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IMPACT OF DIGITIZATION AND ENVIRONMENTAL INNOVATION ON THE EXPORT PERFORMANCE OF FAMILY BUSINESSES

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julho de 2024

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Dissertação de Mestrado em Gestão de Empresas

Trabalho realizado sob a orientação do

Prof. Doutor Prof. Doutor Pedro Mota Veiga

Universidade da Maia

julho de 2024

Agradecimentos:

I would like to express a big thank you to my tutor Pedro Miguel Lopes Mota Veiga who has provided me with great feedback and guidance throughout the entire research process. With the advice and feedback from the professor useful ideas and insights have been implemented in this thesis.

Secondly, I wish to thank all the participants who took part in this study. I am extremely grateful for the time and effort you have spent on this thesis, helping me to gain valuable and fruitful insights.

Thirdly, I thank my fellow students in our seminar group for all the constructive feedback you have given me during the entire research process and the many valuable discussions.

Lastly, I express thank you to anyone else who in some way has contributed to my study and supported me along the way.

Impacto da digitalização e da inovação ambiental no desempenho exportador das empresas familiares

RESUMO

Este estudo investiga o impacto da digitalização e da inovação ambiental no desempenho exportador das empresas familiares, com o objetivo de proporcionar uma melhor compreensão de como estas práticas modernas podem melhorar a competitividade e o sucesso internacional das empresas familiares. A investigação aborda duas questões principais: (1) Como é que a digitalização influencia o desempenho exportador das empresas familiares? e (2) De que forma a inovação ambiental afeta o desempenho exportador das empresas familiares? Para explorar estas questões, o estudo define dois objetivos principais: primeiro, analisar o impacto da digitalização no desempenho exportador das empresas familiares; e segundo, avaliar como as inovações ambientais influenciam o sucesso das empresas familiares nas suas iniciativas de exportação. As hipóteses propostas incluem: (H1) A digitalização influencia positivamente o desempenho exportador das empresas familiares; (H2) A inovação ambiental influencia positivamente o desempenho exportador das empresas familiares; e (H3) A digitalização modera a relação entre a inovação ambiental e o desempenho exportador.

O estudo utiliza microdados do inquérito Flash Eurobarometer 486, intitulado "PMEs, Start-ups, Scale-ups e Empreendedorismo," conduzido pela Comissão Europeia em 2020. Este conjunto de dados inclui informações detalhadas sobre 195 empresas familiares em Portugal, recolhidas através de entrevistas telefónicas com os principais decisores. A amostra é constituída por empresas de diferentes tamanhos e setores, com uma maioria (67,7%) tendo 1 a 9 empregados, e outras distribuídas pelos setores da manufatura, construção, comércio e vários setores de serviços. Para a análise dos dados, o estudo utiliza a regressão logística ordinal multivariada. Os resultados demonstram

que a digitalização afeta significativa e positivamente o desempenho exportador, confirmando a Hipótese 1, destacando-se a importância das capacidades digitais para melhorar as atividades empresariais internacionais das empresas familiares. Por outro lado, a inovação ambiental, por si só, não mostra um impacto direto significativo no desempenho exportador, não suportando assim a Hipótese 2. No entanto, a interação entre a digitalização e a inovação ambiental mostra uma melhoria significativa no desempenho exportador, suportando a Hipótese 3, o que sugere que a combinação de altos níveis de digitalização e inovação ambiental cria um efeito sinérgico, levando a melhores resultados exportadores. Em conclusão, o estudo sublinha o papel crítico da digitalização no sucesso exportador das empresas familiares e destaca a interação benéfica entre a digitalização e a inovação ambiental. Estes resultados podem orientar as empresas familiares na adoção de estratégias que aproveitem as tecnologias digitais e práticas sustentáveis para melhorar a sua competitividade internacional e desempenho global.

Palavras chave: Desempenho Exportador, Digitalização, Empresas Familiares, Inovação Ambiental, Transformação Digital

Impact of digitization and environmental innovation on the export performance of family businesses

ABSTRACT

This study investigates the impact of digitization and environmental innovation on the export performance of family businesses, aiming to provide a comprehensive understanding of how these modern practices can enhance the competitive edge and international success of family-owned enterprises. The research addresses two primary questions: (1) How does digitization influence the export performance of family businesses? and (2) In what ways does environmental innovation affect the export performance of family businesses? To explore these questions, the study sets two main objectives: first, to analyze the impact of digitization on the export performance of family businesses; and second, to evaluate how environmental innovations influence the success of family businesses in their export endeavors. The hypotheses proposed include: (H1) Digitization positively influences the export performance of family businesses; (H2) Environmental innovation positively influences the export performance of family businesses; and (H3) Digitization moderates the relationship between environmental innovation and export performance.

The study utilizes microdata from the Flash Eurobarometer 486 survey, titled "SMEs, Start-ups, Scale-ups, and Entrepreneurship," conducted by the European Commission in 2020. This data set includes detailed information on 195 family-owned businesses in Portugal, collected through telephone interviews with key decision-makers. The sample consists of enterprises of varying sizes and sectors, with a majority (67.7%) having 1 to 9 employees, and others distributed across manufacturing, construction, trade, and various service sectors. For data analysis, the study employs multivariate ordinal logistic regression. The results demonstrate that digitization significantly and positively affects

export performance, confirming Hypothesis 1. This highlights the importance of digital capabilities in enhancing international business activities for family enterprises. On the other hand, environmental innovation alone does not show a significant direct impact on export performance, thus not supporting Hypothesis 2. However, the interaction between digitization and environmental innovation is found to significantly improve export performance, supporting Hypothesis 3. This suggests that the combination of high levels of digitization and environmental innovation creates a synergistic effect, leading to superior export outcomes.

In conclusion, the study underscores the critical role of digitization in driving export success for family businesses and highlights the beneficial interplay between digitization and environmental innovation. These results can guide family-owned enterprises in adopting strategies that leverage digital technologies and sustainable practices to enhance their international competitiveness and overall performance.

Keywords: Digitalization, Environmental innovation, Export performance, Family businesses, Digital transformation

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INTRODUCTION

The progress and proliferation of digitalization have transformed how organizations function and interact with their external environment. The swift advance of digitalization brings about the development of cutting-edge digital technologies and novel business concepts (Verhoef et al., 2021). These advancements disrupt organizations globally, compelling both society and businesses to navigate the transformative effects of digitalization, which are fundamentally altering the commercial landscape and challenging existing norms. Furthermore, the changes and the general increased usage of digital technologies influence the organizational structure, work design (, and other critical functions of a firm Colbert, Yee & George, 2016). However, for businesses to be adaptive and thrive in the digitalized era, it is vital to re-evaluate existing business models and their associated dimensions to find new avenues for value creation (Dörner & Edelman, 2015), also known as a digital transformation (Fitzgerald, Kruschwitz, Bonnet & Welch, 2014). Hence, it is important to properly execute and handle different digital transformations, as they are crucial for the firms' survival (Alonso, Kok & O'Shea, 2019). Furthermore, Verhoef et al. (2021) imply that a more digitalized world causes customer requirements and behavior to alter, which businesses could successfully manage and embrace through a well-executed digital transformation.

Recent surveys indicate that transformations brought forth by digitalization are a major concern for family businesses that impose strategic challenges for family firms worldwide, which are of particular importance for the global economy given that two-thirds of firms in Western countries are family businesses (Basly & Hammouda, 2020). A multitude of family businesses are found to be small and medium-sized enterprises, generating a substantial amount of wealth and jobs across the world (Nordqvist, Melin, Waldkirch & Kumeto, 2015). Nonetheless, considering that family firms operate at the intersection between the work system and the family, complexities often arise (Nordqvist, Melin, Waldkirch & Kumeto, 2015). Family firms generally have a strong linkage between business and family concerns, creating a more complicated organizational culture and structure to transform (Berrone, Cruz & Gomez-Mejia, 2012).

This strong connection influences how family businesses function and operate. Furthermore, research suggests that family businesses possess distinctive characteristics, making them inherently different and unique (Berrone, Cruz & Gomez-Mejia, 2012). One major contributor to this reasoning is the fact that the literature suggests that family firms tend to emphasize non-financial goals and strive to preserve non-financial aspects (Berrone, Cruz & Gomez-Mejia, 2012). Concerning this, a prominent paradigm related to family business is the concept of socioemotional wealth (SEW) (Cleary, Quinn & Moreno, 2019). Although the non-financial goals and aspects may vary from firm to firm, literature suggests that they are highly intertwined with SEW, where an example is exerting influence over the business and keeping it within the family (Daspit et al., 2017). According to Kammerlander and Ganter (2015), family businesses tend to pursue non-financial motives to accumulate SEW, sometimes forgoing economic goals to reach higher SEW. SEW is argued to play an incremental role in family businesses, where it acts as a crucial denominator to why family firms behave and act distinctively, hence instating that SEW is one major reason why a family firm could be considered a unique entity (Berrone et al., 2012). Family businesses, due to their unique characteristics, are encountering challenges in adapting to digital transformations. Building upon the differences and unique elements prevalent in family firms, including the prioritization of non-financial aspects, entails both opportunities and challenges in coping with transformations and changes. Considering the specific dynamics within which family firms operate, research indicates that they may face various challenges, including factors like family involvement and the potential loss of control impacting the change process. Conversely, the literature also proposes that family businesses might have advantages in managing changes, such as digital transformations, due to their unique characteristics associated with the firm. Thus, family businesses could face both hampering effects as well as opportunities for adapting to changes associated with a more digitalized business setting (Batt et al., 2020). However, digital transformation does not merely revolve around adopting new and improved technologies in the organization, it represents the process of how and when the change is implemented where the organization must act to reap the benefits

associated with the digital era (Weill & Woerner, 2018). For family firms, it encompasses keeping a fine balance in maintaining and emphasizing non-financial aspects (Batt et al.,2020) whilst simultaneously finding avenues to successfully leverage transformations to thrive in a dynamic and everchanging business environment.

Research indicates that the diffusion and spread of digitalization and the associated disruptions change the way organizations conduct their operations (Weill & Woerner, 2018). The rise of digital technologies, new innovative business ideas, and digital disruptions implies a need for change and calls for organizations to adapt accordingly (Verhoef et al., 2019). Digital transformation stems from increased digitalization which emits into utilizing digital technologies, altercating business models and structures, subsequently entailing adaptation and changes to succeed and create value in the current business environment (Wrede, Velamuri & Dauth, 2020). Therefore, firms should find new avenues to successfully leverage digital transformations and tailor the organization to meet the challenges prevalent in the digital world (Weill & Woerner, 2018). Nevertheless, characteristics that are common to family businesses such as handing down the business to future generations, family control and other critical non-financial aspects (Berrone et al., 2012; Miller & Le Bretton-Miller, 2005), could arguably signify opportunities as well as inhibitory outcomes for changes caused by digitalization (Batt et al., 2020). Contemporary literature on how family businesses handle transformations is inconclusive. On one hand, various sources indicate that family firms have advantages when leveraging transformations because of their distinctive and unique pool of characteristics, such as high family presence and an idiosyncratic array of resources which for instance could yield access to social capital, tacit knowledge, and ease the decision-making process (Daspit et al., 2017). On the other hand, literature also suggests that family businesses tend to be disinclined and face several major challenges related to change due to reasons such as the fear of losing control over the business and diminishing their influence (Daspit et al., 2017; Ceipek, Hautz, De Massis, Matzler & Ardito, 2020). This could imply that specific family business dimensions, such as various non-financial aspects, could either hinder or ease how such firms adapt, confront and handle the corresponding changes brought forth by digitalization. Given the unique and

distinctive attributes prevalent in family firms (Berrone, Cruz & Gomez-Mejia, 2012), the interest in further exploring how family businesses leverage organizational change, and more specifically, digital transformations, has emerged. Also, current literature has neither acknowledged nor answered how family firms respond to the rise of more rapid changes due to digitalization and how such firms handle the subsequent process of digital transformations. Vardaman (2019) elaborates on this notion, claiming that research at the intersection of organizational change and family business remains heavily undeveloped where further refinement is needed. Considering that family businesses are a form of business that is incremental for the global economy (Basly & Hammouda, 2020), the topic becomes of great importance. Thus, providing an interesting and conducive gap in contemporary research. Furthermore, the strong linkage and influence between the family and the firm itself normally influence how family firms conduct their business operations (Daspit et al., 2017). Therefore, the continuous prioritization and emphasis on non-financial aspects could potentially affect a digital transformation as well, as the SEW derived from different non-financial aspects influence how family firms handle various strategic initiatives and transformations (Cleary et al., 2019).

This study aims to explore the impact of digitization and environmental innovation on the export performance of family businesses. Specifically, it seeks to answer the following research questions: How does digitization influence the export performance of family businesses? In what ways does environmental innovation affect the export performance of family businesses? To address these questions, the study has set two primary objectives. The first objective is to analyze the impact of digitization on the export performance of family businesses. The second objective is to evaluate how environmental innovations influence the success of family businesses in their export endeavors. By achieving these objectives, the study aims to provide a comprehensive understanding of how these modern practices can enhance the competitive edge and international success of family-owned enterprises.

LITERATURE REVIEW

Digital Transformation

The emergence of new digital technologies and unconventional business ideas force many organizations and companies to transform digitally to be adaptive (Fitzgerald et al., 2014), and play a vital role in the survival of the organization (Alonso et al., 2019). Digital transformation is defined as "a change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm" (Verhoef et al., 2021). Moreover, Verhoef et al. (2021) further argue that digital transformations consist of three phases, where the first two phases are digitization and digitalization, which creates the foundation for the final and last phases, namely the digital transformation. As digitalization is enabled by digitization, it could be described as the integration of digital 8 technologies, leading to changes in organizational processes (Wrede, Velamuri & Dauth, 2020). When simplified, it could be depicted as "becoming digital". The third and final phase is the actual digital transformation, which redesigns and affects the entire organization (Amit & Zott, 2001). As previously mentioned, digital transformation is when businesses develop a new business model by integrating digital technologies in their operations to generate more value (Shahi & Sinha, 2020). Furthermore, prior literature also argues that the main objective for businesses when undertaking digital transformations is to capture more value by being more competitive and adaptive towards new customer behaviors (Verhoef et al., 2021).

Although existing literature emphasizes the importance of digital transformation to tackle digital disruptions and changes , one cannot exclude the importance to have a unified vision and share the same objectives regarding digital transformations . Without a comprehensive understanding of the incentives behind a digital transformation, inconsistencies such as resistance to change could emerge, potentially hampering the process and resulting in unsatisfactory outcomes (Krauss et al. 2022). Nevertheless, digital transformations are generally of unconventional nature and involve rapid fundamental organizational changes, such as changes in the business model, processes, strategies, as well as the firm's products and services (Krauss et al. 2022). This could

cause the vision of the digital 9 transformation to continuously change as well as create an unpredictable future (Krauss et al. 2022). Thereby, leading to a necessity for companies to evaluate the incentives of digital transformation and only execute transformations of strategic character with a beneficial outcome (Shahi & Sinha, 2020). However, depending on the firm, there are various incentives for digital transformation (Hess et al., 2016). For instance, the incentives can vary between generating more value or simply leveraging digital transformations for the survival of the company (Alonso et al., 2019). Regardless, the incentives are, in most cases, developed from different key drivers, such as increased competition (Verhoef et al., 2021) or changes in consumer behavior (Verhoef et al., 2021). Additionally, Covid-19 has also shown to be a major driver, with an immense impact on the urgency for digital transformations, causing digital transformations to accelerate even quicker (Autio, Mudambi & Yoo, 2021; Lee et al., 2015). Hence, insinuating the importance for firms to be unafraid of structural changes and to have a strategic plan in place (Hess et al., 2016). The strategy can alternate based on the nature of the firm and the desired outcome of a digital transformation (Kraus et al., 2022). Furthermore, Schallmo, Williams and Boardman (2017) present five general phases commonly prominent in digital transformations. If properly understood, they could enhance the possibility to successfully execute digital transformations

Family Business

Family businesses have been widely researched in contemporary literature, however, a common definition has yet to be established. To this study, family business will be defined by the definition provided by Chua et al. (1999). The family business is a business governed and/or managed intending to shape and pursue the vision of the business held by a dominant coalition controlled by members of the same family or a small number of families in a manner that is potentially sustainable across generations of the family or families (Chua et al., 1999) Literature highlights that family firms operate at the intersection of the work system and family, where family members influence strategic decisions and visions for the organization (Nordqvist, Melin, Waldkirch & Kumeto, 2015). Habbershon and Williams (1999) further denote that the relationship and intersection

of the family and the business itself entails behaviors and complexities often significant to family firms.

Digital Transformation in Family Businesses

According to Basly and Hammouda (2020), family businesses are commonly told to favor stability to change over rapid and more disruptive changes. However, literature found in the field of family business is rather inconsistent on whether family businesses possess advantages or disadvantages when dealing with change given their specific nature which they operate under or are influenced by. Daspit et al. (2017) illustrate that family businesses could face major challenges when dealing with change because of the family involvement inflicting the change process. The authors further state that family businesses have a propensity to be loss-averse in terms of SEW and therefore show a tendency to maintain the status quo which might hamper organizational and strategic change. This notion is further elaborated by Berrone, Cruz and Gomez-Mejia (2012) who argue that adopting and changing processes within the family business might be difficult as it might entail changes in the status quo. In relation to this, Szymanska et al. (2019) also bring forth similar viewpoints, stating that family businesses could become discontented from implementing change as the family might lose control over the organization. Chirico et al. (2012) denote that family businesses often are disinclined to pursue change, even though the change is highly anticipated and needed. They argue that it could stem from the high level of emotions and feelings from the family members in relation to the organization, thus creating resistance to change. On the contrary, family businesses could possess advantages and experience great opportunities when dealing with change given their unique alignment of characteristics (Daspit et al., 2017). According to Batt et al. (2020), family businesses have esteemed decision-making power, high flexibility, and autonomy which serves to provide such organizations with greater advantages when leveraging transformations. Zahra (2005) argues that family firms, given their unique governance structure, easily can overcome inertia whilst simultaneously making rapid and resolute decisions, hence leading to the implementation of change in an effective and timely manner. It is further understood that family businesses, due to family involvement, can yield access to valuable resources

such as reputation, social capital, and knowledge, leading to change management efforts becoming easier to handle and leverage (Daspit et al., 2017). The same authors also highlight that family businesses could, if facing threats against the survival of the firm, forgo non-financial goals and other family intrinsic values to initiate change efforts. However, research in the intersection of family business and organizational change is argued to remain largely underserved where additional literature and further academic inquiry are needed (Vardaman, 2019).

As outlined above, existing literature is contradictory as to whether family firms possess advantages or disadvantages regarding the process of organizational changes. As family businesses operate in different industries and pursue different non-financial goals to accumulate SEW, a variance may occur among family firms as well (De Massis, Wang & Chua, 2019). According to Verhoef et al. (2021), companies tend to enter collaborations with competitors to be more adaptive when addressing the constant appearance of new digital technologies and innovative business ideas. Although external collaborations could be beneficial for family firms as well, they usually disregard the opportunity, leading to more inadequate transformations (De Massis, Frattini & Lichtenthaler, 2013). This is due to the family firms' tendency to see various external collaborations as threats to the family's influence on the business, i.e., SEW (Frank et al., 2010). Furthermore, due to the fear of losing control over the business, family firms tend to mainly pursue digital transformations that do not endanger the family's SEW, causing them to forgo certain digital transformations that potentially could be beneficial (Ceipek et al., 2020). Nonetheless, it could be particularly important for family firms to understand a digital transformation's different phases and utilize suitable change management strategies and actions as guidance to handle this type of complex transformation. However, as SEW and its interconnected non-financial goals and aspects are the basis for why and how family-governed firms do business and manage transformations (Cleary et al., 2019), it may entail that change management and digital transformation strategies and actions need to be attuned concerning the family firms' non-financial aspects and goals.

Environmental innovation in family businesses

Environmental innovation involves the development and implementation of new products, processes, and practices that reduce environmental impact, such as the use of renewable energy, sustainable materials, and eco-friendly production methods (Horbach, 2008; Brunnermeier & Cohen, 2003). Family businesses, with their often strong values and community ties, are well-positioned to lead in environmental innovation (De Marchi, 2012; Adams et al., 2016). While prior studies have shown that family involvement enhances environmental performance, it's essential to consider environmental innovation as a proactive measure (Schiederig et al., 2012; Buzohera, 2024). Environmental innovation refers to technological development aimed at addressing environmental issues. It goes beyond merely preventing environmental problems, such as air pollution or CO_2 emissions, and involves fundamentally transforming activities to protect the environment (Liao et al., 2024; Cai et al., 2024). Family-controlled firms, driven by socioemotional wealth considerations, tend to engage in environmental innovation more proactively. As family involvement increases, these firms become more aware of the significance of socioemotional wealth, leading to a stronger pursuit of environmental innovation (Horbach et al., 2023; Yang et al., 2024).

Family interlocks play a role in strengthening the link between family involvement and environmental innovation. Family interlocks occur when a firm's family directors are affiliated with the boards of directors of other firms. An increase in family interlocks intensifies the positive relationship between family involvement and environmental innovation (Bendell, 2022; Han et al., 2021). In summary, family involvement motivates firms to engage in environmental innovation, and family interlocks further enhance this effect (Aiello et al., 2021). Larger family businesses often invest in sustainable practices to reduce their environmental impact. For instance, family businesses aim to reduce their reliance on price-volatile energy sources by investing in greener energies such as solar and biomass, which simultaneously contribute to economic sustainability. Additionally, family businesses may develop or adopt innovative technologies that enhance environmental performance. Some family businesses focus on sustainable

supply chain practices, such as sourcing materials responsibly and minimizing waste (Horbach, 2008; Brunnermeier & Cohen, 2003). In conclusion, family involvement and family interlocks play crucial roles in driving environmental innovation within family businesses. By combining socioemotional wealth considerations with proactive measures, these businesses contribute to a more sustainable future.

HYPOTHESIS DEVELOPMENT

Digitization has become a crucial element in enhancing the export performance of family businesses by significantly improving their operational efficiency. By integrating digital technologies such as Enterprise Resource Planning (ERP) systems, Customer Relationship Management (CRM) software, and e-commerce platforms, family businesses can streamline their internal processes, reduce operational costs, and enhance supply chain management (Wang et al., 2024). These advancements not only boost productivity but also allow businesses to respond more swiftly and effectively to market demands. The automation and integration of various business functions through digitization facilitate smoother operations, which are essential for maintaining competitiveness in the international market (Fambeu, 2024). Moreover, digitization extends market reach by enabling family businesses to access and engage with a broader global audience. Digital marketing strategies, including social media marketing, search engine optimization, and email campaigns, enable businesses to target specific demographics and penetrate new markets with precision (Elsharnouby et al., 2024). Online platforms also provide valuable data analytics, offering insights into consumer behavior and preferences. This information is crucial for tailoring products and services to meet the unique needs of different markets, thereby increasing the likelihood of successful market entry and sustained export growth (Giordino et al., 2024). By leveraging digital tools, family businesses can expand their customer base and increase export sales, directly contributing to improved export performance. Additionally, digitization supports better decision-making through enhanced data collection and analysis capabilities. Real-time access to financial data, market trends, and performance metrics allows family businesses to make informed strategic decisions quickly (Leonidou et al., 2024). This agility is particularly important in the fast-paced global market, where the ability to adapt to changing conditions can provide a significant competitive advantage (Mitropoulos et al., 2023). By integrating digital technologies into their operations, family businesses can optimize their current performance and position themselves for future growth and expansion in international markets (Kryeziu et al.,

2023). Building upon the earlier discussions, the following hypothesis is proposed to investigate the influence of digitization on the export performance of family businesses:

H1: Digitization positively influences the export performance of family businesses.

Environmental innovation has become a crucial factor in the modern business landscape, particularly as consumers and regulators increasingly demand sustainable practices. Family businesses, with their often strong values and long-term orientation, are uniquely positioned to leverage environmental innovation to enhance their export performance. Environmental innovation involves the development and implementation of new products, processes, and practices that significantly reduce environmental impact. This includes the use of renewable energy sources, sustainable materials, and eco-friendly production methods, which not only meet regulatory requirements but also appeal to the growing segment of environmentally conscious consumers (Horbach, 2008; Brunnermeier & Cohen, 2003).

Family businesses can benefit from environmental innovation by differentiating themselves in the global market. By adopting sustainable practices, these firms can enhance their brand reputation, making their products more attractive to international buyers who prioritize sustainability (De Marchi, 2012; Galera-Quiles et al., 2023). The commitment to environmental innovation can also open new market opportunities and niches that value sustainability. For example, family businesses that invest in green technologies and sustainable supply chain practices can cater to markets that enforce strict environmental standards, thus expanding their customer base and increasing their export potential (Adams et al., 2016). This view is further supported by Shu et al. (2024), who argue that green innovation can help emerging market firms gain regulatory and social legitimacy in host countries, boosting their export performance. Moreover, the proactive adoption of environmental innovations can lead to cost savings and operational efficiencies. Utilizing renewable energy sources and optimizing resource use can reduce operational costs in the long run. These cost savings can be reinvested in other areas of the business, further enhancing competitive advantage. Furthermore,

family businesses that lead in environmental innovation often experience enhanced employee morale and community support, which can translate into increased productivity and loyalty. Studies such as those by Gao and Ren (2023) and Lu (2022) demonstrate how green innovation and practices like green mergers and acquisitions can improve export performance by enhancing corporate image and operational efficiencies. Based on the previous discussions, the following hypothesis is proposed to examine the impact of environmental innovation on the export performance of family businesses:

H2: Environmental innovation positively influences the export performance of family businesses

Digitization plays a critical moderating role in the relationship between environmental innovation and export performance, amplifying the benefits that environmental initiatives bring to family businesses. As companies integrate digital technologies, they can better manage and implement environmental innovations, resulting in more efficient processes and enhanced product offerings. For instance, advanced data analytics and digital monitoring systems enable firms to optimize resource use, track environmental impact in real-time, and quickly adapt to regulatory changes (Gao & Ren, 2023). These capabilities not only improve operational efficiency but also ensure that environmental innovations are effectively implemented and maintained, thereby boosting the overall export performance. Moreover, digitization enhances the visibility and marketability of environmentally innovative products. Through digital marketing strategies such as social media campaigns, search engine optimization, and targeted online advertisements, family businesses can effectively communicate their commitment to sustainability and reach a broader audience. Digital platforms also allow for better engagement with consumers, providing a channel for feedback and fostering a community around the brand's sustainable practices (Shu et al., 2024). This increased visibility and engagement can lead to a stronger brand reputation and higher demand for environmentally friendly products, which are crucial for success in international markets (Ullah, Arslan, & Puhakka, 2021). Furthermore, the integration of digitization

with environmental innovation supports better decision-making and strategic planning. Real-time data collection and analysis facilitate more informed and agile business decisions, enabling firms to quickly respond to market trends and regulatory requirements (Joo, Seo, & Min, 2018). This agility is particularly important in the global market, where conditions can change rapidly. By leveraging digital tools, family businesses can not only enhance their current performance but also position themselves for sustainable long-term growth (Costantini & Mazzanti, 2012). Drawing from the prior discussions, we present the following hypothesis to examine how digitization influences the relationship between environmental innovation and export performance in family businesses:

H3: Environmental innovation moderates the relationship between digitalization and export performance

METHODOLOGY

Study design

The research design aims to detail the procedures necessary for collecting information to analyze the impact of digitization and environmental innovation on the export performance of family businesses. Based on the study's objectives, research questions, and hypotheses, selecting the appropriate methodology is crucial for obtaining relevant and reliable results.

There are several research methodologies, and choosing the right one is vital for achieving meaningful results. Quantitative analysis is frequently used in marketing research and is described as a more suitable method for answering questions about relationships between specific variables and inquiries such as who, where, how many, and how much (Davis et al., 2013; Harrison & Reilly, 2011). In contrast, qualitative analysis is better suited for answering why and how questions, focusing on in-depth understanding, interpretation, and exploration of marketing phenomena through non-numeric methods such as interviews, observations, and content analysis (Davis et al., 2013; Harrison & Reilly, 2011). Furthermore, the combination of both approaches, known as mixed methods, integrates elements of qualitative and quantitative research to achieve a more comprehensive and in-depth understanding (Davis et al., 2013; Harrison & Reilly, 2011).

After analyzing the methods mentioned, this study adopts a quantitative approach to examine the impact of digitization and environmental innovation on the export performance of family businesses. The quantitative method facilitates extensive data collection over time, providing a broader perspective on the subject matter (Ranganathan & Caduff, 2023). The choice of this methodology is justified by the multiple advantages associated with using questionnaires. According to Ranganathan & Caduff (2023), questionnaires allow for exploring new perspectives and operational methods, in addition to facilitating the testing of various theories. As Yaddanapudi & Yaddanapudi (2019) point out, questionnaires also enable reaching many observations and a wide geographical area, saving time, collecting more data, ensuring greater

freedom in responses due to anonymity, and obtaining faster and more accurate answers.

To explore the research questions and achieve the study objectives, the following research questions and objectives are formulated:

- How does digitization influence the export performance of family businesses? Analyze the impact of digitization on the export performance of family businesses.
- In what ways does environmental innovation affect the export performance of family businesses? Evaluate how environmental innovations influence the success of family businesses in their export endeavors.

To address these research questions and operationalize the objectives, the following hypotheses are proposed:

- H1: Digitization positively influences the export performance of family businesses.
- H2: Environmental innovation positively influences the export performance of family businesses.
- H3: Digitization moderates the relationship between environmental innovation and export performance

In Figure 1, the conceptual model of the research is presented, serving as the foundational framework for the entire study. This model is meticulously designed to map out the relationships among key variables—digitalization, environmental innovation, and export performance—while also considering the moderating effects of environmental innovation on the relationship between digitalization and export performance. The model visually presents the hypothesized pathways through which

these variables interact, providing a clear representation of the theoretical assumptions and the expected flow of influence.

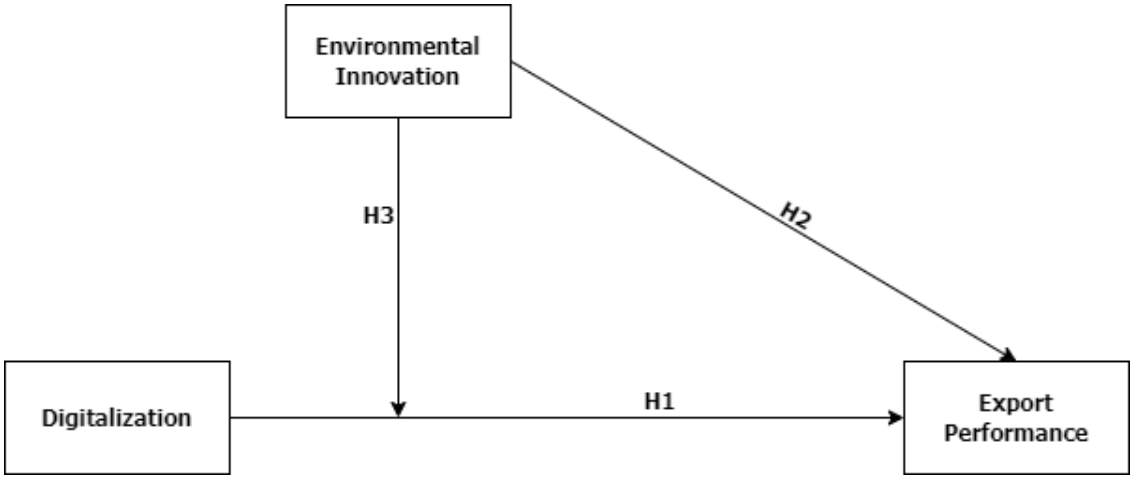

Figure 1 – Conceptual model

Data and Sampling

For our analysis, we utilized microdata from the Flash Eurobarometer 486 survey, titled "SMEs, Start-ups, Scale-ups, and Entrepreneurship," conducted by the European Commission in 2020. This survey provides detailed insights into the challenges and opportunities faced by businesses, with a particular focus on their growth, adoption of sustainable practices, and integration of digital technologies (European Commission, 2020).

The survey included data from 195 family-owned businesses in Portugal, allowing for an in-depth analysis of the specific business conditions and economic environment within the country. Data collection was performed through telephone interviews with key decision-makers from these enterprises between February 19 and May 5, 2020.

The Flash Eurobarometer surveys are recognized for their precision and reliability, ensured by rigorous validation processes. The microdata from these surveys is made available to the scientific community for research and educational purposes, maintained by the GESIS Survey Data Curation Department and the Interuniversity Consortium for

Political and Social Research. This guarantees global accessibility and long-term availability for statistical analysis. The robustness of the Eurobarometer data makes it an asset for empirical studies, providing a strong foundation for testing hypotheses and gaining knowledge into the dynamic business environment in Portugal (Marnoto et al., 2024; Veiga et al., 2024).

Table 1 summarizes the characteristics of the sample of family businesses included in the study.

The sample consists of enterprises of varying sizes and sectors of activity. Among these enterprises, 67.7% have 1 to 9 employees, 20.5% have 10 to 49 employees, 10.8% have 50 to 249 employees, and 1.0% have 250 employees or more. On average, the number of employees excluding the owners is 19.9, with a standard deviation of 43.6, and the range of employees spans from 1 to 290. In terms of the time since the enterprises were registered, the average duration is 16.4 years, with a standard deviation of 18.3 years, ranging from 3 to 134 years. The sectors of activity, classified according to the NACE code, are distributed as follows: 15.4% in Manufacturing, 10.8% in Construction, 33.8% in Wholesale and retail trade; repair of motor vehicles and motorcycles, 5.1% in Transportation and storage, 13.3% in Accommodation and food service activities, 2.1% in Information and communication, 2.1% in Financial and insurance activities, 2.6% in Real estate activities, 8.7% in Professional, scientific and technical activities, 0.5% in Administrative and support service activities, 1.0% in Education, 3.6% in Human health and social work activities, and 1.0% in Arts, entertainment and recreation.

Table 1 – Sample characterization

		N	%
Employees excluding the owners	1 to 9 employees	132	67,7%
	10 to 49 employees	40	20,5%
	50 to 249 employees	21	10,8%
	250 employees or more	2	1,0%
Employees excluding the owners, Mean ± SD (Range)		19,9 ± 43,6 (1 - 290)	
Time since enterprise was registered, Mean ± SD (Range)		16,4 ± 18,3 (3 - 134)	
SECTOR OF ACTIVITY (NACE)	C - Manufacturing	30	15,4%
	F - Construction	21	10,8%
	G - Wholesale and retail trade, repair of motor vehicles and motorcycles	66	33,8%

	H - Transportation and storage	10	5,1%
	I - Accommodation and food service activities	26	13,3%
	J - Information and communication	4	2,1%
	K - Financial and insurance activities	4	2,1%
	L - Real estate activities	5	2,6%
	M - Professional, scientific and technical activities	17	8,7%
	N - Administrative and support service activities	1	0,5%
	P - Education	2	1,0%
	Q - Human health and social work activities	7	3,6%
	Arts, entertainment and recreation	2	1,0%

Measures

Dependent Variable

To measure export performance, we used a specific question from the Flash Eurobarometer 486 survey: "What percentage of your enterprise's total turnover in 2019 was accounted for by exports of goods and services?" The response options were 0%, less than 25%, between 25% and 50%, and more than 50%.

Independent Variables

Environmental innovation was measured by asking if the company had introduced any innovations with an environmental benefit, including those that improve energy or resource efficiency. This was a binary variable, with responses being either "Yes" or "No."

To assess digitization, we used a specific question in the questionnaire: "Which of the following digital technologies has your company adopted?" The responses were binary, allowing respondents to choose between "No" or "Yes" for several options: (1) AI (e.g., machine learning or technologies for identifying objects or people), (2) cloud computing (i.e., storing and processing files or data on remote servers hosted on the Internet), (3) robotics (i.e., robots used to automate processes in construction or design), (4) smart devices (e.g., smart sensors, smart thermostats), (5) big data analysis (e.g., data mining and predictive analysis), (6) high-speed infrastructure, and (7) blockchain. Following Arranz et al. (2023), the digitization variable was constructed as a cumulative index by summing the scores of these seven categories, resulting in a range from 0 to 7.

Control Variables

The control variables included in the empirical analysis were: (1) Company size, measured by the number of employees, (2) Time since the enterprise was registered, and (3) Sector of activity, classified according to the NACE codes. These factors are included to account for their potential influence on the results, ensuring a more robust and accurate analysis.

Data Analysis

To evaluate our hypotheses, we employed multivariate ordinal logistic regression analysis. We developed two different models, both with export performance as the dependent variable. In the first model (Model 1), we included control variables, digitization, and environmental innovation as independent variables. These control variables allowed us to account for factors that might influence export performance independently of our main variables of interest. The control variables included dummies for family businesses in the industry and construction sectors, with the commerce and services sectors serving as the reference category. In the second model (Model 2), we further refined our analysis by including interaction terms to explore the interaction between digitization and environmental innovation. This approach enabled us to assess whether the effect of digitization on export performance varies depending on the level of environmental innovation within the family businesses.

RESULTS

The table presents the correlation coefficients between export performance, digitization, environmental innovation, and several other variables. Export performance is positively correlated with the number of employees excluding the owners (0.358), the time since the enterprise was registered (0.191), the manufacturing sector (0.285), digitization (0.362), and environmental innovation (0.177). Digitization is also positively correlated with export performance (0.362), the number of employees excluding the owners (0.310), the manufacturing sector (0.168), and environmental innovation (0.400). Environmental innovation shows a positive correlation with export performance (0.177) and digitization (0.400).

Additionally, there are positive correlations between the number of employees excluding the owners and the time since the enterprise was registered (0.176), as well as between the number of employees and the manufacturing sector (0.180). The construction sector shows a weak and negative correlation with export performance (-0.009) and a slight positive correlation with the time since the enterprise was registered (0.140). Overall, export performance is most strongly correlated with digitization (0.362), indicating that higher levels of digitization are associated with better export performance. Both digitization and environmental innovation are interrelated and positively contribute to improved export outcomes.

Table 2 – Correlation between variables

	1	2	3	4	5	6	7
(1) Export performance (%)	1,000						
(2) Employees excluding the owners	0,358	1,000					
(3) Time since enterprise was registered	0,191	0,176	1,000				
(4) Manufacturing	0,285	0,180	0,054	1,000			
(5) Construction	-0,009	0,039	0,140	-0,148			
(6) Digitalization	0,362	0,310	0,019	0,168	1,000	1,000	
(7) Environmental innovation	0,177	0,126	0,070	0,081	-0,006	0,400	1,000

Table 3 presents the results of the regressions aimed at validating the study hypotheses. The Pseudo R^2 (Nagelkerke) for Model 1 is 32.2%, indicating that this model explains 32.2% of the variance in export performance. Model 2 has a Pseudo R^2 of 31.5%, indicating that this model explains 31.5% of the variance in export performance.

Regarding the control variables, the number of employees excluding the owners is positively associated with export performance in Model 1 (β = 0.01; Wald = 3.13; p = 0.077), although it is not statistically significant. However, in Model 2, this relationship becomes significant (β = 0.01; Wald = 3.98; p = 0.046), indicating that more employees are linked to better export performance. The time since the enterprise was registered is significant in both models, showing a positive relationship with export performance. In Model 1, the coefficient is (β = 0.02; Wald = 3.86; p = 0.049), and in Model 2, it remains significant (β = 0.02; Wald = 4.19; p = 0.041), suggesting that older enterprises tend to have better export performance. Being in the manufacturing sector significantly positively affects export performance in both models. In Model 1, the coefficient is (β = 1.31; Wald = 6.12; p = 0.013), and in Model 2, it is (β = 1.34; Wald = 6.39; p = 0.011), highlighting the strong export capabilities of manufacturing firms. The construction sector does not show a significant effect on export performance in either model, with Model 1 (β = 0.14; Wald = 0.04; p = 0.849) and Model 2 (β = 0.18; Wald = 0.06; p = 0.802).

The analysis further revealed that digitization significantly positively affects export performance in Model 1 (β = 0.47; Wald = 8.14; p = 0.004). This supports Hypothesis 1 (H1), which posits that digitization positively influences the export performance of family businesses. This result underscores the importance of digital capabilities for enhancing international business activities. However, in Model 1, environmental innovation does not show a significant effect on export performance (β = 0.26; Wald = 0.28; p = 0.595), suggesting that, on its own, environmental innovation might not directly influence export outcomes, thus not supporting Hypothesis 2 (H2), which proposed that environmental innovation positively influences the export performance of family businesses.

The interaction between digitization and environmental innovation significantly positively affects export performance in Model 2 (β = 0.45; Wald = 10.94; p = 0.001). This supports Hypothesis 3 (H3), which posits that environmental innovation moderates the relationship between digitization and export performance. This indicates that the combination of high digitization and environmental innovation leads to significantly better export performance, highlighting the synergistic effect of these two factors in driving international success.

Table 3 – Sample characterization

	Model 1			Model 2		
	B	Wald	p	B	Wald	p
Employees excluding the owners	0,01	3,13	0,077	0,01	3,98	0,046
Time since enterprise was registered	0,02	3,86	0,049	0,02	4,19	0,041
Manufacturing	1,31	6,12	0,013	1,34	6,39	0,011
Construction	0,14	0,04	0,849	0,18	0,06	0,802
Digitalization (H1)	0,47	8,14	0,004			
Environmental innovation (2)	0,26	0,28	0,595			
Digitalization x Environmental innovation (H3)				0,45	10,94	0,001
Preudo R^2 (Nagelkerke)		32,2%			31,5%	

** p < 0,01; * p < 0,05

DISCUSSION

The intersection of family dynamics and business processes provides a complex backdrop for analyzing the implications of digitization and environmental innovation on export performance in family businesses.

The results indicating a significant positive effect of digitization on export performance emphasize the transformative power of digital technologies in enhancing operational efficiencies and broadening market reach. The agility afforded by digital tools enables family businesses to quickly respond to market demands and to engage with a global audience through sophisticated digital marketing strategies. This adaptability is particularly valuable for family enterprises that typically face challenges such as risk aversion and a reluctance to deviate from established processes that characterize many family-run operations. The ability of digital technologies to bridge these traditional barriers is noteworthy, as it suggests that even traditionally conservative business models can be revitalized to compete effectively in today's fast-paced market environments. This aligns with observations by Daspit et al. (2017) and Fambeu (2024), who note the pivotal role of technology in driving business evolution.

Conversely, the less pronounced impact of environmental innovation alone on export performance suggests that while such practices are crucial, their effectiveness in enhancing export capabilities may depend on the presence of other complementary strategies or favorable market conditions. This observation ties in with results from Horbach et al. (2023) and Yang et al. (2024), who argue that environmental innovation, despite its significance for sustainability, may not directly translate into improved business performance without strategic alignment with broader business goals or market readiness for environmentally friendly products. It highlights the complexity of integrating environmental practices into the core business strategy, which requires not only commitment but also a conducive external environment and internal capabilities that can leverage these innovations effectively.

The observed significant positive interaction between digitization and environmental innovation underscores the potential of these combined factors to drive substantial improvements in export performance. This synergy is particularly relevant for family businesses, which may traditionally eschew radical innovations due to concerns over disrupting family legacy or diluting socioemotional wealth. The findings suggest that when digital transformation and environmental innovation are pursued together, they can counteract the typical resistance to change seen in family businesses, thereby not only enhancing export performance but also positioning the business for long-term sustainability and competitive advantage in the global market. This dynamic reflects theoretical perspectives offered by De Massis, Frattini & Lichtenthaler (2013) and practical challenges discussed by Ceipek et al. (2020), who highlight the delicate balance family businesses must navigate between innovation and tradition. The combined approach of digitization and environmental innovation provides a compelling pathway for family businesses to embrace change while maintaining their core values and strategic objectives.

Theoretical Implications

The findings from this study contribute to an extension of family business theory by integrating the concepts of digitization and environmental innovation. Traditionally, family business research has focused on governance, succession, and socioemotional wealth, often overlooking the impact of technological advancements and sustainability measures on business performance. By demonstrating that digitization significantly enhances export performance, this research suggests a reevaluation of how family businesses are theorized to engage with technology. It prompts a broader inclusion of technological adaptation as a factor in the family business theoretical frameworks, potentially leading to revised models that better account for the dynamics of modernization in family-operated firms.

The study also deepens the theoretical understanding of socioemotional wealth by exploring its interaction with environmental innovation. While socioemotional wealth has been predominantly viewed through the lens of preserving family legacy and controlling interests, this research suggests that it could also be extended to include environmental stewardship as a component of the family's legacy. This aligns with the growing global emphasis on sustainable practices and suggests that family businesses might consider environmental innovation not only as a business strategy but also to enhance their socioemotional wealth by building a legacy of responsibility and sustainability. This could lead to new theoretical developments that view socioemotional wealth not just as a barrier to change but as a motivator for adopting sustainable practices.

Finally, the significant interaction between digitization and environmental innovation found in this study suggests a synergistic effect that has been underexplored in academic literature. This finding can stimulate further theoretical inquiries into how different types of innovations interact within family businesses and how these interactions can be managed to optimize performance. The observed synergy challenges existing theories that treat technological and environmental innovations as isolated or occasionally conflicting strategies. It proposes a new theoretical perspective that sees them as complementary forces that, when aligned, can amplify benefits far beyond what each could achieve alone. This perspective invites further exploration into the conditions under which such synergies are most effective and how they can be fostered, particularly in the unique context of family businesses where change can be both a strategic imperative and a cultural challenge.

Practical Implications

The synergistic effects of digitization and environmental innovation offer critical insights for family businesses looking to thrive in a competitive market landscape. Embracing digitization is crucial for family businesses that often grapple with the dual challenges of

preserving tradition and adapting to technological advances. By integrating advanced digital technologies such as artificial intelligence, cloud computing, robotics, and big data analysis, these businesses can significantly enhance their operational efficiencies. These technologies enable automation of routine tasks, improve accuracy and speed of data processing, and facilitate more informed decision-making. Implementing such digital solutions helps streamline business processes, reduce costs, and ultimately, improve the agility of the business in responding to market changes.

In parallel, enhancing an online presence is essential for expanding market reach and customer engagement. By developing robust digital marketing strategies that leverage social media, search engine optimization, and e-commerce platforms, family businesses can effectively target and engage with a wider global audience. This approach not only helps in penetrating new markets but also strengthens customer relationships by providing more personalized and responsive interactions. As digital platforms continue to dominate the commercial landscape, having a strong online presence becomes indispensable for capturing and retaining customer interest in an increasingly digital world.

Moreover, the integration of environmental innovation into business operations offers a strategic advantage by aligning with global sustainability trends. Family businesses can adopt sustainable practices such as using renewable energy sources, enhancing resource efficiency, and reducing waste. These practices not only contribute to cost savings in the long run but also enhance the company's brand reputation as a responsible and ethical business. As consumers and regulatory bodies increasingly favor environmentally friendly products and practices, incorporating these innovations can open new market opportunities and meet compliance standards, thereby securing a competitive edge in the market.

Finally, the interaction between digitization and environmental innovation can create a powerful synergy that drives superior export performance and sustainable business growth. By using digital tools to enhance their environmental management systems,

family businesses can more effectively implement and monitor sustainable practices. For instance, digital analytics can provide precise measurements of resource use and emissions, enabling businesses to optimize their operations for better environmental and economic outcomes. This synergy not only positions the business favorably in terms of operational efficiency and sustainability but also caters to the growing consumer demand for green products, thereby enhancing the overall competitiveness and longevity of the family business in the global market.

CONCLUSION

This study was designed to explore the effects of digitization and environmental innovation on the export performance of family businesses. The primary objectives were to determine how digitization impacts export performance, to assess the role of environmental innovation, and to explore the potential interaction between these two factors. These objectives led to the formulation of three specific research questions, each corresponding to a hypothesis: H1 posited that digitization positively influences export performance; H2 suggested that environmental innovation alone positively affects export performance; and H3 proposed that digitization moderates the relationship between environmental innovation and export performance.

The study adopted a quantitative research methodology, utilizing extensive data collection through questionnaires to provide a broad perspective on the impact of digitization and environmental innovation. This approach allowed for a comprehensive analysis of the relationships between the variables, aligning with the methodological frameworks recommended by scholars like Davis et al. (2013) and Ranganathan & Caduff (2023). The choice of a quantitative method was justified by its ability to facilitate the testing of theories across a wide geographical area and among a large sample size, providing generalizable and statistically significant findings.

The results of the analysis indicated that digitization has a significant positive impact on the export performance of family businesses, supporting Hypothesis H1. This suggests that investments in digital technology can directly enhance the international market reach and operational efficiency of family-operated firms. In contrast, Hypothesis H2 was not supported; environmental innovation alone did not show a significant direct effect on export performance. This finding implies that while environmental innovation is important, its impact on export performance may require the presence of other facilitating factors or conditions.

Furthermore, the study found strong support for Hypothesis H3, indicating that the interaction between digitization and environmental innovation significantly enhances export performance. This suggests that when family businesses integrate digitization

with environmental innovation, the combined effect is greater than the sum of their contributions. This synergy can provide family businesses with a competitive edge in the global market, particularly in industries where sustainability and technological advancement are highly valued.

Despite these implications, the study has several limitations that suggest directions for future research. First, the reliance on quantitative data may overlook the nuanced ways in which family dynamics and individual stakeholder values influence the adoption and effectiveness of digitization and environmental innovation. Future studies could incorporate qualitative methods, such as case studies or interviews, to gain deeper insights into these internal factors. Additionally, the study's focus on family businesses may limit the generalizability of the findings to other types of companies. Comparative studies involving non-family businesses could illuminate whether the observed effects are unique to family firms or applicable more broadly.

Another limitation is the potential variability in the adoption and impact of digital and environmental innovations across different industries and regions. Subsequent research could explore these variables in a more segmented manner, examining specific sectors or geographic contexts to determine how contextual factors influence the effectiveness of these innovations. Finally, longitudinal studies could provide a better understanding of how the long-term integration of digitization and environmental innovation affects the sustainability and growth trajectories of family businesses over time. Addressing these limitations in future research will not only strengthen the theoretical foundations laid by this study but also enhance practical recommendations for family businesses aiming to leverage digitization and environmental innovation for improved export performance and overall business success.

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