmental demands are more likely to engage in such practices. In this study, stakeholder pressure is captured through a binary indicator based on question BMGA.4 from the BEEPS survey, which records whether any of the firm's customers required environmental certifications or compliance with environmental standards. A value of 1 reflects the presence of such pressure and 0 its absence.

Lastly, **Human Capital (HC)** is included as an additional control variable, measured by the percentage of employees holding a university degree. This variable serves as a proxy for the skill level and educational background of the workforce, which can significantly influence a firm's capacity to adopt sustainable practices. A more qualified workforce is likely to exhibit higher environmental awareness, better technical capabilities, and stronger absorptive capacity for implementing innovative and sustainable solutions (Horbach et al., 2012). In particular, firms with higher human capital tend to be more responsive to environmental regulations and stakeholder pressures, and are better positioned to translate knowledge into organizational change (Triguero et al., 2013).

Beyond firm-level characteristics, sector and country heterogeneities are controlled for to capture unobservable factors that could influence the adoption of sustainable practices. In the empirical models, sector and country controls are introduced as sets of dummy variables (fixed effects), derived from the categorical codes in the BEEPS VI dataset and included using the 'i.country' and 'i.sector' notations in the regression specification.

Sector controls are introduced to account for structural differences across industries, as certain sectors, particularly those with higher environmental impact, such as manufacturing, energy and chemicals are often subject to stricter regulations and stakeholder scrutiny (Benatti et al., 2024). Likewise, country fixed effects control for institutional, regulatory, and cultural differences across economies, which are known to affect firms' environmental behavior (Amer, 2023).

**Table 3.** Variables' Description and Expected Results

| Variable                     | Description                                                                                                                                                            | Expected Signal    | Literature                                                                    |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------|
| <b>Sustainable_Practices</b> | Count variable measuring the number of green practices adopted by the firm, based on 10 sustainability-related survey items.                                           | Dependent Variable | Bergantino et al. (2024)<br>Tsukanova (2022)                                  |
| <b>Exporter</b>              | Dummy variable: 1 if the firm exports (directly or indirectly); 0 otherwise.                                                                                           | (+)                | Aguilera-Caracuel et al. (2012)<br>Forslid et al. (2018)<br>Tsukanova (2022)  |
| <b>MNE</b>                   | Dummy variable: 1 if the firm has $\geq 10\%$ foreign ownership; 0 otherwise.                                                                                          | (+)                | Chiarvesio et al. (2014)<br>Garri (2022)<br>Park (2018)<br>Zhao et al. (2024) |
| <b>Innovation</b>            | Composite binary variable indicating whether the firm introduced product or process innovations or invested in external knowledge acquisition in the past three years. | (+)                | Cai & Li (2018)<br>Cheng et al. (2023)                                        |
| <b>Firm Age</b>              | Natural logarithm of the number of years since the business was founded.                                                                                               | (+)                | Elango & Pattnaik (2007)                                                      |
| <b>Firm Size</b>             | Natural logarithm of the total full-time employees at the end of the last fiscal year.                                                                                 | (+)                | Gallo & Christensen (2011)<br>Wang et al. (2018)                              |
| <b>Stakeholder pressure</b>  | Dummy variable: 1 if customers required environmental certifications or compliance with environmental standards; 0 otherwise.                                          | (+)                | Bello-Pintado et al. (2023)<br>Konadu et al. (2020)                           |
| <b>Human Capital (HC)</b>    | Percentage of employees with a university degree.                                                                                                                      | (+)                | Horbach et al. (2012)<br>Triguero et al. (2013)                               |
| <b>Sector</b>                | Controls for unobserved country-level differences.                                                                                                                     | n.a.               | Benatti et al. (2024)                                                         |
| <b>Country</b>               | Controls for unobserved sector-specific characteristics.                                                                                                               | n.a.               | Amer (2023)                                                                   |

**Source:** Own elaboration, based on the literature reviewed.

## 2.3. Descriptive Statistics

This section presents a descriptive overview of the main variables used in this study, based on the cleaned dataset derived from the sixth wave of the BEEPS survey. The analysis was conducted using Stata 18 software and includes measures of central tendency: mean, median, minimum, and maximum, as well as dispersion (standard deviation).

**Table 4.** Descriptive Statistics

| Variable                     | Obs    | Mean      | Median | Std. dev. | Min | Max     |
|------------------------------|--------|-----------|--------|-----------|-----|---------|
| <b>Sustainable Practices</b> | 20 008 | 2.828669  | 2      | 2.74454   | 0   | 10      |
| <b>MNE</b>                   | 24 213 | 0.079131  | 0      | 0.2699488 | 0   | 1       |
| <b>Exporter</b>              | 24 213 | 0.2871598 | 0      | 0.4524461 | 0   | 1       |
| <b>Innovation</b>            | 24 213 | 0.3248668 | 0      | 0.4683347 | 0   | 1       |
| <b>Firm Age</b>              | 23 942 | 20.05313  | 17     | 15.64245  | 0   | 205     |
| <b>Firm Size</b>             | 24 008 | 156.7489  | 21     | 10808.75  | 1   | 1673000 |
| <b>Stakeholder pressure</b>  | 23 973 | 0.1344429 | 0      | 0.3411347 | 0   | 1       |
| <b>Human Capital</b>         | 10 893 | 28.99972  | 20     | 28.42295  | 0   | 100     |

**Source:** Own elaboration using Stata 18.

As shown in Table 4, the variable Sustainable Practices, which ranges from 0 to 10, presents a mean of 2.83, a standard deviation of 2.74 and a median value of 2. This suggests that, on average, firms adopt only a limited set of the environmental practices captured by this indicator. Although 98.82% of the firms completed the Green Module, only 20 008 observations were retained for this variable. This is because Sustainable Practices was constructed based on a selected group of items within the Green Module that required valid binary responses (“yes” or “no”). Consequently, only firms that provided complete and valid information for all selected items were considered, in order to preserve the internal consistency and accuracy of the composite measure.

The variable MNE presents a mean value of 0.079, indicating that around 7.9% of the firms in the sample are classified as multinationals. The median is 0, and the standard deviation is 0.27, which is expected for a binary variable. These figures reflect the proportion of multinational firms relative to domestic firms within the dataset used for this analysis.

Regarding the Exporter variable, the median also being 0 indicates that the majority of the firms do not export (28% of the firms in the sample are exporters), but the relatively higher standard deviation (0.45) compared to MNEs suggests more variability in exporting status.

This aligns with the idea that exporting may be a more widespread form of international engagement than multinational ownership, potentially facilitated by lower entry barriers.

The variable Innovation presents a median of 0 and a standard deviation of 0.47, indicating a skewed distribution with a majority of firms reporting no innovation activity. Despite this concentration of zero values, approximately 7 866 firms (32.5%) reported engaging in some form of innovation, offering a solid basis for subgroup analysis. The relatively high dispersion suggests heterogeneity in innovation behavior within the sample.

The Firm Age variable has a mean of 20.05 years and a median of 17, with a standard deviation of 15.64 and a range from 0 to 205 years. The median being lower than the mean suggests a right-skewed distribution, indicating the presence of a few very old firms that pull the average upwards. The large variability highlights the heterogeneity in the age profile of firms, ranging from newly established businesses to very old ones.

The Firm Size variable, measured by the number of employees, shows a mean of 156.7 and a median of 21, with a very large standard deviation (10808.75) and a maximum value of 1 673 000 employees. These statistics indicate a highly skewed distribution, where most firms are relatively small (as shown by the median), but a few very large firms significantly increase the average. This extreme dispersion suggests the need for careful treatment of this variable in econometric models, notably by applying a logarithmic transformation to reduce the effect of outliers and normalize the distribution.

The Stakeholder pressure variable has a mean of 0.13, a median of 0, and a standard deviation of 0.34, with values ranging from 0 to 1, as it is a binary variable. The low mean suggests that only about 13.4% of firms report experiencing pressure from stakeholders regarding environmental or sustainability issues. The dominance of zero values indicates that, for the majority of firms, such pressure is not perceived as relevant, which may limit their motivation to engage in sustainable practices.

Finally, the Human Capital variable, which has the smallest number of observations (10 893), displays a mean of 29, a median of 20, and a standard deviation of 28.42, with values ranging from 0 to 100. The difference between the mean and median, as well as the relatively high standard deviation, reflect substantial variation in workforce qualification levels across firms.

This heterogeneity may play a critical role in shaping firms' absorptive capacity, innovation capabilities, and the adoption of sustainable practices.

Table B.4. in Annex presents the correlation matrix of the explanatory variables and the Variance Inflation Factor (VIF) test. It provides initial insights into the relationships among the independent variables, helping to identify potential multicollinearity issues.

Through the analysis of the Pearson Correlation Test (Table B.4.), notable relationships are revealed. Sustainable Practices shows positive and statistically significant correlations with the key explanatory variables, Innovation (0.3318), Exporter (0.2234) and MNE (0.0971), consistent with the expectation that innovative and internationally engaged firms tend to be more committed to environmental practices.

Among the control variables, Firm size correlates positively with Innovation and Exporter status, while Stakeholder pressure shows a moderate positive association with Sustainable Practices. Although these values suggest a substantial association, they remain below the conventional threshold of 0.8 that typically raises concerns about harmful multicollinearity (Gujarati & Porter, 2009). By contrast, Firm age and Human capital present weak or negligible correlations, indicating limited influence.

Overall, the correlation matrix reveals associations that are directionally consistent with the theoretical framework and previous empirical findings, while also indicating that multicollinearity is not expected to pose a major threat to the estimation of the models. Even so, the Variance Inflation Factor (VIF) was applied to evaluate potential multicollinearity among the independent variables. All VIF values are well below the threshold of 10, with a mean of 1.70, confirming that the explanatory variables are not excessively correlated and the regression estimates are unlikely to be biased (Neter et al., 1989).

## **2.4. Model Specification**

As the dependent variable displays characteristics typical of count data, taking only non-negative integer values, count data models are utilized for the analysis. While the Poisson regression model is a common starting point for count data due to its simplicity and interpretability (Cameron & Trivedi, 2009), it imposes the restrictive assumption of equidispersion, meaning that the mean and variance of the dependent variable must be equal.

In practice, especially with survey data, this assumption is frequently violated due to the presence of over-dispersion, where the variance exceeds the mean. To address this issue, we opt for the Negative Binomial Regression Model, an extension of the Poisson model that introduces an additional parameter to explicitly model over-dispersion (Hilbe, 2011). This allows for more flexible and accurate estimation of the expected count of sustainable practices, as it accounts for unobserved heterogeneity across firms that may influence their environmental behaviour. The use of the negative binomial model is consistent with prior research examining similar dependent variables derived from BEEPS data, such as in the studies of Tsukanova (2022) and Un & Rodríguez (2018) which also identified over-dispersion in the data.

The standard probability mass function of the negative binomial distribution for a variable  $Y$  is given by:

$$f(y; \mu, k) = \frac{\Gamma(y + k)}{\Gamma(k) + \Gamma(y + 1)} \left( \frac{k}{k + \mu} \right)^k \left( \frac{\mu}{k + \mu} \right)^y$$

where:

- $\mu = E(Y)$  is the expected value;
- $\text{Var}(Y) = \mu + \frac{\mu^2}{k}$  is the variance;
- $k$  is the dispersion (gamma scale) parameter;
- $1/k$  reflects the degree of overdispersion.

It allows variance to exceed the mean, overcoming a key Poisson limitation.

The general econometric specification is:

*Sustainable Practices<sub>i</sub>*

$$\begin{aligned} &= \beta_0 + \beta_1 \text{Exporter}_i + \beta_2 \text{MNE}_i + \beta_3 \text{Innovation}_i \\ &+ \beta_5 (\text{Exporter}_i \times \text{Innovation}_i) + \beta_7 (\text{MNE}_i \times \text{Innovation}_i) + X_i' \gamma \\ &+ \varepsilon_i \end{aligned}$$

Where:

- ***Sustainable Practices<sub>i</sub>***: the number of sustainable practices adopted by firm  $i$  (dependent variable). This is a count variable ranging from 0 to 10.
- ***Exporter<sub>i</sub>***: a dummy variable that equals 1 if the firm exports (either directly or indirectly), and 0 otherwise.
- ***MNE<sub>i</sub>***: a dummy variable that equals 1 if the firm is a multinational enterprise (i.e.,

has at least 10% foreign ownership), and 0 otherwise.

- ***Innovation<sub>i</sub>***: a dummy variable that equals 1 if the firm has introduced product or process innovations or invested in external knowledge acquisition over the past three years, and 0 otherwise.
- ***Exporter<sub>i</sub> × Innovation<sub>i</sub>***: interaction term used to test whether innovation moderates the relationship between exporting status and the adoption of sustainable practices.
- ***MNE<sub>i</sub> × Innovation<sub>i</sub>***: interaction term used to test whether innovation moderates the relationship between being a multinational firm and the adoption of sustainable practices.
- ***X<sub>i</sub>***: vector of control variables, which includes: firm age (log), firm size (log), stakeholder pressure, human capital, country and sector fixed effects.
- ***ε<sub>i</sub>***: error term.

## 2.5. Results and Discussion

Table 5 presents the results of negative binomial models that test our Hypotheses. Five models are estimated sequentially. The first model includes only the control variables. Model 2 analyses the direct relations between the different types of firms' internationalization (Exporter and MNE), innovation and sustainable practices. Model 3 and 4 include interaction terms to test the moderating effects of innovation on the relations between internationalization and sustainable practices. Finally, Model 5 jointly reports all direct effects and interaction terms. All models are statistically significant at the 1% level.

Model 1, restricted to control variables, serves as the reference point for the analysis. Firm age is positively associated with the adoption of sustainable practices, consistent with Elango & Pattnaik (2007), suggesting that older firms benefit from accumulated experience and legitimacy. Firm size is also positively significant, reinforcing the findings of Gallo & Christensen (2011) and Wang et al. (2018), aligning with the RBV and the ownership advantages logic, as larger firms benefit from greater resources and capabilities to internalize sustainable practices as a source of competitive advantage. Stakeholder pressure emerges as another strong determinant, in line with Stakeholder Theory and the evidence of Bello-Pintado et al. (2023) and Konadu et al. (2020), showing how external demands act as powerful

catalysts for environmental engagement. By contrast, human capital does not display a significant effect, suggesting that no robust statistical relationship can be established between workforce education levels and the adoption of sustainable practices. This result contradicts Horbach et al. (2012) and Triguero et al. (2013), who argue that a more qualified workforce enhances firms' capacity to adopt sustainable practices. A possible explanation is that workforce skills alone may not be sufficient, as their impact depends on complementary organizational resources and institutional support (Tsukanova, 2022).

**Table 5.** Negative Binomial Regression Results

|                       | <b>Sustainable Practices</b>       |                                    |                                     |                                    |                                    |
|-----------------------|------------------------------------|------------------------------------|-------------------------------------|------------------------------------|------------------------------------|
|                       | <b>Model 1</b>                     | <b>Model 2</b>                     | <b>Model 3</b>                      | <b>Model 4</b>                     | <b>Model 5</b>                     |
| <i>Exporter</i>       |                                    | <b>0.1055925***</b><br>(0.0261213) | <b>0.17277***</b><br>(0.0315073)    | <b>0.1048584***</b><br>(0.0238651) | <b>0.173669***</b><br>(0.0321248)  |
| <i>MNE</i>            |                                    | <b>-0.071878**</b><br>(0.0359336)  | <b>-0.0736943**</b><br>(0.031165)   | <b>-0.0524983</b><br>(0.0504952)   | <b>-0.079690</b><br>(0.051506)     |
| <i>Innovation</i>     |                                    | <b>0.3693894***</b><br>(0.0228474) | <b>0.4239994***</b><br>(0.0256305)  | <b>0.3732412***</b><br>(0.0216295) | <b>0.423363***</b><br>(0.0258829)  |
| <i>Exp_Innov</i>      |                                    |                                    | <b>-0.1495445***</b><br>(0.0384124) |                                    | <b>-0.151039***</b><br>(0.0393748) |
| <i>MNE_Innov</i>      |                                    |                                    |                                     | <b>-0.0366161</b><br>(0.0594877)   | <b>0.011237</b><br>(0.0610675)     |
| <i>Log(Firm_Age)</i>  | <b>0.0483655***</b><br>(0.014431)  | <b>0.0441095***</b><br>(0.0146086) | <b>0.0444236***</b><br>(0.0142471)  | <b>0.0439412***</b><br>(0.0142447) | <b>0.044479***</b><br>(0.0142461)  |
| <i>Log(Firm Size)</i> | <b>0.1725539***</b><br>(0.0073845) | <b>0.1496249***</b><br>(0.0085245) | <b>0.1486466***</b><br>(0.0077347)  | <b>0.1496706***</b><br>(0.0077349) | <b>0.148623***</b><br>(0.007735)   |
| <i>Stak_Pressure</i>  | <b>0.5709178***</b><br>(0.0214209) | <b>0.5033998***</b><br>(0.0265175) | <b>0.5069272***</b><br>(0.0216247)  | <b>0.5038829***</b><br>(0.0216713) | <b>0.506812***</b><br>(0.0216294)  |
| <i>HC</i>             | <b>0.0003795</b><br>(0.0004481)    | <b>-0.0000397</b><br>(0.0004393)   | <b>-0.0000193</b><br>(0.0004452)    | <b>-0.0000348</b><br>(0.0004456)   | <b>-0.000021</b><br>(0.0004453)    |
| <i>Constant</i>       | <b>0.7495724***</b><br>(0.0866877) | <b>0.551741***</b><br>(0.0893308)  | <b>0.5290855***</b><br>(0.0860024)  | <b>0.5499394***</b><br>(0.0860966) | <b>0.529411***</b><br>(0.0860212)  |
| <i>Country</i>        | Included                           | Included                           | Included                            | Included                           | Included                           |
| <i>Sector</i>         | Included                           | Included                           | Included                            | Included                           | Included                           |
| <i>R-squared</i>      | 0.0567                             | 0.0640                             | 0.0643                              | 0.0640                             | 0.0643                             |
| <i>Wald chi2</i>      | 3233.69***                         | 2568.39***                         | 3648.20***                          | 3622.34***                         | 3652.37***                         |
| <i>Log Likelihood</i> | -18933.291                         | -18787.091                         | -18781.328                          | -18786.946                         | -18781.315                         |

**Source:** Own Elaboration using Stata 18.

**Note:** \*\*\* statistically significant at 1% level; \*\* at 5% level; \* at 10% level.

**Note:** Standard errors reported in parentheses.

The results from Model 2 provide evidence to test Hypotheses H1 and H2 (direct effects). The findings partially support H1: the estimated coefficient of Exporter is positively and significantly associated with the adoption of sustainable practices (supporting H1b), while

MNE status shows negative effect (not supporting H1a). This asymmetry highlights that not all forms of international engagement drive adoption of sustainable practices in the same way. The positive and significant coefficient for the exporter variable is coherent with the prior literature which suggests that exposure to international markets promotes the adoption of environmental practices (Forslid et al., 2018; Barbosa, 2024). In line with Stakeholder theory, exporters face pressure from foreign customers and regulators to comply with environmental standards, which fosters legitimacy abroad (Martos-Pedrero et al., 2022; Singh et al., 2024). At the same time, from a Resource-Based View, adopting sustainable practices can also be interpreted as a strategic capability that enhances competitiveness and differentiation in global markets (Porter & Kramer, 2019).

However, the MNE coefficient is small, negative and either weakly significant or insignificant once controls and moderating effects are introduced, failing to provide support for prior evidence suggesting that multinational enterprises have a positive influence on sustainable practices (Aguilera-Caracuel et al., 2012; Park, 2018; Gómez-Bolaños et al., 2019). Instead, it is closer to the findings of Amer (2023) and Sorroche-del-Rey et al. (2022), who argue that for resource-constrained subsidiaries internationalization may impose financial and operational burdens that discourage ambitious sustainability commitments, while in weaker regulatory environments MNE may engage in regulatory arbitrage, thereby diluting their sustainability engagement. An interpretation based on Hymer (1976) also helps to explain this result: while MNE need ownership advantages to overcome the liability of foreignness, Hymer (1976) also emphasized that they exploit market imperfections and exercise market power. In this sense, MNEs may persist in leverage their power to maintain less stringent practices, particularly in contexts of weaker regulation.

Regarding H2, the estimated coefficient of Innovation is statistically significant, strong and positively associated with the adoption of sustainable practices (supporting H2). In substantive terms, exporting increases the expected number of environmental practices adopted by around 11% ( $(e^{0.1055925} - 1) \times 100\%$ ), while innovation raises it by approximately 45% ( $(e^{0.3693894} - 1) \times 100\%$ ). This indicates that innovation is a stronger driver than mere international market participation, aligning with evidence that innovation is central to sustainable practices (Kuzma et al., 2020; Alraja et al., 2022).

Testing H3a and H3b, the models reveal that innovation does not strengthen the link between internationalization and sustainable practices. While the interaction  $MNE \times Innovation$  is not statistically significant (meaning H3a is not supported), this suggests that innovation does not systematically reinforce the sustainability engagement of multinational firms. A plausible explanation is that contrasting mechanisms offset each other: some MNEs integrate global knowledge flows and sustainability standards, while others exploit institutional voids in host countries, leading to an overall null effect (Kolk et al., 2017). On the other hand, the  $Exporter \times Innovation$  interaction is negative and statistically significant, implying that for exporters, innovation may crowd out resources from sustainability adoption (not supporting H3b). This confirms arguments that innovation, particularly for SMEs, involves a difficult trade-off: it's crucial for long-term sustainability, yet it comes at the cost of competing with the financial and operational demands of internationalization (Tsukanova, 2022).

In sum, the findings show that internationalization alone is insufficient to ensure adoption of sustainable practices. Exporters are driven by external pressures (Martos-Pedrero et al., 2022), whereas MNEs display mixed patterns shaped by regulatory environments (Amer, 2023). Innovation emerges as the most robust direct determinant of sustainable practices, corroborating prior meta-analytical findings that link innovation with sustainable practices (Kuzma et al., 2020). However, its moderating effect is more nuanced: Its moderating effect is nuanced: for MNEs, innovation does not significantly enhance sustainability, while for exporters it may limit sustainability adoption due to resource trade-offs (Tsukanova, 2022). This evidence suggests that policies and managerial strategies must adapt to firm type and context if internationalization is to become a genuine pathway to adoption of sustainable practices.

## **2.6. Robustness Checks**

To ensure the robustness of the results, a series of complementary analyses was conducted. These exercises confirm that the relationships between internationalization, innovation, and the adoption of sustainable practices are stable across different specifications.

First, we employed alternative operationalizations of the dependent variable. Besides the baseline count index of sustainable practices (0–10), we constructed a binary variable equal to 1 if the firm adopted at least one sustainable practice and 0 otherwise. Given the binary nature of this variable, logit regressions were estimated, a common approach for

dichotomous outcomes (Long, 1997). Table B.5. (1) in Annex presents the results of our estimations and they are consistent with the baseline confirming the validity of the initial findings.

Second, an alternative measure of innovation was employed. Instead of the composite dummy for innovation, a composite innovation index was constructed by summing up the different innovation dimensions reported by the firm. This index ranges from 0 to 3 and provides a more nuanced measure of firms' innovation intensity. Prior to estimation, we assessed the internal consistency of the item and standardized the index (z-score) to facilitate the interpretation of interaction effects. Replacing the binary dummy with this composite index in the regressions, the results in Table B.5. (2) in Annex remained qualitatively similar to those of the baseline models, reinforcing the robustness of the main conclusions.

Taken together, these robustness exercises confirm that the main findings are not driven by specific operationalizations or modelling choices, but rather reflect a consistent and stable relationship between firms' internationalization, innovation and the adoption of sustainable practices.

## **Conclusions and Policy Implications**

This dissertation set out to examine whether internationalization drives the adoption of sustainable practices by firms, while also assessing the role of innovation as both a direct determinant and a moderator of this relationship. Drawing on a unique, large-scale, diverse multi-country firm-level dataset from the sixth wave of the BEEPS survey and employing robust econometric techniques suited for count data, we investigated how exporters and MNEs differ in their commitment to sustainability and how innovation capabilities condition these dynamics.

The empirical results provide several important insights. First, exporting activity is positively associated with the adoption of sustainable practices, supporting the idea that exposure to foreign markets and external stakeholder demands incentivizes firms to engage in environmentally responsible behavior. Second, contrary to widespread assumptions, multinational status is not systematically linked to stronger adoption of sustainable practices in this dataset, suggesting that foreign ownership *per se* does not guarantee superior

environmental performance when compared to exporters. Third, innovation presents a robust and positive direct effect on adoption of sustainable practices, confirming its role as an enabling mechanism. However, the moderating effect of innovation reveals a more complex picture: while innovation strengthens firms' capabilities, it also appears to weaken the positive relationship between exporting and sustainability, echoing the resource-constraint argument in contexts of limited managerial and financial capacity.

The contributions of this dissertation are threefold, with a primary focus on the relationship between International Business and sustainable practices. By distinguishing between exporters and MNEs, the study reveals how distinct internationalization paths lead to different sustainability outcomes, adding clarity to debates where internationalization is often treated as a homogeneous process.

Furthermore, the dissertation enriches existing debates by bridging International Business theories, such as the OLI framework, Stakeholder Theory, the Resource-Based View/Knowledge-Based View and Dynamic Capabilities, with insights from the sustainability and innovation literatures. This multi-theoretical approach provides a more comprehensive explanation of why and how internationalization shapes firms' environmental strategies, demonstrating that the adoption of sustainable practices is influenced by both internal capabilities and external pressures.

In addition, the study sheds light on the complex role of innovation at this intersection. Beyond confirming its positive direct effect, the results reveal that innovation involves a trade-off: while it strengthens firms' ability to adopt sustainability practices, it may simultaneously weaken the positive impact of exporting on sustainability, particularly in contexts where financial and managerial resources are constrained. By highlighting this paradox, the dissertation refines existing theory and underscores the need to view innovation not only as an enabler but also as a potential source of tension in the internationalization and adoption of sustainable practices.

Empirically, the dissertation draws on the BEEPS VI, covering over 24 000 firms across 41 countries, which allows for a broad comparative perspective on sustainability adoption. Methodologically, the use of negative binomial regressions with complementary robustness checks ensures the reliability and replicability of the findings.

The findings carry relevant implications. For managers, the evidence suggests that international exposure through exports can serve as a catalyst for sustainability adoption, but firms should be mindful of resource allocation when pursuing innovation strategies simultaneously. For policymakers, support measures should be tailored: exporters should benefit from incentives that ease the joint pursuit of eco-innovation and sustainability, while MNEs require stronger monitoring and reporting obligations to match their global scale and influence. More broadly, harmonizing institutional frameworks and raising sustainability standards across countries is crucial for internationalization to act as a genuine lever of sustainable transition.

### **Limitations and Avenues for Future Research**

This study faces certain limitations. While the analysis emphasizes the effect of internationalization on sustainable practices, the relationship may also be reciprocal, as sustainability engagement can itself facilitate access to foreign markets. Moreover, the cross-sectional nature of the BEEPS Green Economy Module data, available for only one year across all countries in the study, restricts causal inference and prevents capturing temporal dynamics. Future research could address these issues by applying instrumental variable techniques, exploiting longitudinal datasets, conducting sector- and country-specific analyses and comparing developing and emerging economies to uncover how institutional and industrial contexts shape the internationalization–sustainability nexus.

## Appendix

**Table A.1.** Main Articles Reviewed on Internationalization and Sustainable Practices

| Study                           | Sample                                                                                                                                                               | Variables                                                                                                                                                                                                                                                                                                                                                       | Methodology                                                          | Key Findings                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aguilera-Caracuel et al. (2012) | Survey data from 106 Spanish export firms in the food industry (2004-2005).                                                                                          | <b>Dependent:</b> Proactive Environmental Strategy (measured through a questionnaire based on a seven-point Likert scale designed to assess the advancement of proactive environmental initiatives).<br><b>Independent:</b> International Experience (Years of Export Activity); International Environmental Diversification; Organizational learning capacity. | Multiple and moderated regression analysis                           | International experience, in terms of years of export activity, was not positively related to the adoption of a proactive environmental strategy. International environmental diversification had a positive relationship with the adoption of proactive environmental strategies. Organizational learning capacity was also positively related to the adoption of proactive environmental strategies.                                                 |
| Chiarvesio et al. (2014)        | Dataset compiled by the TeDIS Center, which includes data from a survey aimed at monitoring the evolution of competitive strategies of 684 Italian companies (2011). | <b>Dependent:</b> Propensity to introduce environmental innovations.<br><b>Independent:</b> % of local and non-local suppliers, size categories of firms, presence of R&D activities, number of knowledge partners, Foreign Direct Investment (FDI), firms with exports accounting for more than half of their turnover and firms' part of a foreign group      | Logit regression analysis                                            | Belonging to a multinational group positively influences a firm's eco-innovation propensity.<br>A negative correlation exists between export propensity and environmental innovation, suggesting that firms heavily engaged in exports are less likely to pursue green innovations.<br>The presence of environmental certifications, firm size, and collaboration with knowledge partners are significant factors influencing environmental innovation |
| Forslid et al. (2018)           | Firm level data of 1500 Swedish manufacturing companies (2004-2011).                                                                                                 | <b>Dependent:</b> CO2 emissions/output; Investments in cleaner technology. <b>Independent:</b> Export dummy and productivity                                                                                                                                                                                                                                    | Regression analysis with panel data, controlling firm fixed effects. | Firms that export tend to have lower intensity of CO2 emissions per unit of production compared to non-exporting firms. Export encourages greater investment in clean technology due to the scale of production.                                                                                                                                                                                                                                       |
| Park (2018)                     | Firm level data of 456 Korean MNEs, publicly listed in the KOSPI.                                                                                                    | <b>Dependent:</b> Sustainability Strengths (measured by Thomson Reuters ESG Score) and Sustainability Concerns (measured by Thomson Reuters ESG Controversies Score). <b>Independent:</b> Internationalization (measured as the ratio of foreign sales to total sales).                                                                                         | Two-stage least squares (2SLS) instrumental variable approach.       | Internationalization increases the sustainability strengths of MNEs, motivating them to adopt global business norms and improve their sustainability practices.<br>Internationalization also increases sustainability concerns of MNEs. The relationship between internationalization and corporate sustainability is complex, indicating that internationalization can have both positive and negative effects.                                       |
| Gómez-Bolaños et al. (2019)     | Total of 287 firms from the energy sector and energy-related utilities sector, from the Thomson Reuters Eikon database. (2018)                                       | <b>Dependent:</b> Environmental Management and Environmental Performance.<br><b>Independent:</b> Internationalization and Internationalization in Developing Countries.                                                                                                                                                                                         | Ordinary Least Squares (OLS).                                        | The study finds a significant positive relationship between a firm's level of internationalization and its environmental management practices, but not find a significant positive relationship between internationalization and environmental performance. The analysis reveals that internationalization towards developing countries does not have a statistically significant positive effect on environmental performance                         |

|                                |                                                                                                                                 |                                                                                                                                                                                                                                  |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Garri (2022)                   | Data from 5 MNEs that are recognized as leaders in sustainability within their respective industries.                           | n.a.                                                                                                                                                                                                                             | Multiple case study research.                                                                                     | MNEs often act as self-regulators in emerging and developing markets, filling institutional voids where local governance may be lacking. Rather than merely responding to industry pressures, MNEs proactively seek to transform their industries through sustainability initiatives. MNEs integrate sustainability into their core business strategies, recognizing that long-term profitability is linked to their social and environmental responsibilities.                                                        |
| Sorroche-del-Rey et al. (2022) | 118 empirical articles focusing on the interrelationship between international trade and environmental performance (1994-2022). | n.a.                                                                                                                                                                                                                             | Literature review.                                                                                                | 41.37% of studies found a positive effect of international trade on environmental performance. Significant differences exist between developed and developing countries regarding the impact of international trade on environmental performance.                                                                                                                                                                                                                                                                      |
| Amer (2023)                    | Firm level data of 48 countries, developed and developing (2002-2012).                                                          | <b>Dependent:</b> Environmental performance (using the environmental metric reported by Asset4 as the basis for measurement).<br><b>Independent:</b> Foreign Markets Formal Pressure and Foreign Markets Informal Pressure.      | Arellano-Bond estimator, which relies on an instrumental variable Generalized Methods of Moments (GMM) procedure. | Companies face challenges in complying with informal pressures, which take longer to address compared to formal pressures. Failure to comply with these pressures can have severe consequences for a company's legitimacy, especially in contexts where environmental sustainability is a public concern. Investing in knowledge-based capabilities is crucial for companies to effectively navigate institutional pressures in new and changing business environments.                                                |
| Barbosa (2024)                 | Survey data from 122 Chilean export firms in agri- food industry.                                                               | <b>Dependent:</b> Greenhouse Gas Emissions, Energy Efficiency, Food Loss and Waste, Food Quality and Safety and Water Footprint Management.<br><b>Independent:</b> International Orientation.                                    | Partial Least Squares Structural Equation Modeling (PLS-SEM).                                                     | International orientation has a positive impact on all aspects of environmental performance. Firms with strong international orientation tend to adopt environmentally friendly practices because of pressure from international markets.                                                                                                                                                                                                                                                                              |
| Zhang et al. (2024)            | Firm level data of 4,219 publicly listed MNEs across 41 economies (2002-2020).                                                  | <b>Dependent:</b> Environmental Performance (EP) score from the REFINITIV EIKON database.<br><b>Independent:</b> Internationalization (measured by an entropy index of sales across regions); MNEs' home-country GDP per capita. | Multilevel modelling.                                                                                             | For MNEs from advanced economies EP initially decreases at low levels of internationalization but increases at higher levels. In contrast, for MNEs from less advanced economies EP increases at low levels of internationalization but decreases at high levels. The economic development level of the home country significantly moderates the relationship between internationalization and EP, with MNEs from advanced economies generally demonstrating higher EP compared to those from less advanced economies. |

**Source:** Own elaboration, based on the literature. Papers are referenced in chronological order.

**Table A.2.** Main Articles Reviewed on the Role of Innovation in the Relationship between Internationalization and Sustainable Practices

| Study                        | Sample                                                                                                                                    | Variables                                                                                                                                                                                                                        | Methodology                                                    | Key Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Direct Effect</i>         |                                                                                                                                           |                                                                                                                                                                                                                                  |                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Moyano-Fuentes et al. (2018) | Firm level data from a survey, with 239 high-tech firms located in Spanish science and technology parks (July–October 2015).              | <b>Dependent:</b> Environmental sustainability engagement.<br><b>Independent:</b> Process innovation; Degree of process innovation; Years in the park.                                                                           | Exploratory factor analysis.                                   | Firms performing process innovation show higher environmental engagement. Relative degree/intensity of process innovation vs competitors positively affects environmental engagement. The positive link between process innovation and environmental engagement weakens as years in the park increase.                                                                                                                                                                        |
| Kuzma et al. (2020)          | 15 empirical articles published between 2014 and 2019, focusing on the relationship between innovation and organizational sustainability. | n.a.                                                                                                                                                                                                                             | Meta-analysis.                                                 | Innovation has a positive impact on sustainability performance across social, environmental, and economic dimensions. Technological and process innovations are essential drivers for enhancing sustainability performance. Practical implications include encouraging firms to invest in innovation to achieve long-term sustainability goals.                                                                                                                               |
| Sempere-Ripoll et al. (2020) | Firm level data from CIS survey, with 1574 financial industry firms (2012–2014).                                                          | <b>Dependent:</b> Sustainability orientation (based on reputation, compliance, and environmental actions).<br><b>Independent:</b> Types of innovation; radical innovation; R&D investment.                                       | OLS regression models.                                         | Companies engaged in innovation, especially radical innovation, tend to have higher sustainability orientation. Internal and external innovation activities jointly enhance innovation capability, positively affecting sustainability. Open innovation practices are crucial for integrating sustainability into firm strategies. Firms in Central and Eastern European countries reveal a weaker orientation towards sustainability compared to their Western counterparts. |
| Alraja et al. (2022)         | Firm level data collected through a survey of 669 employees working in SMEs in Oman (March–April 2021).                                   | <b>Dependent:</b> Sustainable Performance.<br><b>Independent:</b> Technological, organizational and environmental factors.<br><b>Mediating:</b> Green practices (e.g. Green Innovation, Green Marketing and Green Supply Chain). | Partial least Squares Structural Equation Modelling (PLS-SEM). | Technological and organizational factors strongly support adoption of green practices. Green Supply Chain adoption did not significantly affect sustainable performance. Investing in R&D and using new technology are shown to positively contribute to sustainable performance.                                                                                                                                                                                             |
| <i>Moderating Effect</i>     |                                                                                                                                           |                                                                                                                                                                                                                                  |                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Suarez-Perales et al. (2017) | Firm level data from Spanish Technological Innovation Panel (PITEC) (2008–2013).                                                          | <b>Dependent:</b> Environmental Proactivity; Innovation Proactivity; Internationalization Proactivity.<br><b>Independent:</b> R&D Expenditure; Patents.                                                                          | Fixed-effects panel ordered probit model.                      | Firms that invest in R&D and patent their innovations are more likely to exhibit advanced environmental strategies. Innovation proactivity is a significant driver of environmental strategy, with innovative firms showing greater environmental proactivity. Internationalization also positively influences environmental proactivity, as firms operating in larger geographical areas tend to adapt to more demanding environmental legislation.                          |

|                            |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                           |                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tsukanova (2022)           | Firm level data from BEEPS survey, 704 responses from international and independent SMEs (2018-2021).                                                                          | <b>Dependent:</b> Green practices (measured as a sum of green initiatives impacting the environment).<br><b>Independent:</b> Export intensity; Innovation efforts (spending on external knowledge acquisition and R&D activities).                                                                                        | Moderated hierarchical regression analysis.                                | Export intensity is positively associated with the number of green practices. Innovation efforts are positively associated with the number of green practices. Innovation efforts weaken the positive link between export intensity and green practices. Innovativeness allows SMEs to take positive environmental steps, but balancing external pressures and financial sustainability is crucial.                                                                                       |
| Hernández et al. (2022)    | Firm level data from BEEPS survey, specifically data from waves IV and V. The study analysed data from 19 Central and Eastern European (CEE) transition countries (2008-2012). | <b>Dependent:</b> Export intensity (measured based on the level of a firm's export activities).<br><b>Independent:</b> Governance imperfections (measuring the quality of institutions); Innovation performance (as a moderating factor)                                                                                  | Multilevel mixed effects Tobit regression models                           | The study found that higher levels of governance imperfections in transition economies are negatively related to export intensity among firms. /Innovation was found to have a positive moderating effect on the relationship between governance imperfections and export intensity. /Firms that engage in innovation can mitigate some negative impacts of poor institutional conditions on their export activities.                                                                     |
| Marco-Lajara et al. (2023) | Data collected from the Directory of Spanish Exporters of 120 internationalised Spanish agri-food firms (2011).                                                                | <b>Dependent:</b> Economic performance.<br><b>Independent:</b> International experience, green knowledge acquisition and eco-innovation.                                                                                                                                                                                  | Partial Least Squares based-structural equation modeling (PLS-SEM) method. | International experience positively influences eco-innovation and green knowledge acquisition, but there is no direct effect on global economic performance.<br>The acquisition of green knowledge mediates the relationship between international experience and eco-innovation.<br>Eco-innovation contributes to improving economic performance, implying that firms must harness international experience for knowledge acquisition and innovation to enhance performance effectively. |
| Gonçalves et al. (2024)    | Sixth International Manufacturing Strategy Survey of 22 countries, a periodic international survey of manufacturers in the assembly industry (2013-2014).                      | <b>Dependent:</b> International Sales Intensity (ratio of foreign sales to total sales).<br><b>Independent:</b> Environmental Sustainability Practices Index (based on efforts in environmental certification, energy/water reduction, pollution emission reduction, and supplier sustainability performance assessment). | Fractional regression analysis.                                            | Open innovation positively influences environmental sustainability practices. Strong correlation between sustainability practices and international sales intensity.                                                                                                                                                                                                                                                                                                                      |
| Zhao et al. (2024)         | Studies that contribute to the understanding of MNEs' sustainable innovations.                                                                                                 | n.a.                                                                                                                                                                                                                                                                                                                      | Literature review.                                                         | MNEs play a critical role in addressing global sustainability challenges through sustainable innovations. The alignment of MNEs' innovations with the SDGs is essential for long-term success. Stakeholder engagement and the context-specific nature of sustainability challenges significantly influence MNEs' innovation strategies.                                                                                                                                                   |

**Source:** Own elaboration, based on the literature. Papers are referenced in chronological order.

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## Annex

**Table B.1.** Country-Level Distribution of Firms across Years

| Country            | 2016      | 2017         | 2018          | 2019       | n (Firms)     | Sample Percentage |
|--------------------|-----------|--------------|---------------|------------|---------------|-------------------|
| Albania            | 0         | 5            | 372           | 0          | 377           | 1.36%             |
| Armenia            | 0         | 1            | 45            | 500        | 546           | 1.97%             |
| Azerbaijan         | 0         | 0            | 205           | 20         | 225           | 0.81%             |
| Belarus            | 0         | 354          | 246           | 0          | 600           | 2.16%             |
| Bosnia and Herz.   | 0         | 0            | 362           | 0          | 362           | 1.31%             |
| Bulgaria           | 11        | 76           | 643           | 42         | 772           | 2.78%             |
| Croatia            | 0         | 2            | 402           | 0          | 404           | 1.46%             |
| Cyprus             | 4         | 149          | 207           | 0          | 360           | 1.30%             |
| Czech Rep.         | 1         | 17           | 429           | 55         | 502           | 1.81%             |
| Egypt              | 0         | 306          | 2 769         | 0          | 3 075         | 11.09%            |
| Estonia            | 1         | 73           | 285           | 1          | 360           | 1.30%             |
| Georgia            | 0         | 0            | 554           | 27         | 581           | 2.10%             |
| Greece             | 0         | 384          | 216           | 0          | 600           | 2.16%             |
| Hungary            | 0         | 168          | 618           | 19         | 805           | 2.90%             |
| Italy              | 4         | 217          | 539           | 0          | 760           | 2.74%             |
| Jordan             | 0         | 11           | 590           | 0          | 601           | 2.17%             |
| Kazakhstan         | 0         | 0            | 1 446         | 0          | 1 446         | 5.22%             |
| Kosovo             | 0         | 1            | 270           | 0          | 271           | 0.98%             |
| Kyrgyz Rep.        | 0         | 7            | 353           | 0          | 360           | 1.30%             |
| Latvia             | 2         | 64           | 293           | 0          | 359           | 1.29%             |
| Lebanon            | 0         | 7            | 525           | 0          | 532           | 1.92%             |
| Lithuania          | 0         | 34           | 323           | 1          | 358           | 1.29%             |
| Malta              | 4         | 39           | 199           | 0          | 242           | 0.87%             |
| Moldova            | 0         | 0            | 360           | 0          | 360           | 1.30%             |
| Mongolia           | 0         | 11           | 349           | 0          | 360           | 1.30%             |
| Montenegro         | 0         | 2            | 148           | 0          | 150           | 0.54%             |
| Morocco            | 0         | 2            | 659           | 0          | 661           | 2.38%             |
| North Macedonia    | 0         | 11           | 349           | 0          | 360           | 1.30%             |
| Poland             | 0         | 0            | 1 369         | 0          | 1 369         | 4.94%             |
| Portugal           | 0         | 23           | 1 038         | 1          | 1 062         | 3.83%             |
| Romania            | 6         | 36           | 757           | 15         | 814           | 2.94%             |
| Russia             | 0         | 1            | 1 322         | 0          | 1 323         | 4.77%             |
| Serbia             | 0         | 13           | 348           | 0          | 361           | 1.30%             |
| Slovak Rep.        | 1         | 7            | 415           | 6          | 429           | 1.55%             |
| Slovenia           | 0         | 16           | 393           | 0          | 409           | 1.48%             |
| Tajikistan         | 0         | 0            | 352           | 0          | 352           | 1.27%             |
| Tunisia            | 0         | 3            | 612           | 0          | 615           | 2.22%             |
| Turkey             | 0         | 461          | 1 202         | 0          | 1 663         | 6.00%             |
| Ukraine            | 0         | 2            | 1 335         | 0          | 1 337         | 4.82%             |
| Uzbekistan         | 0         | 0            | 1 239         | 0          | 1 239         | 4.47%             |
| West Bank and Gaza | 0         | 2            | 363           | 0          | 365           | 1.32%             |
| <b>Total</b>       | <b>34</b> | <b>2 505</b> | <b>24 501</b> | <b>687</b> | <b>27 727</b> | <b>100%</b>       |

Source: Own elaboration using Stata 18.

**Table B.2.** Sectoral Distribution of Firms

| Sector                      | n (Firms)     | Sample Percentage |
|-----------------------------|---------------|-------------------|
| <b>Manufacturing</b>        | 11 254        | 46.48%            |
| <b>Services</b>             | 9 898         | 40.88%            |
| <b>Food &amp; Beverages</b> | 2 795         | 11.54%            |
| <b>Construction</b>         | 266           | 1.10%             |
| <b>Total</b>                | <b>24 213</b> | <b>100%</b>       |

Source: Own elaboration using Stata 18.

**Table B.3.** Operationalization of Variables Based on BEEPS Survey

| Variable Name         | Question Code | Question                                                                                                                                                                                             |
|-----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sustainable Practices | <b>BMGc23</b> | <b>Over the last three years, did this establishment adopt any of the following measures?</b>                                                                                                        |
|                       | BMGc23a       | Heating and cooling improvements                                                                                                                                                                     |
|                       | BMGc23b       | More climate-friendly energy generation on site                                                                                                                                                      |
|                       | BMGc23c       | Machinery and equipment upgrades                                                                                                                                                                     |
|                       | BMGc23d       | Energy management                                                                                                                                                                                    |
|                       | BMGc23e       | Waste minimization, recycling and waste management                                                                                                                                                   |
|                       | BMGc23f       | Air pollution control measures                                                                                                                                                                       |
|                       | BMGc23g       | Water management                                                                                                                                                                                     |
|                       | BMGc23h       | Upgrades of vehicles                                                                                                                                                                                 |
|                       | BMGc23i       | Improvements to lighting systems                                                                                                                                                                     |
|                       | BMGc23j       | Other pollution control measures                                                                                                                                                                     |
| Exporter              | <b>D.3</b>    | <b>In last complete fiscal year, what percentage of this establishment's sales were:</b>                                                                                                             |
|                       | d3b           | Indirect exports (sold domestically to third party that exports products)                                                                                                                            |
|                       | d3c           | Direct exports                                                                                                                                                                                       |
| MNE                   | <b>B.2</b>    | <b>What percentage of this firm is owned by each of the following:</b>                                                                                                                               |
|                       | b2b           | Private foreign individuals, companies or organizations                                                                                                                                              |
| Innovation            | H.1           | During the last three years, has this establishment introduced new or improved products or services?                                                                                                 |
|                       | H.5           | During the last three years, has this establishment introduced any new or improved process?                                                                                                          |
|                       | BMh.1         | Over the last three years, did this establishment spend on the acquisition of external knowledge?                                                                                                    |
| Firm Age              | B.5           | In what year did this establishment begin operations?                                                                                                                                                |
| Firm Size             | L.1           | At the end of last fiscal year, how many permanent, full-time individuals worked in this establishment?                                                                                              |
| Stakeholder Pressure  | BMGA.4        | In fiscal year, did any of the establishment's customers require environmental certifications or adherence to certain environmental standards as a condition to do business with this establishment? |
| Human Capital         | BMI1a         | What percentage of the full-time permanent workers employed at the end of fiscal year had a university degree?                                                                                       |

Source: Own Elaboration, based on BEEPS.

**Table B.4.** Correlation Matrix and VIF test

| Variables         | 1         | 2          | 3          | 4          | 5           | 6         | 7       | 8        | VIF  |
|-------------------|-----------|------------|------------|------------|-------------|-----------|---------|----------|------|
| 1.Sus_Practices   | 1.0000    |            |            |            |             |           |         |          |      |
| 2.Exporter        | 0.2234*** | 1.0000     |            |            |             |           |         |          | 2.08 |
| 3.MNE             | 0.0971*** | 0.2184***  | 1.0000     |            |             |           |         |          | 2.07 |
| 4.Innovation      | 0.3318*** | 0.2008***  | 0.1008***  | 1.0000     |             |           |         |          | 1.68 |
| 5.Log (Firm_Age)  | 0.0911*** | 0.1519 *** | -0.0146 ** | 0.0315***  | 1.0000      |           |         |          | 1.12 |
| 6.Log (Firm Size) | 0.3061*** | 0.3501 *** | 0.2344 *** | 0.1723***  | 0.2351***   | 1.0000    |         |          | 1.33 |
| 7.Stak_Pressure   | 0.3316*** | 0.1703***  | 0.0846***  | 0.1865***  | 0.0631***   | 0.2048*** | 1.0000  |          | 1.09 |
| 8.HC              | -0.0290*  | -0.0082    | 0.0372***  | 0.0699 *** | -0.0861 *** | 0.0675*** | 0.0168* | 1.0000   | 1.02 |
|                   |           |            |            |            |             |           |         | Mean VIF | 1.70 |

**Source:** Own Elaboration using Stata 18.

**Note:** \*\*\* statistically significant at 1% level; \*\* at 5% level; \* at 10% level.

**Table B.5.** Robustness Check Results

| <i>Sustainable Practices</i> |              |              |
|------------------------------|--------------|--------------|
|                              | 1            | 2            |
| <i>Exporter</i>              | 0.1575618**  | 0.1391277*** |
| <i>MNE</i>                   | -0.1510598   | -0.0905278*  |
| <i>Innovation</i>            | 1.031734***  | 0.1803897*** |
| <i>Exp_Innov</i>             | -0.1825187   | -0.0862865** |
| <i>MNE_Innov</i>             | 0.5068867**  | 0.0420444    |
| <i>Log(Firm_Age)</i>         | 0.1060401*** | 0.0417132*** |
| <i>Log(Firm Size)</i>        | 0.2232635*** | 0.1465135*** |
| <i>Stak_Pressure</i>         | 1.587063***  | 0.4942334*** |
| <i>HC</i>                    | -0.0013635   | -0.0002508   |
| <i>Constant</i>              | 0.4918488*   | 0.7360826*** |
| <i>Country</i>               | Included     | Included     |
| <i>Sector</i>                | Included     | Included     |
| <i>R-squared</i>             | 0.1570       | 0.0642       |
| <i>Wald chi2</i>             | 1844.07***   | 2540.06***   |
| <i>Log Likelihood</i>        | -4950.0393   | -18510.577   |

**Source:** Own Elaboration using Stata 18.

FACULDADE DE ECONOMIA

