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Digitalization, Sustainability, and Internationalization Nexus: Insights from Portuguese Entrepreneurs

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Abstract: The convergence of digitalization, sustainability, and internationalization represents a fundamental paradigm shift in today's world of global business. This paper delves into the intricate relationship among these three pillars and their transformative impact on businesses, economies, and societies worldwide. Digitalization, characterized by the adoption of digital technologies, serves as a catalyst for internationalization, breaking down traditional barriers and fostering seamless connectivity across borders. Concurrently, the imperative of sustainability compels organizations to operate with consideration for environmental, social, and economic factors. Bearing this reality in mind, the aim of this study is to investigate, from the perspective of entrepreneurs of internationalized Portuguese companies, the factors contributing most to the importance they attach to digitalization in inducing internationalization. Using statistical methods of regression analysis (linear and logistic multivariate regression), the study seeks to identify the complex interactions between digitalization strategies and international expansion efforts. The results shed light on the critical role that digitalization plays in supporting internationalization goals and furthering sustainability objectives, stating that there is a strong connection between the importance of digitalization partnerships, counselling, and access to the new technologies and resources. Additionally, budget constraints may pose challenges for companies prioritizing digitalization efforts.

Keywords: business digitalization; sustainability; internationalization

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1. Introduction

1.1. Internationalization

International business plays a vital role in driving economic growth and prosperity, as it fosters innovation, creates job opportunities, and promotes knowledge exchange, ultimately contributing to an increased competitiveness and resilience of national economies. OECD data show that exports of goods and services as a percentage of GDP have been steadily increasing globally, reaching an average of around 30% of GDP in 2020, and continued to rise in 2021, reaching an average of around 31% of GDP [1].

Internationalization can holistically be defined as a growth strategy that firms implement when they follow a process to expand their operations across country borders. Explanations for firm internationalization trace back to the era when global foreign direct investment (FDI) flows were predominantly led by corporations from the foremost industrialized nations. These explanations emphasize the benefits derived from firms' cross-border transfer of competitive advantages, encompassing proprietary technology, know-how, brands, and managerial expertise. Such transfers serve to diminish the "liability of foreignness" encountered in host country markets [2,3]. The Uppsala Model expands upon and refines this perspective to accommodate the internationalization strategies of smaller enterprises and

those possessing limited foreign market experience [4,5]. Through a resource-based approach, this model underscores the importance of managers' incremental learning as a mechanism for mitigating firm risk, thereby engendering positive feedback effects.

Emerging internationalizing firms may opt to concentrate on their immediate global region to attenuate their exposure to the liability of foreignness, akin to the Triad market bias observed among Fortune 500 corporations [6] and US manufacturing firms [7]. However, empirical evidence at the global level fails to robustly support this perspective [8]. Furthermore, establishing a direct correlation between geographic distance and the liability of foreignness remains elusive. Therefore, the importance of the internationalization of firms for them and, of course, for the economy, is undeniable.

1.2. Internationalization, Digitalization, and Sustainability

In an era marked by rapid globalization and technological advancement, the intersection of internationalization, digitalization, and sustainability has become increasingly significant [9–11]. The integration of these three pillars has reshaped the landscape of businesses, economies, and societies worldwide. Internationalization, referring to the process of expanding operations beyond domestic borders, has been facilitated by digitalization, which encompasses the adoption of digital technologies to streamline processes, enhance connectivity, and foster innovation. Concurrently, the imperative of sustainability, encompassing environmental, social, and economic dimensions, has emerged as a fundamental consideration in decision-making processes, urging organizations to operate in a manner that ensures the well-being of current and future generations.

Digitalization has played a key role in facilitating internationalization efforts by breaking down traditional barriers to entry and enabling seamless communication and collaboration across borders. Through digital platforms, companies can reach new markets, engage with diverse stakeholders, and conduct business operations with unprecedented speed and efficiency. Moreover, digital technologies have empowered organizations to gather and analyze vast amounts of data, providing valuable insights into consumer behavior, market trends, and operational performance [12,13]. Also, in recent years, the landscape of international business has been significantly influenced by the rapid advancement of digitalization and the growing emphasis on sustainable practices. According to recent studies, companies that adopt digital technologies experience an average revenue increase of 14% and a significant expansion in their international market reach [14]. OECD statistics indicate that the digital economy has continued to expand, with ICT services, software, and digital media sectors contributing significantly to GDP growth in many countries [1]. This data-driven approach not only enhances strategic decision-making but also enables companies to tailor their offerings to meet the evolving needs and preferences of global consumers while optimizing resource utilization and minimizing environmental impact.

Therefore, the pursuit of internationalization and digitalization must be accompanied by a steadfast commitment to sustainability to ensure long-term viability and resilience. As organizations expand their global footprint and embrace digital technologies, they must mitigate the associated environmental and social risks while maximizing positive impacts. This entails adopting sustainable business practices, embracing renewable energy sources, reducing carbon emissions, promoting diversity and inclusion, and fostering ethical supply chains [15]. By aligning internationalization and digitalization efforts with sustainability goals, organizations can create shared value for stakeholders, enhance brand reputation, and contribute to the collective effort towards building a more equitable, prosperous, and resilient global community. A study by McKinsey & Company found that companies with strong sustainability practices are outperforming their peers financially, with a 3.9% higher return on investment (ROI) over a five-year period [16].

Considering the organization itself, the digitalization has become intrinsically linked to organizational sustainability, presenting opportunities for companies to enhance their environmental and social responsibility efforts. Through the adoption of digital technologies, firms can optimize resource utilization, reduce waste, and improve energy efficiency

across their operations. Data-driven decision-making enabled by digitalization allows organizations to gain insights into their environmental footprint and identify areas for improvement, leading to more sustainable practices. Additionally, digital platforms facilitate greater transparency and engagement with stakeholders, enabling firms to communicate their sustainability initiatives and progress effectively. By embracing digitalization as a tool for enhancing sustainability, organizations can not only improve their environmental performance but also strengthen their reputation as responsible corporate citizens committed to long-term sustainability goals.

The integration of digitalization and sustainability within firms can significantly bolster internationalization strategies by providing competitive advantages and opening new market opportunities [17,18]. Digitalization enables firms to streamline processes, enhance operational efficiency, and improve communication channels, thereby facilitating their expansion into global markets. By leveraging digital technologies, firms can overcome traditional barriers to entry, such as geographical distance and cultural differences, and establish a stronger presence in international markets. Moreover, the alignment of digitalization with sustainability goals enhances the attractiveness of firms to international stakeholders, including customers, investors, and regulatory bodies [19]. Sustainable practices, enabled and supported by digital technologies, demonstrate a commitment to environmental stewardship, social responsibility, and ethical business conduct, thereby enhancing the firm's reputation and credibility on the global stage. This positive reputation not only attracts environmentally conscious consumers but also fosters trust and collaboration with international partners and stakeholders. Furthermore, digitalization facilitates market research and consumer insights, enabling firms to adapt their products and services to meet the diverse needs and preferences of global consumers effectively [20]. Through data analytics and digital marketing strategies, firms can identify emerging trends, localize their offerings, and target specific market segments more precisely, thus enhancing their competitiveness in international markets. Additionally, digital platforms provide opportunities for firms to engage with international customers and build relationships through personalized interactions and targeted communication strategies. The integration of digitalization and sustainability not only enhances the operational efficiency and reputation of firms but also strengthens their internationalization strategies. By leveraging digital technologies to drive sustainability initiatives, firms can expand their global footprint, attract international stakeholders, and capitalize on new market opportunities more effectively. Embracing digitalization to enhance sustainability not only fosters organizational growth but also contributes to the collective effort towards building a more equitable, prosperous, and sustainable global economy.

Bearing this reality in mind, the aim of this study is to find out from the entrepreneurs of internationalized Portuguese companies, and their point of view, which factors contribute most to the importance they attach to the digitalization of their company as a factor that induces internationalization. With this aim in mind, we will use statistical multivariate methods of regression analysis.

2. Background and Related Works

2.1. Background

Recent research on the impact of digital transformation on business internationalization has revealed several key findings. Studies indicate that digital transformation positively influences firms' internationalization processes at individual, firm, and macro levels, with both human and non-human components playing crucial roles [21]. Additionally, the European Union recognizes the importance of SMEs internationalizing and has implemented tools to support this, highlighting the differences in internationalization models between SMEs and multinational enterprises [22]. Empirical evidence from the Chinese stock market suggests that digital transformation enhances corporate international strategies, particularly benefiting private firms and non-high-tech enterprises, with corporate innovation playing a mediating role [23]. Furthermore, the use of digital tools by entrepreneurs has shown both

positive and negative impacts, emphasizing the need for new activity organization and training to navigate the digital environment effectively [24,25].

The proliferation of digital technologies has significantly reshaped business practices worldwide, particularly emphasizing the nexus between digitalization and sustainability. A systematic review of 1.066 research articles from the Scopus database, spanning from 2019 to 2024, utilizing the search query "Digitalization AND Sustainability", reveals a compelling trajectory of scholarly focus. This analysis, underpinned by VOSviewer 1.6.20 for constructing and visualizing bibliometric networks, uncovers the critical dimensions and thematic progressions that inform the intersection of digitalization and business internationalization (Figure 1).

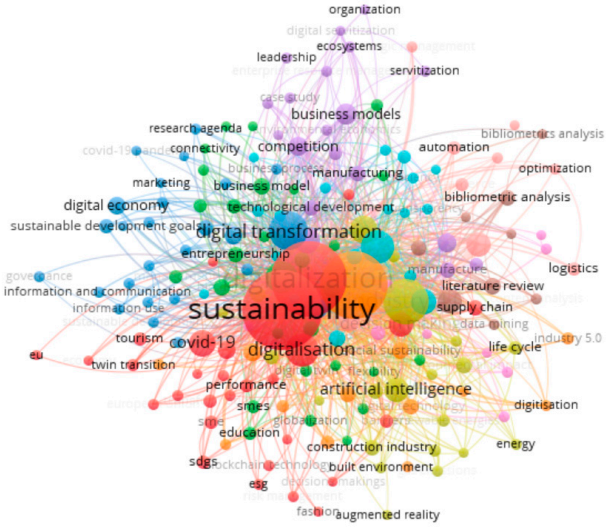


Figure 1. Bibliometric networks for "Digitalization" AND "Sustainability".

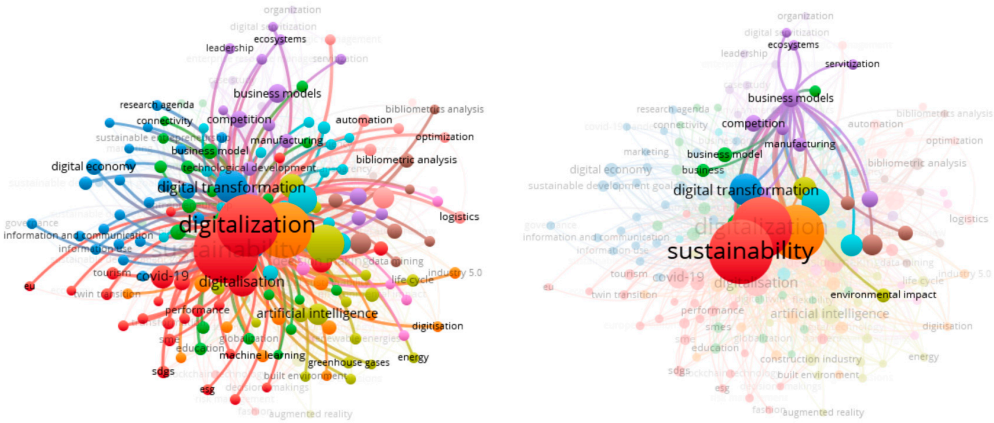
The emergence of digitalization in sustainable international business practices has shown that digital transformation, as both a catalyst and a conduit for sustainable business models, has prompted a paradigm shift in how companies penetrate and operate in international markets. The integration of digital technologies—ranging from big data and analytics to AI-driven processes—facilitates a deeper understanding and implementation of sustainable practices. These technologies enable businesses to achieve greater efficiency and effectiveness in resource utilization, waste reduction, and carbon footprint minimization, aligning with global sustainability goals.

The bibliometric analysis conducted using VOSviewer highlights several key themes that dominate the scholarly discussion. Firstly, the role of digitalization in enhancing operational efficiency and fostering innovation emerges as a central theme. This includes the adoption of smart technologies that streamline operations and reduce environmental impact through more precise resource management.

Secondly, the literature indicates a strong emphasis on the socio-economic dimensions of digitalization. This involves examining how digital tools empower businesses to create value in new markets, particularly in developing regions, while promoting inclusive growth and sustainable economic development.

Thirdly, the interplay between digitalization and regulatory frameworks is scrutinized. Research suggests that as businesses expand internationally, digital compliance and adherence to international standards of sustainability become increasingly complex yet critical. Dynamic regulatory landscapes require businesses to be agile, leveraging digital systems for compliance management.

The synthesis of the main factors from the bibliometric network reveals that successful internationalization in the digital era is predicated on several pillars: technological adaptability, strategic foresight in digital investments, and a robust understanding of the sustainability challenges and opportunities in target markets. Companies that harness digital technologies to not only optimize their internal operations but also to enhance their market entry strategies are shown to be more resilient and capable of sustainable growth (Figure 2).



(**a**) (**b**)

Figure 2. Bibliometric networks for "Digitalization" AND "Sustainability": (**a**) emphasis on "Digitalization" and (**b**) Emphasis "Sustainability".

After bibliometric analysis, the next step was to select the papers to be used to design the study structure.

2.2. Related Works

Research on the internationalization and sustainability of companies holds increasing significance in today's global landscape. This topic is not only crucial for individual firms but also for national economies. Declines in export performance can have adverse effects on economic growth, leading to disparities in real per capita income, as seen in the euro area. Internationalization has shifted from being merely optional to becoming a necessity for survival in a rapidly changing world [26].

In the context of international business, sustainability is crucial since it affects a company's long-term profitability, reputation, and capacity to compete in international markets. Adopting sustainable practices solves social and environmental issues, which are becoming more important factors for investors, regulators, and customers in addition to being in line with society expectations [27]. Businesses operating internationally must consider a variety of environmental and social environments, which means incorporating sustainability into their operations is crucial to reducing risks and seizing possibilities. In addition to improving operational efficiency, sustainable practices including resource efficiency, waste reduction, and ethical sourcing also help to develop a positive brand image and trust among stakeholders [28].

For international businesses, sustainability is increasingly important as a driver of innovation and market differentiation. Businesses can reach new markets, draw in environmentally and socially concerned customers, and set themselves apart from rivals by incorporating sustainability into their business plans [29]. A company's capacity to fulfill the changing expectations of investors, customers, and other stakeholders can provide it a competitive edge in today's linked world, where information moves quickly, and transparency is demanded. International businesses can strengthen their resilience to social and environmental crises and help to achieve global sustainability goals by implementing sustainable practices throughout their value chains [30].

In today's environment, companies must explore innovative ways to develop competitive advantages, which involves acquiring new skills, resources, and capabilities [31]. Companies often gain access to these resources, including market-specific knowledge, through alternative management methods and the adoption of new technologies [32]. Regarding these alternative management methods, we can refer, for instance, to networks (or partnerships). Successful international business in today's globalized market depends on effective networking. International businesses can benefit from a wealth of resources, opportunities, and insights by creating and maintaining networks with stakeholders like suppliers, customers, industry groups, and governmental organizations [33]. Through these networks, companies can enter new markets, handle challenging regulatory situations, and keep up with cutting-edge trends and technological advancements. Strong partnerships with partners worldwide allow businesses to take advantage of common knowledge and work together on sustainability projects that tackle social and environmental issues [29]. Networks promote innovation, knowledge exchange, and the distribution of best practices, enabling companies to absorb insights from a variety of viewpoints and modify their approaches in response to shifting market dynamics and cultural contexts. Ultimately, strong networking makes international businesses more resilient and competitive, allowing them to grow sustainably and have a good global influence.

Additionally, addressing now the importance of new technologies, the rise of e-commerce has reshaped the landscape of international business for many SMEs [34]. By enabling direct connections between companies and foreign clients, new technologies offer opportunities for accessing and servicing foreign markets, thereby influencing the number of exporters involved in international operations [35]. This approach acknowledges that, with the advent of the internet, small and medium-sized enterprises (SMEs) have begun engaging in international activities, often immediately after their establishment. These international entrepreneurship (IE) approaches focus on internal factors, capabilities, and networks of a company as drivers for such behavior [36,37]. Consequently, there is an increasing need to understand internationalization within the SME context as much as it is understood within the context of large multinationals. Understanding how, when, and why companies internationalize has become a crucial research area in the field of internationalization. For [26], the internationalization of small and medium-sized enterprises (SMEs) hinges on two key pillars: the growing globalization of markets [38–41] and the rapid advancements in technology, particularly in online trading.

Digitalization has fundamentally altered business practices, posing challenges to the competitive advantages of established businesses while offering opportunities to new ventures [41]. The characteristics of the digital market promote the internationalization of smaller and younger companies, despite their limited budgets for early and wide-scale internationalization. Traditional theories, such as internalization theory and the eclectic paradigm, were developed based on observations in large multinational enterprises (MNEs) over 40 years ago. In contrast, digitalization could be viewed as a new "game changer" in the internationalization of SMEs globally. It presents new opportunities in foreign markets while also intensifying competition in domestic markets. Achieving a competitive advantage requires companies to be responsive to market changes through digital tools and capabilities [42]. This necessitates learning and dynamic capabilities. The authors of [43] also emphasize the need for further research on the utility of digitalization for decision-making purposes. Digitalization plays a crucial role in facilitating earlier and faster internationalization through digitalized knowledge, network creation, and decision-making processes [44]. According to the Uppsala internationalization process model, companies follow an establishment chain to enter new foreign markets [45]. This market development process includes four steps: market evaluation and selection, market preparation, market entry, and market growth and development [46]. In this study, digitalization is assumed to benefit decision preparation and decision-making processes in international market development.

For international businesses to succeed in the complex world of global marketplaces, decision-making autonomy is essential. Giving managers authority in the global arena helps

them make quick decisions that are tailored to the specific opportunities and difficulties that each market presents. This is especially important in the context of international operations, which span a variety of cultures, regulatory frameworks, and market circumstances [31]. Because of their autonomy, international managers can adjust their plans, distribute resources, and deal with sustainability challenges in a way that is consistent with local conditions as well as global goals. Companies can empower their teams to use their knowledge and insights to generate innovation, responsiveness, and effectiveness in global operations by decentralizing decision-making authority. This adaptability not only improves the business's capacity to handle cultural and commercial complexities, but it also cultivates a climate of responsibility, empowerment, and ownership among staff members, resulting in higher levels of participation and output in the pursuit of global sustainability objectives.

This would reduce the evaluation and selection workflow from three tasks to just one task and expand the analysis scope from a limited number of countries to the entire population. Although research on this type of digitalization was initiated in 1996 by Lovelock and Yip, as indicated in [47–51], these studies focus on specific aspects of digitization [47,48] or internationalization [52,53], or on specific types of companies [54] or countries [55]. Digitalization involves more than just using digital technologies; it encompasses the integration of digital concepts, methods, and tools into business models, leading to organizational digital transformation (DT) [56]. Automation enabled by robotics and artificial intelligence holds promise for higher productivity, efficiency, safety, and convenience [57]. It also transforms the world of work, creating new types of digital or virtual work [58]. According to [59], digitization transforms entrepreneurship by shifting the location of entrepreneurial opportunities and transforming entrepreneurial practices. The term "digital disruption" describes the transformational impact of digital technologies and infrastructures on businesses, the economy, and society. The need to adapt to new market demands and consumer habits has accelerated digital transformation. All organizations and companies possess valuable digital assets, whether data or functionality, with resources and capabilities being strategic assets for initiating or accelerating DT [60]. DT involves more than just using digital technologies; it entails leveraging resources and capabilities to redefine an organization's value proposition for stakeholders. After the pandemic moment, market dynamics and preferences are shifting, further highlighting the importance of digital transformation [61]. While digital technology is essential for internationalization, distribution networks and market knowledge are also crucial, presenting obstacles that can impede companies' international expansion [62]. Nevertheless, the increasing market demand closely associates internationalization strategy with DT [63]. Incorporating digital technologies into business processes can automate operations, with social technologies, mobile technologies, analytics, clouds, and the Internet of Things (IoT) considered new digital technologies [64]. These technologies are advantageous for international business as they add value, particularly to digital workplaces, providing access regardless of location. According to [65], research has shown that companies need to adopt "an entrepreneurial orientation by being innovative, proactive, and risk-taking in their decisions" and to acknowledge that "technologies are creating more fluidity and nonlinearity in entrepreneurial processes and activities across time and space" [66] in order to make a difference in international markets and achieve a more successful internationalization.

To sum up, this section highlights the critical roles of digitalization, sustainability, and internationalization in modern global business strategies. It emphasizes that digitalization helps businesses overcome traditional limitations and geographic boundaries by leveraging digital technologies, leading to enhanced connectivity, operational efficiency, and new market opportunities. Sustainability is essential for balancing economic goals with social and environmental responsibilities. Integrating sustainability into business practices can mitigate risks, improve long-term profitability, and build stakeholder trust. Sustainable practices also enhance operational efficiency, reduce waste, and foster ethical sourcing, contributing to a positive brand image. The internationalization process benefits significantly from digital technologies, which facilitate rapid global expansion and provide tools for managing

complex international operations. This integration allows businesses to adapt quickly to diverse market environments and enhances their ability to compete internationally.

The research highlights a consensus among scholars that digitalization is a pivotal enabler of internationalization, fostering efficient market entry and operations. Sustainability, equally vital for long-term viability, aligns with the growing global emphasis on environmental and social governance. A quantitative analysis of Portuguese entrepreneurs reveals that digitalization significantly influences their internationalization strategies. Digital tools provide firms with the agility to navigate global market complexities and adapt to changing consumer demands and regulatory conditions. Moreover, sustainability offers a distinct competitive advantage in global markets by aligning with consumer and regulatory expectations, inspiring firms to embrace it.

These studies suggest that businesses develop comprehensive frameworks integrating digitalization and sustainability to maximize international potential. This approach prepares firms for current market demands and future challenges. Key factors influencing digitalization include potential partnerships, access to new technologies, decision-making autonomy, and managerial support. Financial constraints and managerial resistance can hinder digital transformation efforts.

3. Methodology

In relation to research methodology, the primary focus is on employing a scientific approach, conducting structured research, and maintaining rigorous control over the utilization of theoretical observations and knowledge. Quantitative approaches supported the research at the methodological level. Quantitative research is expressed in numbers and graphs, and it is used to test or confirm theories and assumptions [67]. The selection of the quantitative methodology was justified by the need to collect the entrepreneur's opinions and attitudes, that is, the study was descriptive, and the data collection was carried out with the use of a questionnaire composed of several questions regarding companies located in Portugal and that are internationalized. This questionnaire intends to find from entrepreneurs who value business digitalization for internationalization, what other factors (for example, the importance of partnerships, the obstacles encountered …) they value the most. All 8183 companies registered in the AICEP database of Portuguese internationalized companies received the questionnaire by e-mail with the title "Factors inducing and inhibiting the internationalization of Portuguese companies". We collected 310 valid answers between May 2019 and May 2020. The questionnaire had an evaluation period, where some businesses experts assessed it, and a pre-test was done. According to the two most widely adopted approaches (power analysis presented by [68] and rules of thumb described by [69] for estimating the sample size, it can be considered that the sample size used is sufficient for this study. For the multivariate techniques (that will be used in the study), we used rules of thumb, and the sample size used verified the condition of being between 5 k and 10 k, where k is the number of variables. For the study, we only considered 24 variables from the questionnaire (see Table 1), so the 310 responses are sufficient for the sample to be representative. It should be noted that both the dependent and independent variables in the study are all qualitative, measured on a nominal (dichotomous) or ordinal scale (5-point Likert scale).

Table 1. Variable descriptions with the respective scales.

Dependent Variables	**Categories**	**Scale**
Importance of business digitalization (Y)—linear regression or Business digitalization (BD)—logistic regression	Likert scale from 1—not important to 5—extremely important 0—"failure" (not important or not very important) 1—"success" (at least important)	Ordinal Nominal
Independent variables	Categories	Scale
Mode of internationalisation	1—Export	Nominal

	2—Other modes	
Need to explore new resources (NER)	Likert scale from 1—not important to 5—extremely important	Ordinal
Allow access to new technologies or resources (ANT)	Likert scale from 1—not important to 5—extremely important	Ordinal
Strong entrepreneurial and risk-taking propensity by the main collaborators (SER)	Likert scale from 1—not important to 5—extremely important	Ordinal
Autonomy in decision-making (ADM)	Likert scale from 1—not important to 5—extremely important	Ordinal
Relevance of national universities and research centres as partners in making internationalisation a reality	Likert scale from 1—not important to 5—extremely important	Ordinal
Relevance of universities in the country of destination as partners in internationalisation	Likert scale from 1—not important to 5—extremely important	Ordinal
Relevance of the following partnerships: • Scientific and technological knowledge; • Market information; • Information on financing and incentive systems; • Information about potential partnerships (IPP); • Information on the political and legal framework; • Information on the macroeconomic and fiscal framework; • Distribution channel; • Production capacity; • Counselling (C); • Credibility (CR).	Likert scale from 1—not important to 5—extremely important	Ordinal
Frequency of encountering the following obstacles when using technology: • Organizational culture; • Resistance from managers (R); • Few technological partners; • Inadequate budgets (IB); • Lack of necessary skills on the part of employees; • Leadership confused about what to do.	Likert scale from 1—always to 5—never	Ordinal

Data collected were treated using IBM SPSS Statistics 29.0. The statistical analyses used were linear and logistic multivariate regression [70,71]. To verify whether the variability in the answers effectively resulted from differences in entrepreneurs' opinions to analyze the degree of importance attributed to each construct of partnerships and obstacles, Cronbach's alpha reliability analysis was used. The values obtained were 0.841 and 0.915, respectively, which show a good internal consistency.

Since the original dependent variable in the questionnaire is the variable "Importance of business digitalization (Y)" measured on a Likert (ordinal) scale, the multivariate regression analysis began by applying the ordinal regression model. However, in addition to some of the assumptions for applying this model not being validated, the results obtained (in terms of cumulative probabilities) did not meet the achievement of our objective.

It should also be noted that, for this study, it is more relevant to know whether the digitalization of the business was necessary for the implementation of internationalization

than knowing the degree of importance (1—not important to 5—extremely important) attributed to the digitalization of the business by the respondents, which is why we opted for the binary logistical model. The new dependent variable, "Business Digitalization (BD)", was constructed in this sense. With the application of this binary model, the aim was to model the occurrence, in probabilistic terms, of one of the two realizations of the BD variable and evaluate the significance of each of the independent variables present in the final adjusted model.

Subsequently, the multivariate linear regression model, a model widely used in practice and more straightforward to interpret, was used to identify which factors (independent variables) were most valued by entrepreneurs (survey respondents) for internationalization, depending on the importance they attribute to the digitalization of the business (Y).

4. Results and Discussion

4.1. Multiple Logistic Regression Model

The objective of binary logistic regression is to find a parsimonious model that provides a good fit to the data. What distinguishes the logistic regression model from the linear model is that the dependent variable, called the response variable, is dichotomous. In the case under study, the dependent variable business digitalization (BD) takes only two values: one if the answer to the question constitutes a "success", that is if the digitalization of the business is considered important, very important, or extremely important, or zero if the answer constitutes a "failure", in case the digitalization of the business is considered not important or not very important. The logistic model [71], for the case in which there are p independent variables, is as follows (1):

$$\widehat{\boldsymbol{\pi}} = \frac{e^{X\beta}}{1+e^{X\beta}} = \frac{e^{\beta_0+\beta_1 x_1+\cdots+\beta_p x_p}}{1+e^{\beta_0+\beta_1 x_1+\cdots+\beta_p x_p}} \quad (1)$$

where $\widehat{\boldsymbol{\pi}}$ is the vector of estimated probabilities ($\widehat{\boldsymbol{\pi}}_{\mathbf{1}} = \mathrm{P}(Y_1 = 1)$) and β is the vector of p logistic regression coefficients. To linearize this function, the logit function (π) (link function) (2) is used.

$$\text{Logit}\,(\widehat{\boldsymbol{\pi}}) = \ln\left(\frac{\widehat{\pi}}{\mathbf{1}-\widehat{\boldsymbol{\pi}}}\right) = \beta_0 + \beta_1 \boldsymbol{x}_1 + \cdots . + \beta_p \boldsymbol{x}_p. \quad (2)$$

The values of the regression coefficients, β, can be challenging to interpret directly. Therefore, it is common practice to examine the exponential of these coefficients, known as odds ratios, for interpretation purposes (3):

$$Exp(\beta_i) = \frac{\dfrac{P(Y=1|X_i=x+1)}{1-P(Y=1|X_i=x+1)}}{\dfrac{P(Y=1|X_i=x)}{1-P(Y=1|X_i=x)}} \quad (3)$$

The odds ratio estimates the ratio of the possibilities of "success" versus "failure" per unit of the independent variable *i*. Note that an $Exp(\beta)$ value greater than one ($\beta > 0$) indicates an increase in chances. In contrast, an $Exp(\beta)$ value less than one ($\beta < 0$) indicates a decrease in chances when the independent variable (in our study, the independent variables are all qualitative) passes from the reference class (in our case, the first class) to the class under test.

In this work, logistic regression was used, starting with the "Enter" method (in which all independent variables are selected), followed by the Forward-LR method (stepwise selection method based on the likelihood ratio). The significance level (p-value) for adding an independent variable to the model was $\alpha = 0.10$ (the variable enters the model if its p-value in the addition test is less than or equal to 0.10). The p-value for removal was 0.15 (the variable is removed if its p-value in the removal test is more significant than 0.15).

To assess the significance of the complete model, we used the likelihood ratio test (omnibus tests of model coefficients, Table 2), noting that the greatest significance occurs for the 11th step model ($G^2 = 199.206$, p-value< 0.001). This result allows us to conclude that at least one of the independent variables of the complete model has predictive power (significant influence) for the dependent variable (BD).

Table 2. Results of omnibus tests for complete model.

Omnibus Tests of Model Coefficients				
		Chi-Square	**df**	**Sig.**
Step 1	Step	78.391	4	<0.001
	Block	78.391	4	<0.001
	Model	78.391	4	<0.001
Step 2	Step	15.228	4	0.004
	Block	93.620	8	<0.001
	Model	93.620	8	<0.001
Step 3	Step	16.173	4	0.003
	Block	109.792	12	<0.001
	Model	109.792	12	<0.001
Step 4	Step	16.891	4	0.002
	Block	126.683	16	<0.001
	Model	126.683	16	<0.001
Step 5	Step	11.794	4	0.019
	Block	138.477	20	<0.001
	Model	138.477	20	<0.001
Step 6	Step	12.195	4	0.016
	Block	150.672	24	<0.001
	Model	150.672	24	<0.001
Step 7	Step	9.772	4	0.044
	Block	160.444	28	<0.001
	Model	160.444	28	<0.001
Step 8	Step	10.826	4	0.029
	Block	171.269	32	<0.001
	Model	171.269	32	<0.001
Step 9	Step	8.680	4	0.070
	Block	179.949	36	<0.001
	Model	179.949	36	<0.001
Step 10	Step	9.217	4	0.056
	Block	189.166	40	<0.001
	Model	189.166	40	<0.001
Step 11	Step	10.050	4	0.040
	Block	199.216	44	<0.001
	Model	199.216	44	<0.001

Next, to assess the significance of the independent variables (indicated in Table 1) on the probability of a company considering business digitalization (BD) to be at least important, the Wald test was used (test for the significance of the model coefficients). This test is constructed based on the null hypothesis (H_0) that a coefficient (β_i, $i = 1, \ldots, p$) associated with a particular variable is null, that is, that this variable is not significant, against the alternative hypothesis (H_1) that is non-zero.

In the first application of the test to the complete model, a non-significant p-value = 0.301 was obtained for the variable "Information on the macroeconomic and fiscal framework" for the usual levels of significance, so it was decided to remove this variable from the model and readjust the model with only the remaining significant independent variables. After re-estimating the model and the consequent evaluation of the significance of the variables, two more variables emerged, "Distribution channels" and "Leadership confused about what to do", with high p-values (p-value = 0.115 and p-value = 0.376, respectively), so they were also removed from the model, and the model was readjusted again. This resulted in a simplified model consisting of only eight significant variables (overall p-values all below 5%, as will be shown later.

To apply the logistic regression model, it was necessary, since the independent variables are qualitative, to choose the reference classes that are left out of the model for each of

them. For example, for the variable "Need to explore new resources (NER)", the reference class is the "not important" class, with the "not very important" classes being class 1, "important" being class 2, "very important" class 3, and "extremely important" class 4. The reference class is always the first class for all qualitative variables in the final model. This information is essential for interpreting the odds ratio ($Exp(\beta_i)$).

In summary, the independent variables included in the final model to assess the probability of a company considering business digitalization (BD) to be at least important were SER, CR, NER, ANT, ADM, C, R, and IB. These variables had a statistically significant effect on the probability of business digitalization (BD) being at least important.

To assess the significance of the adjusted model, we again used the likelihood ratio test, obtaining the value of the G^2 test statistic, $G^2 = 181.401$ with a p-value < 0.001, which allows us to conclude that at least one independent variable in the model has predictive power over the dependent variable (BD). To evaluate the quality of the model adjustment, we used the −2LL statistic (−2LogLikelihood) in which we obtained that the p-value corresponding to the −2LL estimated by $\chi^2(277) = 248.35$ (Table 3) is 0.89. Given this value, the H_o hypothesis cannot be rejected: the model fits the data. The table obtained also presents the pseudo-R^2 values of Cox and Snell ($R^2 = 0.443$) and Nagelkerke ($R^2 = 0.591$). These values reveal a model with adequate quality.

Table 3. The goodness of fit measures.

−2Log Likelihood	Cox and Snell R Square	Nagelkerke R Square
248.350	0.443	0.591

Table 4 presents the Hosmer–Lemeshow fit test. Given that $\chi^2 = 9.210$ and p-value = 0.325, we can then conclude that the values estimated by the model are close to the observed values; that is, the model fits the data.

Table 4. Hosmer and Lemeshow test.

Chi-Square	df	Sig
9.210	8	0.325

Next, to assess whether the model classifies companies well in terms of the importance they attribute to the digitalization of business in the internationalization process, we turn to Table 5, which provides the classification of the responses observed and predicted by the adjusted model.

Table 5. Classification table (the cut-off value is 0.500).

Observed		Predicted		
		BD		Percentage Correct
		Failure	Success	
BD	Failure	57	37	60.6
	Success	18	198	91.7
Overall Percentage				82.3

The model's sensitivity is 198/216 = 0.917; that is, the model correctly classifies 91.7% of companies that consider business digitalization (BD) to be at least important (successes). The model's specificity is 57/94 = 0.606; that is, the model correctly classifies 60.6% of companies that do not consider business digitalization important (failure). This model correctly classifies 82.3% of cases (of companies). Given these specificity and sensitivity measures, the model has acceptable predictive capabilities.

At the same time, the ROC curve was constructed (Figure 3) by calculating the respective area under the curve (AUC), given that this is another measure widely used to evaluate

the model's ability to discriminate between "companies that consider that the digitalization of business (BD) is at least important" against "companies that do not consider it important".

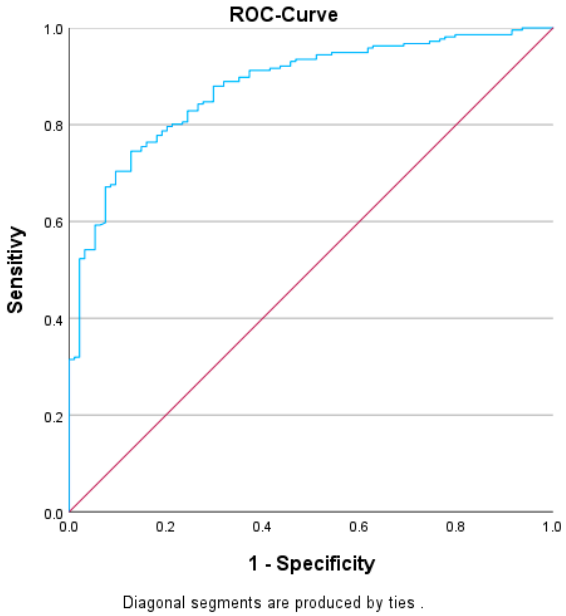


Figure 3. ROC curve (red—diagonal reference line; blue—ROC curve).

Table 6 gives the area under the ROC curve (AUC = 0.878), which is significantly higher than 0.5 (*p*-value = 0.000), which validates that the adjusted model presents an excellent discriminating capacity.

Table 6. Area under the ROC curve.

Area	Std. Error	Asymptotic Sig.	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
0.878	0.020	0.000	0.840	0.917

Finally, we analyze the residuals and diagnose influential cases.

The standardized residuals graph (Figure 4) is a powerful tool for identifying outliers, which play a crucial role in our analysis. In our investigation, we identified some potential outlier observations, $|r| > 2$. However, their inclusion in the final model was justified as their removal did not enhance the significance or the quality of the adjustment of the logistic model.

Regarding the diagnosis of influential cases (observations that influence the adjustment), a graphical representation (Figure 5) was used, which indicates both the influence of observations on the quality of the model and on the estimates of the model coefficients [69].

Only two cases influence the quality of the model (DX2 ≥ 4). However, these cases present a Cook's distance greater than 1, meaning that none of the observations significantly influence the model coefficients (they are not eliminated).

Table 7 summarizes information about the independent variables in the entire model. Since the variables are qualitative, the numbers in parentheses indicate the classes (codes) that participate in the model.

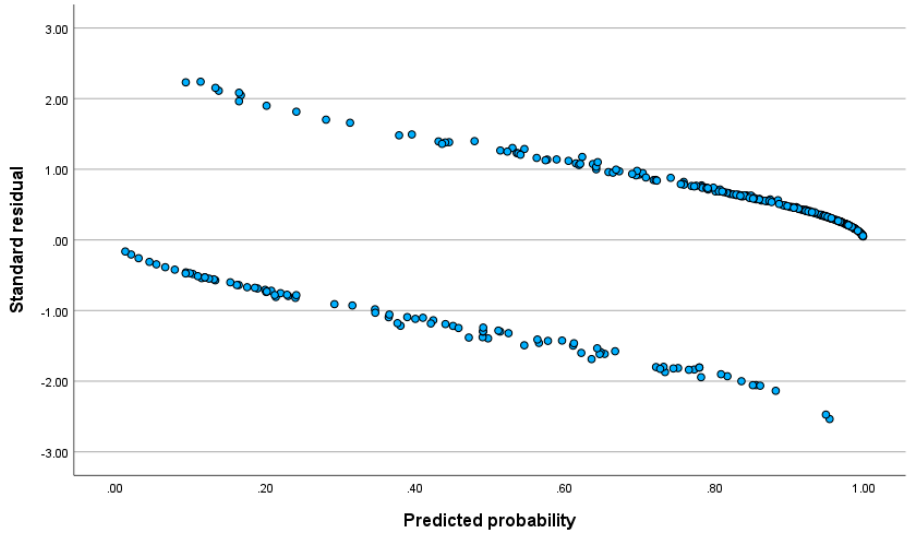


Figure 4. Predicted probability versus standard residual.

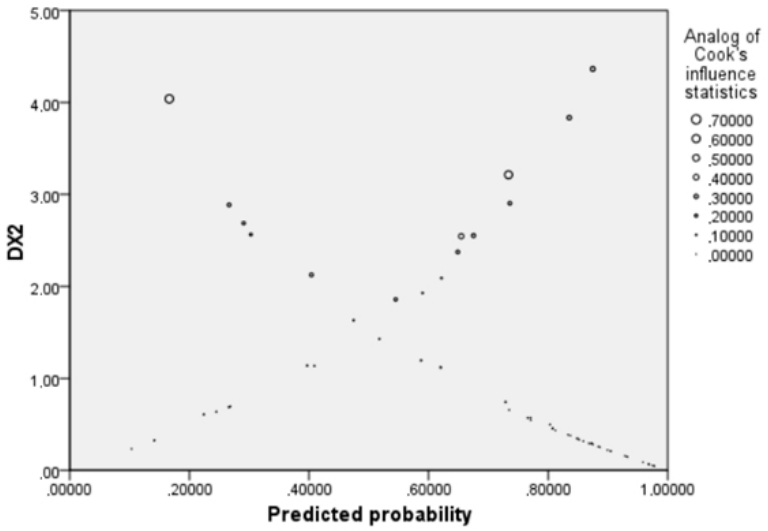


Figure 5. Predicted probability versus DX2.

Table 7. Logit coefficients of the logistic regression model of the BD variable as a function of the variables NER, ANT, SER, ADM, C, CR, R, and IB.

Variables in the Equation						
	B	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
NER			14.867	4	**0.005**	
NER (1)	−1.723	0.595	8.383	1	0.004	0.179
NER (2)	−0.532	0.572	0.866	1	0.352	0.587
NER (3)	−0.141	0.608	0.054	1	0.816	0.868
NER (4)	−2.032	0.959	4.490	1	0.034	0.131
ANT			19.847	4	**<0.001**	
ANT (1)	1.696	0.515	10.850	1	<0.001	5.450
ANT (2)	1.564	0.526	8.857	1	0.003	4.779
ANT (3)	2.278	0.630	13.090	1	<0.001	9.758
ANT (4)	3.332	0.980	11.570	1	<0.001	27.988

SER			12.089	4	**0.017**	
SER (1)	0.389	0.978	0.158	1	0.691	1.475
SER (2)	1.843	0.948	3.779	1	0.052	6.315
SER (3)	0.315	0.901	0.122	1	0.726	1.371
SER (4)	0.308	0.952	0.105	1	0.746	1.360
ADM			11.762	4	**0.019**	
ADM (1)	−1.416	0.802	3.122	1	0.077	0.243
ADM (2)	0.471	0.650	0.525	1	0.469	1.602
ADM (3)	0.793	0.584	1.844	1	0.174	2.209
ADM (4)	0.502	0.669	0.562	1	0.453	1.651
C			17.636	4	**0.001**	
C (1)	−1.345	0.805	2.792	1	0.095	0.260
C (2)	0.289	0.739	0.152	1	0.696	1.334
C (3)	1.679	0.836	4.032	1	0.045	5.359
C (4)	2.068	1.155	3.206	1	0.073	7.911
CR			11.053	4	**0.026**	
CR (1)	1.798	0.904	3.957	1	0.047	6.035
CR (2)	1.810	0.811	4.977	1	0.026	6.108
CR (3)	0.548	0.829	0.438	1	0.508	1.731
CR (4)	0.144	0.899	0.026	1	0.873	1.154
R			14.217	4	**0.007**	
R (1)	1.249	1.027	1.480	1	0.224	3.487
R (2)	−0.017	0.882	0.000	1	0.985	0.983
R (3)	−0.083	0.925	0.008	1	0.928	0.920
R (4)	1.502	0.953	2.487	1	0.115	4.492
IB			16.913	4	**0.002**	
IB (1)	−2.594	0.874	8.814	1	0.003	0.075
IB (2)	−3.216	0.857	14.090	1	<0.001	0.040
IB (3)	−2.538	0.907	7.827	1	0.005	0.079
IB (4)	−3.353	0.911	13.554	1	<0.001	0.035

Thus, the final model that allows estimating the probability ($\hat{\pi}$) of a company considering business digitalization (BD) to be at least important is then (according to Table 7) (4):

$$\begin{aligned}\text{Logit}\ (\hat{\pi}) = {} & -1.723\text{NER}(1) - 0.532\text{NER}(2) - 0.141\text{NER}(3) - 2.032\text{NER}(4) + 1.696\text{ANT}(1) + 1.564\text{ANT}(2) \\ & + 2.278\text{ANT}(3) + 3.332\text{ANT}(4) + \cdots - 2.594\text{IB}(1) - 3.216\text{IB}(2) - 2.538\text{IB}(3) \\ & - 3.353\text{IB}(4)\end{aligned} \quad (4)$$

That is (5),

$$\hat{\pi} = \frac{e^{-1.723\text{NER}(1)-0.532\text{NER}(2)-0.141\text{NER}(3)-2.032\text{NER}(4)+1.696\text{ANT}(1)+1.564\text{ANT}(2)+2.278\text{ANT}(3)+3.332\text{ANT}(4)+\cdots-2.594\text{IB}(1)-3.216\text{IB}(2)-2.538\text{IB}(3)-3.353\text{IB}(4)}}{1 + e^{-1.723\text{NER}(1)-0.532\text{NER}(2)-0.141\text{NER}(3)-2.032\text{NER}(4)+1.696\text{ANT}(1)+1.564\text{ANT}(2)+2.278\text{ANT}(3)+3.332\text{ANT}(4)+\cdots-2.594\text{IB}(1)-3.216\text{IB}(2)-2.538\text{IB}(3)-3.353\text{IB}(4)}} \quad (5)$$

which is equivalent to (6)

$$\hat{\pi} = \frac{1}{1 + e^{-[-1.723\text{NER}(1)-0.532\text{NER}(2)-0.141\text{NER}(3)-2.032\text{NER}(4)+1.696\text{ANT}(1)+1.564\text{ANT}(2)+2.278\text{ANT}(3)+3.332\text{ANT}(4)+\cdots-2.594\text{IB}(1)-3.216\text{IB}(2)-2.538\text{IB}(3)-3.353\text{IB}(4)]}} \quad (6)$$

According to this model, we can state the following:

The importance attributed to the digitalization of business is approximately 0.179 less critical in companies that classify the need to explore new resources (NER) as not very important and 0.131 less necessary in those that classify it as extremely important compared to those that classify it as not important. In the latter case, the chances decrease (0.131 − 1) × 100% = −86.9% when we go from the not important classification for the digitalization of business (reference class) to the extremely important classification.

The importance attributed to the digitalization of business is approximately 5.450 higher in companies that give the rating of less essential to allow access to new technologies or resources (ANT) compared to those that classify it as not important, 9.758 higher in companies that give the rating of essential to allow access to new technologies or resources compared to those that classify it as not important, and around 27.988 higher in companies that assign the classification of extremely important to allow access to new technologies or resources compared to those that classify it as not necessary. The chances of classifying business digitalization as at least important increase as the importance of allowing access to new technologies or resources increases.

The importance attached to the digitalization of business is approximately 1.475 higher in companies that assign the rating of not very important to strong entrepreneurial and risk-taking propensity by the main employees (SER), 1.371 higher in companies that assign the rating of important to strong entrepreneurial and risk-taking propensity, and is 1.360 higher in companies that classify strong entrepreneurial and risk-taking propensity as extremely important, compared to those that classify it as not important at all (even though these effects are not statistically significant). The chances of classifying business digitalization as at least necessary increase by approximately (1.360 − 1) × 100% = 36% when strong entrepreneurial and risk-taking propensity goes from not important to extremely important.

The importance attributed to business digitalization is approximately 1.602 higher in companies that assign important to autonomy in decision-making (ADM) and 2.209 higher in companies that assign very important to autonomy in decision-making, compared to those that classified it as not important. The chances of classifying business digitalization as the least significant increase by approximately (1.651 − 1) × 100% = 65.1% when autonomy in decision-making goes from not important to extremely important.

The importance attached to the digitalization of business is approximately 1.334 higher in companies that rate counselling partnership (C) as important, 5.359 higher in companies that rate counselling partnership as very important, and 7.911 higher in the companies that give the classification of the counselling partnership as extremely important, compared to those that classified it as not important. The chances of classifying business digitalization as the least significant increase as the degree of the importance of the counselling partnership increases.

The importance attributed to the digitalization of business is approximately 6.035/6.108 higher in companies that classify the credibility (CR) partnership as not very important/important than in those that classify it as not important at all. However, when the importance of this partnership is considered very important or extremely important, the importance given to business digitalization is about 1.731/1.154 higher.

The chances of the importance attached to the digitalization of business are not affected when the frequency of almost always or sometimes is attributed to managers' resistance (R) because $exp(\beta) \cong 1$, (0.983 and 0.920, respectively).The importance attributed to the digitalization of business is approximately 4.492 higher in companies that attribute never to the resistance of managers, compared to companies that classify resistance as always. When there is no resistance from managers, the importance attributed to business digitalization is more significant than when there is always resistance.

The importance of business digitalization is approximately 0.075 less in companies that consistently perceive their budget as inadequate (IB), 0.040 less in companies that occasionally perceive it as inadequate, 0.079 less in companies that rarely perceive the budget as inadequate, and 0.035 less in companies that never perceive it as inadequate, all of them compared to those that always perceive the budget as inadequate.

The importance that companies attach to business digitalization regarding internationalization decreases as the importance of inadequate budgets decreases. The digitalization is crucial for companies that consider budgets inadequate.

4.2. Multiple Linear Regression Model

Multiple linear regression with the stepwise variable selection method (with criteria where significance level $\alpha = 0.10$ for the entry value and $\alpha = 0.15$ for the removal value) was used to obtain a parsimonious model that allows for the prediction of the degree of the importance of the "digitization of business" (Y) in affecting the internationalization of the company depending on the independent variables (IPP, ANT, ADM, C, R, and IB).

We began by analyzing whether the model's applicability assumptions (the normal distribution of errors, homogeneity, and independence of errors) were verified. The first assumption was validated graphically (Figure 6) together with the Kolmogorov–Smirnov test (Table 8).

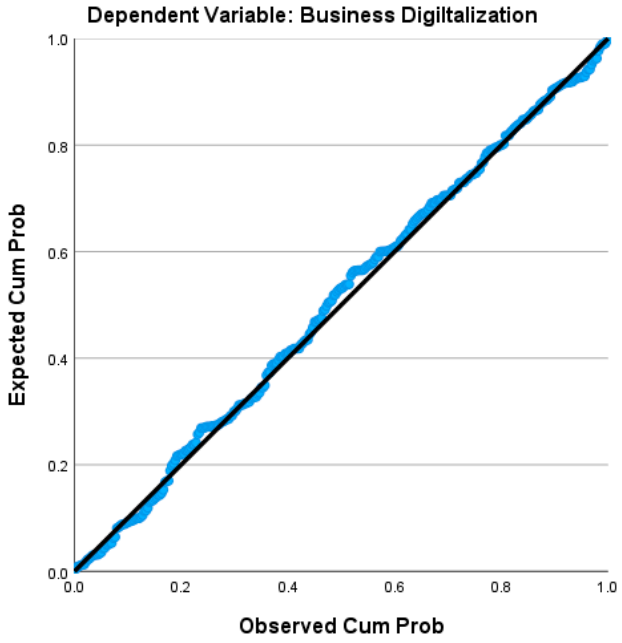


Figure 6. Normal P–P Plot for errors (residuals).

Table 8. Kolmogorov–Smirnov test for residuals.

One-Sample Kolmogorov–Smirnov Test			
			Unstandardized Residual
N			310
Normal Parameters	Mean		−0.0023213
	Std. Deviation		1.11048787
Most Extreme Differences	Absolute		0.034
	Positive		0.021
	Negative		−0.034
Test Statistic			0.034
Asymp. Sig. (2-tailed)			0.200
Monte Carlo Sig. (2-tailed)	Sig.		0.545
	99% Confidence Interval	Lower Bound	0.532
		Upper Bound	0.558

We can conclude from this graph, where the abscissa axis shows the cumulative observed probability of the errors and the ordinate axis shows the cumulative probability that would be observed if the errors had a normal distribution, that since the values shown above

are mostly distributed on the main diagonal, the errors are normally distributed. This assumption is also validated by the Kolmogorov–Smirnov test (p-value = 0.200).

The second assumption (the homogeneity of errors) was also validated graphically. Finally, the third assumption (the independence of errors) was validated using the Durbin–Watson test. Given that IBM SPSS does not produce the p-value associated with the Durbin–Watson test statistic, we then use the decision rule empirically—do not reject H_0: there is no autocorrelation between the residuals if $d_{obs} \approx 2 \pm 0.2$. It should be noted that, as $d_{obs} = 1.867$ is far from 2 (Table 9), H_0 is accepted; the residuals are independent.

Table 9. Model summary with Durbin–Watson test.

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin–Watson**
	0.950	0.902	0.900	1.120	1.867

Next, to diagnose the possible existence of multicollinearity (association between independent variables), the ratio k = $\sqrt{\lambda_{max}/\lambda_i}$ designated as the condition index (Table 10) was used. As the values obtained for this ratio for each dimension (the number of model parameters) are all lower than 15 [69], we conclude there is no multicollinearity between the independent variables.

Table 10. Condition index.

Model	Dimension	λ_i	Condition Index (k)
6	1	5.484	1.000
	2	0.221	4.985
	3	0.104	7.268
	4	0.082	8.192
	5	0.068	8.950
	6	0.042	11.452

To assess the existence of influential observations in the sense that there are observations that affect the values of the estimated parameters, the effects of leverage and residuals are graphically represented. As we can see in Figure 7, there are no outliers because no centered leverage value is close to 0.5.

Having verified all of the applicability assumptions of the model and given that there was no association between the independent variables, the application of the multiple linear regression model made it possible to identify the variables IPP ($\beta = 0.247$, t = 3.367, p-value < 0.001), ANT ($\beta = 0.203$, t = 4.031, p-value < 0.001), ADM ($\beta = 0.253$, t = 4.020, p-value < 0.001), C ($\beta = 0.193$, t = 2.813, p-value = 0.005), R ($\beta = 0.191$, t = 3.225, p-value = 0.001), and IB ($\beta = -0.108$, t = −2.012, p-value = 0.045) as significant predictors of the dependent variable Y (business digitalization). A type I error probability of $\alpha = 0.05$ was considered for all analyses.

The final adjusted model is highly significant (F = 426.160, p-value < 0.001) and explains a high proportion of the variability in variable Y ($R_a^2 = 0.9$, we can state that 90% of the total variability in Y is explained by the independent variables present in the adjusted linear regression model—Table 11).

As we can see in Table 12, the final adjusted model is highly significant (F = 426.160, p-value < 0.001) and explains a high proportion of the variability in the Y variable ($R_a^2 = 0.9$, we can say that 90 per cent of the total variability in Y is explained by the independent variables present in the adjusted linear regression model—see Table 9).

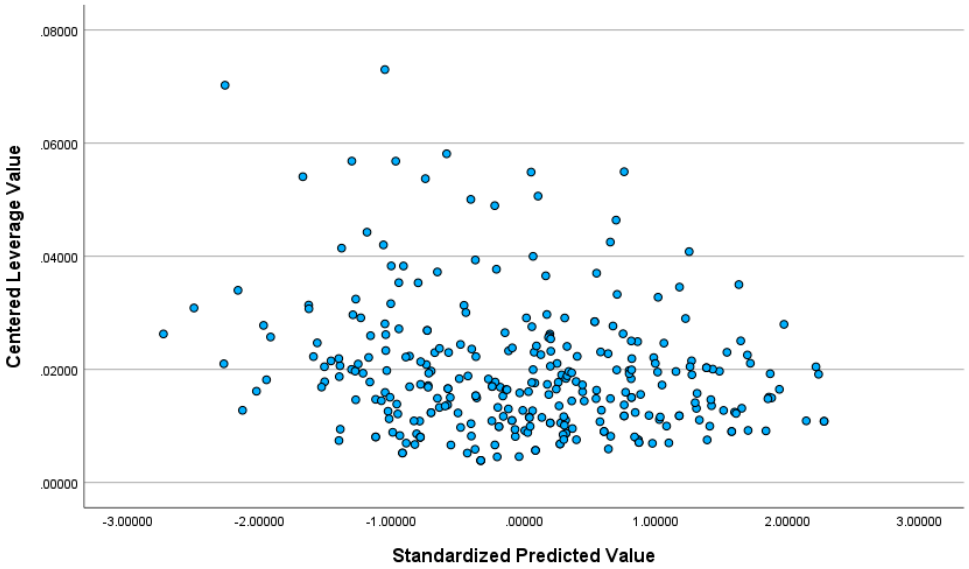


Figure 7. Graph of standardized predicted values vs. centered leverage values.

Table 11. Condition index.

Model	Unstandardized Coefficients	Standardized Coefficients	Beta	t	Sig.
	B	Std. Error			
Information about potential partnerships (IPP)	0.255	0.076	0.247	3.367	<0.001
Autonomy in decision-making (ADM)	0.236	0.059	0.253	4.020	<0.001
Allow access to new technologies or resources (ANT)	0.238	0.059	0.203	4.031	<0.001
Resistance from managers (R)	0.179	0.056	0.191	3.225	0.001
Counselling (C)	0.210	0.075	0.193	2.813	0.005
Inadequate budgets (IB)	−0.114	0.057	−0.108	−2.012	0.045

Table 12. Results of ANOVA.

ANOVA					
Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	3206.392	6	534.399	426.160	<0.001
Residual	348.608	278	1.254		
Total	3555.000	284			

The final fitted model (Table 11) that allows for the estimation of the "Importance of business digitalization (Y)" for the internationalization of a company is then as follows:

$$\hat{Y} = 0.255 \times IPP + 0.238 \times ANT + 0.236 \times ADM + 0.210 \times C + 0.179 \times R - 0.114 \times IB \quad (7)$$

As all independent variables are expressed in the same units, regression coefficients can be used to assess the importance of each independent variable in the model (note that all regression coefficients are significant).

The higher the IPP, ANT, ADM, and C, the greater the importance of business digitalization. The lower the resistance from managers, the greater the degree of importance attributed to the digitalization of business (inverted Likert scale as explained above). Finally, with less effect on the prediction of Y, we can state that the more inadequate the available budgets are, the less importance is attributed to the digitalization of business.

The multivariate linear regression model, a model widely used in practice and renowned for its straightforward interpretation, was instrumental in identifying the factors (independent variables) most valued by entrepreneurs (survey respondents) for internationalization, based on the significance they attribute to the digitalization of the business (Y). The statistical variables used in both models (multivariate logistic and multivariate linear regression) are nearly identical, which further reinforces the validity of using the linear model, the most common in practice. This ultimately validates its use, instilling confidence in the results.

5. Conclusions

This study relates three crucial areas: digitalization, sustainability, and internationalization, which are essential issues that influence and condition business strategies. Digitalization is described as an enabler that allows companies to overcome some of the operational restrictions and reduce geographies through the adoption of digital technologies. Therefore, companies use digitalization to improve their operational efficiency, mainly to look for new market opportunities. Sustainability is fundamental to business operations, so companies balance economic objectives with social and environmental responsibilities.

Through the literature review, it becomes evident that digitalization plays a central role as a facilitator of internationalization through technological advancements. However, nowadays sustainability also emerges as a strategic imperative for companies aiming for long-term viability in international markets. The emphasis on sustainability is not just a trend, but a growing recognition of its economic, social, and environmental dimensions. Companies must urgently integrate both factors into their strategies to maintain competitiveness and ensure their long-term survival in the global marketplace.

The research methodology encompasses a robust quantitative analysis through surveys among Portuguese entrepreneurs, focusing on their perceptions and strategies regarding digitalization and its impact on international business activities. Through a comprehensive study of 310 internationalized Portuguese companies and statistical analysis using multivariate linear regression and multivariate logistic models, this study identifies the factors that influence entrepreneurs' opinions on the importance of digitalization in internationalization efforts.

In this study, it is shown that the variables "Information about potential partnerships", "Access to new technologies or resources", "Autonomy in decision-making", and "Counselling" are critical to entrepreneurs, specifically when they are assessing the importance assigned to digitalization in the context of internationalization. Additionally, the positive relationship between digitalization and sustainability is evident in the emphasis placed on factors such as access to new technologies and resources, which can enable companies to adopt more sustainable practices. Furthermore, the inverse relationship between resistance from managers and the importance attached to digitalization suggests that companies may face internal resistance when implementing digital initiatives. Overcoming this resistance is crucial for promoting sustainable practices and ensuring the success of internationalization efforts.

In addition, the observation that companies who perceive budgets as inadequate have less effect on predicting the importance of business digitalization, indicates that those who consider digitalization as an important factor most often consider that there are budget constraints. Adequate budget allocation is essential for investing in digital technologies and implementing sustainable strategies that support long-term growth and competitiveness in international markets.

In summary, the conclusions drawn from the analysis highlight the interconnection of digitalization and sustainability in the context of internationalization. Embracing digital technologies and overcoming barriers such as budget constraints and internal resistance are key steps towards achieving sustainable international business practices.

As our findings highlight the interconnection of digitalization and sustainability in the context of internationalization strategies, policymakers in Portugal could consider developing initiatives to support digitalization and sustainability efforts among entrepreneurs, in particular, and using the results of the study, could encourage entrepreneurs to strengthen strategic partnerships with other countries and international organizations and also encourage an increase in the autonomy of managers, to foster knowledge exchange and collaboration in digitalization and sustainability. In summary, our research provides valuable insights that can inform policy decisions and support programs and strategic initiatives aimed at advancing Portugal's internationalization and digitalization agenda.

The resistance of managers towards digitalization, coupled with budget constraints, suggests a need for a strategic approach that addresses both technological and organizational challenges. Managers' resistance to the loss of autonomy [72] and workers' dissatisfaction with increased surveillance [73] highlight the importance of involving stakeholders in the digital transformation process. Implementing integrated management approaches through digital solutions [74] can enhance sustainability while overcoming challenges like technology robustness and data ownership. Additionally, understanding the power dynamics embedded in management control systems [75] can guide the development of digital tools that balance control and autonomy. By incorporating input from all levels of the organization, utilizing in situ measurements, satellite data, and decision support systems, a comprehensive digitalization strategy can effectively address resistance, budget constraints, and technological needs.

For future studies, we aim to explore additional driving forces of internationalization and their implications for digitalization and sustainable business practices. The majority of our data came from the manufacturing and services sectors, which may skew our results towards these industries. In future research, we will aim for a more diverse sample across various industries to mitigate potential biases. Also, it would be interesting to compare these results with post-pandemic data.

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References

1. OECD. OECD.Stat. 2022. Available online: https://stats.oecd.org/ (accessed on 16 April 2024).
2. Dunning, J.H. Trade, Location of Economic Activity and the Multinational Enterprise: A Search for an Eclectic Approach. In *The International Allocation of Economic Activity*; Ohlin, B., Hesselborn, P.O., Wijkman, P.M., Eds.; Macmillan: New York, NY, USA, 1977; pp. 395–418.
3. Hymer, S.H. *The International Operations of National Firms: A Study of Direct Foreign Investment*; MIT Press: Cambridge, MA, USA, 1960.
4. Johanson, J.; Vahlne, J.E. The Internationalization Process of the Firm: A Model of Knowledge Development and Increasing Foreign Market Commitments. *J. Int. Bus. Stud.* **1977**, *8*, 23–32.
5. Johanson, J.; Vahlne, J.E. The Uppsala Internationalization Process Model Revisited: From Liability of Foreignness to Liability of Outsidership. *J. Int. Bus. Stud.* **2009**, *40*, 1411–1431.
6. Rugman, A.M.; Verbeke, A.A Perspective on Regional and Global Strategies of Multinational Enterprises. *J. Int. Bus. Stud.* **2004**, *35*, 3–18.
7. Qian, G.; Li, L.; Rugman, A.M. Liability of Regional Foreignness and Use of Firm Resources in Multinational Enterprise Strategy. *Strateg. Manag. J.* **2010**, *31*, 1337–1358.

8. Dunning, J.H.; Kim, C.; Park, D. Old Wine in New Bottles: A Comparison of Emerging-Market TNCs Today and Developed-Country TNCs Thirty Years Ago. *Thunderbird Int. Bus. Rev.* **2007**, *49*, 479–495.
9. Dunning, J.H. Location and the multinational enterprise: A neglected factor? *J. Int. Bus. Stud.* **1998**, *9*, 45–66.
10. Elkington, J. Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environ. Qual. Manag.* **1998**, *8*, 37–51.
11. OECD. *Digitalisation and Internationalisation: The Impact of Digital Technologies on Trade, Foreign Investment and Global Value Chains*; OECD Publishing: Paris, France, 2020.
12. Schwab, K. *The Fourth Industrial Revolution*; Crown Business: Bangkok, Thailand, 2016.
13. World Economic Forum. *Digital Transformation Initiative: Sustainable Development*; World Economic Forum: Cologny, Switzerland, 2019.
14. Bughin, J.; Catlin, T.; Hirt, M.; Willmott, P. Why Digital Strategies Fail. McKinsey Quarterly. 2018. Available online: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/why-digital-strategies-fail (accessed on 10 March 2024).
15. UNEP. *Digitalisation, Trade and Sustainability*; United Nations Environment Programme: Nairobi, Kenya, 2021.
16. McKinsey & Company. Sustainability's Strategic Worth: McKinsey Global Survey Results. 2021. Available online: https://www.mckinsey.com/business-functions/sustainability/our-insights/sustainabilitys-strategic-worth-mckinsey-global-survey-results (accessed on 16 April 2024).
17. Kolk, A.; Pinkse, J. A perspective on multinational enterprises and climate change: Learning from "an inconvenient truth"? *J. Int. Bus. Stud.* **2010**, *41*, 1359–1378.
18. Lee, S.Y.; Kim, H.; Kim, D.; Kang, H.Y. The role of digitalization and sustainability in international business strategy. *Sustainability* **2020**, *12*, 6123.
19. Eisenhardt, K.M.; Graebner, M.E. Theory building from cases: Opportunities and challenges. *Acad. Manag. J.* **2007**, *50*, 25–32.
20. Hill, C.W.; Rothaermel, F.T. The performance of incumbent firms in the face of radical technological innovation. *Acad. Manag. Rev.* **2003**, *28*, 257–274.
21. Feliciano-Cestero, M.M.; Ameen, N.; Kotabe, M.; Paul, J.; Signoret, M. Is digital transformation threatened? A systematic literature review of the factors influencing firms' digital transformation and internationalization. *J. Bus. Res.* **2023**, *157*, 113546. https://doi.org/10.1016/j.jbusres.2022.113546.
22. Gaweł, A.; Mroczek-Dąbrowska, K.; Pietrzykowski, M. Digitalization and Its Impact on the Internationalization Models of SMEs. In *Artificiality and Sustainability in Entrepreneurship. FGF Studies in Small Business and Entrepreneurship*; Adams, R., Grichnik, D., Pundziene, A., Volkmann, C., Eds.; Springer: Cham, Switzerland, 2023. https://doi.org/10.1007/978-3-031-11371-0_2.
23. Fuxia, G.; Chuan, L.; Haomiao, Z. Digital Transformation, Corporate Innovation, and International Strategy: Empirical Evidence from Listed Companies in China. Sustainability. *Sustainability* **2022**, *14*, 8137. https://doi.org/10.3390/su14138137.
24. Jafari-Sadeghi, V.; Garcia-Perez, A.; Candelo, E.; Couturier, L. Exploring the impact of digital transformation on technology entrepreneurship and technological market expansion: The role of technology readiness, exploration and exploitation. *J. Bus. Res.* **2021**, *124*, 100–111. https://doi.org/10.1016/j.jbusres.2020.11.02.
25. Carla, S.-P.; Natércia, D.; Moreira, F.; Veloso, B. The Importance of Digital Transformation in International Business. *Sustainability* **2022**, *14*, 843. https://doi.org/10.3390/su14020834.
26. Hagen, B.; Zucchella, A.; Larimo, J.; Dimitratos, P. A Taxonomy of Strategic Postures of International SMEs. *Eur. Manag. Rev.* **2017**, *14*, 265–285. https://doi.org/10.1111/emre.12109.
27. Porter, M.E.; Kramer, M.R. Creating shared value. *Harv. Bus. Rev.* **2011**, *89*, 62–77.
28. Bansal, P. Evolving sustainably: A longitudinal study of corporate sustainable development. *Strateg. Manag. J.* **2005**, *26*, 197–218.
29. Schaltegger, S.; Wagner, M. Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Bus. Strategy Environ.* **2011**, *20*, 222–237.
30. Schaltegger, S.; Burritt, R. Business Cases and Corporate Engagement with Sustainability: Differentiating Ethical Motivations. *J. Bus Ethics* **2018**, *147*, 241–259. https://doi.org/10.1007/s10551-015-2938-0.
31. Nakos, G.; Dimitratos, P.; Elbanna, S. The mediating role of alliances in the international market orientation-performance relationship of smes. *Int. Bus. Rev.* **2019**, *28*, 603–612. https://doi.org/10.1016/j.ibusrev.2018.12.005.
32. Beneki, C.; Papastathopoulos, A.; Tsagris, M. The Influence of Web-based Enterprise Systems on SMEs' Internationalization Process. *Int. Bull. Bus. Adm.* **2011**, *12*, 51–65.
33. Gulati, R. Tent poles, tribalism, and boundary spanning: The rigor-relevance debate in management research. *Acad. Manag. J.* **2007**, *50*, 775–782. https://doi.org/10.5465/amj.2007.26279170.
34. Karavdic, M.; Gregory, G. Integrating e-commerce into existing export marketing theories: A contingency model. *Mark. Theory* **2005**, *5*, 75–104. https://doi.org/10.1177/1470593105049602.
35. Joensuu-Salo, S.; Sorama, K.; Viljamaa, A.; Varamäki, E. Firm Performance among Internationalized SMEs: The Interplay of Market Orientation, Marketing Capability and Digitalization. *Adm. Sci.* **2018**, *8*, 31. https://doi.org/10.3390/admsci8030031.
36. Etemad, H.; Wright, R.W. Internationalization of SMEs: Management Responses to a Changing Environment. *J. Int. Mark.* **1999**, *7*, 4–10. https://doi.org/10.1177/1069031x9900700401.
37. Andersson, S. International entrepreneurship, born globals and the theory of effectuation. *J. Small Bus. Enterp. Dev.* **2011**, *18*, 627–643. https://doi.org/10.1108/14626001111155745.

38. Thomas, A.M. Online activities and export performance of the smaller firm: A capability perspective. *Eur. J. Int. Manag.* **2009**, *3*, 266. https://doi.org/10.1504/ejim.2009.026992.
39. Coviello, N.; Munro, H. Network relationships and the internationalisation process of small software firms. *Int. Bus. Rev.* **1997**, *6*, 361–386.
40. Jones, M.V. The Internationalization of Small High-Technology Firms. *J. Int. Mark.* **1999**, *7*, 15–41. https://doi.org/10.1177/1069031X9900700403.
41. Clercq, D.D.; Sapienza, H.J.; Crijns, H. The Internationalization of Small and Medium-Sized Firms. *Small Bus. Econ.* **2005**, *24*, 409–419. https://doi.org/10.1007/s11187-005-5333-x.
42. Cao, L.; Navare, J.; Jin, Z. Business model innovation: How the international retailers rebuild their core business logic in a new host country. *Int. Bus. Rev.* **2018**, *27*, 543–562. https://doi.org/10.1016/j.ibusrev.2017.10.005.
43. Merkert, J.; Mueller, M.; Hubl, M. A Survey of the Application of Machine Learning in Decision Support Systems. In Proceedings of the European Conference on Information Systems, Münster, Germany, 26–29 May 2015; Paper 133.
44. Coviello, N.; Kano, L.; Liesch, P.W. Adapting the Uppsala model to a modern world: Macro-context and microfoundations. *J. Int. Bus. Stud.* **2017**, *48*, 1151–1164. https://doi.org/10.1057/s41267-017-0120-x.
45. Vahlne, J.-E.; Johanson, J. From Internationalization to evolution: The Uppsala Model at 40 years. *J. Int. Bus. Stud.* **2017**, *48*, 1087–1102. https://doi.org/10.1057/s41267-017-0107-7.
46. Neubert, M. Early internationalisation of high-tech firms: Past accomplishments and future directions. *Int. J. Teach. Case Stud.* **2015**, *6*, 353. https://doi.org/10.1504/ijtcs.2015.074603.
47. Alves, A.M.R. The Impact of Digitalization on SMEs International Strategies: A Bibliometric Analysis. 2020. Available online: https://sigarra.up.pt/fep/pt/pub_geral.show_file?pi_doc_id=266800 (accessed on 15 January 2024).
48. Gilson, L.L.; Maynard, M.T.; Jones Young, N.C.; Vartiainen, M.; Hakonen, M. Virtual Teams Research: 10 Years, 10 Themes, and 10 Opportunities. *J. Manag.* **2014**, *41*, 1313–1337. https://doi.org/10.1177/0149206314559946.
49. Kotha, S.; Rindova, V.P.; Rothaermel, F.T. Assets and Actions: Firm-Specific Factors in the Internationalization of U.S. Internet Firms. *J. Int. Bus. Stud.* **2001**, *32*, 769–791. https://doi.org/10.1057/palgrave.jibs.8490994.
50. Leamer, E.E.; Storper, M. The Economic Geography of the Internet Age. *J. Int. Bus. Stud.* **2001**, *32*, 641–665. https://doi.org/10.1057/palgrave.jibs.84909988.
51. Eduardsen, J.S.; Ivang, R. Internet-enabled internationalisation: A review of the empirical literature and a research agenda. *Int. J. Bus. Environ.* **2016**, *8*, 152. https://doi.org/10.1504/ijbe.2016.076629.
52. Reuber, A.R.; Fischer, E. International entrepreneurship in internet-enabled markets. *J. Bus. Ventur.* **2011**, *26*, 660–679. https://doi.org/10.1016/j.jbusvent.2011.05.002.
53. Vadana, I.-I.; Torkkeli, L.; Kuivalainen, O.; Saarenketo, S. Digitalization of companies in international entrepreneurship and marketing. *Int. Mark. Rev.* 2019, *ahead-of-print*. https://doi.org/10.1108/imr-04-2018-0129.
54. Wittkop, A.; Zulauf, K.; Wagner, R. How Digitalization Changes the Internationalization of Entrepreneurial Firms: Theoretical Considerations and Empirical Evidence. *Manag. Dyn. Knowl. Econ. J.* **2013**, *6*, 193–207.
55. Mendes, M.V.I. The Limitations of International Relations Regarding MNCs and the Digital Economy: Evidence from Brazil. *Rev. Political Econ.* **2020**, *33*, 67–87. https://doi.org/10.1080/09538259.2020.1730609.
56. Sestino, A.; Prete, M.I.; Piper, L.; Guido, G. Internet of Things and Big Data as enablers for business digitalization strategies. *Technovation* **2020**, *98*, 102173. https://doi.org/10.1016/j.technovation.2020.102173.
57. Manyika, J. Technology, Jobs, and the Future of Work. McKinsey & Company. 2017. Available online: https://www.mckinsey.com/featured-insights/employment-and-growth/technology-jobs-and-the-future-of-work (accessed on 10 March 2024).
58. Valenduc, G.; Vendramin, P. Digitalisation, between disruption and evolution. *Transf. Eur. Rev. Labour Res.* **2017**, *23*, 121–134. https://doi.org/10.1177/1024258917701379.
59. Huckstep, R. Insurance of Things–How IoT Shows Prevention is Better than Cure for Insurers. *Insur. Wkly.* **2016**, *39*.
60. Zavery, A. Google Cloud BrandVoice: Digital Transformation Isn't a Project, It's a Way of Operating. Forbes. n.d. Available online: https://www.forbes.com/sites/googlecloud/2020/01/22/digital-transformation-isnt-a-project-its-a-way-of-operating/?sh=1fa0b18f7b6c (accessed on 21 February 2024).
61. Knight, G.A.; Cavusgil, S.T. Innovation, Organizational capabilities, and the born-global Firm. *J. Int. Bus. Stud.* **2004**, *35*, 124–141. https://doi.org/10.1057/palgrave.jibs.8400071.
62. Dethine, B.; Enjolras, M.; Monticolo, D. Digitalization and SMEs' Export Management: Impacts on Resources and Capabilities. *Technol. Innov. Manag. Rev.* **2020**, *10*, 18–34. https://doi.org/10.22215/timreview/1344.
63. Sebastian, I.M.; Ross, J.W.; Beath, C.; Mocker, M.; Moloney, K.G.; Fonstad, N.O. How Big Old Companies Navigate Digital Transformation. In *Strategic Information Management*; Routledge: Abingdon, UK, 2020; pp. 133–150. https://doi.org/10.4324/9780429286797-6.
64. White, M. Digital workplaces: Vision and reality. *Bus. Inf. Rev.* **2012**, *29*, 205–214. https://doi.org/10.1177/0266382112470412.
65. Hervé, A.; Schmitt, C.; Baldegger, R. Digitalization, Entrepreneurial Orientation & Internationalization of Micro-, Small-, and Medium-Sized Enterprises. *Technol. Innov. Manag. Rev.* **2020**, *10*, 5–17. https://doi.org/10.22215/timreview/1343.
66. Nambisan, S. Digital Entrepreneurship: Toward a Digital Technology Perspective of Entrepreneurship. *Entrep. Theory Pract.* **2017**, *41*, 1029–1055.
67. Malhotra, N.; Nunan, D.; Birks, D. *Marketing Research: An Applied Approach*; Pearson: London, UK, 2017.

68. Cohen, J. *Statistical Power Analysis for the Behavioral Sciences*; Academic Press: Cambridge, MA, USA, 2013.
69. Hair, J.F. *Multivarate Data Analysis*; Kennesaw State University: Kennesaw, GA, USA, 2009.
70. Marôco, J. *Análise Estatística com o SPSS Statistics*, 7th ed.; ReportNumber; Análise e Gestão de Informação, Lda.: Pêro Pinheiro, Portugal, 2018.
71. Hosmer, D.; Lemeshow, S.; Sturdivant, R. *Applied Logistic Regression*, 3rd ed.; John Wiley & Sons: Hoboken, NJ, USA, 2013; ISBN 9781118548387. https://doi.org/10.1002/9781118548387.
72. Mel, B. Management and resistance in the digital newsroom. *Journalism* **2019**, *20*, 890–905. https://doi.org/10.1177/1464884916688963.
73. Konstantin, B.; Thomas, T.; Olga, A. Resistance to Digital Transformation: The Role of Middle Management Personal Networks. In Proceedings of the 23rd European Conference on Knowledge Management, Naples, Italy, 1–2 September 2022. https://doi.org/10.34190/eckm.23.1.473.
74. Moore, P.V.; Akhtar, P.; Upchurch, M. Digitalisation of Work and Resistance. In *Humans and Machines at Work. Dynamics of Virtual Work*; Palgrave Macmillan: Cham, Switzerland, 2018. https://doi.org/10.1007/978-3-319-58232-0_2.
75. Anders, N. Budgeting and beyond: Mobilizing the management control system for change and resistance. In Proceedings of the Annual Congress of the European Accounting Association, Tallinn, Estonia, 21–23 May 2014.