a scientific open access quarterly

EBER

Entrepreneurial Business and Economics Review

eISSN 2353-8821

2024, Vol. 12, No. 1

KRAKOW UNIVERSITY OF ECONOMICS
Department of International Trade
Centre for Strategic and International Entrepreneurship

a scientific open access quarterly

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eISSN 2353-8821 2024, Vol. 12, No. 1

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Publisher

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Cover and DTP: Marek Sieja

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All articles are double-blinded peer-reviewed at least by two independent reviewers.
The detailed list of reviewers is published at our website once a year.

Original Version

The online journal is the primary and reference version.
Both printed and online versions of the journal are original and identical.

ISSN 2353-883X (printed version, in the years 2013-2019)
eISSN 2353-8821 (online version, since 2013)

Abstracting/Indexing

The journal, and all its articles, is abstracting and/or indexing
in international databases, including:

ESCI Web of Science ™ Core Collection (USA)
Scopus by Elsevier (the Netherlands)
SJR – Scimago Journal Ranking (Spain)
Clarivate Analytics (Beijing, China)
EconLit – American Economic Association (USA)
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NSD Nordi – Norwegian Register for Scientific Journals, Series and Publishers (Norway)
Julkaisufoorumi – Finish Classification of Publications (Finland)
BazEkon (Poland)
BazHum (Poland)

Identification and Originality

All articles published in EBER are tagged with an identification number
employing the Digital Object Identifier (DOI) System.
EBER uses the Crossref Similarity Check service powered by iThenticate to verify the originality of articles
submitted to the journal.

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Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120101

Artificial intelligence: Building a research agenda

Vanessa Ratten

ABSTRACT

Objective: The existing literature on artificial intelligence is reviewed with the aim of identifying interesting and novel research avenues. This leads to a focus on experiences, customisation, diversity and strategy as the main issues requiring further investigation.

Research Design & Methods: A systematic literature review was conducted on articles related to artificial intelligence and business using various databases including Scopus, Web of Science and Google Scholar.

Findings: Artificial intelligence is a hot topic particularly for international business managers who are incorporating technological innovation for competitive reasons. This article focuses on the link between artificial intelligence and international business in terms of future research opportunities.

Implications & Recommendations: The results of this study will help business managers and practitioners understand the main trending areas related to artificial intelligence in a business setting. It is recommended that academic researchers and policy makers consider the future research suggestions stated in the article in order to help them derive new research directions.

Contribution & Value Added: Potential research topics and questions are stated that help international business researchers and practitioners focus on key important areas. Thereby helping to consolidate the existing research but also offering new possibilities regarding the use of artificial intelligence in international business.

Article type:	literature review
Keywords:	artificial intelligence; business model innovation; entrepreneurship; globalisation; innovation; international business; internationalisation; societal change; technology innovation
JEL codes:	O33; F23; M15

Received: 1 October 2024 | Revised: 3 December 2023 | Accepted: 5 December 2023

Suggested citation:

Ratten, V. (2024). Artificial intelligence: Building a research agenda. *Entrepreneurial Business and Economics Review,* 12(1), 7-16. https://doi.org/10.15678/EBER.2024.120101

INTRODUCTION

Exponential technologies such as the internet of things and artificial intelligence have transformed international business (Enholm *et al.*, 2022). The term 'artificial intelligence' is an umbrella term that discusses the whole process for utilising computer aided machine technology in business. It includes the whole digitalisation process for acquiring and assessing data to managing business relationships and enables businesses to create and sustain value for their stakeholders by using computer aided data techniques (Nguyen & Malik, 2022). An artificial intelligence application is defined as "diverse algorithms, systems and devices that have capabilities for gaining insights, learning from data, and making informed decisions" (Dorotic *et al.*, 2023, p. 2). Globally people can expect major changes to their daily activity as a result of artificial intelligence applications (Kulkov, 2021). Increasingly artificial intelligence technologies such as virtual assistants are used with artificial intelligence algorithms underpinning mobile commerce. This means there are a plethora of ways artificial intelligence can be used with governments relying on it as a form of surveillance and monitoring activity with public services such as educational institutions using it. Increasingly electronic-government services such as healthcare (Noorbakhsh-Sabet *et al.*, 2019) and transport are

based on artificial intelligence. Smart cities that enable people to electronically pay for and use services harness artificial intelligence technologies.

Generative artificial intelligence is "a type of artificial intelligence (AI) that can generate text, images, audio, code, videos and synthetic data" (Kanbach *et al.*, 2023, p. 2). It is becoming popular due to its simplicity in useability to generate content, which has implications for companies in terms of how they develop their business model (Loureiro *et al.*, 2021). Some functions of a business such as interaction with customers are being more affected by generative artificial intelligence. This has meant more automisation of administrative tasks. Generative artificial intelligence is a groundbreaking technology that is forcing businesses and governments to alter their business model particularly through the creation of smart cities (Herath & Mittal, 2022). Thereby providing the impetus for internal change but also a restructure in external relationships. In the swiftly evolving global business environment companies need to utilise generative artificial intelligence particularly through integrating human knowledge into artificial intelligence to stay competitive (Johnson *et al.*, 2022).

Empirical evidence about international business evaluations of artificial intelligence technology is limited with scarce research available regarding international differences (Mariani *et al.*, 2023). We know little about how different countries utilise artificial intelligence through public and private partnerships particularly through customer relationships (Ledro *et al.*, 2022). This means we lack clear insights into whether country contexts influence perceptions of artificial intelligence.

In the current business climate, managers cannot ignore artificial intelligence and need to monitor it carefully (Pitt *et al.*, 2023). Artificial intelligence has broadened the mindsets of global managers and influenced new trajectories particularly around digital sustainability initiatives (Pan & Nishant, 2023). The purpose of this article is to review the literature on artificial intelligence with a goal towards obtaining future research suggestions. Key issues are highlighted in order to stress certain research paths.

RESEARCH METHODOLOGY

A systematic literature review was conducted using the key words 'artificial intelligence' and 'business'. Articles, book chapters and books were analysed for their main trending areas related to these topics. The review conducted emphasised new publications published in the last couple of years after the COVID-19 pandemic in order to understand the trajectory of digitalisation practices regarding artificial intelligence. Each contribution was then analysed in terms of how it influenced artificial intelligence research and future research suggestions then identified. The main themes and findings were considered as a way to understand forthcoming projections.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Artificial Intelligence

Stone *et al.* (2020, p. 183) define artificial intelligence as "the use of multiple technologies that enable computers to sense, comprehend, act and learn, including techniques such as machine learning, natural language processing, knowledge representation and computational intelligence". The link between humans and computers in work practices is increasing due to the digital economy emphasising the automation of tasks. Artificial intelligence is used in workplaces for a variety of tasks including identifying target markets, communicating with customers, organising deliveries from suppliers and for competitive strategic reasons (Schneider *et al.*, 2023). Some companies have made greater progress in integrating artificial intelligence into their operations thereby helping them to be technological progressive. Artificial intelligence can be used by humans to delegate tasks such as online fraud detection and online advertising (Vrontis *et al.*, 2022). This means it is utilised as a form of recommendation system in terms of taking into account dynamic knowledge. It can be used in decision making in terms of evaluating candidates for jobs via processes of automation (Wright & Schultz, 2018). In the sport and health areas it is being used for marketing analytics and monitoring purposes.

Artificial intelligence is different from basic computer analytics as it learns from data in terms of doing things better (Wu & Monfort, 2023). Thus, it feeds back improvements in terms of assessing

current practices. It is useful when data is precise and the outcomes can be measured but when data is unclear the use of artificial intelligence might not be so accurate. This is due to data rapidly changing based on time constraints and information being contextually based. The use of artificial intelligence in business is taking place in conjunction with general digital technology advances. Thus, business innovation practices are being computerised but supplemented by artificial intelligence applications such as blockchain technology (Wang *et al.*, 2022). An advantage of artificial intelligence usage over humans is the removal of personal biases from decision making, which can be unintentional based on experiences or intentional due to thought processes (Sestino & De Mauro, 2022). The benefits of using artificial intelligence in business include faster decision-making processes that can free up time for other tasks (Sharma *et al.*, 2022). Businesses can capture better competitive positions when they use artificial intelligence to make rational decisions that remove any form of bias.

Unprecedented changes in digital technologies have compelled businesses to utilise artificial intelligence and is now viewed as more user friendly for businesses and a necessity in the digital business environment. In the 1990's artificial intelligence was defined in a general sense because the internet and related mobile commerce applications were not available. This meant the emphasis was on technology that solved problems as Hayes-Roth (1995, p. 329) defined artificial intelligence as "reasoning to interpret perceptions, to solve problems, (and) draw inferences and determinations". Another definition from the 1990's is Russell and Norvig (1995, p. 31) who stated that it is "anything that can be viewed as perceiving its environment through sensors and acting upon that environment through effectors". In the 2000's artificial intelligence began being defined with reference to emerging technologies such as cloud computing. In the 2020's machine learning, big data and augmented reality are often included in definitions of artificial intelligence.

Artificial intelligence technologies exploit big data in order to help a business in the marketplace. Big data includes information assets that can help a firm make decisions. This involves mining data through sentiment analysis and other techniques. Artificial intelligence systems can identify sentiments from data and identify emotions, which includes analysing non-verbal and facial recognition structures (Mariani & Borghi, 2023). Machine learning is a form of artificial intelligence that involves machines learning from data that helps predict trends. Large language models are used for deep learning because they can communicate in natural languages. This enables them to summarise information in a way humans can understand. ChatGPT and Bard are forms of large language models that are considered generative forms of artificial intelligence. This means they are conversational agents that communicate like humans but through technology (Malthouse & Copulsky, 2023). Artificial intelligence is enabled by different stakeholders in the business environment. Table 1 below states each of these stakeholders in terms of their international business functions.

Table 1. Artificial intelligence ecosystem stakeholders

Stakeholder	International business functions
Consumers	Individuals and entities that interact with artificial intelligence communications through the consumption of products and services. This includes how they view and understand the role of artificial intelligence in the transaction.
Influencers	Third parties such as celebrities or multinationals that influence perceptions about artificial intelligence.
Marketers	Marketing communication including social media, print advertisements and word of mouth regarding artificial intelligence.
Technology developers	Artificial intelligence creators that utilise formal and informal innovation to build systems.
Regulators	Governments and policy makers implement laws and policies regarding artificial intelligence.

Source: own study.

International Business and Artificial Intelligence

Emerging technologies such as artificial intelligence and quantum computing are getting more attention in the international business literature. Artificial intelligence and international business are conceptually about how digital technologies are used in a global context. Research on digital technology has focused on innovation and entrepreneurship but more recently artificial intelligence. New areas of research involve specific forms of artificial intelligence such as machine learning, the metaverse, virtual reality, augmented reality and conversational agents. This has led to a rapid increase in research around the use of artificial intelligence in international business (Ciulli & Kolk, 2023). The international business discipline area is well established in the literature and in practice. It has been prolific in identifying new areas of research such as international entrepreneurship, business model innovation and the circular economy thereby consistently exploring new research topics.

Internationalisation or globalisation has long been a key area of interest for international business managers. Govindarajan and Gupta (2001, p. 4) define globalisation as "a growing economic interdependence among countries, as reflected in the increased cross-border flow of three types of entities: goods and services, capital, and know-how". It has enabled them to increase their performance by opening up their business to new customers. Leung *et al.* (2005, p. 358) states "traditional IB research has been concerned with economic/legal issues and organizational forms and structures". The transition of countries such as China and India to global powerhouses has shifted the economic power and made international business research focus on emerging technologies such as artificial intelligence. Regional integration through the European Union and Association of South East Asian Nations has further stressed internationalisation and the reliance on new technology.

Internationalisation is now assumed in business transactions due to the relative ease at which products and services can be sold globally. The COVID-19 pandemic did somewhat change the process of internationalisation as country borders closed and global mobility was restricted. However, coinciding with the COVID-19 pandemic was the increased digitalization of services that increased global opportunities. This meant the digital economy based on artificial intelligence changes and new platform companies such as Amazon has increased. Universally people regardless of geographic or monetary position can obtain many digital services. This has led to a form of cultural convergence in terms of accessing digital technology. Artificial intelligence is a modern form of digital technology that is further internationalising business and offers benefits to companies in detecting and diagnosing issues that might otherwise be overlooked. This helps in decision making processes and provides a sense of objectiveness (Li *et al.*, 2023). However, the quality of the decisions might be dependent on the available data and power of the technology. This can lead to some debate about data driven decisions made from the use of artificial intelligence. Moreover, the use of artificial intelligence can result in moral and ethical dilemmas (Haenlein *et al.*, 2022). This is caused by the artificial intelligence not having unique competences or context specific data.

Barriers to Usage of Artificial Intelligence

The main barriers to usage of artificial intelligence are customer, marketing, technical, socio-cultural, organizational, financial, operational (Kamoonpuri & Sengar, 2023). Customer related barriers include a reluctance to engage in new technologies causing inertia, which can lead to psychological discomfort in using artificial intelligence due to a fear or loss of control (Gera & Kumar, 2023). Customers might also have physical discomfort in terms of interacting with the technology that can lead to other negative perceptions caused by technology anxiety such as privacy and trust (Haenlein & Kaplan, 2019). Increasingly socio-demographic factors such as age and living conditions can then cause feelings surrounding a loss of human interaction. Marketing barriers normally refer to a lack of communication regarding how to use the artificial intelligence, which can include a lack of adequate promotional activities around the value of the artificial intelligence (Ding & Goldfarb, 2023). Improper framing means that it can be confusing for users to understand why the artificial intelligence is important. In order to reduce marketing barriers the consumer's adoption behaviour regarding the technology should be taken into account in order to tailor the marketing promotion to the technology (Davenport & Ronanki, 2018).

Technical barriers to using artificial intelligence include not having the right training or support to use the technology. This can lead to misinterpretation about the way the technology is used and required support systems. As a consequence, it can take time to adjust to new technology. Linked to technology barriers are socio-cultural barriers, which refer to a unwillingness to engage with non-humans on tasks. Ethical and privacy concerns surrounding artificial intelligence mean that some people fear new technology and can be referred to as laggards (Ashok *et al.*, 2022). This can lead to negative perceptions about the artificial intelligence and result in organizational barriers to integrating the technology in a real world setting (Di Vaio *et al.*, 2020).

Organizational barriers can refer to firm-specific challenges such as having an inappropriate context to introduce artificial intelligence (Chen *et al.*, 2022). Having a lack of managerial support for artificial intelligence may lead to inadequate commitment from top managers. The managers may fear malfunctioning of artificial intelligence that can lead to brand damage and loss of reputation in the marketplace. As a consequence, managers will want to ensure employees are proficient at using artificial intelligence. Issues such as data privacy and security are also important. Financial barriers include high costs of doing business such as setting up factories and distribution centres as well as maintaining them (Abioye *et al.*, 2021). Operational barriers involve difficulties regarding implementation of process systems involving artificial intelligence needed by regulators. This can include political and legal uncertainties as well as customer needs.

DISCUSSION

Agenda for Future Research

Having discussed the definition and conceptualisation of artificial intelligence in international business, an agenda for future research is now presented. Table 2 summarises each of the main research avenues and provides future research focuses and research questions.

Experiences

Artificial intelligence can offer new experiences and enable different ways of thinking about international business particularly around the use of innovation (Bahoo et *al*., 2023). Virtual international experiences can be created to facilitate interaction between business trading partners. For example, the metaverse that enables virtual experiences to be experienced can facilitate international business experiences. When business partners feel and experience the metaverse they may be able to make better decisions. This decreases the risk and likeliness of failure. Researchers should explore how international business companies can improve the trading experience in order to obtain more realistic outcomes. This can lead to improved levels of international engagement and better performance outcomes. Researchers should seek to understand how virtual experiences can lead to real life interactions rather than simply experiences. Virtual experiences can be used to trial different products or services in order to improve international engagement. Physical international experiences can be costly and time dependent so virtual international experiences offer benefits. There are opportunities for researchers to leverage virtual experiences in supply chain management and negotiation tasks.

Customisation

International business managers should use artificial intelligence to customize offerings for stakeholders including customers and suppliers. Future research should look into how predictive analytics can forecast demand by certain customers. For example, some customers might not know what future needs they have but artificial intelligence can predict them. Alternatively, artificial intelligence can customize the needs of international business partners such as their preferences regarding quantity. This can lead to new kinds of international relationships and a more customer centric approach.

Table 2. Future research opportunities

Need in research	Future research focus	Research questions
Need to consider the international business artificial intelligence experience. Businesses should incorporate artificial intelligence into their production and distribution network. Different types of artificial intelligence such as virtual reality should be utilised in international business experiences.	Experiences	What type of international business experiences can utilise artificial intelligence (ie. direct and indirect interactions, marketing communications)? How should international businesses utilise artificial intelligence experiences in the negotiation stage? How can international business utilise artificial intelligence to increase their interactions with potential customers?
International businesses should customise their artificial intelligence offerings based on industry and geographical needs.	Customisation	What kind of artificial intelligence customisation can be used by international businesses? What environmental factors influence levels of artificial intelligence customisation? Can international businesses use artificial intelligence to predict future customisation trends? How should international businesses utilise the metaverse and augmented reality?
International businesses should harness the diverse usages of artificial intelligence. There are numerous advantages and disadvantages of artificial intelligence.	Diversity	How should international businesses consider artificial intelligence from a diversity perspective? How can international businesses weigh up positives and negatives of artificial intelligence usage?
What kind of international business strategies can artificial intelligence be used for? What strategic planning do international businesses need to do regarding artificial intelligence?	Strategy	In the short, medium and long term what kind of artificial intelligence strategies are needed? How can international businesses strategize the use of artificial intelligence?

Source: own study.

Diversity

International business companies should be encouraged to take a diverse approach to artificial intelligence, in terms of thinking holistically about its usages. For example, businesses can adopt artificial intelligence quickly or slowly depending on their financial resources and needs but should be considerate of alternative routes. Diversity can refer to numerous ways artificial intelligence is considered as a resource in a firm context. This can include relationships with other firms and interactions with regulatory authorities. Firms should use artificial intelligence such as the metaverse to create more opportunities for international business. Since developing good business partnerships can take some time, the metaverse offers a new way for firms to communicate. Researchers should explore how firms can utilise the metaverse as a replacement or addition to real time communication. This can make international business more accessible to firms and decrease lead times. By addressing the diversity aspect of artificial intelligence, firms in the international market can better strategize and succeed.

Strategy

Artificial intelligence can help predict changes in the international market thereby enabling improvements in strategic planning. Businesses may change the location of their factories due to the increased usage of robotic technology and less reliance on human labour (Budhwar *et al.*, 2022). Currently many factories are strategically located in areas with low labour rates. As more automation in factories is used there will be less reliance on human capital. Thus, businesses can change their business models based on data predictions. An interesting area for future research is to analyse changes in international market strategies based on artificial intelligence usage. This can include researching whether artificial intelligence driven algorithms can influence geographic location of production facilities. As artificial

intelligence becomes more advanced future research could also look into whether predictive analysis can forecast changes in politics in a country. Research should examine how to use artificial intelligence insights with human intuition about country political changes.

Artificial intelligence in the form of machine learning can help predict price, promotion and produce changes based on alternations in consumer behaviour (Canhoto & Clear, 2020). Future research should examine how artificial intelligence can predict change and resource allocations. Currently much price data is based on forecasts but if more real time information is available then businesses can better personalise their offerings. Businesses might also be able to be more efficient with their usage of resources by focusing on new market strategies such as customer and supplier awareness of their offerings. As more artificial intelligence is incorporated into the value chain of a business, businesses need to manage the trade-off between using technology versus people. This means they will need to invest more into customer concerns relating to emotions and behaviour. Potential research questions can relate to whether there are different opinions based on country settings related to data privacy and ethics.

Preferences for the use and intensity of artificial intelligence related services should be studied in more depth. This can include issues around job design and interaction with technology innovation. Suggestions based on geographic location are more likely to elicit different responses to artificial intelligence. Thus, more qualitative research in the form of in-depth interviews, observation and case studies are required to understand artificial intelligence usage in different country settings.

CONCLUSIONS

Artificial intelligence is one of the hottest topics at the moment that will certainly change international business practices. It has both positive and negative effects depending on its contribution to the global business environment. This article has shown how artificial intelligence shapes international business practices and evolved in the current economic climate. This can shed light on existing artificial intelligence practices and help guide management change.

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Acknowledgements and Financial Disclosure

The author would like to thank the anonymous referees for their useful comments, which allowed to increase the value of this article.

Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120102

Is sustainability a cost, an obligation, or an opportunity? Evidence on sustainable entrepreneurship orientation from Poland

Anna Dość, Francesco Pattarin

ABSTRACT

Objective: The objective of the article is to find if Polish managers exhibit a sustainable entrepreneurship orientation and to comprehend the factors driving this orientation.

Research Design & Methods: We conducted a factor analysis and regression analysis on data from an original survey on 301 managers of Polish companies.

Findings: We identified two orientations towards sustainability, *i.e.* as an opportunity, and a cost. Personal values, demographic characteristics, personal experience, and education affect perceptions of sustainability.

Implications & Recommendations: Some managers who work for large and middle enterprises see sustainability as an opportunity and are ready to take responsibility for facing social and environmental challenges. Companies and government need to find a way to unlock this potential. Having international experience and working for a company that is regularly involved in corporate social responsibility promotes such orientation.

Contribution & Value Added: This study is the first to diagnose sustainable entrepreneurship orientation in Poland – a country which urgently needs to adopt a sustainable development model. It is also the first study to analyse the societal factors behind sustainable entrepreneurship orientation.

Article type:	research article
Keywords:	business sustainability; corporate social responsibility; sustainable entrepreneurship orientation; personal values; managerial experience; sustainable development
JEL codes:	L21, M14, M21

Received: 6 December 2022 Revised: 18 October 2023 Accepted: 31 October 2023

Suggested citation:
Dość, A., & Pattarin, F. (2024). Is sustainability a cost, an obligation, or an opportunity? Evidence on sustainable entrepreneurship orientation from Poland. *Entrepreneurial Business and Economics Review,* 12(1), 17-33. https://doi.org/10.15678/EBER.2024.120102

INTRODUCTION

While the business and its practices used to be viewed as obstacles in achieving sustainable development, today, scholars stress that they can be the solutions. Companies can become sustainable development agents if sustainability and business goals are aligned. Such alignment requires a particular perception of sustainable development by businesspeople. The perception of business contribution to sustainability can theoretically be at least three-fold: as a cost, an obligation, or an opportunity (Bos-Bouwers, 2010). The last type of perception allows for recognizing and seizing new business opportunities by incorporating sustainability-related goals (Kraus *et al*., 2018). Recently, the entrepreneurship literature has devoted increased attention to businesspeople who are inclined to build a competitive advantage by targeting sustainability challenges (Pratono *et al.,* 2019). The broad term used to describe such inclination is sustainable entrepreneurship orientation (SEO) (Criado-Gomis *et al.,* 2017; Nasser, 2021); this construct broadly refers to the integration of entrepreneurial orientation (creating value by exploring and exploiting new emergent opportunities) and sustainability orientation (focus on environmental and social sustainability) (Criado-Gomis *et al.,* 2018). The emerging research on SEO is gaining

increasing visibility because scholars recognize it as a factor in determining sustainable entrepreneurship initiatives in new or already established organisations (Demirel *et al.,* 2019; Parboteeah *et al.,* 2012; Kraus *et al.,* 2018). Sustainable entrepreneurship can effectively transform business development models (Muñoz & Cohen, 2018). However, businesspeople can perceive the role of business and sustainability in different ways and consequently not always be ready to participate in such transformations. This issue is particularly relevant for already established organisations, which have a significant impact on society and the environment. Therefore, we must address some key questions. Are managers inclined to seek business opportunities with social and environmental components? Why are they and not others? The main goal of this article was to investigate if managers show SEO and what are the factors behind it. We focused on Poland, which is a country characterized by diverse perceptions about sustainability because of its recent history of transition from a centralized planned economy to a market-based system. The orientation of business responsibility has changed over this process, gradually incorporating views typical of western European countries. However, Poland is exposed to a significant risk of becoming a laggard in the transition towards sustainable Europe (McCauley *et al.,* 2023).

Our research contributes to the ongoing debate about the strategic approach to sustainability goals. Previous studies use questionnaires designed to grasp SEO only and do not account for alternative orientations toward sustainability, which may result in diverse forms and levels of commitment to sustainable business practices. Indeed, the relative importance of SEO is under-investigated. Moreover, extant studies collect data mainly from young and small-sized firms, often disregarding larger companies with better capabilities to undertake sustainability-oriented entrepreneurial actions. Thus, the knowledge about drivers of SEO among business managers needs to improve to uncover new ways of promoting sustainability (Ameer & Khan, 2022).

We aimed to offer two contributions. Firstly, we provided insight into the individual perceptions of relations between business and sustainability among managers. We found evidence that managers perceive sustainability either as an opportunity or a cost but not as an obligation. Next, we studied the psychological and sociological drivers of SEO perceptions. This way, we hope to offer insights about how SEO can be stimulated. Our research is focused on managers and owners of middle and large enterprises in large cities in Poland. Therefore, our results inform about high-impact individuals in a country that needs a stimulus for taking a sustainable path of development.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

In the business context, sustainability focuses on a set of ethical values and principles which guide business action in a responsible way, incorporating the environmental and societal consequences of actions alongside economic goals (Font & McCabe, 2017). Many recent empirical studies show how sustainable strategies pay off financially (Bartolacci *et al.,* 2020). However, this does not necessarily translate into business engagement in sustainable practices. Indeed, a long-standing stream of research in psychology has highlighted that individuals often form specific beliefs not so much based on evidence, but rather on their consolidated views (Knight, 2006). In these cases, attitudes, beliefs and inclinations are key in understanding foundations for business engagement contributing to sustainable development. Managers often must decide on whether to trade off short-term profits and expenditures for sustainability-related activities with (if at all) long-term and rather uncertain benefits (Feder & Weißenberger, 2019). Therefore, a critical point is how managers perceive the relationship between sustainability and business goals, *i.e.* as a cost, an obligation, or an opportunity (Bos-Bouwers, 2010). Perceiving business sustainability as the cost is related to self-centric profit maximisation that has traditionally been promoted as the fundamental objective of business. The well-known Friedman's view is representative of this approach. According to it, 'the only responsibility of business towards society is the maximisation of profits to the shareholders within the legal framework and the ethical custom of the country' (Friedman, 1970). In this vein, pro-social and pro-environmental activity of business can be seen as a waste of resources (McWilliams *et al.,* 2006). Thus, some managers may perceive sustainability as cost only and choose profit over environmental and societal impact (Fuentes *et al.,* 2019). The opposite way of perceiving business by managers regards sustainability as an obligation,

which results in prioritising the ethical imperative. Such perception is fuelled by the idea that accommodating environmental and social concerns has intrinsic value (Hahn *et al.,* 2018). Ethical concerns of some managers inevitably contradict the economic imperative of sheer profit objectives (De Bakker *et al.,* 2019). While budgetary allocations often must be made to achieve social and environmental goals, the moral duty fulfilment can trigger compromising financial goals (Jones & Felps, 2013). The third approach is sustainability as an opportunity. This relates to incorporating environmental and societal demands to re-think products, services, and the business model of firms so that trade-offs can potentially become new business strategies. This approach enables the development of commercially viable ventures that advance the causes of both environmental protection and social justice (Muñoz & Dimov, 2015). Managers' inclination to align sustainability and business goals fits SEO as a behavioural construct rather than as an organisational quality (Wu *et al.,* 2019). Managers showing SEO not only establish new ventures but also conduct sustainable entrepreneurial activities within existing organisations and transform their business models consequently (Criado-Gomis *et al.,* 2018). In this vein, SEO closely relates to strategic approaches to corporate social responsibility (CSR) (Hooi *et al*., 2016; Kraus *et al*., 2018). Schrettle *et al.* (2014) indicate that only organisations with a proactive approach to sustainability consistently incorporate a commitment to sustainable development. Consequently, SEO among managers contributes to the country's sustainable development.

Poland is an internationally important and interesting context to study SEO, because it has been infused with rich and often conflicting beliefs on the role of business. Until 1989, under a command-economy system, Polish state-owned enterprises focused on achieving social goals set by the government. The process of transitioning to a market-based system, which began in 1989, radically changed the dominating narratives. Fierce competition, lack of support from the government, and the belief that profit maximisation is the principal objective of private companies dramatically reduced firms' prosocial activities (Potocki, 2015). However, over the last decade, the business environment in Poland has evolved rapidly; significant trends towards sustainable and responsible business have emerged (Doś & Pattarin, 2021). Possibly, these changes have shaped new mindsets about the role of business in society with respect to sustainability issues.

Another crucial point to address is the factors that motivate managers to demonstrate SEO. Wu *et al.* (2019) show the effect of Machiavellianism ('the aim justifies means'), psychopathy, and narcissism on SEO. Extant literature argues that key personal characteristics of sustainable entrepreneurs are their personal values (Thelken & de Jong, 2020). Thus, the primary drivers of SEO to investigate are personal values. Values are 'beliefs that a specific mode of conduct or end-state of existence is personally and socially preferable to alternative modes of conduct or end-states of existence' (Rokeach, 1973, p. 160). Values are stable and central in a person's cognitive structure (Dietz & Stern, 1995), and causal antecedents to views and attitudes, and, ultimately, behaviour (Stern *et al.,* 1995). We drew on Schwartz (1994) who identified ten basic human values organised into four high-order groups (Table 1).

As far as businesspeople are concerned, self-transcendent values work to identify and exploit business opportunities closely linked to environmental and social issues (Liobikienė *et al.,* 2020; Yasir *et al.,* 2022). Tenner and Hörisch (2021) find that supporters of sustainability-oriented ventures hold low levels of self-enhancement values. Thus, we hypothesised:

H1: There is a negative relationship between self-enhancement values and SEO among Polish managers.

H2: There is a positive relationship between self-transcending values and SEO among Polish managers.

The theories of judgement formation highlight that it is jointly affected by both psychological traits and social context (Bandura, 2002). Thus, studying psychological traits as stand-alone drivers of SEO gives only limited and possibly confounding insights. In our study, we accounted for basic elements of social context potentially affecting SOE, *i.e.* individual experiences exposing individuals to views and evaluations within their social environment (Wood & Bandura, 1989). Obviously, education is such an experience. Godos-Díez *et al.* (2015) showed how in, comparison with other kinds of education, a business studies background may affect the way stakeholders' interests are considered and moral judg-

ments are made. It also seems possible that managers who studied humanities are less inclined to focus exclusively on profits (Rivera & De Leon 2005). Lewis *et al.* (2014) show that CEOs with legal education act more conservatively and are less likely to agree on environmental disclosure.

Table 1. Motivational types of values sectioned in high-order groups

High-order group	Value	Motivation
Self-enhancement	Power	Social status and prestige, control, or dominance
	Achievement	Personal success through demonstrating competence according to social standards
	Hedonism	Pleasure and sensuous gratification for oneself
Openness to change	Stimulation	Excitement, novelty, and challenge in life
	Self-direction	Independent thought and action-choosing, creating, exploring
Self-transcendence	Universalism	Understanding, appreciation, tolerance, and protection for the welfare of all people and nature
	Benevolence	Preservation and enhancement of the welfare of people with whom one is in frequent personal contact
Conservation	Tradition	Respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provide
	Conformity	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms
	Security	Safety, harmony, and stability of society, relationships, and self

Source: own elaboration based on Schwartz (1994).

The psychological literature provides evidence that familiarity with an object creates more positive attitudes towards it (Heath *et al.,* 2011). In that case, acting in a social environment where responsible business practices are common, potentially increases managers' favour to sustainability. Polish managers can get exposed to such environments in two ways. Firstly, they can work for a company fostering business sustainability. Secondly, they can enter international social environments where companies are committed to sustainability daily. Many Polish managers have lived, studied, or gained professional experiences in Western European countries, well-known for their commitment to sustainability, and later came back to work in Poland; such experience could have exposed them to sustainability issues or orientations.

Manager's personal experiences with the business itself can also play a role. The experience can be positive or negative. Negative experiences drive scepticism and lead to devaluing companies (Chu *et al.,* 2014). Scepticism about business in general fosters opinions that business responsibility for the environment and society is simply window-dressing and that business roles are narrow (Elving, 2013). One easy-to-observe and well-tested proxy of negative experience-driven dissatisfaction is turnover (Hom & Kinicki, 2001).

The literature widely reports the effect of gender on sustainable business practices (Amorelli & García-Sánchez, 2021). Women undergo different socialization processes than men; through these processes, women learn that they are expected to be helpful, kind, interpersonally sensitive, nurturing, and concerned about others' welfare (Lämsä *et al.,* 2008). Considering that diverse dimensions of managers' experience can impact their perception of business sustainability, we hypothesized that:

H3: Personal experience is a significant antecedent of managers' perception of business sustainability.

RESEARCH METHODOLOGY

We collected information about managers' perceptions of business sustainability and psychological and environmental factors that may shape them. To this end, we conducted a survey using a questionnaire consisting of three major sections.

The first part of the questionnaire asked for managers' perceptions of the role of business in society with a focus on sustainability issues, the second part for the personal values of managers, and the third

part for managers' experience and demographic profile. The first part of the questionnaire aimed at obtaining information about the managerial perception of business sustainability according to the schema developed by Hernández-Perlines and Rung-Hoch (2017) and Wu and co-authors (2019). We elicited the position of managers about SEO, corporate social responsibility (CSR), and the environment. Social and governance issues were in line with the Quazi and O'Brien (2000) approach. We asked the respondents to express agreement or disagreement about each of the eight statements on a 7-point Likert scale (see the Appendix for details). The second part of the questionnaire aimed at obtaining information about personal values. We measured personal values using ten items adapted from the World Values Surveys Questionnaire (WVSA, 2008; Schwartz, 1994) using, again, a 7-point Likert scale. The third part of the questionnaire was about respondents' experiences and demographic profile. To capture managers' profiles, we focused on the type and level of education, gender, international experience (working or studying abroad), individual turnover (number of companies where the manager had worked for), the position of a manager in a company (middle, upper, company owner), and age.

The questionnaire was submitted by direct interview to owners and managers of middle and large companies located in seven major cities in Poland (Warsaw, Krakow, Wroclaw, Katowice, Lodz, Poznan, and Gdansk) in December 2018. The survey sample was 500 managers; 301 of them participated, which is about 60%.

We compared respondents and non-respondents by firm size (sales), economic sector and type of ownership, and we did not find any significant pattern. Therefore, our sample may be considered random. This does not exclude that some personal features of managers may have affected participation. However, the features of participating managers were quite ample and diverse. Males constituted 43.5% of respondents, and the median age of respondents was 42 years with a minimum of 28 and a maximum of 65 years. Company owners constituted about 21% of the sample, while 79% were middle to upper managers – almost equally distributed. Furthermore, educational profiles were quite diversified, both in terms of educational level and type of studies. Most managers had a university degree (73.4%), 9.9% had a bachelor and the rest a postgraduate degree. Managers with university or postgraduate degrees were mostly trained in economics or law, while technical sciences and economics bachelors constituted 51.4% and 33.3% respectively among bachelors.

RESULTS AND DISCUSSION

Our analysis of managers' orientation towards sustainability is twofold. Firstly, we performed exploratory (EFA) and confirmatory (CFA) factor analysis of managers' attitudes towards society. Next, we turned to regression analysis of the hypotheses about the relationship between attitudes and managers' features.[1]

In the first step, we aimed to identify synthetic constructs and related scales based on the questionnaire items; such scales should be meaningful representations of managers' attitudes or, as we call them, 'perceptions.' Table 2 displays the descriptive statistics for the eight items used in our analysis.

We checked the correlation pattern of these items and found meaningful links among some of them. Moreover, multicollinearity did not seem to be an issue (Figure 1). We also evaluated standard measures of sampling adequacy (MSA). The lowest MSA value was 0.547 for 'Seek profit' and the highest was 0.824 for 'social welfare'. The total MSA was 0.765. According to the common practice, we deemed all measures satisfactory and concluded that our sample was adequate for factor analysis.

We used the principal axis method (PA) to perform EFA. Based on the parallel scree plots of the correlation matrix eigenvalues, very simple structure, Velicier MAP, and Bayes information criterion (BIC) statistics, we tried models characterized by two and three factors. The two-factors were better than the three-factor models according to the root mean square of residuals (RMSR), root mean square error of approximation (RMSEA), BIC, and the Tuckey-Lewis index (TLI) of factor reliability (Table 3). While RMSR, RMSEA, and TLI were quite close and equally acceptable for two and three factors, BIC

[1] We conducted all calculations in the R environment (R Core Team, 2023). We used the packages psych for EFA (Revelle, 2023) and lavaan (Rossell, 2012) for CFA and car for regressions (Fox & Weisberg, 2019).

strongly suggested two factors. With two factors, PA explained 36% of the total sample variation and 46% with three. In the two-factor models, the second factor accounted for 27% of the total explained variation versus 73% of the first, while in the three-factor models, the second and third factors explained 52% of it versus 48% of the first. Therefore, the underlying construct representation was clearer in the two-factor models than in the three-factor ones and was preferred even if it sacrificed 10% points of total variance explained. We confirmed this conclusion with our examinations of the factor loadings produced by EFA for two and three factors, in which the third factor was not easy to interpret as a meaningful underlying construct. Finally, we passed the chi-squared test of the two-factor model versus the null model at less than the 0.001 size.

Table 2. Descriptive statistics of eight questionnaire items on 301 subjects

Items	Mean	Standard Deviation	Median	Skewness	Kurtosis	Interquartile Range
Seek profit	5.06	1.43	5	-1.11	0.98	1
Legal bounds	4.20	1.53	4	-0.29	-0.75	2
Stakeholder value	5.04	1.34	5	-0.71	0.10	2
Social welfare	5.00	1.31	5	-0.48	-0.37	2
Government fails	4.54	1.43	5	-0.40	-0.33	2
Assets in business	4.69	1.42	5	-0.70	0.17	2
CSR moat	5.00	1.28	5	-0.63	0.36	2
CSR profit	5.06	1.31	5	-0.79	0.43	2

Source: own study.

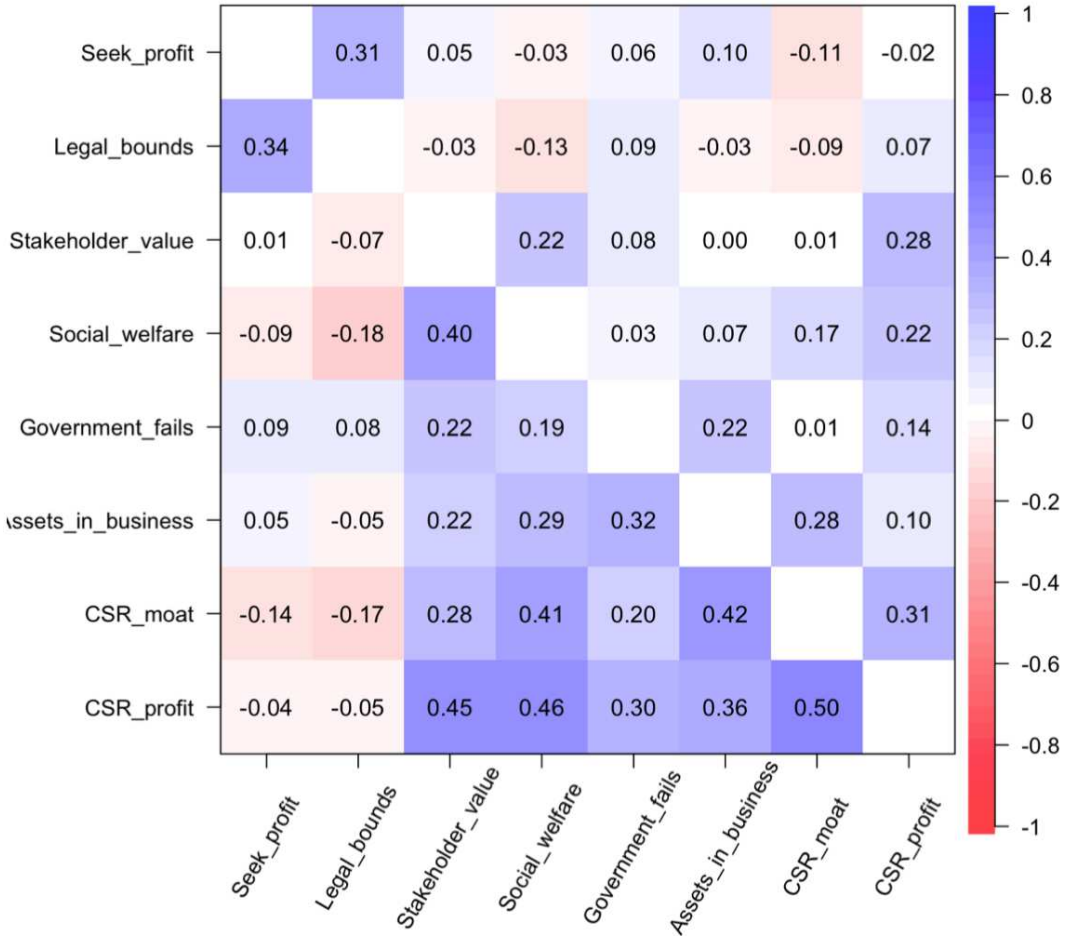

Figure 1. Correlations and partial correlations of questionnaire items

Note: Correlations are in the lower and partial correlations in the upper triangle.

Source: own elaboration.

Table 3. The EFA comparison of two- and three-factor models

Criterion	Number of Factors	
	2	3
RMSR	0.04	0.02
RMSEA	0.06	0.02
BIC	-45.53	-31.92
TLI	0.92	0.99

Note: based on 301 subjects and eight items. We based all criteria on the decomposition of the correlation matrix by factors, *i.e.* relative mean squared residual (RMSR), root mean square error of approximation (RMSEA), Bayes information criterion (BIC), and Tuckey-Lewis index (TLI).
Source: own study.

The first set of EFA models assumed there was not any correlation between factors, while the second set allowed for it. In the first case, we used Varimax, in the second Oblimin factor rotations. We estimated all models by maximum likelihood. Although item measures were not continuous, we did so, because the 7-point Likert scale can be fairly accommodated this way if data do not show strong asymmetries or fat-tails as it generally was in our case.

While factor correlation is often an issue when constructing psychometric scales, this was not the case for our data. Indeed, the estimated correlation from the Oblimin rotation was tiny (-0.15) and not statistically different from zero. Preferring an orthogonal factor structure was also suggested by CFA. According to EFA results, for CFA, we assumed the following model structure:

Factor 1: Sustainability as Opportunity ~ CSR profit + CSR moat + Social welfare + +Stakeholder value + Assets in business + Government fails

Factor 2: Sustainability as Cost ~ Legal bounds + Seek profit

in which Factor 1 and Factor 2 were allowed to correlate.

We estimated the model by maximum likelihood with the Satorra-Bentler correction for robustness. The CFA estimated correlation between factors was -0.216 and its standard error was 0.105. Thus, it was quite small and only marginally significant given the sample size of 301 subjects (the *P*-value of the z-score test is 0.04). After constraining factors to be uncorrelated, we did not reject the restrictions implied by the model structure against the saturated model at the 0.001 significance of the deviance-based chi-square test.

Table 4 presents the loadings of the two extracted factors from the eight questionnaire items by PA with bootstrapped 95% confidence intervals and standard analysis of variance statistics. The pattern of factor loadings clearly identified two meaningful constructs, *i.e.* 'sustainability as opportunity' and 'sustainability as cost,' which we will describe below.

Table 4. Results of factor analysis

Items	Factor 1: Opportunity		Factor 2: Cost		Items variance shares		Items total variance
	Estimate	Interval	Estimate	Interval	Common	Unique	
Seek profit	0.00	(-0.09. 0.08)	0.55	(0.25. 0.94)	0.31	0.69	1.0
Legal bounds	-0.07	(-0.19. 0.01)	0.61	(0.29. 0.88)	0.38	0.62	1.0
Stakeholder value	0.54	(0.42. 0.67)	-0.02	(-0.26. 0.19)	0.3	0.7	1.0
Social welfare	0.60	(0.47. 0.74)	-0.20	(-0.38. -0.03)	0.40	0.6	1.2
Government fails	0.42	(0.27. 0.56)	0.19	(-0.07. 0.38)	0.21	0.79	1.4
Assets in business	0.53	(0.38. 0.69)	0.02	(-0.20. 0.26)	0.28	0.72	1.0
CSR moat	0.64	(0.53. 0.75)	-0.22	(-0.39. -0.08)	0.45	0.55	1.2
CSR profit	0.76	(0.67. 0.85)	-0.33	(-0.28. 0.14)	0.58	0.42	1.0

Note: PA extracted factors loadings on items with 95% bootstrapped confidence intervals based on 500 replicas. Multiple R-squares of items with factors were 0.784 for Factor 1 and 0.542 for Factor 2. Loadings and variances were based on standardized values of items.
Source: own study.

Having assessed the validity of the proposed scales, we checked their reliability. The evidence provided by the commonality-uniqueness decomposition suggested that factors were reliable (Table 4). This was supported by three common measures of reliability, *i.e.* Cronbach's alpha, omega total, and split half. The alpha and omega reliability statistics were at acceptable levels, *i.e.* 0.68 and 0.74 respectively. The distribution of the split half statistic with Spearman-Brown correction on 5000 permutations had a minimum of 0.55 and a maximum of 0.78, which was an acceptable range.

Sustainability as opportunity is characterized by seeing the responsibilities of business extending beyond the sheer search for profit within legal boundaries. It encompasses beliefs that assuming broad responsibilities is an effective basis for competing in the market and enhances profitability, and that businesses should take on the role of a social leader and protect stakeholders, and that companies are capable and legitimate to do so because they have enough resources to do it, especially when other institutions fail to respond to social issues. This perception aligns with SEO and encourages the active pursuit of projects that benefit society, leading to enhanced competitiveness and, ultimately, increased profitability.

Sustainability as a cost points to perceptions about the role of business in society that emphasizes strict attendance to the economic interest of the capital providers. Existing law and regulations are perceived as already putting a sufficient check on business behaviour, so that additional corporate responsibilities toward broader stakeholders and society in general, are not worth considering. This perception leads to not seeing SEO as a relevant objective for company managers and possibly hindering their actions to gain a competitive advantage through pro-environmental and/or pro-social projects.

We found that the two factors were cast into two scales normalized in the range [-100, 100], in which values less than zero represented negative and values above zero – positive perceptions (see the Appendix for details). For brevity, we called the first scale "sustainability as opportunity" (SaO) and the second 'sustainability as cost. (SaC) Although SaO and SaC imply opposite views about SEO, they may coexist in a manager's overall attitude. Indeed, 26.8% of managers were positive about SaO and negative about SaC. In total, 29.8% of managers were negative about SaO and positive about SaC, and the rest of them were either fully positive or negative about both (43.4%).

In the second step, we investigated the determinants of managers' attitudes toward SEO through regression analysis, in which the dependent variables were the SaO and SaC scales. We were especially interested in the effect of value-related scales on perceptions.

Regressions included several control and explanatory variables. Because most independent variables were qualitative factors, and some included many levels, the more variables we included in a regression equation, the quicker the number of regressors increased. This implies that although the sample size was not small (301 cases), estimators may not have been very precise (*i.e.* they had large variances). Some independent variables may have been strongly dependent. This also reduces precision. To resolve these issues, we adopted three estimation methods and compared their results to single-out significant independent variables: least-squares, stepwise variable selection on least-squares, and ridge regression.

Regression models differed because of their dependent variable (*i.e.* either SaO or SaC) and the sets of independent variables. The baseline model included the most variables. Restricted 1 and Restricted 2 were paired-down versions of it where some subsets of non-significant variables were consecutively excluded. Overall, we estimated six models, *i.e.* three for opportunity and three for cost.

In all regressions, we centred quantitative variables around the mean and scaled by their standard deviation to improve fitness. We encoded quantitative variables into binary variables, so that we dropped the first level to avoid linear dependencies in the model matrix. Therefore, in interpreting regressions, coefficients of qualitative variables shall be interpreted as differential effects with respect to the baseline reference. Table 5 presents the results of regression analysis with least-squares. Stepwise and ridge regression provided similar outcomes.

Table 5. Results of regression analysis

Coefficients	Baseline		Restricted 1		Restricted 2	
	Sustainability as Opportunity (SaO)	Sustainability as Cost (SaC)	Sustainability as Opportunity (SaO)	Sustainability as Cost (SaC)	Sustainability as Opportunity (SaO)	Sustainability as Cost (SaC)
(Intercept)	-0.053	0.055	-0.071	-0.025	-0.152	-0.017
St. Err.	0.264	0.242	0.224	0.211	0.164	0.149
P-value	0.842	0.819	0.752	0.908	0.356	0.907
Power	0.016	0.077	0.025	0.079	0.041	0.065
St. Err.	0.067	0.077	0.066	0.074	0.065	0.072
P-value	0.813	0.319	0.702	0.285	0.536	0.369
Achievement	-0.004	0.049	-0.016	0.035	-0.022	0.044
St. Err.	0.061	0.062	0.060	0.061	0.060	0.060
P-value	0.948	0.429	0.793	0.571	0.709	0.465
Hedonism	-0.146	0.169	-0.144	0.156	-0.155	0.145
St. Err.	0.065	0.070	0.064	0.068	0.063	0.066
P-value	0.025	0.015	0.024	0.021	0.014	0.028
Stimulation	-0.003	0.122	-0.009	0.122	-0.002	0.131
St. Err.	0.061	0.064	0.060	0.062	0.060	0.059
P-value	0.954	0.057	0.879	0.051	0.973	0.027
Self-direction	0.087	0.014	0.083	0.013	0.090	0.029
St. Err.	0.058	0.074	0.056	0.071	0.055	0.068
P-value	0.131	0.853	0.140	0.856	0.102	0.676
Universalism	0.169	0.160	0.156	0.173	0.166	0.163
St. Err.	0.058	0.080	0.057	0.075	0.056	0.073
P-value	0.004	0.046	0.006	0.022	0.003	0.026
Benevolence	0.211	-0.117	0.224	-0.113	0.216	-0.120
St. Err.	0.059	0.066	0.058	0.065	0.057	0.062
P-value	0.000	0.074	0.000	0.083	0.000	0.052
Tradition	0.187	0.083	0.171	0.080	0.150	0.074
St. Err.	0.060	0.072	0.059	0.066	0.058	0.062
P-value	0.002	0.252	0.004	0.226	0.010	0.233
Conformity	-0.044	0.243	-0.025	0.251	-0.015	0.263
St. Err.	0.066	0.081	0.065	0.074	0.065	0.071
P-value	0.508	0.003	0.702	0.001	0.812	0.000
Security	0.012	0.184	0.010	0.172	0.000	0.177
St. Err.	0.059	0.072	0.058	0.068	0.059	0.067
P-value	0.834	0.011	0.867	0.012	0.998	0.008
logAge	0.010	-0.017	-0.010	0.005		
St. Err.	0.064	0.075	0.059	0.068		
P-value	0.876	0.825	0.869	0.945		
Gender: Female	0.194	0.030	0.116	0.062		
St. Err.	0.111	0.123	0.101	0.104		
P-value	0.079	0.811	0.254	0.550		
Education level: University	-0.194	0.008	-0.180	-0.012		
St. Err.	0.156	0.131	0.149	0.118		
P-value	0.212	0.954	0.226	0.922		
Education level: MBA/Postgraduate	0.064	-0.243	0.240	-0.305		
St. Err.	0.268	0.386	0.248	0.366		
P-value	0.810	0.529	0.333	0.404		
Education level: PhD	0.155	0.200	0.239	0.191		
St. Err.	0.273	0.180	0.264	0.174		
P-value	0.570	0.268	0.366	0.272		

Education field: Law	0.114	-0.299				
St. Err.	0.182	0.229				
P-value	0.532	0.192				
Education field: Natural sciences	-0.107	-0.269				
St. Err.	0.169	0.172				
P-value	0.527	0.119				
Education field: Other	0.368	0.074				
St. Err.	0.271	0.368				
P-value	0.175	0.840				
Education field: Social sciences and humanities	-0.005	-0.116				
St. Err.	0.187	0.163				
P-value	0.977	0.476				
Education field: Technical sciences	-0.192	-0.002				
St. Err.	0.131	0.145				
P-value	0.142	0.988				
Experience: International	0.340	-0.055	0.326	-0.017	0.398	-0.010
St. Err.	0.120	0.141	0.116	0.131	0.111	0.123
P-value	0.005	0.697	0.005	0.895	0.000	0.937
Jobs: 2	-0.044	0.267	-0.102	0.258	-0.048	0.271
St. Err.	0.149	0.150	0.145	0.148	0.143	0.143
P-value	0.765	0.075	0.482	0.081	0.740	0.058
Jobs: 3	-0.055	-0.180	-0.062	-0.191	-0.041	-0.181
St. Err.	0.159	0.179	0.155	0.168	0.147	0.153
P-value	0.730	0.315	0.690	0.254	0.780	0.236
Jobs: [4. +Inf)	-0.302	0.084	-0.299	0.073	-0.285	0.070
St. Err.	0.162	0.168	0.159	0.164	0.146	0.150
P-value	0.062	0.614	0.060	0.656	0.051	0.640
Level in company: Middle manager	0.001	-0.030				
St. Err.	0.152	0.161				
P-value	0.997	0.851				
Level in company: Upper manager	-0.137	0.073				
St. Err.	0.149	0.169				
P-value	0.358	0.665				
Size assets: (180. +Inf]	0.156	0.049				
St. Err.	0.113	0.139				
P-value	0.169	0.726				
CSR implementation: Occasionally	0.009	-0.004	0.021	0.045	0.001	0.043
St. Err.	0.161	0.174	0.153	0.159	0.153	0.147
P-value	0.954	0.982	0.892	0.779	0.993	0.772
CSR implementation: Regularly	0.351	-0.213	0.402	-0.165	0.427	-0.147
St. Err.	0.176	0.192	0.161	0.158	0.161	0.147
P-value	0.047	0.267	0.013	0.297	0.008	0.316
Residuals St. Err.	0.835	0.835	0.836	0.832	0.842	0.829
R-squared	0.37	0.37	0.35	0.356	0.329	0.349
Adjusted R-squared	0.303	0.302	0.301	0.308	0.292	0.312
F-statistic	5.49	5.48	7.15	7.36	8.72	9.51
Degrees of freedom	(29. 271)	(29. 271)	(21. 279)	(21. 279)	(16. 284)	(16. 284)
P-value	0.000	0.000	0.000	0.000	0.000	0.000

Note: All quantitative variables were expressed as z-scores. The reference levels of qualitative variables in the baseline model were: Gender: Male, Education level: Secondary, Education field: Economics. Experience: Domestic. Jobs: 1. Level in company: Company_owner. Size assets: (0. 180]. Csr implementation: Never. HC-adjusted coefficient standard errors and F-tests are used for 'cost' models. The sample size was 301 subjects.

Source: own study.

The SaO regressions passed both the Breusch-Pagan test for constant variance and spread-level plots checks, while in the SaC regressions, there was a hint of heteroscedasticity. Therefore, we used robust estimates of the variance-covariance matrix of estimators in this case (Long & Ervin, 2000). Residual analysis did not show any functional-form misspecification. The normality of errors was strongly supported across all models. Finally, common residual-based diagnostics did not reveal any significant outliers-related problems.

The results of all models for SaO showed that two variables related to personal values had a strong and very significant positive effect. These were universalism and benevolence. These are both self-transcendent values which emphasize concern for the welfare of others, social justice, equality, and nature. These motivations do not contradict business purposes but help focus on seeking business opportunities through sustainability. Interestingly, also Tradition, which is related to responsiveness to immutable expectations from the past, positively impacts opportunity. This suggests that Polish tradition, in which social solidarity holds a unique position, is a nurturing environment for SEO. Hedonism had a negative effect on SaO. This motivational type is associated with valuing pleasure or sensuous gratification for oneself and is a trait of self-enhancement values. Our results showed that such motivation reduces SEO.

These findings strongly supported Hypothesis 1 and 2. Our results differ from the findings by Garçon *et al.* (2021) who studied Brazilian entrepreneurs and showed that personal values do not have any significant impact on social entrepreneurship orientation but are partially in line with Kirkwood and Walton (2010) who suggest that sustainable entrepreneurs are driven by eco-centric, self-transcendent, and openness to change values.

Some variables related to managers' experience also have significant effects on "sustainability as opportunity". Being a woman, having an international experience and working for a socially responsible company has a positive and significant impact on SEO. However, having a high individual turnover (changing jobs more than four times in one's career, indicating scepticism towards the business environment) has a significant negative effect on SEO. Women managers seem slightly keener than males in embracing sustainability as an opportunity. This result is in line with previous research which has found that gender is one of the important factors explaining differences in social responsibilities perception (Alonso-Almeida *et al.*, 2015). International experience and working for a company that is regularly involved in CSR both have strong, positive, and significant effects on SaO. These features relate to familiarity with CSR. Therefore, our results show that social environments where business social responsibility is institutionalized and successfully practiced help build SEO among managers. Overall, these findings support Hypothesis 3. Interestingly, education did not show any significant effect on SaO. This means that study programs in Poland were not adjusted to present societal needs in terms of sustainable transition.

"Sustainability as cost" (SaC) is the opposite view of SaO. Therefore, the results of regression analysis for this factor are a litmus test to better understand the antecedents of SEO in Poland. We found that hedonism and stimulation, which are self-enhancement values that emphasize the pursuit of one's own interests, both have significant positive effect on the SaC Security and conformity also do; these values express the motivations to preserve the *status quo* through maintaining traditional beliefs, complying with rules and expectations of others, and seeking safety and stability (Sagiv *et al*., 2017). Thus, a profit-oriented attitude seems to be linked with neoliberal imperatives strongly reinforced in Poland during the 1990s and the lack of readiness to essay new ways of thinking about business goals and roles. Thus, our findings indicate that in Poland, sustainable business models may be seen as an innovative approach by managers who prefer stability.

Universalism also has a positive significant effect on SaC. Universalism is generally related to tolerance and protection of the welfare of people and nature. Universalistic managers can exhibit the SaC approach when caring for the shareholders' financial interests. To the contrary, benevolence has a negative effect on SaC. As this concept hinges on voluntary concern for others' welfare, we interpreted this result as the SaC viewpoint conflicting with the internalized motivational base for cooperative and supportive social relations.

The only experience-related factor that significantly increases SaC is having worked for two companies during a managerial career. Since there is no clear pattern in how the number of job changes impacts the managerial mindset, more research is needed to understand this effect.

Overall, although both certain personal values and experience-related variables affect positively Sustainability as opportunity" (SaO), the latter variables show stronger effects. Thus, they can become key SEO drivers in Poland. Interestingly, in almost all cases personal features that positively affect SaO affect negatively SaC and vice versa. Therefore, our results provide evidence that opposite personal profiles lead to opposing views on the role of business in society.

CONCLUSIONS

Factor analysis of survey data revealed that there are two distinctive groups of views on business, social, and environmental goals among Polish managers. The first is "Sustainability as an opportunity". People with this mindset are keen to participate in societal governance, not only within their closest environment but also indirectly reaching out to society in general. This mindset encompasses strong beliefs that entrepreneurship and sustainable development are not mutually exclusive. Sustainability as an opportunity fits SEO and is adequate for facing the globalisation challenges, the lack of regulation and privatisation, weak governments actions, and the strength of private capital. We also showed that an alternative viewpoint on sustainability exists among Polish managers: the "Sustainability as cost" view. This belongs to managers believing that maximising the value of providers of capital within the framework of legal requirements is the fundamental business responsibility and may result in creating negative externalities. We did not find any views of sustainability related to moral obligations suggesting that Poland is different from Western countries where such a view was found (Bos-Bouwers, 2010). The theoretical implication of this finding is that institutional contexts indeed alter the way of seeing sustainability by business practitioners.

Our analysis uncovered antecedents of SEO. We found evidence that SEO among Polish managers is strongly driven by such personal values as self-transcendent and tradition but also by personal experience and profile, notably having been exposed to social environments where business social responsibility is institutionalized and successfully practised. Our findings on personal values provide more detailed insights into how they affect the perception of business role in sustainable transition than previous studies. Our findings on experience-related drivers of sustainability as opportunity give hope that SEO as an individual inclination can be developed under favourable circumstances. Clearly, international experience and working for a company that is regularly involved in CSR promotes such orientation. The practical implication of our study is that sustainability-oriented companies as well as government actions may foster international mobility to promote SEO among entrepreneurs (*e.g.* promoting students' internships in companies that are regularly involved in CSR). Moreover, we showed that university programmes need material improvements to harness higher education for sustainable transition. Many companies strive for developing human resources policies that efficiently improve company's social performance and our results show that such policies should consider the experience of candidates for different positions, their gender, and their personal values.

This study has some limitations. Firstly, our sample included middle and large enterprises. Thus, our results cannot be safely extended to manager working at other types of companies. Surveys to study SEO are still in the development phase and broader designs can bring about new insights. Secondly, we studied a limited number of experience-related factors. The *prima facie* importance of such factors we highlight suggests that they are worth further investigation to help designing policies aimed to spread SEO among businesspeople. Thirdly, we were not able to account for the fact that sustainably oriented entrepreneurs may differ with respect to the dimension of sustainability they mostly focus on. Finally, we did not account for the level of discretion that individual managers have and thus we could not find what was the actual impact of SEO oriented managers on their organisations. This issues needs to be further investigated.

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Appendix:

Managers' opinions questionnaire items

We asked subjects to express their agreement or disagreement about eight items on a 7-point Likert scale, from 1 = completely disagree to 7 = completely agree. The questionnaire items were:

1. Seek profit: 'The main goal of a company is to make high profits.'
2. Legal bounds: 'Law and regulations are sufficient to make companies engage in CSR.'
3. Stakeholder value: 'Companies shall pursue the interests of stakeholders (*e.g.* employees) together with those of equity and debt investors.'
4. Social welfare: 'Companies shall take care of improving community welfare.'
5. Government fails: 'When government ESG policies are insufficient companies shall step in.'
6. Assets in business: 'Companies have enough resources to effectively pursue ESG objectives.'
7. CSR moat: 'A company improves its competitive advantage when it adopts CSR practices.'
8. CSR profit: 'Adopting CSR practices improves company's profits.'

Standardized factor scores

Let S_{ic} be the *i*-th manager's score on factor *c* and Z_{ic} its standardized value for $i = 1,2, \dots, 301$ managers and $c \in \{\text{Opportunity}, \text{Cost}\}$ mindset factors. The standardized score *Z* is defined as:

- if $S_{ic} \geq 0$ then $Z_{ic} = 100 \times \frac{S_{ic}}{\min_i(S_{ic})}$
- if $S_{ic} \geq 0$ then $Z_{ic} = -100 \times \frac{S_{ic}}{\min_i(S_{ic})}$

This transformation scales positive or zero scores in the [0,100] and negative ones in the [–100, 0) range.

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The contribution share of authors is equal. Anna Dość: conceptualisation, literature.
Francesco Pattarin: methodology, calculations, and discussion.

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Acknowledgements and Financial Disclosure

The authors would like to thank the anonymous referees for their useful comments, which allowed to increase the value of this article.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120103

Enhancing resilience in digital multi-sided platform start-ups: An exploration of entrepreneurial logic and open innovation strategies

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ABSTRACT

Objective: The article aims to examine the strategic fit between two distinguishable types of entrepreneurial logic (effectuation and causation) and different types of innovation approaches (radical and innovative).

Research Design & Methods: We employed a self-administered questionnaire-based quantitative study and the partial least squares structural equation modelling (PLS-SEM) to test the hypothesis. The sample comprises 70 Indonesian digital multi-sided platform (MSP) start-ups that have been operating for at least three years.

Findings: The empirical results suggest that effectuation can contribute to digital MSP start-ups' resilience after they succeed in providing radical innovation. On the other hand, causation directly contributes to their resilience. Meanwhile, incremental innovation does not contribute to digital MSP start-ups' resilience.

Implications & Recommendations: The empirical results suggest that effectuation can contribute to the resilience of digital MSP start-ups after they succeed in providing radical innovation. On the other hand, causation directly contributes to their resilience. Meanwhile, incremental innovation does not contribute significantly to the resilience of digital MSP start-ups.

Contribution & Value Added: This study explores how the entrepreneurial logic in digital MSP start-up models can improve the survival rates of emerging market start-ups. It focuses on Indonesia, where the survival rate is comparatively lower than in other Asian countries. Moreover, this research is crucial for comprehending the phenomenon underlying the resource-based theory paradox, because it involves implementing innovation strategies within the constraints of limited initial resources and capabilities.

Article type: research article

Keywords: effectuation; radical innovation; incremental innovation; resilience; multi-sided platform

JEL codes: O3, Y8

Received: 20 April 2023 | Revised: 14 August 2023 | Accepted: 19 September 2023

Suggested citation:

Prijadi, R., Santoso, A.S., Balqiah, T.E., Jung, H., Desiana, P.M., & Wulandari P. (2024). Enhancing resilience in digital multi-sided platform start-ups: An exploration of entrepreneurial logic and open innovation strategies. *Entrepreneurial Business and Economics Review,* 12(1), 35-53. https://doi.org/10.15678/EBER.2024.120103

INTRODUCTION

Digital entrepreneurship through multi-sided platforms (MSPs), a business model involving multiple user roles that interact within the enterprise's digital ecosystem, has become a common approach for young entrepreneurs to innovate and address inefficiencies or institutional voids in the market (Soluk *et al.,* 2021; Khanal *et al*., 2021; McAdam *et al*., 2021). Driven by two key reasons, scholars have started to focus more on MSPs (McIntyre *et al*., 2017). Firstly, platforms play a crucial role in the broader economy by reducing transaction costs among market sides (*e.g.* Hagiu, 2015). Secondly, multi-sided platforms (MSPs) stand out as highly promising business models in the digital economy because of their flexibility, capacity to handle complexity, rapid scalability, and value capture (Abdelkafi *et al*., 2019). Multi-sided platforms offer the same benefits to entities engaging in larger-scale transactions

as technology platforms do, enabling companies to achieve economies of scale and scope. The effects of platforms extend to diverse sectors such as the food industry, credit card processing, and textbook publication, highlighting their relevance beyond technological advancement (McIntyre *et al*., 2021).

Employing an MSP serves as a common indicator of an innovative firm. Through harnessing platform economics and the potential of networks, numerous early-stage businesses have evolved from modest beginnings into global leaders. Furthermore, established enterprises have turned to the platform paradigm to break free from their routines and explore innovative avenues (Libert *et al*., 2016). According to the research by Krisharyanto and Purwadi (2021), more than 1000 digital MSP start-ups had been registered as legal entities by 2019. These entrepreneurs initiate digital MSP start-ups with a nascent business model, despite having limited resources and experience. Many of them achieve remarkable success, growing into unicorn-stage start-ups or publicly listed companies (Fauzi & Daryanto, 2019; Santoso *et al*., 2018). Nevertheless, the Indonesian context also witnessed the failure of numerous digital MSP start-ups due to their inability to establish market-accepted business models and adapt to shifting business dynamics (Santoso *et al*., 2020b; Sucahyo *et al*., 2018).

Recent research in the entrepreneurship field mentions that the resilience of start-ups largely hinges on innovation (*e.g.* Sadeh & Dvir, 2020; Eftekhari & Bogers, 2015) and entrepreneurial logic (*e.g.* Long *et al*., 2021; Laine & Galkina, 2017). Two types of technological innovations, *i.e.* radical and incremental, still pose challenges in identifying their determinants in the market (Coccia, 2017). Interestingly, some studies also suggest that innovation might not significantly contribute to start-up resilience (Shan *et al*., 2016; Hyytinen *et al*., 2015). Regarding entrepreneurial logic, Sarasvathy (2001) elucidated decision-making processes at the firm level, especially when leaders must make choices in situations when information and resources are insufficient. Traditionally, causation logic is employed when contemplating intended outcomes and selecting available resources. In the case of resource scarcity, firms adopt effectuation logic to proactively seize opportunities. Given that firms can concurrently engage in radical and incremental innovation (Coccia, 2017), these two logic can also apply to technological innovation. However, studies delving into the strategic alignment between entrepreneurial logic and open innovation approaches for start-up survival remain relatively limited.

To bridge this gap, we aimed to examine the strategic alignment between two distinct types of entrepreneurial logic (effectuation and causation) and various innovation approaches (radical and incremental) that contribute to start-up resilience. These endeavours align with the notion put forth by West and Bogers (2017) to encompass and integrate our comprehension of innovation, particularly within innovative phenomena and perspectives, focusing on new venture development and the innovation process within the MSP firm context. This study focused on the paradox presented by the resource-based theory, wherein innovation strategies are employed amidst limited initial resources and capabilities. Furthermore, this research is pivotal in comprehending the entrepreneurial logic embedded in the business model of digital MSP start-ups. Its significance lies in enhancing the survival rate of Indonesian start-ups, which remains comparatively lower than that of other Asian countries (Maulana *et al*., 2018).

The structure of this article is as follows. Firstly, we will present the conceptual framework and hypotheses, providing an explanation of the theoretical underpinning. Secondly, we will present the research methodology. Thirdly, we will elaborate on the result of the empirical research and discussion. Finally, we will highlight the significance of the findings and their implications for theoretical, managerial, and future research.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Effectuation and Causation in Digital MSP Start-ups Innovation

Effectuation is characterized as a logic of 'organized improvisation' and non-predictive control that accepts a set of means as provided and concentrates on picking amongst various results that may be generated with that set of means. Meanwhile, causation begins with the intended outcomes and the selection of the most appropriate means to produce such outcomes (Sarasvathy, 2001). Effectuation and causation, either separately or jointly, are aspects of entrepreneurs' logic that are crucial in governing the firms' innovation or strategy to attain noble performance (Paweta, 2016; Roach *et al.*, 2016; Yu *et al.*, 2018).

In the context of digital multi-sided platform (MSP) start-ups, innovation is best understood in terms of novel substances. Concerns regarding the MSP's impact on innovation are logically linked to concerns about competition (Marty & Warin, 2022). They present a straightforward theoretical model that emphasizes the importance of an MSP in promoting open innovation. This model aims to assess the consequences of organizing sectors around an MSP on open innovation dynamics, with particular attention to the influence of cross-platform competition. In relation to competition policy, it illustrates how to encourage cross-platform competition. The resulting outcomes are threefold. Firstly, an MSP's presence is pivotal for fostering market innovation. Secondly, it suggests that the MSP's disproportionate market power could impede open innovation in this realm, even if the negative impact on the industry's pace of open innovation is not immediately evident. Finally, the data reveals that industries with multiple MSPs tend to innovate at a higher rate.

Trabucchi and Buganza (2019) differentiate three strategies that can be observed from multiple open innovation perspectives, offering broader insights. Supply (side) extension and data trading are grounded in the potential to augment the fundamental transactional two-sided structure by introducing a new side, effectively reshaping the system around the platform provider. This transformation takes place not only because the participants within it exchange value in diverse manners but also because it evolves as a dynamic, growing ecosystem. They coined the term 'ecosystem innovation' for these two tactics, aiming to expand the network's entities (Trabucchi & Buganza, 2019). In this context, incremental innovation performance is achieved by initially exploring novel insights, followed by the transformation of existing activities using these insights, and ultimately leading to the creation of fresh offerings such as content or features. On the other hand, radical innovation can be realized by reinforcing crowd or community management practices through co-creation initiatives involving ecosystem platform members, potentially leading to the development of new business models (Subramaniam & Youndt, 2005; Solesvik, 2019).

The question of which logic (effectuation or causality) contributes to specific forms of innovation (radical or incremental) is intriguing. According to Tushman and Anderson (1986), firms implementing radical innovations experience faster expansion than those adopting incremental ones. Similarly, Chandy and Tellis (2000) concluded that new firms are the origins of radical innovation, whereas incumbents lean towards incremental innovation. In cases of resource constraints, open innovations in new ventures or start-up environments usually emerge based on effectuation logic. As these firms progress beyond their initial stages, they tend to innovate employing causation logic.

As per Arroteia and Hafeez (2020), earlier studies based on the resource-based view both endorse and indicate that firm and individual resource levels constrain the development of capabilities required for identifying new market opportunities. The existence of social networks and experiential knowledge leads to a fusion of effectual and causal relationships. Furthermore, Pérez Sigüenza *et al*. (2022) discovered that effectuation surpasses the resource-based theory when effectuation employs networking strategies for expansion. Effectuation is also recognized as a tool for enhancing creativity.

A previous study revealed that small start-ups with limited resources employ effectuation reasoning early in the open innovation process, while causation logic becomes more prevalent as the firms progress through their life cycle (Linglebach *et al*., 2015). Under conditions of uncertainty, the resource-based view perspective suggests that entrepreneurial networking leads to the non-predictive control of effectuation (Galkina & Jack, 2022). In this context, non-predictive control involves abstaining from using available information to predict specific situations. Instead, start-ups tend to base their decision-making on interactions and negotiations with their stakeholders (Dew *et al*., 2009). Guo (2019) discovered that effectuation strongly influences open innovation and is often associated with emergent strategies for exploring new possibilities. As a result, effectuation logic fosters radical innovation. Conversely, the resource-based view also suggests that in more stable situations, relationships with external stakeholders through entrepreneurial networking are forged using goal-driven decision-making of causation (Galkina & Jack, 2022). Unlike the non-predictive control of effectuation, which shapes open innovation through external interactions, goal-driven decision-making of causation relies on available information such as market research or feasibility studies (Dew *et al*., 2009). The prominence of causation logic increases in the open innovation process as the firm's resource constraints diminish.

Sarasvathy and Venkataraman (2011) argue that we can perceive entrepreneurship as a method akin to the scientific method. They suggest that teaching entrepreneurship as a skill can improve reasoning about the world. Rathakrishnan *et al*. (2021) discovered that the right combination of people (those open to change or self-transcendent) and process (effectuation) positively predicts innovative behaviour and firm performance. Guo (2019) establishes a connection between effectuation and innovation strategy, highlighting the favourable impact of effectuation on innovation strategy and opportunity shaping. Moreover, Guo (2019) suggests that opportunity shaping plays a mediating role in the link between effectuation and innovation strategy. This implies that effectuation can shape the identification and creation of opportunities, which in turn can lead to radical innovation. Moreover, Rathakrishnan *et al*. (2021) emphasize that incorporating effectuation logic into decision-making processes can activate implementation-oriented behaviour, resulting in elevated firm performance. Furthermore, Liu and Isaak (2016) argue that effectuation can drive radical, disruptive innovation, while causation logic is more likely to yield iterative, incremental innovation. These studies collectively imply that effectuation can enhance innovative behaviour, firm performance, and the identification and creation of opportunities, ultimately culminating in radical innovation. Hence, we hypothesised:

H1: Effectuation has a positive association with radical innovation performance.

Forés and Camisón (2016) discovered that internal knowledge creation capability positively influences incremental innovation performance. This finding supports the notion that a deliberate and planned approach, characteristic of causation, can contribute to incremental innovation performance. Furthermore, Ritala *et al*. (2022) examined the connection between renewal capital, knowledge protection, and innovation performance. Their findings reveal that firms' renewal capital is positively linked to the extent of incremental innovation. This implies that the capacity to refresh and enhance the firm's knowledge base, aligning with the principles of causation, can contribute to incremental innovation performance (Ritala *et al*., 2022). Moreover, Prokop *et al*. (2022) investigated the relationship between owner gender diversity, energy management, and the degree of innovation radicalness within firms. They affirmed the correlation between firms' implementation of energy management and the generation of both radical and incremental innovations. This further bolsters the hypothesis that causation is positively associated with incremental innovation performance (Prokop *et al*., 2022). These studies collectively indicate that external environmental factors, internal knowledge creation capability, renewal capital, and energy management are positively linked to incremental innovation performance. These findings underscore that a methodical and planned approach characteristic of causation can contribute to incremental innovation performance. Hence, the above conditions are formulated as hypothesis as follows:

H2: Causation has a positive association with incremental innovation performance.

Digital MSP Start-ups' Innovation in the Resilience Aspect

Our research focused on how digital MSP start-ups can evolve into resilient organizations. Organizational resilience signifies an organization's ability to adapt to and thrive within its evolving environment (Chaharbaghi *et al*., 2005). Chaharbaghi *et al*. (2005) and Mafabi *et al*. (2012) provide evidence that innovation is the fundamental route to establishing organizational resilience. Their findings, grounded in knowledge management research, underscore the significant role of innovation in fostering company resilience. Moreover, Borda-Rodrigue and Vicari (2015) demonstrated the connection between innovation and cooperative resilience. As per Sabahi and Parast (2020), firms operating within a more innovative environment exhibit greater robustness against disruptions. Innovation, both directly and indirectly, helps firms reinforce competencies that positively impact their risk management capacity.

A symbiotic connection appears to exist between the two. A resilient firm acquires knowledge from its environment to implement the necessary open innovations for enhancing resilience (García-Morales *et al*., 2006). Buliga *et al*. (2016) claim that business model innovation (*i.e.* radical innovation) serves as a robust response to environmental turbulence and it emanates from resilient companies. Consequently, a firm's resilience is closely linked to its capacity for generating radical innovation (Buliga *et al*., 2016; Rampa & Agogué, 2021). However, in certain contexts, such as the

manufacturing sector within developed countries, emphasizing extensive or incremental innovation enhances firms' resilience (Wojan *et al*., 2018).

Thus, we hypothesised:

H3: Radical innovation performance has a positive association with start-up resilience.

H4: Incremental innovation has a positive association with start-up resilience.

Entrepreneurial Path for Start-up Resilience

Prior research has substantiated that effectuation and causation stand as pivotal components of firms' open innovation (Linglebach *et al*., 2015; Roach *et al*., 2016; and Yu *et al*., 2018). Numerous additional studies have further affirmed the role of open innovation in fostering business resilience (Chahrabaghi *et al*., 2005; Garcia-Morales *et al*., 2006; Mafabi *et al*., 2012; Buliga *et al*., 2016). To gain a more comprehensive understanding of how entrepreneurial logic (effectuation and causation) are adapted to cultivate resilient companies, there is a need to test the mediating impacts of open innovation. This endeavour is essential given our primary objective of constructing firm resilience based on entrepreneurs' logic.

While delving into knowledge management, McManus *et al*. (2008) discovered that innovation serves as a bridge to establish organizational resilience. Knowledge management, as detailed by Mafabi *et al*. (2012), encompasses the acquisition, development, and utilization of information for change, leading to innovation and ultimately firm resilience. Ferreira *et al*. (2021) examined the mediating roles of open innovation in achieving firm performance within their study on how managerial capability generates competitive advantages. They emphasized that dynamic capability may directly and indirectly influence competitive advantage, but innovation is essential to connect this capability with outcomes.

In certain instances, radical innovation and incremental innovation assume distinct mediating roles between antecedents such as entrepreneurial logic or market orientation and firm performance, ultimately influencing resilience. Although both radical innovation and incremental innovation stem from market orientation, these two types of innovation serve as antecedents for varying firm performance outcomes. Radical innovation operates as a direct antecedent of firm performance. In contrast, incremental innovation indirectly contributes to firm performance by means of new product performance (Chang *et al*., 2014).

Gruber *et al*. (2008) explored market opportunity identification in emerging technology firms and underscored the concept of multiple opportunity identification prior to entry. Serial entrepreneurs, who possess prior start-up experience, formulate a 'choice set' of alternative market opportunities before determining which one to pursue. This implies that effectuation, as a decision-making approach, can lead to the identification of multiple market opportunities, including those necessitating radical innovations. Furthermore, Gruber *et al*. (2008) support the notion that entrepreneurs who identify a 'choice set' of market opportunities prior to their initial entry attain performance advantages. This indicates that start-ups engaging in effectuation and identifying multiple market opportunities have the potential to attain superior performance outcomes, including resilience. Therefore, we hypothesised that radical innovation performance mediates the relationship between effectuation and start-up resilience. Effectuation, as a decision-making approach, can lead to the identification of multiple market opportunities and the creation of radical innovations, which subsequently contribute to the resilience of start-ups.

H5: Radical innovation performance mediates the relationship between effectuation and start-up resilience.

Zahra and George (2002) discuss the concept of absorptive capacity, which pertains to a firm's ability to acquire, assimilate, and apply external knowledge. The article underscores the distinction between a firm's potential and realized capacity and how they can influence the establishment and maintenance of competitive advantage. This implies that causation, involving the leveraging of existing resources and capabilities, can contribute to a firm's absorptive capacity. Consequently, absorptive capacity can facilitate incremental innovation performance, potentially mediating the relationship between causation and start-up resilience. Furthermore, Zahra and George (2002) extend the concept of absorptive capacity by delineating the circumstances in which a firm's potential and realized capacities

can differentially impact its performance. By proficiently harnessing and applying external knowledge, start-ups can enhance their innovation capabilities and ultimately enhance their resilience in the face of challenges. As a resource-based approach, causation can contribute to a firm's absorptive capacity, subsequently fostering incremental innovation performance. This performance in incremental innovation can then mediate the link between causation and start-up resilience. Hence, we hypothesised:

H6: Incremental innovation performance mediates the relationship between causation and start-up resilience.

RESEARCH METHODOLOGY

Sample and Data Collection

This research employed samples from Indonesian digital MSP start-ups that implement open innovation practices involving crowd, community, or complementary approaches. These start-ups have been operational for a minimum of three years. Most of these digital start-ups are user-generated content platforms (UGC) relying on multiple individuals or communities to co-create content (Rayna & Striukova, 2015; Schweisfurth *et al*., 2011). Moreover, MSP firms can capture value from the crowd or the platform ecosystem using an open strategy perspective (Chesbrough, 2007).

In our research, we focused on the founding team personnel of Internet-based MSP start-ups, aiming to scrutinize the implementation process within new businesses engaged in open innovation procedures. The members of the founding team were generally young individuals with relatively limited absorptive capacity and little experience in establishing or managing a company, given that internet ventures are typically no more than a decade old (Guo *et al*., 2016; Milanov & Fernhaber, 2009). This background aligns with the principles of effectuation, particularly for novel and unproven business models (Fisher, 2012; Sarasvathy, 2001), and is especially relevant for developing countries (Cai *et al*., 2017). This type of business demonstrates exceptionally high market growth and a notable level of uncertainty due to environmental dynamism. Consequently, we confronted these challenges through exploratory learning.

The respondents representing digital MSP start-ups as entrepreneurial organizations are founders or executives. Given the relatively nascent nature of these businesses and the fragmented company data available in Indonesia, we employed a judgmental sampling method (Malhotra & Birks, 2007). To address these challenges, we collected data from diverse sources, including recommendations from interviewees (snowball sampling). Not all contacts were willing to provide information about potential respondents. We managed to accumulate around 151 lists of potential respondents. Out of these, 78 questionnaires were distributed and fully completed. Among these distributions, 47 were submitted online, and 31 questionnaires were collected through face-to-face interactions. Out of the 78 collected datasets, eight did not meet the screening criteria and thus we excluded them from data processing. Therefore, the total number of responses comprised 70 data samples. Apart from the screening results, no data were lost due to the researcher's direct contact and respondents' monitoring.

Measures and Statistical Methods

We employed a self-administered questionnaire-based quantitative study that utilized a 6-point Likert scale for hypothesis testing. We adapted the measurements of the latent variables from previous studies with relevant contexts to uphold content and construct validity, as outlined in Table 1. In this context, effectuation comprises five lower-order constructs: means, affordable loss, leverage contingencies, partnerships, and non-predictive control. This measures the entrepreneurial decision-making approach that emphasizes leveraging existing resources and constraints to generate new opportunities and outcomes (Sarasvathy & Dew, 2008). Conversely, causation measures a process that concentrates on selecting means to create a particular effect, assuming the effect as given (Chandler *et al*., 2011). Radical innovation performance gauges the development and execution of new and notably distinct business models that induce substantial changes and disruptions within the market (Tien & Cheng, 2017). On the other hand, incremental innovation performance assesses the process of refining, enhancing, and exploiting

existing products, services, or processes without introducing significant changes to the underlying technical trajectory (Tien & Cheng, 2017). Lastly, start-up resilience measures the start-up's ability to anticipate, respond, adapt, and rebound from disruptive events or challenging circumstances, enabling the maintenance of operations and the achievement of long-term success (Matos *et al*., 2022).

Table 1. Measurement indicators

Questionnaire items	AVE	CR	SLF	Mean	Std. Dev
Effectual logic (Chandler *et al.*, 2011; Guo *et al.*, 2016; Laskovaia *et al.*, 2017; Roach *et al.*, 2016)					
- *Means*	**0.639**	**0.839**			
1. Network contribution to innovation ability **(MNS1)**			0.877	4.690	1.040
2. Network helps to strengthen innovation concept **(MNS2)**			0.857	4.800	1.040
3. Network assists to improve innovation concepts **(MNS3)**			0.644	4.470	1.150
- *Affordable Loss*	**0.676**	**0.861**			
1. Careful not to commit unaffordable resources **(AFL1)**			0.756	4.090	1.160
2. Careful not to risk more money **(AFL2)**			0.802	3.930	1.290
3. Careful not to exceed financial capacity for unsuccessful innovation projects **(AFL3)**			0.900	4.380	1.100
- *Partnerships*	**0.607**	**0.822**			
1. Use a number of agreements **(PCS2)**			0.788	4.430	1.160
2. Use pre-commitments as often as possible **(PCS3)**			0.766	3.840	1.400
3. Risk reduction by approaching potential partners or customers **(PCS4)**			0.783	4.400	1.090
- *Leverage Contingencies*	**0.557**	**0.833**			
1. Experiment with different products, services, or business models **(LVC1)**			0.807	4.730	1.020
2. Experiment with different innovation concepts **(LVC2)**			0.637	4.640	0.890
3. Flexible and took advantage of opportunities **(LVC4)**			0.803	4.840	0.880
4. Adapt activities based on resources availability **(LVC5)**			0.724	4.740	1.030
- *Non-predictive control*	**0.576**	**0.799**			
1. Talk with people to enlist their support **(NPC1)**			0.840	4.530	0.900
2. Measure the success of product development based on our and our partner's perspectives **(NPC4)**			0.833	4.730	0.900
3. Base strategy on what we are capable of **(NPC5)**			0.575	4.530	1.090
Causation (Chandler *et al.*, 2011)	**0.619**	**0.919**			
1. Analyzed long-run opportunities and selected the best return **(CAU1)**			0.802	4.867	0.945
2. Developed a strategy to best take advantage of resources and capabilities (**CAU2**)			0.827	5.059	0.862
3. Researched and selected target markets and did meaningful competitive analysis **(CAU3)**			0.829	4.868	1.006
4. Designed and planned business strategies (CAU4)			0.785	4.838	1.002
5. Organized and implemented control processes to meet objectives (CAU5)			0.744	4.588	1.136
6. Had a clear and consistent vision (CAU6)			0.735	5.118	0.890
7. Designed and planned production and marketing efforts (CAU7)			0.779	4.824	1.010
Radical innovation performance (Tien & Cheng, 2017; Crossan & Apaydin, 2010)	**0.586**	**0.804**			
1. Growth ratio from radical innovation in the last three years **(RAD1)**			0.553	3.890	1.310
2. Introduce more new business models than major competitors in the last three years **(RAD2)**			0.869	4.670	1.220
3. Frequently introduced new business models into markets that were totally new to the firm in the last three years **(RAD3)**			0.834	4.530	1.140
Incremental innovation performance (Tien & Cheng, 2017; Crossan & Apaydin, 2010)	**0.498**	**0.745**			
1. Growth ratio from incremental innovation in the last three years **(INC1)**			0.638	5.130	0.900
2. Frequently introduce incremental new features into new markets in the last three years (**INC2**)			0.640	5.090	0.990
3. Introduce more new features than competitors in the last three years **(INC3)**			0.822	5.010	0.860

Questionnaire items	AVE	CR	SLF	Mean	Std. Dev
Start-up resilience (Branicki *et al.*, 2018; Pal *et al.*, 2014; Sheffi & Rice, 2005)	**0.518**	**0.806**			
1. Have strong support from business partners **(RES1)**			0.733	4.911	0.860
2. Have easy access to funding and other resources for any situation (**RES2**)			0.485	4.015	1.344
3. Have firm principles and self-confidence in running a business **(RES3)**			0.767	5.338	0.704
4. Able to find a way out when faced with various difficulties (RES4)			0.837	5.310	0.758

Source: own study.

The inferential statistics utilize the partial least squares structural equation modelling (PLS-SEM) method to analyse the relationships between constructs within the research context as outlined in the hypotheses. The PLS-SEM method is a causal modelling approach that emphasizes maximizing the explained variance of constructs' latent variables. It is commonly employed when the research involves a small sample size (Sosik *et al*., 2009), utilizing the bootstrap technique with 5000 samples (Hair *et al*., 2016). Moreover, PLS-SEM is frequently employed in research within the social sciences, including strategic management research (Hair *et al*., 2012). Data processing with PLS-SEM involves several procedures (Hair *et al*., 2011; 2012). Firstly, the measurement model is evaluated to analyse items' validity (average variance extracted) and the reliability of constructs (construct reliability) in constructing latent variables (constructs). Secondly, the structural model is evaluated to explore the relationships among latent variables based on the conceptual framework. Thirdly, a fit assessment model is employed to gauge how well the data aligns with the research model. Finally, hypotheses are tested by evaluating t-values and p-values.

RESULTS AND DISCUSSION

We collected data from 70 respondents as the sample, with demographic information regarding the duration of business operations and the number of employees presented in Table 2. This sample represented 46.36% of the relevant population (151) and met the PLS-SEM standard for three endogenous variables, which indicated that the minimum required sample size was 65. This aligns with the theory of Hair *et al*. (2014), which suggests that the sample size should be at least the number of endogenous variables multiplied by 10. Furthermore, this study achieved an R2 value of 0.44 and observed four inward arrows pointing towards firm resilience. According to Hair *et al*. (2014), when there is a maximum of four arrows pointing at a construct and a minimum R-square value of 0.25, the sample size should be a minimum of 65. Therefore, considering these factors and the total population of 151, a sample size of 70 was sufficient.

Table 2. Demographic data

Duration of business operation	Frequencies	Number of employees	Frequencies
3rd Year	33 (47.14%)	< 15	16 (23.86%)
4th Year	17 (24.29%)	15-49	29 (41.43%)
Above 4th Year	20 (28.57%)	50-100	18 (25.71%)
		> 100	7 (10%)

Source: own study.

Measurement Models

As presented in Table 1 above, the measurement model assessed convergent validity through the loading factor value, discriminant validity through the average variance extracted (AVE) value, and construct reliability through the composite reliability (CR) value. A standardized loading factor (SLF) is a number that indicates the correlation between the score of a question item and the indicator score of the indicator measuring the construct. According to Hair *et al*. (2016), a loading factor greater than 0.50 is generally considered sufficient for an initial examination of the loading factor matrix. The measurement results indicate that most of the factor loading values for the research indicators are sufficient, with values above 0.50, except for RES2 (0.495), which is still close to the threshold value.

The subsequent evaluation involved comparing the square root of the AVE with the correlation between the constructs. Discriminant validity was achieved when the square root of the AVE for each construct was greater than the correlation between the two constructs within the model. An AVE value greater than 0.50 was desired. The measurement results demonstrated that the AVE values of the dimensions and variables exceeded the minimum value of 0.50. These values were as follows: means with 0.639, affordable loss with 0.676, partnership with 0.607, leverage contingencies with 0.557, and non-predictive control with 0.576 for effectuation. The AVE values for the remaining variables were causation with 0.619, radical innovation with 0.586, and firm resilience with 0.518. The exception was the incremental innovation variable with a value of 0.498, which was close to the AVE threshold.

Lastly, for the CR value, a construct was considered reliable if the composite reliability was above 0.7. The measurement results show that all variables had values above 0.7, with the lowest value for incremental innovation (0.745) and the highest reliability value for causation (0.919).

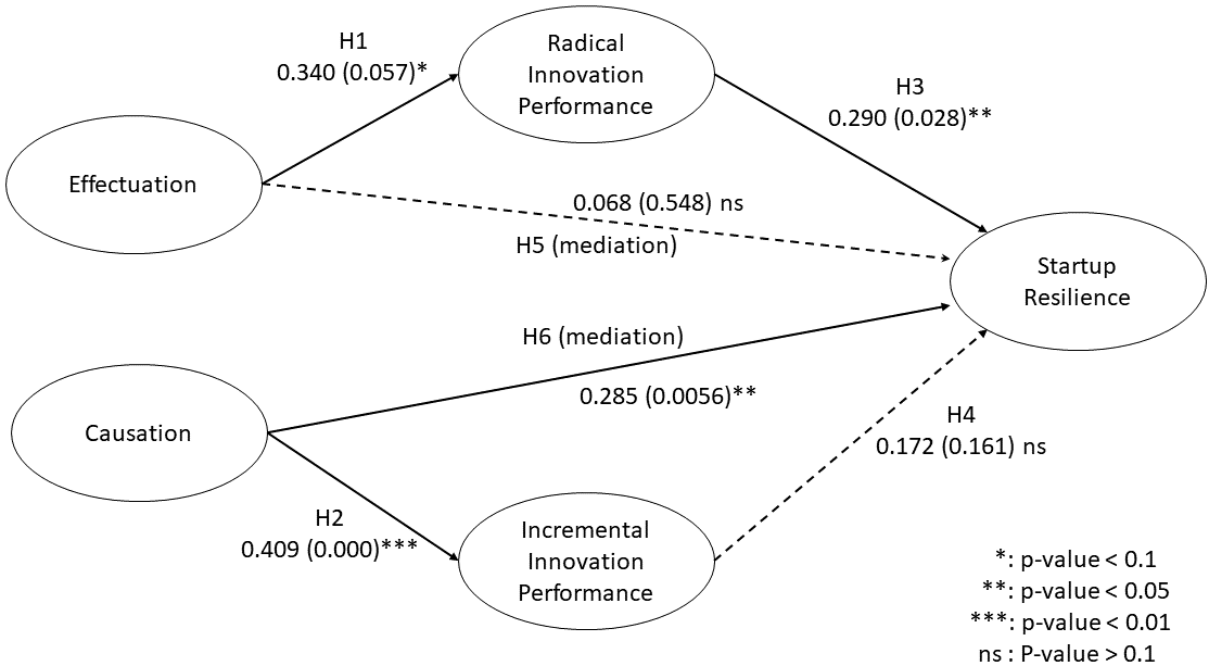

Figure 1. Structural model testing with path coefficient and p-values (in bracket)
Source: own elaboration.

Figure 1 shows the results of the structural model. Firstly, hypothesis 1 was supported, indicating that effectuation had a positive relationship with radical innovation performance. These findings were statistically significant with a coefficient value of 0.340 (p-value 0.057). The second hypothesis, involving causation, also demonstrated a positive relationship with radical innovation performance, having a coefficient value of 0.409 (p-value 0.000). The third hypothesis was corroborated with a coefficient value of 0.290 (p-value 0.028), establishing that radical innovation performance positively affected the resilience of digital MSP start-ups. In contrast, hypothesis four was not substantiated, as evidenced by a coefficient value of 0.172 (p-value 0.161). Thus, incremental innovation performance did not impact the resilience of digital MSP start-ups.

Using the VAF (Variance accounted for) value, we could determine whether a model was fully mediating, partially mediating, or exhibiting no mediation. According to Hair *et al*. (2014), a model is classified as fully mediating if its VAF value exceeds 0.8, as partially mediating if it falls between 0.2 and 0.8, and as having no mediation if the value is below 0.2. The VAF value is obtained by dividing the indirect effect by the total effect. Based on this theory, hypothesis five was supported, and radical innovation performance partially mediates the influence of effectuation on start-up resilience. The direct effect was 0.068 (p-value 0.548), and the indirect effect was 0.09, yielding a total effect of 0.166. The VAF value, calculated as 0.596 (0.09/0.166 = 0.596), fell within the category of partial mediation (VAF between 0.2-0.8). The

final sixth hypothesis was not supported. It demonstrated a direct effect of 0.285 (p-value 0.056), an indirect effect of 0.07, and a total effect of 0.355. Consequently, the VAF value was 0.197 (0.07/0.355 = 0.197), placing it in the category of no mediation. In other words, incremental innovation performance did not mediate the impact of causation on the resilience of digital MSP start-ups.

Effectuation And Causation As The Driver of The Open Innovation Process

This study found that effectuation and causation have distinct positive associations with innovation performance. Effectuation is associated with radical innovation performance, while causation is associated with incremental innovation performance. This finding is in line with Tushman and Anderson's (1986) statement that firms implementing radical innovations expand faster than those adopting incremental ones, and with Chandy and Tellis (2000), who found that new firms are sources of radical innovation, while incumbents lean towards incremental innovation. Linglebach *et al*. (2015) also contribute by noting that small start-ups with limited resources tend to employ effectuation reasoning early in the innovation process, while causation logic becomes more prevalent later in a firm's life cycle. Additionally, Guo (2019) supports the idea that effectuation strongly influences innovation and results in radical innovation.

Within the effectuation context, open innovation is a multi-actor process, in which negotiations and interactions guide innovation strategy (Yoho *et al*., 2018). Effectual processes and behaviours contribute to improving open innovation within start-ups (Nytch, 2012). Effectuation impacts start-up-level innovativeness (Roach *et al*., 2016). Furthermore, both causation and innovation performance have a positive effect on industry growth (Futterer *et al*., 2018). Both effectuation and causation can lead to innovation performance, but their effectiveness depends on the uncertainty level (Harms *et al*., 2021).

Effectuation and causation can be effective pathways for entrepreneurial innovation in business model performance. Futterer *et al*. (2018) also indicate that in moderately growing industries, entrepreneurial paths are comparably effective, while effectuation is more advantageous for developing innovation performance in high-growth industry situations. Conversely, causation is more effective in generating innovation performance in low-growth industry contexts. Effectuation and causation serve as decision-making frameworks that can guide open innovation and help start-ups navigate uncertainty. These concepts also contribute to start-up performance, particularly concerning business model innovation (Harms *et al*., 2021).

Different Innovation Process as The Driver of Digital MSP Start-up Resilience

The findings reveal that radical innovation performance is positively associated with start-up resilience, while incremental innovation has no significant effect on start-up resilience. These findings are consistent with previous studies (Chaharbaghi *et al*., 2005; Mafabi *et al*., 2012), which provide evidence that innovation is a primary avenue for creating organizational resilience and underscore the significant role of innovation in start-up resilience.

Furthermore, Borda-Rodrigue and Vicari (2015) have also demonstrated the relationship between innovation and cooperative resilience. According to Sabahi and Parast (2020), start-ups with a more innovative atmosphere are more resilient to disruptions. A resilient start-up gathers knowledge from its environment to implement the innovations necessary to enhance resilience (Garcia-Morales *et al*., 2006). Buliga *et al*. (2016) suggest that business model innovation (*i.e.* radical innovation) is a robust response to environmental turbulence and often originates from resilient companies. Consequently, firm's resilience is strongly influenced by its capacity to generate radical innovation (Buliga *et al*., 2016; Rampa & Agogué, 2021).

Mafabi *et al*. (2015) discovered that open innovation partially mediates the effect of creative climate on organizational resilience. Open innovation plays a pivotal role in building organizational resilience by fostering dynamic capabilities through adjustments in work processes and structures. Successful diffusion of open innovation practices can lead to resilience behaviours such as competitiveness, adaptability, and value creation. However, Harms *et al*. (2021) found that incremental innovation might not be sufficient to deliver customer value, aligning with the insignificant findings of this study.

High-tech industries tend to exhibit greater resilience to shocks through their open innovation activities compared to low-tech entities (Wziątek-Kubiak & Pęczkowski, 2021). Innovative resilience results

from persistent innovation efforts, enabling the creation of new knowledge and fostering learning. Resilient organizations manifest their open innovation strategy, processes, and routines (Lv *et al*., 2018).

Resilience emphasizes the ongoing pursuit of product differentiation based on innovation (Herrera-Reyes *et al*., 2015). Resilience encourages innovation by reducing negative emotional and psychological responses, thereby promoting creative thinking. The impact of resilience on performance varies with the start-ups' years of experience (Hallak *et al*., 2018).

The Path of Digital MSP Start-ups Journey Toward Resilience

The findings of this study indicate that radical innovation performance significantly mediates the relationship between effectuation and start-up resilience. This study aligns with the works of Buliga *et al*. (2016), Chahrabaghi *et al*. (2005), Garcia-Morales *et al*. (2006), and Mafabi *et al*. (2012), all of which highlight how innovation drives business resilience. Particularly, companies with technological capabilities strive to enhance their resilience through innovative methods, often resulting in the discovery of new capabilities and the creation of new business models as a manifestation of radical innovation. Such companies enhance their innovation by leveraging their new open innovation-oriented businesses (Aldianto *et al*., 2021). Open innovation serves as a bridge to establish organizational resilience (McManus, 2008). Additionally, Ferreira *et al*. (2020) explore the mediating role of open innovation in achieving firm performance by examining how managerial competencies contribute to competitive advantages. Open innovation is instrumental in connecting capabilities to outcomes, especially for start-ups with standalone company status; radical innovation proves more advantageous for start-up resilience (Wojan *et al*., 2018).

Being innovative is a prerequisite for being resilient, as innovative businesses tend to continually anticipate and adapt to specific conditions (Kuckertz *et al*., 2020). However, in this research, incremental innovation performance does not mediate the relationship between causation and start-up resilience. This finding contrasts with Roca *et al*. (2021), who demonstrate the significance of incremental innovation for resilience. Companies focused on generating profits often prioritize incremental innovation in their production processes, rather than engaging in immature strategies. In the context of digital MSP start-ups, incremental innovation alone cannot guarantee resilience since these start-ups often implement unproven business models (Santoso *et al*., 2020a). Some business models may only work under specific environmental conditions, making the addition of content or features through incremental innovation in different environments inefficient as a solution. The results of the mediation test also indicate that the resilience of digital MSP start-ups is achieved through well-planned strategies and execution driven by causation logic, rather than incremental innovation.

Small businesses have the potential to contribute to the national economy. However, the majority of them encounter significant challenges when initiating and expanding their operations. With the advent of digital technology, particularly in technology-based enterprises, small businesses have recently gained opportunities to grow and expand. Despite limited financial and human resources, they can thrive and grow. Various studies suggest that small and medium-sized enterprises (SMEs) can leverage digital platforms, including multi-sided e-commerce platforms, to overcome resource constraints and capitalize on platform-generated opportunities (Asadullah, 2021).

CONCLUSIONS

The research findings imply that there are two routes to achieving resilience in digital MSP start-ups. The first route achieves resilience through the development of radical innovation based on effectuation logic. The second route involves developing resilience directly based on causation logic. In their research, Ruiz-Jimenez *et al.* (2020) mention that the performance of expert technology-based new ventures relies on both effectuation and causation, whereas the performance of novice start-ups relies solely on effectuation. This research provides theoretical implications, suggesting that both expert and novice digital MSP start-ups utilize effectuation to generate radical innovation performance for their resilience. Moreover, expert start-ups employ causation logic for resilience. Thus, the findings fill the gap in the strategic entrepreneurship literature concerning the strategic fit between entrepreneurial logic and the open innovation approach for start-up resilience.

For practical implications within the context of expert digital MSP start-ups, aside from employing radical innovation through effectual logic, these start-ups can also achieve resilience through causation logic. This can be achieved by preparing well-planned strategies and executions, similar to established firms. They should consider alternative strategic responses such as retrenchment, preservation, innovation, or even pivoting to something new for various scenarios and act accordingly (Wenzel *et al.*, 2020). Ultimately, the efforts to achieve resilience, whether through effectual logic via radical innovation or directly through causal logic, are valuable not only for surviving crises but also for ensuring the sustainable growth of the digital MSP start-ups themselves. Conversely, novice digital MSP start-ups commonly struggle to flexibly navigate between effectuation and causation due to limited resources and experience, leading them to adopt effectuation logic. Consequently, they can achieve resilience by exploring radical innovation through a business model pivot based on relevant stakeholders. This also sheds light on why early-stage start-ups often pivot their business models until they discover a suitable model that drives their growth.

These findings and implications demonstrate that the survival of digital MSP start-ups can be achieved through both radical and incremental innovation. However, these types of innovation stem from different entrepreneurial logic. This underscores the need for entrepreneurship education to encompass both entrepreneurial logic approaches: effectuation and causation. While conventional business schools often emphasize causation logic through activities like developing business plans, making return-based decisions, and conducting market research (Towers *et al.*, 2020), incorporating opportunity-based entrepreneurship education becomes crucial. This can trigger effectuation logic by encouraging students to identify business opportunities, transform them into new ventures, manage dynamic organizations, and cultivate growth-oriented enterprises. Notably, early graduate entrepreneurs, constrained by limited experience and resources, tend to adopt effectuation logic (Ruiz-Jimenez *et al.*, 2020). Given the study's findings, where the path to start-up resilience through effectuation logic involves pursuing radical innovation, entrepreneurship education should include content that equips students to pivot business models and engage in experimentation.

This study significantly contributes to the understanding of how entrepreneurial logic and open innovation techniques might enhance resilience for digital multi-sided platform businesses. However, it is crucial to recognize the limitations of its breadth and the potential challenges in generalizing the findings. This study specifically examines digital multi-sided platform companies within a single industry or setting, which may not provide a comprehensive representation of the wide range of businesses across other industries. Moreover, it is important to consider that the outcomes of this research could have been impacted by the particular temporal context and technical environment in which the data was gathered. The dynamic and ever-changing landscape of digital platforms and innovation initiatives may result in fluctuations in outcomes as time progresses. Hence, it is advisable to exercise prudence when endeavouring to extrapolate the outcomes to alternative beginning scenarios or to prognosticate enduring patterns. Subsequent studies may endeavour to broaden the investigative parameters by incorporating a more extensive array of industries, geographic locations, and temporal intervals. By incorporating a broader range of circumstances, the study's conclusions can be strengthened, as it would yield a more thorough comprehension of the interplay between entrepreneurial logic, open innovation, and start-up resilience. This would enhance the findings' application and robustness.

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Acknowledgements and Financial Disclosure

The authors would like to express their appreciation to DRPM Universitas Indonesia for providing financial support through PUTI 2Q2 Grant, contract No: NKB-802/UN2.RST/HKP.05.00/2020.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120104

Fostering organisational innovation in small retailers: Unleashing the power of family support, competencies, wellbeing, and customer capital

Aborampah Amoah-Mensah

ABSTRACT

Objective: The objective of this article is to investigate the effect of family support (FS) on organisational innovation (OIn), and the intermediary roles of owner-manager competencies (OMC), owner-manager wellbeing (OMW), and customer capital (CC).

Research Design & Methods: Based on resource-based view (RBV), dynamic capabilities (DC), and four market zones, we selected for the study a sample of 723 small retailers in Kumasi, Ghana. Moreover, we adopted a structured interview schedule to collect the data from the respondents. We used partial least squares (PLS) and structural equation modelling (SEM) to test seven hypotheses.

Findings: Family support is an important factor that influences OIn and OMC and FS indirectly affects OIn through OMC. The nexus between FS and OIn is also enhanced by OMW and at the same time CC weakens this link. OMC, OMW, and CC also directly influence OIn.

Implications & Recommendations: To enhance OIn, policymakers should continue to scout for both internal and external resources.

Contribution & Value Added: The contribution of this research is that the results enhance our understanding of how small retailers combine both external and internal resources as proposed by RBV and DC to increase their business innovation.

Article type: research article

Keywords: small retailers; family support; owner-manager competencies; organisational innovation; owner-manager's wellbeing; customer capital

JEL codes: L25, L26

Received: 26 April 2023 Revised: 6 June 2023 Accepted: 23 October 2023

Suggested citation:

Amoah-Mensah, A. (2024). Fostering organisational innovation in small retailers: Unleashing the power of family support, competencies, wellbeing and customer capital. *Entrepreneurial Business and Economics Review,* 12(1), 55-75. https://doi.org/10.15678/EBER.2024.120104

INTRODUCTION

Small retailers are part of small and medium enterprises (SMEs) which encompass informal and formal micro-enterprises (with two to nine employees), small enterprises (with 10 to 49 employees), and medium-sized/large enterprises (with 50 or more employees) (ILO, 2019). Organisational innovation (OIn) has been acknowledged as a catalyst for SME growth (Hamel, 2009) and researchers have not agreed on the sources of OIn (Heyden *et al.,* 2018). One of such sources is family support (FS) which is the extent to which a family is involved and the influence it has on the business of a family member (Astrachan *et al.*, 2002). Within the body of extant literature on firms' performance, FS has been acknowledged as one of the provenances of firms to acquire distinct resources and capabilities to increase their innovation activities (Habbershon & Williams, 1999; Carnes & Ireland, 2013; De Massis *et al.*, 2013; Matzler *et al.*, 2015). Moreover, the literature indicates that both internal and external resources and capabilities induce innovation output in firms (Barney, 1991; Grant, 1991; Teece *et al.*, 2007, Cera *et*

al., 2019; De Brueckere *et al.*, 2020). The need to acquire valuable resources and capabilities to innovate is based on theories such as RBV and DC, hence, using these theories can give us a better understanding of how FS affects OIn of small retailers.

The literature on the link between FS and innovation focused on intellectual property (Matzler *et al.*, 2015), product and process innovation (Liang *et al.*, 2013; Sanchez-Famoso *et al.*, 2017; El Shoubaki *et al.*, 2022), and technological innovation (Manzaneque *et al.,* 2018), radical innovation (Chirico *et al.*, 2022), and innovation capabilities (Sun *et al.*, 2023). The results of these studies demonstrate that as FS increases, their respective innovation categories also increase. Thus, it is abundantly clear that internal resources and capabilities are not sufficient to enhance some aspects of SMEs' innovation performance and therefore they require external resources (FS) (Barney, 1991; Teece *et al.*, 2007; Cera *et al.*, 2019; De Brueckere *et al.*, 2020). Although SMEs can differentiate themselves by introducing some types of innovation, McGrath (2001) and Edward-Schachter (2018) assert that depending on one aspect or various aspects of the same type of innovation is not likely to positively impact the innovation performance of firms in general (Damanpour & Aravind, 2012). Therefore, there is room to look at other forms of innovation especially OIn which is broader and encapsulates new organisational methods in the practices of the business, workplace organization, and its external relations (OECD, 2019) with FS. Although the parameters to measure FS are broad and cover emotional, appreciative, instrumental, and informative support (Sarafino & Smith, 2014), prior studies on the association between FS and innovation concentrated only on involvement in management and governance (Liang *et al.*, 2013; Matzler *et al.*, 2015; El Shoubaki *et al.*, 2022; Sun *et al.*, 2022). Thus, involvement in management and governance is an aspect of instrumental support neglecting the other forms of FS (Sarafino & Smith, 2014) which may not be adequate for firms to improve their OIn performance. Again, participation in management and governance is an intangible FS but to increase the performance of firms to obtain a holistic OIn, Carnes and Ireland (2013) advocate for the combination of both tangible and intangible FS. Therefore, to have a deeper understanding of the FS-innovation relationship, we will introduce FS as a composite support obtained by retailers from their families and OIn – as an embodiment of all innovation activities in firms.

Miller and Le Breton-Miller (2006) indicate that family involvement in firms impacts their performance (activities and processes) differently. Studies that focused on SMEs' FS and innovation have produced mixed results. For example, one group of studies produced both positive and negative results (Liang *et al.*, 2013; Matzler *et al.*, 2015; Sun *et al.*, 2022) whilst another batch had negative results (Sachez-Famoso *et al.*, 2017; Manzaneque *et al.*, 2018). Another group also produced positive results (El Shoubaki *et al.*, 2022). The above studies were not underpinned by RBV and DC and therefore using these theories to examine the link between FS and OIn including intermediary variables (OMC, OMW and CC) is justified to provide an in-depth understanding of this relationship. The above studies were also conducted in the American, Asian, and European contexts and did not focus on the retail industry though it constitutes a greater proportion of all businesses and generates the majority of jobs worldwide (ILO, 2015). Therefore, the results may not be generalized where the retailing of SMEs differs greatly from the African and more specifically the Ghanaian context.

Given the sparseness of empirical evidence, the study aims to build on RBV and DC to explain why and how FS for small retailers impacts the OIn. Moreover, using RBV and DC to examine the link between FS and OIn including intermediary variables (OMC, OMW and CC), the study provides an in-depth understanding of this relationship. Theoretically, the study closes the research lacuna and contributes to the FS and OIn literature by providing an in-depth understanding of the link between FS and OIn through intermediary constructs (OMC, OMW and CC) to enhance small retailers' innovation which is absent in the literature. Contextually, the study also sheds light on the relationships among the study's variables and the directions of the relationships in the Ghanaian context since the environment in Ghana is different from other countries. Lastly, the findings will assist academia and practitioners in general – and especially those in the retail industry – with how to adopt FS to increase OIn in small retailers and SMEs in general. The following sections will present the literature review and hypotheses development, methodology, results and discussion, and conclusions.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Family Support (FS) and Organisational Innovation (OIn)

The resource-based view (RBV) and dynamic capabilities (DC) provided the theoretical basis for this study by explaining the relationship between internal resources (OMC and OMW) and external resources (FS and CC) and how both resources directly or indirectly influence small retailers' OIn. The RBV indicates that the success of any firm is based on the unique internal resources (both tangible and intangible) to innovate to gain competitive advantage (Barney, 1991; Grant, 1991). That is, based on RBV, the study tries to understand how internal intangible resources-competencies/capabilities (OMC and OMW) drive small retailers' OIn (Barney, 1991; Grant, 1991). However, DC emphasize the combination of both internal and external resources for small firms to innovate since depending on internal resources alone as proposed by RBV is not adequate (Teece *et al.*, 2007; Cera *et al.*, 2019; De Brueckere *et al.*, 2020). Dynamic capabilities are the forces or firms' capacities to make/create, change, modify, or extend their resources. Therefore, DC deal with how a firm can develop, deploy, protect, and combine its external and internal resources to innovate (Teece *et al.*, 1997). The combination of RBV and DC will empower a firm to innovate and gain a competitive advantage when its resources are valuable, rare, scarce, inimitable, and unique. Therefore, based on RBV and DC, this study argues that small retailers can increase their OIn when they combine internal resources (OMC and OMW) and external resources (FS and CC).

The OECD (2019) states that OIn is the adoption of a new organisational method in business practices, workplace organization, and external relations. Scholars acknowledge OIn as a catalyst for SME growth (Hamel, 2009) but they do not agree on OIn's sources (Heyden *et al.,* 2018). One such source is FS, which is the extent to which a family is involved and its influence on the family member's business (Astrachan *et al.*, 2002). Moreover, within the body of studies on firms' performance, scholars acknowledge FS as one of firms' provenances to acquire distinct resources and capabilities to increase their innovation activities (Habbershon & Williams, 1999; Carnes & Ireland, 2013; De Massis *et al.*, 2013; Matzler *et al.*, 2015). However, the literature indicates that external variables including individual characteristics, demographics, and external support influence entrepreneurs' performance (Lüthje & Franke, 2003; Peterman & Kennedy, 2003; Krueger *et al.*, 2000). The need for firms to acquire valuable resources and capabilities is based on theories such as RBV and CA. Therefore, the nexus between FS and OIn is based on RBV and DC since depending on internal resources alone as proposed by RBV is not adequate, because the environment is dynamic (Teece *et al.*, 2007; Cera *et al.*, 2019; De Brueckere *et al.*, 2020).

Prior studies have not paid attention to the nexus between FS and OIn. The literature on the link between FS and innovation focused on intellectual property (Matzler *et al.*, 2015), product and process innovation (Liang *et al.*, 2013; Sanchez-Famoso *et al.*, 2017; El Shoubaki *et al.*, 2022), technological innovation (Manzaneque *et al.*, 2018), radical innovation (Chirico *et al.*, 2022), and innovation capabilities (Sun *et al.*, 2023). There are varieties of innovation (Edwards-Schachter, 2016) and depending on one aspect or various aspects of the same type of innovation is not likely to positively impact firms' innovation performance (Damanpour & Aravind, 2012). Therefore, there is room to look at other forms of innovation, especially OIn, which is broader and encapsulates new organisational methods in business practices, workplace organisation, and external relations (OECD, 2019).

Though the parameters to measure FS are broad and encapsulate emotional, appreciative, instrumental, and informative support (Sarafino & Smith, 2014), prior studies on the association between FS and innovation concentrated only on involvement in management and governance (Liang *et al.*, 2013; Matzler *et al.*, 2015; El Shoubaki *et al.*, 2022; Sun *et al.*, 2022). To gain a deeper understanding of the FS and innovation relationship, I introduced OIn as an embodiment of all innovation activities in firms. Therefore, extending the literature by examining the link between FS and OIn is desirable.

Miller and Le Breton-Miller (2006) indicate that family involvement in firms impacts their performance (activities and processes) differently. Noteworthy, SMEs' FS and innovation literature is inconclusive. One group of studies resulted in a positive nexus between FS and innovation. For example, El Shoubaki *et al.* (2022) found that FS increases innovation performance and moderates the relationship

between CEO satisfaction and innovation performance. Another batch of studies recorded both positive and negative results. For instance, the study of Liang *et al.* (2013) demonstrates that family involvement in boards positively moderates the link between R&D investment and innovation performance and negatively moderates the association between management teams and innovation performance. Furthermore, Matzler *et al.* (2015) found that FS in management and governance negatively influences innovation input and positively influences innovation output. Moreover, Sun *et al.* (2022) report that FS in ownership, management, and governance negatively influences innovative capability. However, the impact of FS on ownership, management, and governance on innovative capability is moderated by human resource redundancy. Another batch of studies had only negative results. For example, Sanchez-Famoso *et al.* (2017) found that FS in management negatively influences the relationship between internal social capital and process and product innovation. In the same vein, Manzaneque *et al.* (2018) found that FS in management reduces the efficiency in transforming R&D investments into technological innovation outputs. In the light of the above, I hypothesise that:

H1a: There is a positive relationship between FS and OIn.

Mediating Role of Owner-Manager Competencies

Owner-manager competencies (OMC) are multifaceted which impels managers to deliver distinctively including abilities, skills, behaviours, knowledge, maturity, empathy, motivation, efficiency orientation, productivity, conceptualization and self-confidence (Boyatzis, 1982; Jokinen, 2005; Martina *et al.*, 2012). Managerial competencies are part of individual competencies and include activities, knowledge, skills, attitudes and probably individual traits required to enhance managerial performance (Boyatzis, 1982).

From RBV and DC perspective, both internal and external resources and capabilities induce innovation output in firms (Barney, 1991; Grant, 1991; Teece *et al.*, 2007; Cera *et al.*, 2019; De Brueckere *et al.*, 2020). However, prior studies emphasize the link between OMC and FS only. For example, Yordanova (2012) demonstrates that owner-managers (OM) acquire qualities such as intelligence, respect for employees, commitment to the firm and creativity from FS. Moreover, OM learn and acquire their competencies by observing parents and family members who are entrepreneurs or getting involved in family businesses (Mungai & Velamuri, 2011; Elias *et al.*, 2018).

Even though personal characteristics affect OIn (Finkelstein & Hambrick, 1996), research on competencies is bereft of the link between OMC and OIn. Prior studies have looked at managerial competencies and firms' performance in general (Sultan *et al.*, 2017). Except for Liridon and Mimoza (2017), all these studies were conducted in large firms where the environment is different from that of SMEs. The mediating variable OMC that could better influence the nexus between FS is lacking in the above studies. Mohsin *et al.* (2017) argue that one of the sources through which SMEs can become innovative is OMC because all personal competencies affect the organisation. Moreover, since RBV and DC advocate for the combination of internal and external resources for OIn, I argue that FS will influence OIn through OMC. Based on the above, I hypothesise:

H1b: There is a positive relationship between FS and OMC.

H2: There is a positive relationship between OMC and OIn.

H3: OMC mediates the relationship between FS and OI.

Moderating the Role of Customer Capital

Duffy (2000) indicates that CC is the value (current and future revenues generated and growth of the firm in general) arising out of the relationship between the firm and its customers. Moreover, CC is the observations and experiences employees have with customers when they come into contact with them in trying to listen to their complaints or find solutions to their problems (Selnes & Sallis, 2003). Prior studies have established that CC is a source of intellectual capital which influences organizational performance (Chen *et al.*, 2004). The literature also acknowledges that firms' relations with customers produce new ideas which trigger product and process innovation (Classen *et al.*, 2014) for firms to innovate (Bullinger *et al.,* 2004).

Prior research acknowledges that SMEs collaborating with customers leads to innovation. For example, Rahman and Kavida (2019) demonstrate that SMEs' cooperation with customers affects different innovation activities in SMEs. Jahanshahi *et al.* (2019) also find that CC influences firms' innovative products and services. From RBV and DC, customers constitute external resources (Barney, 1991; Wernerfelt, 1984) for OIn (Stewart & Ruckdeschel, 1998). Furthermore, there are no studies whereby CC moderated the relationship between FS and OIn except one where CC mediated the nexus between innovativeness and SMEs growth (Jalili *et al.*, 2014). Both RBV and DC emphasize the combination of both internal and external resources for OIn and since both FS and CC are external resources, it is expected that CC can alter the direction of the nexus between FS and OIn. Based on the above, I hypothesise:

H4: There is a positive relationship between CC and OIn.

H5: Customer capital moderates the relationship between FS and OIn.

Moderating Role of Owner-Manager Wellbeing (OMW)

According to Davis (2019), wellbeing is the experience of health, happiness, and prosperity encompassing a good mental condition, good life satisfaction, awareness of the meaning and purpose of life and the ability to manage stress. Wellbeing is a crucial aspect of the owner-manager, because it concerns the ability of people to work, ensure good relationships, and have positive emotions (Ryan & Deci, 2000; Seligman, 2012). Imaginario *et al.* (2013) accentuate that wellbeing is of utmost importance, because when people feel good with respect to themselves and everything surrounding them it ensures motivation and physical and mental wellbeing.

Though Finkelstein and Hambrick (1996) indicate that personal characteristics including wellbeing affect OIn, no studies have linked FS with OIn. Prior studies have associated FS with good health in general (Umberson, 1987; Wills, 1991; King *et al.*, 1995; Pressman *et al.*, 2005). The literature has also linked wellbeing with organisational outcomes. For example, happy workers behaviours lead to organizational performance (Judge *et al.*, 2001; Fisher, 2010; Van De Voorde *et al.*, 2012; Coggburn *et al.*, 2014; Chia Chu, 2016; Miah, 2018; Muterera *et al.*, 2018).

There is only one study in which employees' wellbeing (happiness) moderates the relationship between job satisfaction and job performance (Wright *et al.*, 2007). Although prior studies have established that employees' wellbeing is linked with organizational performance, little is known about OMW moderating the relationship between FS and OIn. From RBV, OMW is an internal resource for firms to improve upon their innovation performance (Wernerfelt, 1984; Barney, 1991). Since RBV and DC stress the combination of both internal and external resources for OIn, it is expected that OMW will moderate the nexus between FS and OIn. Therefore, I hypothesise that:

H6: There is a positive relationship between OMW and OIn.

H7: Owner-manager competencies moderate the relationship between FS and OIn.

RESEARCH METHODOLOGY

Research Design, Population, and Sampling

I employed the causal research design to provide predictions between the exogenous and endogenous variables to reject or accept the hypotheses (Sekaran & Bougie, 2016; Apuke, 2017; Mohajan, 2020). The study focused on small retailers in the central business district in Kumasi, Ghana. I selected our respondents (small retailers) based on the ILO (2019) definition of micro-enterprises, *i.e.* informal and formal micro-enterprises with two to nine employees. Since there is no data on SMEs in Ghana and Kumasi specifically and the population size was unknown though very big, I divided the accessible population into four zones to ensure a more homogeneous representation (Etikan & Bala, 2017). I used 723 small retailers for the study which was above the minimum sample size of 385 which is deemed to be good for a large but unknown population (Krejcie & Morgan, 1970; Cochran, 1977; Adam, 2021). I contacted the small retailers dealing in any product including provisions, different perfume brands, stationery, and raw and cooked food. I based the respondents on the characteristics indicated above

due to the easy accessibility, experience, knowledge, and their willingness to participate in the exercise (Bernard, 2002; Lewis & Shepard, 2006).

Data Collection, Instruments, and Analysis

With four research assistants, I administered a structured interview schedule to the small retailers to increase the response rate since the interviewers were in a position to explain certain words or questions and clarify any doubts (Kerlinger, 1986). The interview schedule had demographic questions and thirty-five item questions for the variables. The interview schedule had six sections. The first section was the demographic questions. I took the definitions of the study's constructs from the literature and measured them as follows: The second section was FS with seven questions adopted from King *et al.* (1995) which had four separate headings (emotional, instrumental, cohesion, and environment) with Cronbach's alpha 0.891. The third section was OMC with six questions from Mitchelmore and Rowley (2010) which had four separate headings (entrepreneurial, management, human relations and relational) with Cronbach's alpha 0.887. Section four concerned OMW with seven questions adopted from Renshaw *et al.* (2015) which had four separate headings (connectedness, joy of learning educational purpose, and academic efficacy) with Cronbah's alpha 0.896 whilst section five related to OIn with eight questions selected from Camison and Villar-Lopez (2014) and Hewitt-Dundas, 2015) (as cited in Rupietta *et al.*, 2021) which had two separate headings (outcomes and explanatory) with Cronbach's alpha 0.924 and the last section concerned CC with seven questions picked from Bueno (1998) and Duffy (2000) (as cited in Cegarra-Navarro and Sanchez-Polo, 2008) which had no separate headings with Cronbach's alpha 0.887. Respondents answered all the questions on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Moreover, I modified all the questions from sections two to six taken from the above sources to suit our study (See Appendix A for final question items and sources). For ethical reasons, I informed the respondents that the exercise was voluntary and therefore they could accept or decline to answer the questions. After data collection, I used the partial least squares-structural equation modelling (PLS-SEM) SmartPLS version 4.0.1 to analyse the data (Ringle *et al.*, 2022).

RESULTS AND DISCUSSION

Table 1 shows that the majority of the respondents had little or no education and the industry is female dominated. The aged constituted the majority of the owners and most of the owners were married. Firms with two to five workers also dominated. The respondents from the zones seemed to be evenly distributed.

Measurement Model Assessment

Measurement and model assessment covers the evaluation of the measuring items to confirm that they fulfil the primary metrics to ensure the robustness of the model (Hair *et al.*, 2022). Table 2 displays the key areas examined for reliability and validity, such as indicator reliability, internal consistency reliability, and convergent and discriminant validity.

Items Loadings

Indicator loadings represent how items in a particular correlation matrix relate to a specific main component ranging between -1.0 and 1.0, where a higher value, in absolute terms, suggests a high correlation with a given factor (Pett *et al.*, 2003). Item loadings of over 0.708 are recommended. However, for CC, one item (CC1) was below 0.70 but I did not remove it, because it was satisfactorily reliable (Hair *et al.*, 2010; 2016). Following Table 2, the reliability of the indicators used in the study was confirmed – the factor loadings ranged between 0.685 to 1 with significance at $p < 0.001$ as shown in Figure 1.

Multicollinearity of Indicators and Internal Consistency Reliability

The threshold for VIF was set at 5 (Alauddin & Nghiemb, 2010; Gomez *et al.*, 2016; Hair *et al.*, 2016; Asthana, 2020). All values of VIF in Table 2 were less than 5; hence, no multicollinearity existed, as prescribed by Hair *et al.* (2022). The recommended value for Cronbach's alpha was above 0.70, indicating an

Table 1. Demographic data on respondents

Characteristics	Frequency	Percentage (%)
Gender		
Male	289	40
Female	434	60
Age		
Below 30	94	13
31-40	159	22
41-50	253	35
Above 50	217	30
Education		
Illiterate	181	25
Primary/JHS	304	42
SHS	145	20
Tertiary	94	13
Marital status		
Single	217	30
Married	347	48
Divorced	159	22
Number of employees		
2-3	376	52
4-5	202	28
6-7	94	13
8-9	51	7
Zones of markets		
Zone One	202	28
Zone Two	174	24
Zone Three	159	22
Zone Four	188	26

Source: own study.

acceptable internal consistency. Table 2 reports Cronbach's alpha of 0.887 for CC, 0.891 for FS, 0.924 for Oln, 0.887 for OMC, and 0.896 for OMW. Hence, all the constructs in the model were reliable, indicating a satisfactory level of internal consistency between the constructs (Nunnally, 1978). Like Cronbach's alpha, composite reliability measures the internal consistency of a scale item (Hair *et al.*, 2022). From Table 2, the value of composite reliability, rho_c ranges from 0.910 to 0.938 for all constructs, satisfying Hair *et al.* (2018) criteria for a good and reliable construct with Rho_a ranging between 0.894 and 0.927. The results showed that internal consistency existed.

Convergent Validity of Constructs and Discriminant Validity (DV)

I used AVE to assess the construct's convergent validity. An AVE of 0.50 or above is highly recommended (Hair Jr. *et al.*, 2020). Moreover, AVE greater than or equal to 0.50 indicates that the construct explains more than 50% of the items that make up the construct (Alarcon *et al.*, 2015). The AVE range for the constructs ranged from 0.593 to 0.655, signifying an acceptable criterion. I employed the Heterotrait-Monotrait ratio (HTMT) approach to assess the constructs' discriminant validity (DV) (Henseler *et al.*, 2015).

Henseler *et al*. (2015) posit that HTMT ratio must be less than 1.00. This is a clear indication that each construct was truly distinct from the others following the recommendation of Henseler *et al*. (2015). Thus, this confirms the discriminant validity of the construct employed in the study. After these basic assessments, the study followed up with the analysis of the research hypotheses in the next sections (see Table 3).

Table 2. Significance of the model

Variables	Outer loadings	VIF	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Customer capital			0.887	0.899	0.910	0.593
CC1	0.685	1.740				
CC2	0.816	2.275				
CC3	0.856	2.878				
CC4	0.736	2.522				
CC5	0.768	2.745				
CC6	0.786	1.940				
CC7	0.733	1.674				
Family support			0.891	0.894	0.914	0.604
FS1	0.735	1.948				
FS2	0.783	2.132				
FS3	0.775	2.264				
FS4	0.794	2.448				
FS5	0.764	2.256				
FS6	0.839	2.964				
FS7	0.747	2.321				
Organisational innovation			0.924	0.927	0.938	0.655
OIn1	0.767	2.109				
OIn2	0.726	2.011				
OIn3	0.816	2.639				
OIn4	0.829	3.102				
OIn5	0.852	2.945				
OIn6	0.841	3.107				
OIn7	0.824	2.623				
OIn8	0.813	2.815				
Owner-manager competencies			0.887	0.895	0.914	0.639
OMC1	0.763	1.851				
OMC2	0.758	2.174				
OMC3	0.860	2.508				
OMC4	0.816	2.847				
OMC5	0.812	3.393				
OMC6	0.784	2.128				
Owner-manager well-being			0.896	0.899	0.918	0.618
OMW1	0.826	2.505				
OMW2	0.738	2.088				
OMW3	0.784	2.311				
OMW4	0.772	2.062				
OMW5	0.720	1.703				
OMW6	0.864	3.226				
OMW7	0.787	2.265				
CC x FS	1.000	1.000				
OMW x FS	1.000	1.000				

Source: own study.

Structural Model Assessment

I used five thousand (5000) iterations through the bootstrapping method to assess the statistical significance of each model. Moreover, I evaluated the path coefficient, t-statistic, f square (f^2), R square (R^2), Q^2 predict, root mean square error (RMSE), and mean absolute error (MAE) when assessing the model significance (Table 4).

Table 4. Significance of the model

Relationship	Original sample (O)	T statistics	P values	2.5%	97.5%	f-square
FS -> Oln	0.199	9.036	0.000	0.154	0.241	0.658
FS -> OMC	0.630	26.848	0.000	0.584	0.677	0.091
OMC -> Oln	0.098	3.576	0.000	0.045	0.152	0.019
OMW -> Oln	0.185	4.798	0.000	0.110	0.262	0.049
CC -> Oln	0.540	16.928	0.000	0.476	0.602	0.280
	R-square	**R-square adjusted**	**Q^2predict**	**RMSE**	**MAE**	
OMC	0.397	0.396	0.395	0.780	0.568	
Oln	0.824	0.823	0.813	0.434	0.332	

Notes: R^2 of 0.75 is substantial, 0.50 is moderate, and 0.25 is weak; effect size of 0.02, 0.15 and 0.35 indicates small, medium, and large effect respectively; predictive relevance of 0.02, 0.15 and 0.35 indicates small, medium, and large effect respectively.'
Source: own study.

Table 4 presents the results of the various direct hypotheses. The bootstrap procedure for significance follows a t-statistic greater than 1.96 which corresponds to a p-value less than 0.05 (Hair *et al.*, 2014) as well as a two-tail 95% confidence interval.

H1a: There is a positive relationship between FS and OIn. The results in Table 4 show that FS had a positive effect on Oln ($\beta = 0.199, t = 9.036, p = 0.000 < 0.05$). Family support is an important resource which stimulates or enhances OIn of small retailers and this is contrary to Sun *et al.* (2022) and Sanchez-Famoso *et al.* (2017), in whose work FS had a negative impact on one type of innovation (FS reduces innovative capability and wanes R&D investment into technological innovation outputs respectively). **H1b:** There is a positive relationship between FS and OMC. The results demonstrate that there was a positive significant effect of FS on OMC ($\beta = 0.630, t = 26.848, p = 0.000 < 0.05$). Thus, OMC acquires some of their competencies from family members to run their firms and therefore external support is important. This supports the studies of Mungai and Velamuri (2011); Yordanova (2012) and Elias *et al.* (2018). **H2:** There is a positive relationship between OMC and OIn. The study indicates that OMC has a significant and positive effect on OIn ($\beta = 0.098, t = 3.576, p = 0.000 < 0.05$). This signifies that OMC is the key ingredient for OIn of small retailers and this runs counter to the conclusions of Sultan *et al.* (2017) and Linridon and Mimoza (2019) who found that OMC has a positive link with firms' performance in general.

H3: There is a positive relationship between OMW and OIn. The study found that OMW had a significant and positive effect on Oln ($\beta = 0.185, t = 4.798, p = 0.000 < 0.05$). Thus, OMW is an indispensable predictor of OIn, *i.e.* the healthier the OM, the more small retailers can increase their OIn. Therefore, the results are contrary to those of Chia and Chu (2016); Miah, (2018); and Muterera *et al.* (2018), which demonstrate that wellbeing of workers affects organizational performance in general. **H4:** There is a positive relationship between CC and OIn. **H4.** CC had a significant and positive effect on Oln ($\beta = 0.540, t = 16.928, p = 0.000 < 0.05$) denoting that CC is an important external resource that enhances OIn. The results contradict Jahanshahi *et al.* (2019) and Rahman and Kavida (2019) who found that CC affects different types of innovation activities and innovative products respectively.

On R square, FS explained 39.7% of the variations in OMC, whereas the whole exogenous variables CC, FS, OMC, and OMW explained 82.4% of the variations in Oln. The remaining 18.6% of Oln could not be accounted for in the study. Hair *et al*. (2022) postulate that an R-squared value of 0.75 is substantial in marketing research. The Q^2 predictive size explains the relative impact of predictive relevance, with values of 0.02, 0.15, and 0.35 being indicative of small, medium, and large effect sizes respectively. The Q^2 for both OMC and Oln was large, with Q^2 values of 0.396 and 0.813, respectively. When Q^2 values are close to the R^2 then the model is good (Hair *et al.,* 2022). The effect size measure presented in Table 4 shows how the exogenous variable will cause a change in the R-squared value when the variable is removed from the model. The results show that H1 (f^2 = 0.658), H2 (f^2 =0.019), H3 (f^2 = 0.049), H4 (f^2 = 0.280) and H5 (f^2 = 0.091) were noticed. This shows that when any of the exogenous variables are removed from the model it will have a significant influence on Oln.

Moderation Analysis

The study introduced CC and OMW as moderators in the relationship between FS and OIn. In interpreting the simple slope in Figure 1, we need to look out for the line (+ one standard deviation (red) or - one standard deviation (green)) that will be above the mean after the interaction point. Red above means negative effect whilst green above means positive effect.

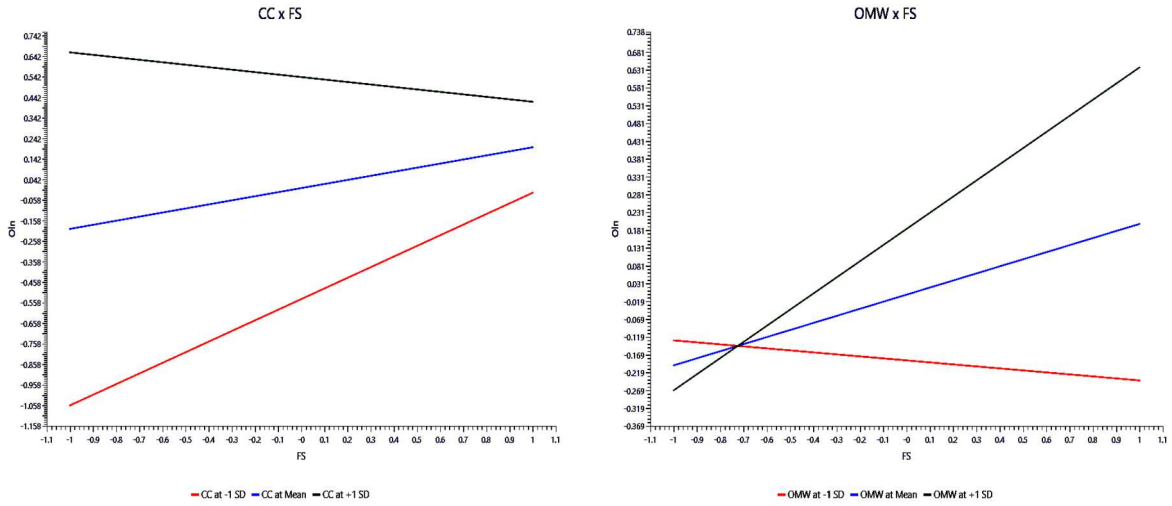
Table 5. Significance of the total moderation effects

Relationship	Path coefficient	T statistics	P values	2.5%	97.5%	f-square
CC x FS -> OIn	-0.319	9.135	0.000	-0.385	-0.248	0.101
OMW x FS -> OIn	0.255	7.018	0.000	0.182	0.324	0.071

Source: own study.

H5: Customer capital moderates the relationship between FS and OIn. Table 5 indicates that CC significantly moderated the relationship between FS and OMC but the impact was negative (β = -0.319, t = 9.135, p = 0.000). The result was counter-intuitive. Thus, when CC was introduced as a moderator between the relationship between FS and OIn, the result became inverse. Thus, CC weakens the nexus between FS and OIn. Thus, when CC is introduced into the relationship between FS and OIN, the less FS will lead to OIn. The simple slope results in Figure 1 show that the possible interaction will happen outside the right-hand side of the graphs' borders. This type is called ordinal interactions, because businesses may not directly observe such interactions.

H6: Owner-manager wellbeing moderates the relationship between FS and OIn. The results show that OMW positively and significantly moderated the relationship between FS and OIn (β = 0.225, t = 7.018, p = 0.000) (Table 6). The influence of FS on OIn is stronger when OMW moderates the relationship. The result of the simple slope analysis shows a disordinal interaction because the interaction (cross-over) occurred with the observed data points.



CC moderates the relationship between FS and OIn *OMW moderates the relationship between FS and OIn*

Figure 1. Simple slope graphs for the moderation results
Source: own elaboration.

Mediation Analysis

H7: Owner-manager competencies mediate the relationship between FS and OIn. Table 6 shows that OMW significantly mediated the relationship between FS and OIn. The total effect $\beta = 0.260$, $t = 8.028, p = 0.000 < 0.05)$ and direct effect $(\beta = 0.199, t = 9.036, p = 0.000 < 0.05)$ of FS on OIn are shown to have a positive and significant relationship. The indirect effect $(\beta = 0.062$, $t = 3.627, p = 0.000 < 0.05)$ of FS on OIn through OMC is also positive and significant.

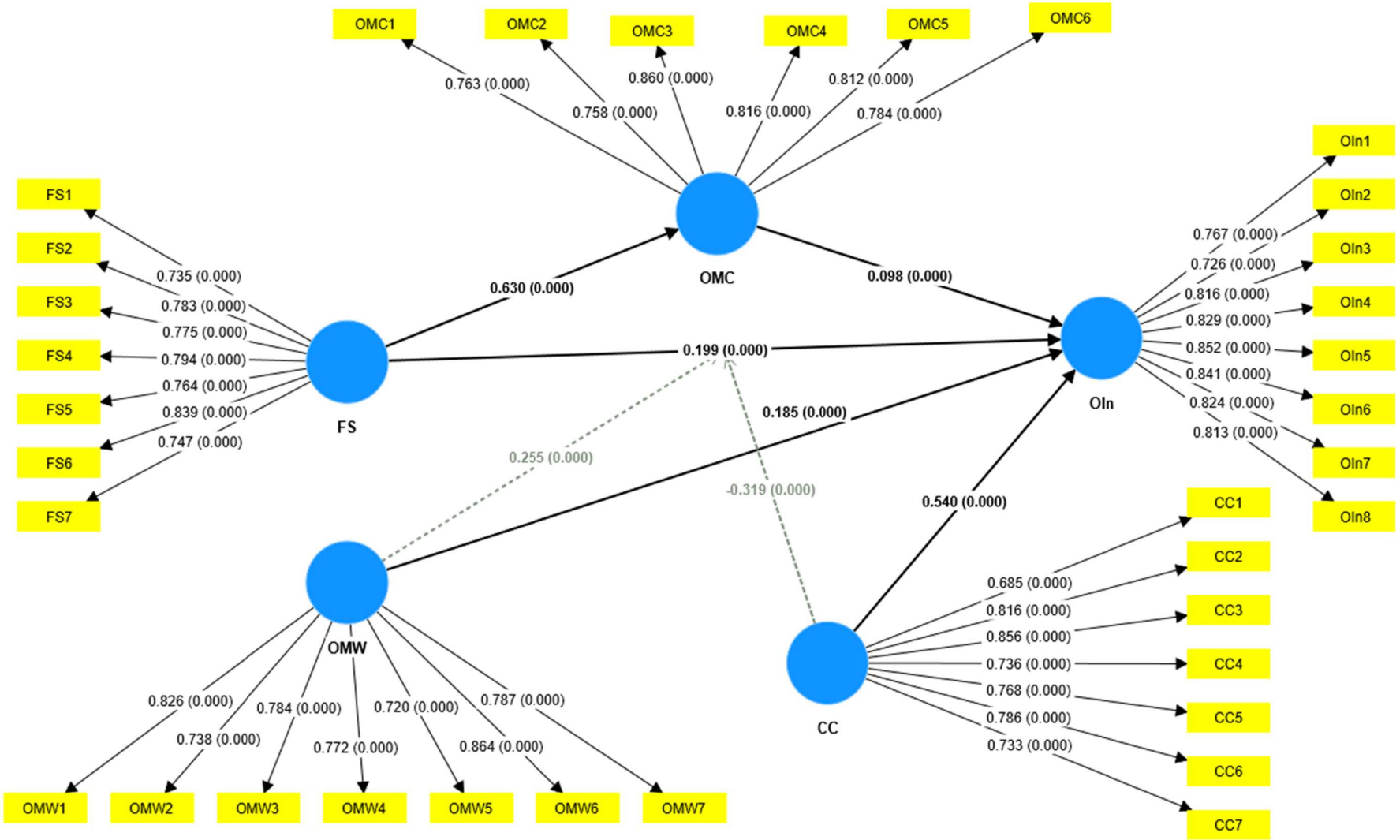


Figure 2. Model extracted from PLS bootstrapping

Source: own elaboration.

Table 6. Mediation analysis

Relationship	Total Effect	t-stats	p-value	Direct effect	t-stats	p-value	Mediation	indirect	t-stats	p-value
FS -> OIn	0.260	8.028	0.000	0.199	9.036	0.000	FS -> OMC -> OIn	0.062	3.627	0.000
Variance accounted for (VAF) VAF = (Indirect effect/Total effect)*100										
FS -> OMC -> OIn			23.8%							

Note: VAF no mediation (0.0%≤ mediation ≤ 20%); partial mediation (20% ≤ mediation ≤ 80%); full mediation (mediation ≥ 80%).
Source: own study.

The mediation effect was assessed through the variance accounted for VAF. The reported VAF was 23.8% (Table 6), depicting OMC's partial mediation effect on FS and OIn. Family support had an indirect influence on OIn through OMC. Structured relationships between the variables are depicted in Figure 2. Yellow rectangles represent the indicators and blue circles are the latent variables.

Robustness

I employed the IMPA technique in SmartPLS by setting the target construct as OIn as shown in Table 7 and Figure 2. The results are ranked according to the performance importance values. The IMPA results are based on the direct link between FS, CC, OMC, and OMW on OIn. It can be gleaned from Table 7 and Figure 2 that CC had the most impact on OIn. The results show that if OM want to improve on OIn in their firms, they should have a quick look at CC, FS, OMW, and OMC.

Table 7. Importance-performance for organizational innovation as the target variable

Variables	Total Effect	Performance	Performance-Importance	Importance Rank
CC	0.540	59.121	109.4833	1
FS	0.260	59.495	228.8269	2
OMW	0.185	61.504	332.4541	3
OMC	0.098	57.448	586.2041	4

Source: own study.

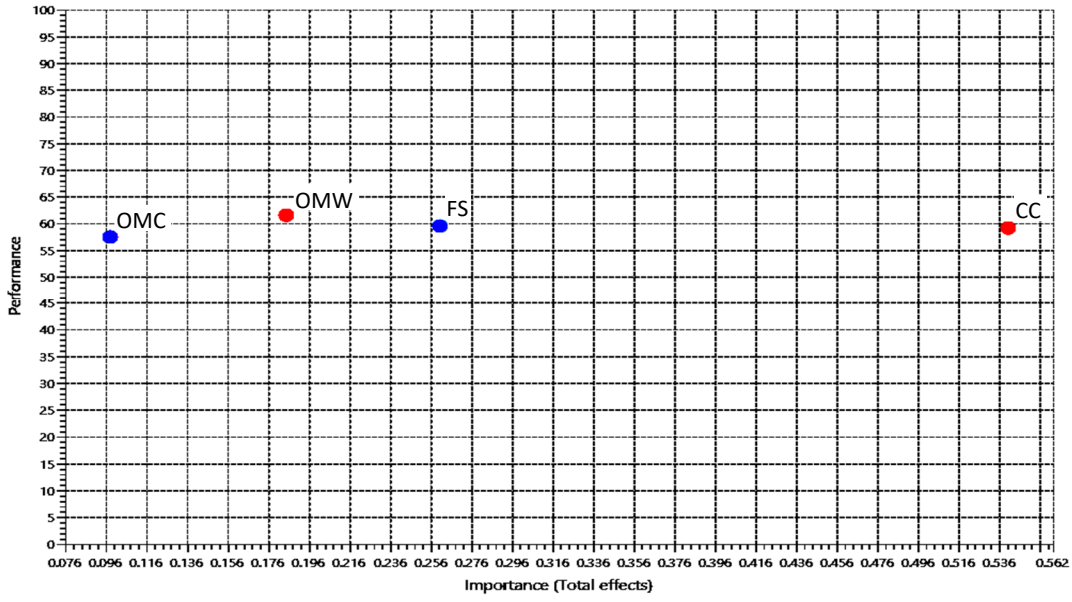


Figure 3. Importance performance map on the relationship between CC, FS, OMC, OMW, and OIn
Source: own elaboration.

Summary of Hypotheses Results

Table 8 provides a summary of hypotheses results. The results show that all the hypotheses were maintained.

Table 8. Summary of hypotheses results

Hypothesis	Relationship	Original Samples	p-value	Remarks
H_{1a}	FS -> OIn	0.199	0.000	Maintained
H_{1b}	FS -> OMC	0.630	0.000	Maintained
H_2	OMC -> OIn	0.098	0.000	Maintained
H_3	OMW -> OIn	0.185	0.000	Maintained
H_4	CC -> OIn	0.540	0.000	Maintained
H_5	CC x FS -> OIn	-0.319	0.000	Ordinal interactions
H_6	OMW x FS -> OIn	0.255	0.000	Disordinal interactions
H_7	FS -> OMC -> OIn	0.062	0.000	Partial mediation

Source: own study.

CONCLUSIONS

Previous studies have ignored the link between FS and OIn and the intermediary roles of OMC, OMW, and CC. In filling this lacuna, the study investigated how small retailers in Ghana combined both external and internal resources to innovate their businesses. Based on 723 small retailers, I used PLS-SEM to test seven hypotheses which were all maintained. Our findings offer novel insights into the role of FS in influencing OIn directly or indirectly and how this relationship is strengthened or weakened by other variables. Our results eloquently demonstrate that small retailers stay afloat in business by finding new ways to innovate their firms through FS. The study showed how small retailers in Ghana combined both external and internal resources to innovate their businesses, buttressing the proposition of Teece *et al.* (2007), Cera *et al.* (2019); De Brueckere *et al.* (2020). Again, OIn is directly influenced by OMC, OMW, and CC. Thus, personal characteristics, including competencies and wellbeing (Finkelstein & Hambrick, 1996; Moshin *et al.*, 2017), as well as relationships with customers (Bullinger *et al.*, 2004), are important determinants of small retailers' innovation in Ghana. Specifically, our findings undoubtedly show that FS positively drives IOn. Secondly, the results demonstrate that OMC partially and complementarily mediates the positive relationship between FS and OIn. Moreover, the results reveal that OMW positively – and CC negatively – moderates the relationship between FS and OIn. To the best of our knowledge, this is the first time research of this nature and scale has been conducted on the indirect effects of FS on OIn through OMC, and this relationship is also enhanced by OMW and waned by CC, although prior research has established a direct relationship with some of these variables.

The study has implications for policymakers and practitioners. Family support is an indispensable resource for small retailers to innovate their businesses. Since small retailers and generally SMEs with limited resources increase their OIn by FS Carnes and Ireland (2013); De Massis *et al*. (2013), they should continue to court such support. Although small retailers seek the support of their families to acquire valuable resources to improve the performance of their businesses (Anderson & Reeb, 2003; Villalonga & Amit, 2006; Arregle *et al.*, 2007), they should not rely on FS alone, since DC indicates that firms should scout and tap both internal and external resources to improve upon their performance Teece *et al.*, (2007). Though it is a good idea for small retailers to learn and acquire some of their competencies from their families (Niittykangas & Tervo, 2005; Mungai & Velamuri, 2011), they should also scout from the external environment in general, especially stakeholders, to increase their OIn. Generally, wellbeing is a crucial aspect of the OM, because it concerns the people's ability to work, ensure good relationships, and have positive emotions (Ryan & Deci, 2000; Seligman, 2012). Since OMW is an internal resource which affects OIn (Barney, 1991), OM should endeavour to be healthy physically and mentally (Williams *et al.*, 2017) to always give them the impetus to innovate their businesses. Moreover, since CC influences OIn and at the same time weakens the relationship between FS

and OIn, even though Jahanshahi *et al.* (2019) also record that CC increases product and service innovation, the collaboration or interaction between OM and customers should be revisited to find out what might have caused this problem and the remedial action taken.

Theoretically, the study fills a lacuna in the existing literature (Liang *et al.*, 2013; Matzler *et al.*, 2015; Sanchez-Famoso *et al.*, 2017; Manzaneque *et al.*, 2018; Chirico *et al.*, 2022; El Shoubaki *et al.*, 2022; Sun *et al.*, 2023) about how a small aspect of FS affects different types of SMEs innovation. Introducing FS and OIn as composite variables for all supports obtained from family members as well as OIn for all innovation activities gives us a better understanding of the FS-OIn relationship. That is, prior studies focused on FS in management and governance (Liang *et al.*, 2013; Matzler, 2015; El Shoubaki *et al.*, 2022; Sun *et al.*, 2022), but this is just an aspect of instrumental support and since FS is a broader (Sarafino & Smith, 2014) and also an intangible resource (Carnes & Ireland, 2013), it is therefore not adequate to propel firms to enhance their OIn. The extant literature also looked at intellectual property and some aspects of innovation such as process, product, technological and radical innovation (Liang *et al.*, 2013; Matzler *et al.*, 2015; Sanchez-Famoso *et al.*, 2017; Manzaneque *et al.*, 2018; El Shoubaki *et al.*, 2022; Chirico *et al.*, 2022; Sun *et al.*, 2023), but using OIn as embodiment of all innovation activities in firms positively impacts firms' innovation performance (Damanpour & Aravind, 2012). Moreover, we introduced OMC, OMW, and CC to give an in-depth understanding of how FS influences OIn through intermediary mechanisms. In doing so, we used the RBV and DC which elicit the appropriate means for analysing how small retailers can combine both external and internal resources as proposed by RBV (Barney, 1991; Grant, 1991) and DC (Teece *et al.*, 2007; Cera *et al.*, 2019; De Brueckere *et al.*, 2020) to increase their business innovation. The choice of OMC as a mediating variable is very important, because competencies are unique firms' resources (Habbershon & Williams, 1999) that can offer a better understanding of how FS indirectly affects OIn. Our findings demonstrate that FS increases OIn through OMC whilst prior studies unveil that managerial competencies affect firms' performance in general (Aslan & Pamukcu, 2017; Sultan *et al.*, 2017). Moreover, it is also important to introduce wellbeing as an intermediary mechanism in the association between FS and OIn owing to the fact that personal disposition and characteristics including wellbeing of the OM and the role he plays affects OIn (Hadjimanolis, 2000; Marcati *et al.*, 2008; Finkelstein & Hambrick, 1996). We found that OMW strengthens the link between OMW and OIn, while previous studies demonstrate an association between OMW and organisational performance in general (Chu, 2016; Miah, 2018; Muterera *et al.*, 2018). Even though prior studies have established a positive impact of CC on some categories of innovation in SMEs (Rahman & Kavida, 2019; Jahanshahi *et al.*, 2019), OIn cannot be fully understood without considering CC moderating the association between FS and OIn. The study demonstrates that the greater FS, the weaker the FS is on OIn. The explanation could be that families of small retailers may not be in favour of small retailers seeking external support from customers even though Moran (2005) indicates that both structural and relational relationships are complementary. Thus, in investigating the connection between FS and OIn and introducing intermediary variables (OMC, OMW and CC) by using RBV and DC, the study elicits the appropriate means for analysing how small retailers can combine both external and internal resources as proposed by RBV (Barney, 1991; Grant, 1991) and DC (Teece *et al.*, 2007, Cera *et al.*, 2019, De Brueckere *et al.*, 2020) to increase their business innovation. The study confirmed RBV and DC in the retail industry in Ghana. In general, to the best of our knowledge, this is the first study that has analysed the link between FS and OIn whilst taking into consideration the intermediary roles of OMC, OMW, and CC. Therefore, our results have added to the FS and SME innovation literature.

The study has limitations. Although we cannot use every industry for the study, choosing small retailers limits the study. Expanding the scope to capture other industries would be an enhancement and an area for future research. The study offers one intriguing result, *i.e.* CC negatively moderates the relationship between FS and OIn. We believe that this could be an opportunity for future research. Moreover, the dimensions of FS and OIn are lumped together in the current study. Future studies can explore the relationship between some of the dimensions of FS and that of OIn.

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Appendix A: VARIABLES, QUESTIONS AND SOURCES

Table A. With respect to your firm, please indicate the degree of agreement and disagreement (1=strongly disagree and 5=strongly agree)

Variable	Source
Family support (FS)	King *et al.* (1995)
1. My family members assist me in doing my job.	
2. My family members advise me when I have problems at work.	
3. My family member provide me with financial support.	
4. My family members give me information about my work.	
5. My family members give me material support.	
6. My family members love when I have a tough day at work.	
7. My family members run my business when I am ill/travel.	
Owner-manager competencies (OMC)	Mitchelmore and Rowley (2010)
1. I have marketing skills.	
2. I have management skills.	
3. I have interpersonal skills.	
4. I have analytical skills.	
5. I have idea-generating skills.	
6. I keep proper records.	
Owner-manager wellbeing (OMW)	Renshaw *et al.* (2015)
1. I feel happy at work.	
2. I am satisfied with my suppliers.	
3. I enjoy working with my workers.	
4. I take business matters seriously.	
5. I am a successful businessman/woman.	
6. I am interested in things I do at work.	
7. I do good work at my workplace.	
Organizational innovation (OIn)	Rupietta *et al.* (2021)
1. Pricing Innovation.	
2. Workplace arrangement innovation.	
3. Firm's external relations innovation.	
4. Routine Innovation.	
5. Workers' relations innovation.	
6. Task allocation innovation.	
7. Selling innovation.	
8. Advertising innovation.	
Customer capital (CC)	Cegarra-Navarro and Sanchez-Polo (2008)
1. Information on customer relations.	
2. Information on advertisement.	
3. Information on competitors.	
4. Information on pricing.	
5. Information on re-purchases.	
6. Information on my workers' attitudes.	
7. Information on workplace.	

Source: own study.

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Acknowledgements and Financial Disclosure

The author declares that there is no one or organization that contributed to the research to be acknowledged as well as to declare any financial obligation. The author would like to thank the anonymous referees for their useful comments, which allowed to increase the value of this article.

Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120105

Corporate social responsibility and forward default risk under firm and industry heterogeneity

Muhammad Mushafiq, Błażej Prusak, Magdalena Markiewicz

ABSTRACT

Objective: This study aims to evaluate the impact of corporate social responsibility on forward default risk (FDR) under the setting of firm and industry heterogeneity.

Research Design & Methods: This study evaluated the impact of corporate social responsibility (CSR) on FDR using the data of 497 companies from 2007-2021 in the S&P 500 index, taking into account firm and industry heterogeneity aspects. This study utilized instrumental variable regression using the generalized method of moments (IV-GMM) estimation technique which is robust for controlling the pertinent issue of endogeneity.

Findings: This study found a negative relationship between CSR and FDR in the full sample. From the firm size aspect, this study found that CSR is more effective in mitigating FDR in large-cap firms than in mid-cap firms. Firm age heterogeneity exhibited a distinct behaviour, as young and middle-aged firms had a stronger impact on FDR management in comparison to old firms. Industry heterogeneity showed that industries with higher customer interaction have a higher impact on corporate social responsibility to control FDR. Industries with lower customer interaction have a lower impact on corporate social responsibility and FDR.

Implications & Recommendations: We proposed some policy recommendations based on the findings in the context of firm and industry heterogeneity. Especially the management of mid-cap and young corporations should improve the CSR policy to enhance CSR performance which would lead to stabilized protection against FDR. Similarly, consumer-intensive industries should also focus on enhancing CSR initiatives to decrease FDR. Non-consumer-intensive industries should focus on enhancing CSR policy and at the same time pay particular attention to communicating CSR results to end consumers to reduce FDR.

Contribution & Value Added: This study is the first to explore CSR's impact on financial parameters under heterogeneity.

Article type: research article

Keywords: corporate social responsibility; forward default risk; heterogeneity effect; firm; industry

JEL codes: G3, G33, M14

Received: 5 May 2023 Revised: 19 September 2023 Accepted: 1 October 2023

Suggested citation:

Mushafiq, M., Prusak, B., & Markiewicz, M. (2024). Corporate social responsibility and forward default risk under firm and industry heterogeneity. *Entrepreneurial Business and Economics Review,* 12(1), 77-99. https://doi.org/10.15678/EBER.2024.120105

INTRODUCTION

In recent decades, many businesses have spent a lot of money on corporate social responsibility (CSR) strategies, which involve working closely with various groups to integrate social, environmental, ethical, and human rights concerns into a company's day-to-day activities and long-term goals (European Commission, 2009). Academics have been studying the elements that influence CSR initiatives, because their use has increased (Petrenko *et al*., 2016; Ratajczak & Szutowski, 2016; Van Marrewijk, 2003; Vilanova *et al.*, 2008). Today's business leaders widely accept the CSR concept because of the widespread belief that it helps both the company and its stakeholders, as well as the community (Koh *et al*., 2023; Mochales & Blanch, 2022; Pfajfar *et al*., 2022; Risi *et al*., 2023; Yang & Basile, 2022).

This principle of enlightened self-interest affects a company's results, most notably in terms of income, creativity, efficiency, fair value, and the overall and idiosyncratic risks that the company faces (Fatemi *et al*., 2018; Jo & Na, 2012; Lins *et al*., 2017; Luo & Bhattacharya, 2009). The findings of the majority of such studies indicate that CSR activities add value to diverse components of a company's success by enabling increased goodwill and services, luring top talent, and enhancing access to important resources (Cheng *et al*., 2014; Greening & Turban, 2000). However, some empirical data reveal contradictory findings, and certain studies suggest that CSR activities are a waste of resources, lower profitability, and increase risk and shareholder value (Barnea & Rubin, 2010; Nguyen & Nguyen, 2021).

Although stakeholder engagement activities focus on a broad variety of interested parties other than simply customers and workers, they frequently appear under the umbrella concept of 'corporate social responsibility.' The environmental, social and governance (ESG) components of CSR and its constituent stakeholder groups can have opposing effects on the financial issues of a business, depending on how and to what extent they influence stakeholders' interests. This may result from externalities surrounding ESG engagement which influence default risk (Sun & Cui, 2014) or the managerial reaction to both internal and external stakeholders (Benabou & Tirole, 2010). The first effect refers to the influence on cash flow and the choices regarding investments, and the outcomes of financing decisions. If ESG activities lead to the inefficient use of an enterprise's resources, CSR can lower its value from an investment perspective (Hussaini *et al*., 2021). This could increase the likelihood of financial problems.

Conversely, CSR has the potential to contribute value if it results in positive externalities, such as an enhanced brand image, more dedicated staff, and happier consumers. Because of this, there may be a mitigating effect on future cash flows, which can reduce the likelihood of experiencing financial hardship. Credit ratings and the costs of financing improve via the implementation of responsible ESG practices and the subsequent improvement in CSR performance (Bannier *et al*., 2022). This might encourage enterprises to take on further debt, which would increase the likelihood that such businesses would fail financially. Thus, debt providers require data on CSR activity and stakeholder management to adequately measure default risks.

Moreover, in the literature, scholars discuss CSR and default risk under the assumption of firm symmetry and ignore the aspects of firm heterogeneity. It is important to address what firm heterogeneity means in this context. Under the assumptions of the neo-classical theory of firms, enterprises maximize profits. Profit maximization translates into increased levels of assets, stabilized cash flows, and a less risky situation for investors, which can be termed as a lower level of default risk. From the viewpoint of corporate finance theory, firms aim to maximize cash flow and business value (Damodaran, 1996; Tirole, 2010). This maximization is a consequence of stability and lower default risk, eventually benefitting firms in terms of lowered capital cost. We may explain stabilisation over the long-run period (assumption of long-run industry entry) as 'firms grow as they get old.' This leads to two aspects of firm heterogeneity, *i.e.* growing 'age' and 'stabilization.' However, not all firms stabilize at the same point in time, and at any given point in time *t*, the firms' ages will differ. This difference due to heterogeneity can cause different impacts of CSR on default risk.

Therefore, the contribution of this study to the literature concerns three aspects. Firstly, this study focused on the lag/lead dynamic relationship by testing the CSR effects on default risk in the 'future,' the so-called forward default risk (FDR). We proposed that CSR affects default risk in the subsequent period (*t+1*). Secondly, this study explored the difference between firm-specific effects on this relationship. This implies that as the temporal dimension varies, spending in CSR differs just like the level of default risk. Lastly, we tested the relationship in different industries, as industries which have lower consumer interaction also have a lower CSR level, and in turn, the effect on default risk differs.

The following section will discuss the relevant literature. Section three will elaborate on data and methods. Section four will present the and section five will provide a discussion and conclusions.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Corporate social responsibility (CSR) is an organization's response to community needs and expectations (Brown & Dacin, 1997; Sen & Bhattacharya, 2001; Varadarajan & Menon, 1988). Generally speaking, it is 'the managerial obligation to take action to safeguard and advance both the welfare of society as a whole and the interest of organizations' (Davis & Blomstrom, 1975). In recent years, CSR has emerged as a key resource for businesses. According to studies, CSR plays a significant role in any successful organization (McWilliams *et al*., 2006).

Sun and Cui (2014) argued the relevance of CSR and default risk by raising the following four major points. (1) CSR has the potential to provide cash flow for a business, and cash flow stability directly influences a firm's inclination to default, because a healthy cash reserve facilitates daily operations and protects against financial trouble. (2) Cash flow volatility is more important than cash flow level in predicting default and CSR helps smooth out cash flows. (3) The worth of a company's assets will influence whether or not it goes into default, which is a predictable series of events. An asset that adds to the firm's worth may consequently contribute to risk mitigation. Activities involving CSR are examples of productive business efforts that create intangible benefits. (4) The firm's microenvironment might benefit from CSR initiatives if they foster goodwill.

Sun and Cui (2014) showed that CSR significantly impacts lowering default risk with a larger association existing between CSR and reduced default risk for enterprises operating in highly dynamic situations. Socially responsible businesses have superior credit ratings and reduced credit risk, both in terms of loan spreads and corporate bond spreads and in terms of distance to default (Hsu & Chen, 2015). Shahab *et al*. (2018) showed that improved environmental performance – which is supported by sound environmental policies – has a statistically significant impact on lowering the incidence and severity of business financial distress. Lin and Dong (2018) divided the accumulated social capital from CSR efforts into moral capital and exchange capital. Findings indicate that moral capital lessens the risk of insolvency when a company expands in size. However, exchange capital reduces the chance of bankruptcy for businesses that rely on intangible assets or that operate in a more litigious business climate.

Using regression analysis, Al-Hadi *et al*. (2019) demonstrated that CSR initiatives significantly ease company's financial stress. The CSR quality ratings greatly lessen the liquidity levels suffered among Chinese businesses. Moreover, some scientists have noticed that CSR is more effective at lowering distress levels in privately held Chinese companies than in state-owned ones (Shahab *et al*., 2019). According to Boubaker *et al*. (2020), firms with greater CSR levels have lower financial distress risk, indicating that good CSR performance improves a company's creditworthiness and its ability to gain access to finance. Kamalirezaei *et al*. (2020) showed that CSR has a negative correlation with insolvency risk. On the contrary, Dumitrescu *et al*. (2020) explained that the chance of future financial suffering rises because of social stakeholder activities.

Gangi *et al*. (2020) showed that CSR activities and corporate governance procedures negatively impact a company's likelihood of experiencing financial trouble. Badayi *et al*. (2021) concluded that the likelihood of default lowers as enterprises in developing nations increase their investments in CSR initiatives. Default risk was found to be lower for companies during the United States quantitative easing (US QE) programme, an approach which could have unintended consequences by raising the risk premiums and volatility of equity and low-grade corporate bonds (Hsu & Chen, 2021). Kölbel and Busch (2021) showed that positive CSR ratings reduce exposure to risk in the marketplace. Saidane and Abdallah (2021) demonstrated the unidirectional nature of the link between business default risk and CSR and the environment dimension using bivariate PVAR estimations. Shih *et al*. (2021) proved that a company's environmental performance significantly affects its default risk.

From the perspective of the banking sector, Nguyen and Nguyen (2021) implied that CSR activities limit bank risk-taking, and this association is only present in the situation of financially restricted institutions. Conversely, unrestrained banks are more inclined to spend money on CSR which is not necessary, leading to lower performance and higher risk-taking. Neitzert and Petras (2022) confirmed that

CSR activities have a net risk-reducing effect on banks. A recent review of the literature confirmed the negative correlation between CSR and the likelihood of default (Mushafiq & Prusak, 2022).

Most of the above-mentioned literature has ignored the time aspect of the relationship between CSR and default risk. However, Chang *et al*. (2013) demonstrated that organizations with high-quality CSR have very low short-term default probability and forward default probability. Furthermore, Do (2022) discovered that CSR has a negative relationship with the likelihood of default and that this relationship is more pronounced over the long term than the short term. However, both these studies test the relationship considering the effect of CSR and default risk on the temporal level and not based on the lag/lead time horizon. Due to the existing gap, we hypothesised:

H1: CSR negatively impacts FDR.

Firm Heterogeneity

Firm size significantly influences CSR dedication; with larger enterprises being correlated with more resource-slack (Johnson & Greening, 1999). Due to limited or insufficient resources, CSR projects may be unfeasible for smaller businesses. The second characteristic of a large company is the degree to which it is organized. Due to their greater exposure to the outside world, businesses of a certain size may benefit from better-developed administrative processes (Donaldson, 2001). Because of this, they would have more sophisticated internal processes for handling issue management, which would make them more sensitive to social problems (Brammer & Millington, 2006).

When compared to a smaller organization, a larger one has several competitive advantages due to its scale. Large companies can sustain financial difficulties better than small firms, and as a result, they can afford to devote more resources to environmental, social, and governance initiatives. Investing in ESG allows businesses to earn the goodwill of their stakeholders and demonstrate their commitment to social responsibility through their participation in ethical ESG initiatives. Udayasankar (2008) claimed that compared to medium-sized businesses, large ones have more incentives to engage in CSR initiatives. According to legitimacy theory, a sizable company can influence the degree to which governments and environmental regulators clamp down on its operations (Watson *et al*., 2002).

The existing body of work clearly shows that firm size can affect firm risk, and when using firm size as a control variable, past research has discovered a negative influence of firm size on firm risk (Benlemlih *et al*., 2018; Chollet & Sandwidi, 2018). This is possible because huge businesses have access to more (in)tangible resources, that ultimately lead to greater financial success and establish them as market leaders. Financial stability helps companies win over their shareholders, which, in turn, calms markets. Similarly, a company's scale significantly impacts its environmental, social, and governance performance (Lerner & Fryxell, 1988).

Firms with better ESG performance have a level of protection similar to insurance, and they also improve their standing in the eyes of their stakeholders (Godfrey, 2005). Companies are better able to manage their volatility and crash risk when their reputation is strong (Albuquerque *et al*., 2019; Wu & Hu, 2019). Based on the literature, we can conclude that firm size is a key influencer for CSR, and this influence can cause differences in the relationship between CSR and default risk. Previous research (Al-Hadi *et al*., 2019; Boubaker *et al*., 2020; Habermann & Fischer, 2021) had accounted for firm size; however, only as a control variable without explaining the difference of discussed effects considering various firm sizes. Only the work of Lin and Dong (2018) explains the relationship between small and large firms. However, this study focuses mainly on medium and large firms as small firms might not have the resources available to perform CSR activities. Therefore, from the theoretical standpoint, it is important to explore the possible changes that might occur in the relationship between CSR and default risk in firms that have the resources to perform CSR activities. Thus, we hypothesised:

H2: The relationship between CSR and FDR differs in mid and large-cap firms.

Being one of the guiding references, Withisuphakorn and Jiraporn (2016) explained that engaging in CSR boosts a company's long-term reputation as a socially conscious business. Consumers and potential customers develop positive feelings towards businesses perceived as socially responsible. It increases the likelihood that customers will purchase from these enterprises. Advocates of CSR claim

that participating in CSR activities leads to higher revenues, greater profits, and better overall business performance. Established businesses are steadier and more reliable in terms of both performance and cash flow. Therefore, established businesses have greater financial resources to devote to CSR.

On the other hand, younger companies have less money to engage in CSR since their cash flows are more volatile, and they are expanding rapidly. According to this idea, established businesses put more resources into CSR initiatives than start-ups. For this reason, scholars perceive increased CSR spending as a natural consequence of a mature business, which Withisuphakorn and Jiraporn (2016) referred to as 'the resulting hypothesis.' Investment in CSR is consequently less crucial for established businesses that have had more time to build a solid reputation, which means, accordingly, they are more valuable to investors. This improved standing cancels out the potential benefits of CSR spending. However, younger businesses, that have yet to build a solid reputation, may benefit from CSR activities.

Çera *et al*. (2020) argued that this reasoning led to the conclusion that an organization's longevity increased the likelihood that it would adopt CSR strategies. Galbreath's (2010) research provides empirical support for this observation. According to Withisuphakorn and Jiraporn (2016), the effect of firm age on CSR varies depending on the type of CSR being measured. Waluyo (2017) confirms this finding. Similar to the size effect of a firm, the age of a firm can shape CSR and create an altering effect on default risk, and previously, Gangi *et al*. (2020) and Sun and Cui (2014) only included this as a control. Therefore, we hypothesised:

H3: The relationship between CSR and FDR differs depending on the company's age.

Industry Heterogeneity

When discussing who should take the lead on issues of social responsibility and sustainability, businesses are frequently given as examples (Fairbrass & Zueva-Owens, 2012). This is due to the fact that the actions of businesses significantly impact society's demand and supply patterns (Fairbrass, 2011). However, corporations do not make decisions in a vacuum. On a global scale, they are affected by policies enacted by countries and international organizations. As meso-level players, they are affected by the norms of their sector. McWilliams *et al*. (2006) state that CSR is still a developing field of study, despite decades of discussion and research. The field of CSR research is also often criticized for its lack of cohesion (Aguinis & Glavas, 2012). In particular, the connection between CSR practices and the sector of activity needs more inquiry in the field of CSR research (Beschorner *et al*., 2013).

Most researchers found that the industry in which a company operates heavily influences CSR actions. According to Hendry (2006), activists choose a problem and industry before singling out a company. Consequently, this emphasizes the value of business sectors for the CSR analysis. Many parties involved are common to businesses in the same field or industry (*e.g.* they compete for the same customers). Furthermore, legislators develop laws for specific activities, meaning that enterprises operating in the same industry have the same restraints (O'Connor & Shumate, 2010), such as environmental or labour regulations.

Roberts (1992) argued that the industry influences CSR actions. Useem (1988) added that businesses with high levels of public engagement, such as those in the financial sector, have a stronger need for a favourable image than sectors with a small concentration of interaction, such as mining or primary metals. Some industries are more susceptible to public perception than others, therefore, they resort to philanthropic donations to protect themselves from an unfavourable reputation (Amato & Amato, 2012). In a cross-sectional examination of corporate donating across several sectors, Amato and Amato (2006) found some interesting trends. Their findings point to significant industry impacts, with industry dummy variables accounting for almost one-fifth of the variance in philanthropic giving.

All companies within an industry are susceptible to reputational issues due to industry impacts attributed to product characteristics or other market qualities. The positive impacts of charity donations can vary widely between sectors, as demonstrated by Brammer and Millington (2005). The results of Dabic *et al*. (2016) reveal that CSR studies are widely dispersed across industries and that the topics and methodologies addressed differ considerably. While exploring the effect of CSR on default risk, Habermann and Fischer (2021) utilized the industry effect as a fixed effect rather than a firm-level effect. However, there still exists a gap in explaining the relationship between CSR and default risk,

whether it differs in different industries or whether there is any difference between the industry's CSR impact on default risk or not. Based on the discussion, we hypothesised:

H4: The industry type affects the relationship between CSR and FDR.

RESEARCH METHODOLOGY

This study utilized data from 497 companies constituting the Standard and Poor's 500 (the S&P 500)[1] index, to explain the relationship between CSR and FDR in the context of firm and industry heterogeneity. Previous research supports our choice of index-based data sampling (Cohen, 2022; Meles *et al*., 2023; Nguyen *et al*., 2023). Table 1 presents the variables of the study with the relevant proxies. We measured FDR using the proxy of FDR for a period of one year from the Credit Risk Institute (CRI) (CRI, 2009). The CRI corporate default prediction system utilizes the forward intensity model developed by Duan *et al.* (2012) to calculate the probability of default (PD), which is a fundamental credit measure. This model incorporates two distinct doubly stochastic Poisson processes that operate on forward time rather than spot time. By employing this forward-looking approach, the model generates PD-term structures for public firms that adapt dynamically to macro financial and firm-specific data, allowing for dynamic learning and analysis. The choice of the main variables of interest was based on two things: accessibility and acceptability of measures. Both the main variables are widely accepted in the literature and calculated based on several points (Berg *et al*., 2022; Do, 2022). We measured CSR using the environmental, social, and governance scores calculated by Eikon. Refinitiv ESG Scores evaluate the ESG performance of companies by analysing reported data available in the public domain. These scores are based on three key pillars and cover 10 different ESG topics. To create these scores, Refinitiv considers a wide range of over 630 company-level ESG measures. For the overall company assessment and scoring process, we selected a subset of the most relevant and comparable 186 data points. We based this selection on factors such as materiality, data availability, and industry relevance. The resulting ESG combined score provided a comprehensive evaluation of a company's ESG performance, incorporating information from the ESG pillars, as well as ESG controversies gathered from global media sources. The control variables included in this study were working capital, efficiency, leverage, and liquidity, which we chose based on the literature (Altman & Sabato, 2007; Habermann & Fischer, 2021; Lin & Dong, 2018; Nguyen & Nguyen, 2021).

Following the discussion in section 2, we based the choice of fixed-effect regression on the assumption that unobserved firm heterogeneity is relevant for the independent and control variables. However, as we tested the model under several settings, this study takes from the Hausman test for the choice between fixed and random effects. In this study, we used the STATA software.

$$d_{it+1} = \alpha_i + \upsilon_1 c_{it} + \varphi_1 w_{it} + \varphi_2 a_{it} + \varphi_3 lq_{it} + \varphi_4 lv_{it} + \varepsilon_{it} \quad (1)$$

in which d is the FDR, c is the ESG score, w is working capital, a is the asset turnover ratio, lq is liquidity, lv is leverage, α is the constant term, ε is the robust error term, *i* represents the observation firm and *t* represents the observation year. This study tested equation (1) under different settings of firm heterogeneity and industry effects. After testing the relationship using the Ordinary Least Squares (OLS) regression, we tested the model using the instrumental variable regression with generalized method of moments estimator (IV-GMM) regression, which helped to address the endogeneity issue. Endogeneity arises in empirical models if an explanatory (independent) variable is connected with the residuals (also known as 'error term' or 'disturbance term') (Lu *et al*., 2018). The IV-GMM regression is a statistical method designed to tackle endogeneity in regression models by incorporating instrumental variables. It leverages the GMM framework to estimate the causal relationships between variables. By utilizing instrumental variables, the IV-GMM regression provides consistent estimates, addresses endogeneity bias, and offers robustness against misspecification. Compared to OLS regression, scholars consider IV-GMM regression more effective in handling endogeneity-related issues. In terms of firm size, firm heterogeneity is expressed in equations (2) and (3):

[1] We obtained the data for the study from the Eikon database, based on the agreement between the LSEG and the University of Gdansk. We accessed them on 9 November 2022. We based the number of firms on the S&P 500 index with regard to time and data availability.

$$Mid_t \equiv \{i \in N : 2 \leq m_{it} \leq 10\} \quad (2)$$

$$Large_t \equiv \{i \in N : m_{it} > 10\} \quad (3)$$

in which *t* = 1,2,...T and *m* is market capitalization in USD billions.

Table 1. Variables' description

Variable	Symbols	Proxy	Description	Source	Period
Default Risk	*d*	Forward one-year probability of default risk	Probability of Default over one year.	CRI	2007-2021
CSR	*c*	Environmental, social, and governance scores	Evaluation of measurement of how well a company handles issues related to the environment, society, and governance (ESG).	Eikon Refinitiv	2007-2021
Working Capital	*w*	Current assets – current liabilities	Measuring the short-term liquidity. Calculated as $Working\ Capital = Current\ Assets - Current\ Liabilities$	Eikon Refinitiv	2007-2021
Efficiency	*a*	Asset turnover ratio	Measuring companies' efficiency in generating sales using their assets. Calculated as $Asset\ Turnover = \frac{Net\ Sales}{Average\ Total\ Assets}$	Eikon Refinitiv	2007-2021
Leverage	*lv*	Debt-to-equity ratio	Measuring firm's leverage. Calculated as $Debt\ to\ Equity\ Ratio = \frac{Total\ Debt}{Total\ Shareholders\ Equity}$	Eikon Refinitiv	2007-2021
Liquidity	*lq*	Current ratio	Measuring the overall liquidity of firm. Calculated as $Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilities}$	Eikon Refinitiv	2007-2021
Firm Size	*m*	Market cap	Total market capital of the firm.	Companies Market Cap	2011-2021
Firm Age	*ag*	Current year – founding year	Number of years to incorporation of firms.	Eikon Refinitiv	2007-2021

Source: own study.

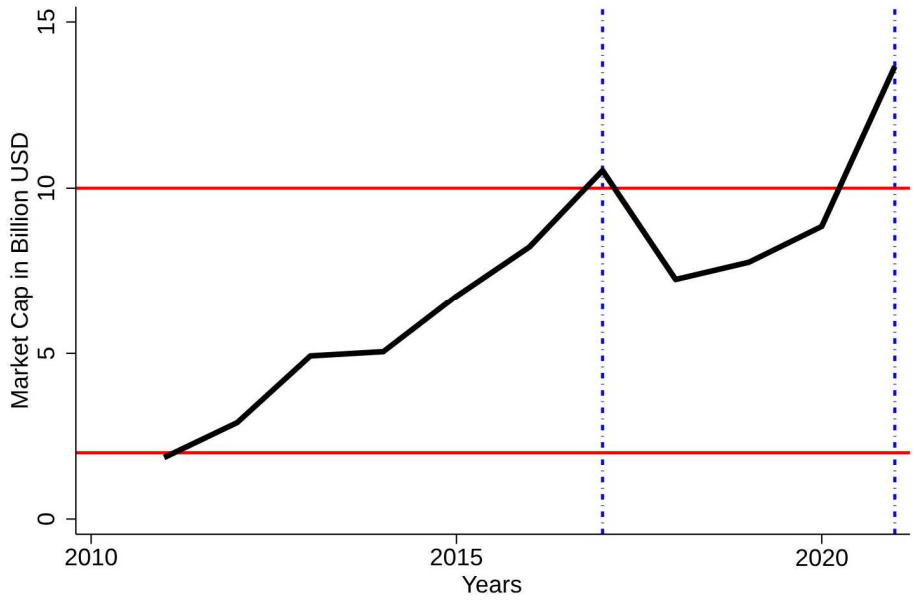

Figure 1. Observation based on division into firm size
Source: own elaboration.

The subset created based on m is the market capitalization of firms, N is the total number of observations. We chose market capitalization instead of other measures, such as the number of employees, assets or turnover, because the firms in the sample are public and come from the S&P 500. Hence, we can refer to them as large. However, market capitalization allowed us to divide them according to

mid and large-cap firms and test the difference of effect in different firm sizes. Investment funds adopt the following thresholds: 'mid-cap' is the term given to companies with a market capitalization between USD 2 billion and USD 10 billion, large-cap is the term given to companies with a market capitalization above USD 10 billion (Ross, 2021). Firms' capitalization changes over time. Therefore, according to above mentioned criteria, some of the firm-observations in the S&P 500 are mid or large-cap firms in certain periods which can explain the effect of CSR and FDR in firm-size heterogeneity. As an example, we present the case of A.O. Smith corporation in Figure 1. Throughout the years, A.O. Smith corporation has been in the mid-cap sample. However, in the 2017-2021 period, it belonged to the large-cap firm sample creating a clear and concise division of mid and large-cap sample.[2] Equation (2) depicts testing equation (1) for the subset of firm-observations that have a market capitalization between USD 2 billion and USD 10 billion and these firms are termed mid-cap firms.

Equation (3) shows testing equation (1) for firm-observations with a market capitalization greater than USD 10 billion, termed as large-cap firms.

$$\{AgeCluster_t \equiv \{i \in N : k_{it} = n\} \quad (4)$$

in which $t = \{1,2, \dots T\}, n = \{1,2,3\}$.

The second part of firm heterogeneity is based on age. We. created the subsets of age $k$based on K-means clustering of firm age, and *N* is the total number of observations. K-means clustering is an efficient method for creating clusters when there is no known outcome variable. In this study, age has not been very well defined in the literature as previous mentions focused on small and medium enterprises, which are different in terms of the demographic characteristics of larger corporations in indexes like the S&P 500. Previous studies on SMEs reported an average of 10 years as a young firm (Messersmith & Wales, 2013; Steffens *et al*., 2013). Therefore, using K-means clustering was the most suitable method. Results of our centroid of cluster k1 in panel B of Table 2 show that the average age of young firms was 11 years, k2 (middle-aged firms) had an average age of 37 years and the cluster for old firms had an average age of 94 years. The classification was similar to that of Shrivastava and Tamvada (2019). Equation (4) tests equation (1) in 3 different settings of firm age, *i.e.* 1) young firms, 2) middle-aged firms, and 3) old firms.

$$\{Industry_t \equiv \{i \in N \mid id_{it} = n\} \quad (5)$$

Finally, the model presented in equation (1) is tested in different industries (equation 5), in which $t = \{1,2, \dots, T\}, n = \{e, m, ind, cd, cs, hc, fin, it, tel, ut\}$, in which e is energy, m is materials, ind is industrials, cd is consumer discretionary, cs is consumer staples, hc is healthcare, fin is financials, it is information technology, tel is telecommunications and ut is utilities. We based the classification of industries on global industry classification standard (GICS) codes.

One of the major assumptions to obtain unbiased results is the normality of data. To test if the variables were close to a normal distribution, we plotted the kernel density of variables as shown in Figure 2. Almost all of the variables were not normally distributed, therefore, we performed log transformation. The variables apart from the ESG score were closer to the bell curve shape. The ESG score was more in normal distribution without the log distribution. Based on the visual appearance of the data, this study used the log-transformed variables of FDR, working capital, efficiency, leverage, and liquidity.

RESULTS AND DISCUSSION

Preliminary analysis

Table 2 shows the descriptive statistics of the variables in their original form. In the full sample, the mean probability of default was at 0.2% with a standard deviation of 1.2 p.p., while the mean of the ESG scores was 54.068 with a standard deviation of 19.496, which lands the full sample in the third quantile as per the Eikon measures, with a relatively good performance in CSR aspects. On average,

[2] Along with the detailed division, the data might be very well explained, there is one issue pertinent regarding the time frame of the study. Due to the availability of market capital data limited only from 2011 to 2021, the results for firm size heterogeneity are explained for 11 years instead of 15 years.

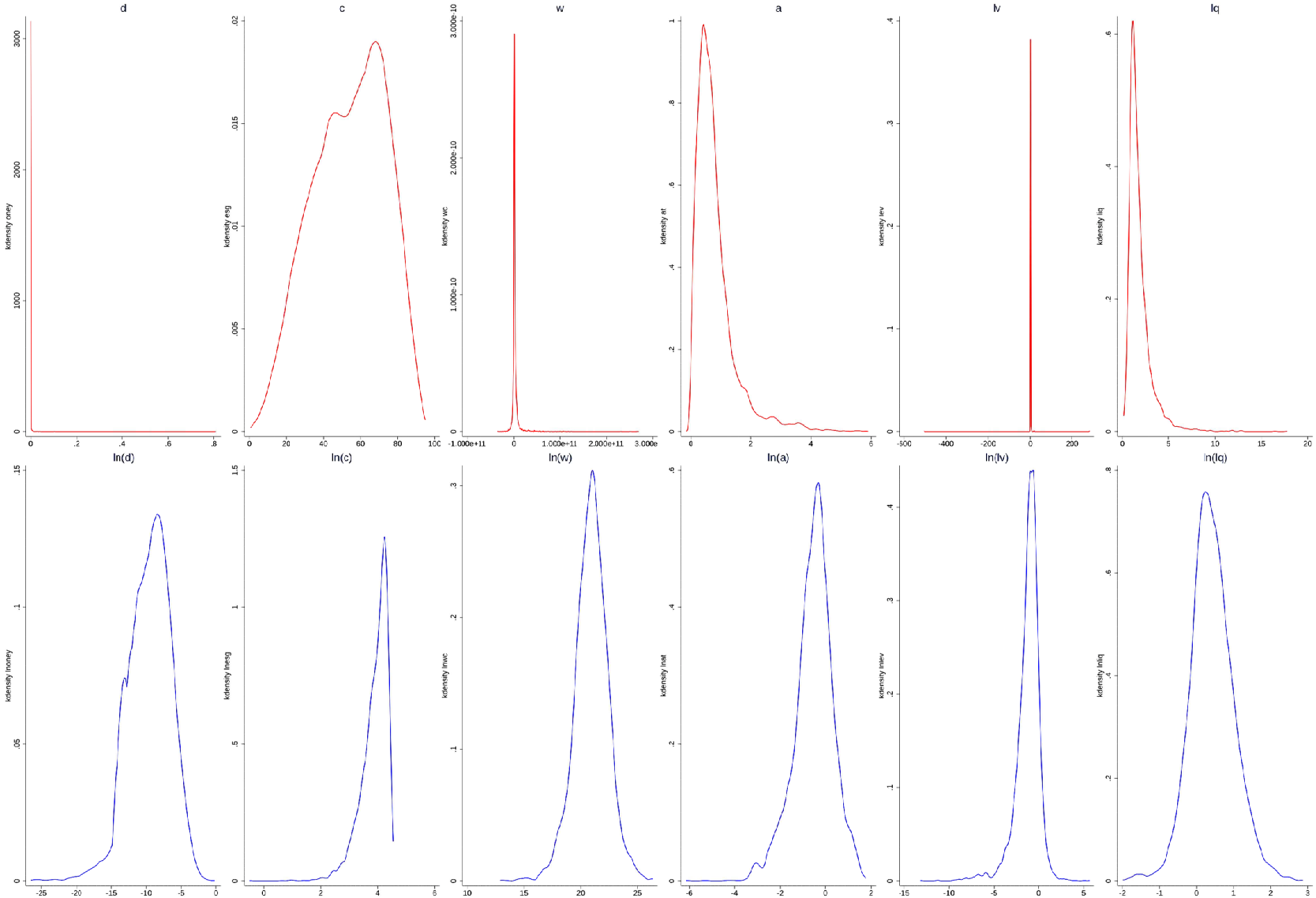

Figure 2. Variable distribution and log transformation

Source: own elaboration.

the working capital for the S&P 500 firms was USD 2.4 billion. The mean efficiency, leverage, and liquidity of firms in the full sample were 80.9%, 0.391, and 1.819, respectively. Firm size heterogeneity led to two subsamples of mid and large-cap firms. The mean FDR in the large-cap was lower when compared to the mid-cap and full sample. However, the deviation from the mean was greater than the mid-cap and full sample. The ESG score was higher for the large-cap in comparison to the mid-cap and full sample. Mid-cap firms belonged to the second quantile of Eikon, in which the ESG performance was satisfactory but could still be improved. Firm age heterogeneity had three subsamples, which we termed as young, middle-aged, and old firms. Young firms had higher FDR when compared the two other subsamples and higher standard deviation than the full sample. Middle-aged and old firms had the same average and standard deviation in FDR. Mean ESG scores increased with the firm age and alongside this, the deviation between the firms lowered as the age increased. Ten industries were part of the full sample, taken to test the effect of industry heterogeneity. The mean FDR was the lowest for the consumer staples industry and the highest for consumer discretionary. The lowest mean ESG scores belonged to the telecommunications services industry and the second quantile of the Eikon scale. The consumer staples industry had the highest mean ESG scores, more than any other subsample and the full sample. It was only nine points short of the fourth quantile.

The panel C of Table 2 presents the full sample pairwise correlation between the variables. The FDR negatively correlated with all the variables except leverage. The ESG scores negatively correlated with FDR, efficiency, and liquidity. Working capital positively correlated with the ESG scores and liquidity, whereas efficiency positively correlated only with liquidity. Leverage negatively correlated with the other control variables. Liquidity negatively correlated with FDR, the ESG scores, and leverage.

The CSR-FDR nexus

We initially assessed the relationship between CSR and FDR using the random and fixed-effect regression model with robust standard errors controlling for heteroskedasticity and autocorrelation. To choose between fixed and random effects, we ran equation (1) without robust standard errors, in both fixed effect and random effect settings. After acquiring both estimates, we performed the Hausman test as depicted in Tables 3 and 4. These results could have been biased due to the endogeneity problem. Therefore, we tested the models using an instrumental variables estimator implemented through IV-GMM with return on asset and return on equity as exogenous excluded variables. The significance of the test for endogeneity (GMM C statistic) showed that the OLS results did have the problem of endogeneity and results obtained from IV-GMM were robust. Tables 5 and 6 present robust IV-GMM results of the CSR-FDR relationship. Results show that in the full sample and all subsamples, the relationship between CSR and FDR was negative except for the energy and financial industry, in which the relationship between CSR and FDR was positive. Results of the full sample showed that as the ESG score increased by 1 point, FDR decreased by 0.577,[3] a 1% increase in efficiency and liquidity decreased FDR by 0.94% and 9.14%, respectively and a positive percent change in leverage increased FDR by 0.90%. For models m1 and m2 of firm size heterogeneity, mid-cap and large-cap subsamples, we noted that a one-point increase in the ESG scores decreased FDR by 0.133% and 0.498%, respectively. Thus, as a firm's size increased, the controlling power over FDR possessed by CSR increased as well. As discussed in the literature, the spending power and resources allocated on CSR might be higher for large capital firms in contrast to the limited resources possessed by mid-cap firms. Therefore, this allocation and availability of resources can cause higher levels of spending by larger firms and eventually protect them against default.

[3] Our explanation uses point-percentage as the relationship between the ESG scores and forward probability of default was in semi-log form. However, we provided. the explanation for the control variables in percentage-percentage as the relationship was in double-log form.

Table 2. Descriptive statistics

Varibles		*d*	*c*	*w**	*a*	*lv*	*lq*
s&p	μ	0.002	54.068	24.400	0.809	0.391	1.819
	σ	0.012	19.496	107.000	0.696	9.457	1.298
m1	μ	0.002	41.490	6.470	0.841	0.197	2.009
	σ	0.009	16.985	15.200	0.666	12.400	1.448
m2	μ	0.001	59.052	32.900	0.783	0.364	1.703
	σ	0.013	18.103	128.000	0.702	6.711	1.172
k1	μ	0.002	49.479	22.200	0.776	0.349	1.942
	σ	0.016	20.030	80.600	0.706	13.149	1.382
k2	μ	0.001	56.328	19.200	0.842	0.431	1.758
	σ	0.006	17.663	73.100	0.746	1.828	1.357
k3	μ	0.001	63.492	41.000	0.854	0.445	1.561
	σ	0.006	17.305	195.000	0.533	0.394	0.770
e	μ	0.003	56.708	22.700	0.785	0.378	1.348
	σ	0.010	19.688	49.200	0.802	0.278	0.545
m	μ	0.002	57.594	17.600	0.791	0.508	1.987
	σ	0.005	18.087	23.200	0.376	0.379	0.785
ind	μ	0.001	53.467	28.100	0.974	0.262	1.782
	σ	0.005	19.051	184.000	0.645	6.140	1.159
cd	μ	0.003	49.544	16.400	1.225	0.618	1.538
	σ	0.030	20.971	66.800	0.740	1.526	0.796
cs	μ	0.000	66.134	2.260	1.268	0.637	1.275
	σ	0.002	15.245	37.900	0.899	0.590	0.679
hc	μ	0.001	53.662	34.500	0.924	0.154	2.552
	σ	0.002	20.924	61.100	0.961	23.366	1.742
fin	μ	0.001	52.549	5.200	0.260	0.449	1.415
	σ	0.007	18.314	9.350	0.277	0.592	0.670
it	μ	0.001	53.661	48.600	0.689	0.341	2.326
	σ	0.004	20.154	120.000	0.328	2.929	1.652
tel	μ	0.002	47.303	-10.600	0.382	-3.891	1.056
	σ	0.007	20.257	101.000	0.261	42.536	0.559
ut	μ	0.001	58.861	-8.830	0.299	0.624	0.872
	σ	0.006	15.046	24.400	0.160	0.229	0.334
Panel B. Descriptive statistics of classifiers 'market capital' and 'firm age'							
	Obs	Mean	Std Dev	Min	Max		
*m1**	2 043	6.018	2.252	2.010	9.997		
*m2**	4 747	57.216	119.329	10.001	2913.300		
k1	4 003	11	8	0	23		
k2	2 391	37	11	24	65		
k3	1 061	94	18	66	168		
Panel C. Correlation matrix							
	d	*c*	*w*	*a*	*lv*	*lq*	
d	1						
c	-0.0210	1					
w	-0.0263	0.3921	1				
a	-0.0485	-0.0024	-0.0139	1			
lv	0.0645	0.0901	-0.0638	-0.1778	1		
lq	-0.1796	-0.1521	0.2795	0.1567	-0.2299	1	

Note: *in billion dollars.
Source: own study.

Table 3. Baseline Regression results of CSR-FDR relationship for the full sample and firm heterogeneity

Variables	*s&p*	*m1*	*m2*	*k1*	*k2*	*k3*
c	-0.0331***	-0.0394***	-0.0146***	-0.0319***	-0.0239***	-0.0309***
	(0.0042)	(0.0081)	(0.0056)	(0.0067)	(0.0074)	(0.0100)
w	-0.0293	0.0937	0.0959	-0.1494	0.133	0.4064***
	(0.0754)	(0.1414)	(0.0926)	(0.1143)	(0.1388)	(0.1291)
a	-1.4302***	-1.3167***	-1.3096***	-0.7699**	-2.3033***	-0.9437***
	(0.2359)	(0.4693)	(0.2811)	(0.3222)	(0.4198)	(0.3369)
lv	0.1189*	0.1812**	0.0963	0.1255	0.1336	0.5372**
	(0.0684)	(0.0870)	(0.1004)	(0.0973)	(0.1063)	(0.2278)
lq	-0.7161***	-0.7574*	-0.8268***	-0.4466	-0.8828**	-1.6874***
	(0.2383)	(0.4012)	(0.2994)	(0.3540)	(0.4257)	(0.5181)
cons	-7.2087***	-9.0052***	-11.0827***	-4.6346**	-11.2628***	-15.8437***
	(1.4815)	(2.6566)	(1.8826)	(2.2393)	(2.7369)	(2.3699)
N	3486	1013	2440	1772	1130	584
r2_w	0.049	0.059	0.025	0.034	0.068	0.051
r2_b	0.054	0.036	0.09	0.059	0.043	0.146
r2_o	0.025	0.041	0.026	0.037	0.013	0.111
rmse	2.147	1.716	2.088	2.165	1.989	2.14
N_g	377	228	357	239	163	67
F	23.25	7.58	7.62	7.76	9.71	-
Hausman Chi2	57.23	77.66	27.33	22.35	32.15	8.26
Hausman p	0.000***	0.000***	0.000***	0.0004***	0.000***	0.1426

Note: standard errors in parentheses. *p<0.10, **p<0.05, *** p<0.01.
Source: own study.

We may explain it by the fact that firms which are growing in capitalization are better at using CSR as insurance against default, while mid-cap firms or medium-sized firms are prone to create a better-developed relationship with society in general, and consumers in particular, following customer connection as a strategy to growth (Wayland & Cole, 1998). Thus, where large-cap firms have better tangible assets to fulfil social responsibility, mid-cap firms have intangible ones, and this connection in society can create a shield against the future possibility of default. Efficiency and liquidity negatively impact FDR and leverage increases FDR similarly to the full sample model.

In the subsamples of firm age heterogeneity, k1, k2, and k3, representing young, middle, and old-aged firms, a 1-point increase in the ESG score pertains to a decrease in FDR by 0.667%, 0.577%, and 0.289%, respectively. Young firms have a higher impact than any other subsample in firm age heterogeneity, while in middle-aged firms, the impact of CSR on FDR lowers and finally, for old-aged firms, the impact of CSR on FDR decreases as compared to young and middle-aged firms. In all three samples all the control variables affected FDR positively by working capital and leverage, and negatively by both efficiency and liquidity. Moreover, CSR can have a varying impact on FDR for different firms, with the effects being influenced by the firm's age. For older firms, the impact of CSR on FDR may be lower due to their established reputation. These firms may already have a solid customer base and a strong brand presence in the market, which could make them less sensitive to fluctuations in their FDR stemming from CSR actions. Furthermore, older firms may have legacy issues related to their operations that cannot be easily resolved through CSR initiatives. For instance, a company with a history of environmental pollution may face greater challenges in improving its FDR through CSR actions than a younger firm that has yet to encounter such problems. Moreover, older firms may be subject to more stringent regulations and standards than younger ones, which may restrict the influence of CSR activities on their FDR. These companies may already be meeting the mandatory bare minimum CSR requirements, leaving less room for additional improvement. Lastly, younger firms may be more focused on building their reputation and

Table 4. Baseline regression results of CSR-FDR relationship for industry heterogeneity

Varables	*e*	*m*	*and*	*cd*	*cs*	*hc*	*fin*	*it*	*tel*	*ut*
c	0.0203**	-0.0404***	-0.0218**	-0.0264**	-0.0815***	-0.0300**	-0.0818***	-0.0556***	-0.0415*	-0.0274*
	(0.0102)	(0.0071)	(0.0090)	(0.0122)	(0.0227)	(0.0114)	(0.0257)	(0.0096)	(0.0223)	(0.0152)
w	-0.2979	0.6859***	-0.3879*	-0.2352	0.0592	0.0312	-0.1785	-0.0615	0.2736	0.6923***
	(0.2094)	(0.2231)	(0.2250)	(0.1851)	(0.3894)	(0.3121)	(0.2766)	(0.1575)	(0.2582)	(0.2174)
a	0.4214	-1.4582***	-1.8573**	-3.2789***	-1.8157	-1.8350***	0.8245	-1.4831***	2.5509***	0.629
	(0.2875)	(0.3964)	(0.8146)	(0.6575)	(1.2969)	(0.5673)	(0.9249)	(0.4086)	(0.7723)	(0.5537)
lv	1.5727***	-0.1229	0.2518**	-0.1063	0.766	0.2439*	0.4	-0.0207	-0.7494	1.8142***
	(0.3056)	(0.1770)	(0.1176)	(0.1072)	(0.5342)	(0.1300)	(0.7407)	(0.1248)	(0.9034)	(0.6524)
lq	0.0095	-2.2862***	0.4849	-0.7162	-0.0909	-0.543	-1.3578	-0.9267**	-0.2606	-0.0597
	(0.7588)	(0.6163)	(0.9182)	(0.6429)	(1.1564)	(0.5730)	(1.4668)	(0.3879)	(2.7344)	(1.1199)
cons	-0.5787	-20.0267***	-0.8704	-2.0086	-6.1471	-9.744	-0.7357	-5.6565*	-9.5215**	-19.6360***
	(3.8029)	(4.3579)	(4.4283)	(3.5272)	(8.5585)	(5.9395)	(4.5524)	(3.2390)	(4.1317)	(4.7322)
N	193	278	626	502	198	511	126	663	30	103
r2_w	0.119	0.07	0.032	0.143	0.111	0.07	0.197	0.11	0.014	0.109
r2_b	0.561	0.187	0.019	0.26	0.006	0.009	0.284	0.052	0.959	0.499
r2_o	0.207	0.102	0.006	0.126	0.001	0.002	0.005	0.056	0.476	0.255
rmse	2.094	2.129	2.219	1.955	2.217	2.174	2.215	2.135	2.406	2.048
N_g	17	21	63	50	28	47	12	65	6	22
F	–	–	2.68	6.65	3.27	6.78	20.3	12.31	–	–
Hausman Chi2	2.2	6.68	15.19	23.92	19.24	27.26	21.85	19.63	3.47	4.5
Hausman p	0.8206	0.2457	0.0096***	0.0002***	0.0017***	0.0001***	0.0006***	0.0015***	0.6273	0.48

Note: standard errors in parentheses. *p<0.10, **p<0.05, *** p<0.01.

Source: own elaboration.

establishing themselves in the market, making them more inclined to invest in CSR initiatives which can enhance their activities to lower FDR. In contrast, older firms may have already made some investments in CSR activities and may not receive the same benefits from additional investments.

Subsamples for industry heterogeneity *e*, *m*, *ind*, *cd*, *cs*, *hc*, *fin*, *it*, *tel*, and *ut* represent the following industries: energy, materials, industrials, consumer discretionary, consumer staples, healthcare, financials, information technology, telecommunications services and utilities. The energy industry is different from all the other industries and samples as it is the only industry in which growth in the ESG score increased FDR. However, the growth was not statistically significant. Similarly, the financial industry showed growth in FDR as the ESG scores increased. The utilities industry showed a negative impact but it was not significant. In the rest of the industries, a 1-point increase in ESG decreases FDR by 0.358%, 0.133%, 0.519%, 0.212%, 0.728%, and 0.129%, respective to the order of industries mentioned at the start of the paragraph. In the results, we noticed a pattern that the impact of CSR on FDR was greater in those industries which directly interacted with the end user, *e.g*. consumer staples, consumer discretionary, healthcare, and information technology. On the contrary, the industry which was less consumer-intensive displayed a lower impact of CSR on FDR.

Amato and Amato (2012) and Useem (1988) provide an explanation of this fact as they mention that industries with more public engagement invest more in CSR. Higher investment in CSR is a driving force for relationships in these industries to better protect them against FDR. More investments in CSR lead to better relationships

Table 5. Robust regression results of CSR-FDR relationship for the full sample and firm heterogeneity

Variables	*s&p*	*m1*[ψ,ς]	*m2*	*k1*	*k2*	*k3*
c	-0.5777***	-0.1325*	-0.4980***	-0.6674***	-0.5769***	-0.2887***
	(0.0960)	(0.0753)	(0.1134)	(0.2577)	(0.1611)	(0.0512)
w	4.3038***	1.8049***	2.9678***	5.2073**	3.8827***	1.8492***
	(0.7068)	(0.4484)	(0.6097)	(2.0582)	(0.9949)	(0.3062)
a	-0.9411***	-0.9912**	-0.8320***	-1.1451**	-0.1718	-2.2708***
	(0.2750)	(0.3959)	(0.2784)	(0.5160)	(0.4006)	(0.5312)
lv	0.9003***	0.1291	0.8971***	0.8060***	0.7444**	1.8852***
	(0.1828)	(0.1383)	(0.2230)	(0.3103)	(0.2931)	(0.3859)
lq	-9.1431***	-3.7205***	-7.0916***	-10.1344***	-8.4560***	-5.3187***
	(1.3695)	(0.7450)	(1.2618)	(3.6066)	(1.9792)	(0.8620)
cons	-62.9472***	-38.1136***	-39.2599***	-78.0486***	-53.8671***	-27.5980***
	(8.9783)	(5.8358)	(5.9791)	(27.8636)	(11.2563)	(3.8550)
N	3482	400	2436	1770	1130	582
rmse	9.837	3.279	8.444	11.706	9.456	4.557
df_m	5	5	5	5	5	5
GMM C Statistic	212.120***	3.987**	17.546***	7.404***	88.715***	64.107***
First Stage Fstat	18.647***	2.789**	81.813***	6.649***	10.773***	23.757***

Note: Standard errors in parentheses. *p<0.10, ** p<0.05, *** p<0.01. [ψ]Excluded exogenous variables in logarithmic form. [ς]Additional excluded exogenous variable (stock return) was included to tackle the issue of weak instrument bias due to a lower number of observations in the sub-sample.
Source: own study.

CONCLUSIONS

In this study, we explored the relationship between CSR and FDR in 497 firms of the S&P 500 index from the firm and industry heterogeneity perspective. We found that CSR negatively impacts FDR. Thus, we accepted the first hypothesis proposed in this study. Moreover, by testing in different settings of firm heterogeneity, we conclude that CSR's impact on FDR varies according to both firm size and age. Figure 3 shows the different effects in the subsamples of firm size. In the context of the full sample, large-cap firms tend to have a great impact on CSR and FDR, and this impact is much lower in mid-cap firms. Figure 4 shows a declining pattern of CSR's impact on the FDR. This is inherent because of the mechanisms explained above.

Table 6. Robust IV-GMM results of CSR-FDR relationship for industry heterogeneity

Variables	*e*	*m*	*and*	*cd*	*cs*	*hc*	*fin*	*it*	*tel*[ψ]	*ut*
c	0.3117	-0.3576*	-0.1329**	-0.5049**	-0.5189***	-0.2122***	0.1351*	-0.7282**	-0.1290***	-0.0380
	(0.2556)	(0.2094)	(0.0630)	(0.2084)	(0.1981)	(0.0347)	(0.0755)	(0.2989)	(0.0411)	(0.0246)
w	-2.934	4.1190*	1.3393***	3.3795**	2.9550***	1.8724***	-1.0174*	5.0942**	1.0874*	0.7131***
	(2.4718)	(2.1133)	(0.4600)	(1.4435)	(0.9485)	(0.3444)	(0.6161)	(2.1976)	(0.6081)	(0.2366)
a	1.2607	-6.1110**	-1.6114***	0.4233	-0.6148	-0.9648***	-1.2770*	5.6561**	3.5035***	0.8238**
	(0.9766)	(2.9953)	(0.3652)	(1.1924)	(0.9342)	(0.3276)	(0.7376)	(2.7776)	(1.2326)	(0.4168)
lv	0.4848	0.7446	-0.0303	0.7634**	1.1124	0.3909***	-0.5752	0.8736**	-1.2272	1.9607***
	(1.3609)	(0.6220)	(0.1050)	(0.3851)	(1.0435)	(0.1365)	(0.3559)	(0.4292)	(0.8676)	(0.3933)
lq	4.7395	-8.7644*	-3.3490**	-12.3467***	-13.3966***	-4.4486***	0.8293	-6.5337**	-5.0763	-0.5825
	(4.6717)	(4.5665)	(1.3041)	(4.6057)	(4.1251)	(0.6882)	(1.7287)	(2.5609)	(3.0956)	(1.3649)
cons	36.006	-70.3105**	-29.7574***	-47.6746***	-34.6682***	-35.5630***	0.435	-69.1872**	-20.3524**	-19.1797***
	(35.6254)	(30.1638)	(5.8916)	(18.2748)	(10.9368)	(5.2593)	(7.8511)	(27.2272)	(9.9658)	(4.1950)
N	191	278	626	502	198	511	126	663	23	101
rmse	4.908	5.116	3.435	9.503	7.448	3.568	3.541	11.681	2.581	2.099
df_m	5	5	5	5	5	5	5	5	5	5
GMM C Statistic	10.078***	1.303	5.545**	7.068***	31.380***	21.255***	3.707**	29.648***	5.683**	0.060
First Stage Fstat	0.672	1.178	10.269***	14.011***	3.106**	18.084***	7.125***	4.603**	7.096***	4.026**

Note: Standard errors in parentheses. * p<0.10, **p<0.05, ***p<0.01. [ψ]Excluded exogenous variables in logarithmic form.
Source: own elaboration.

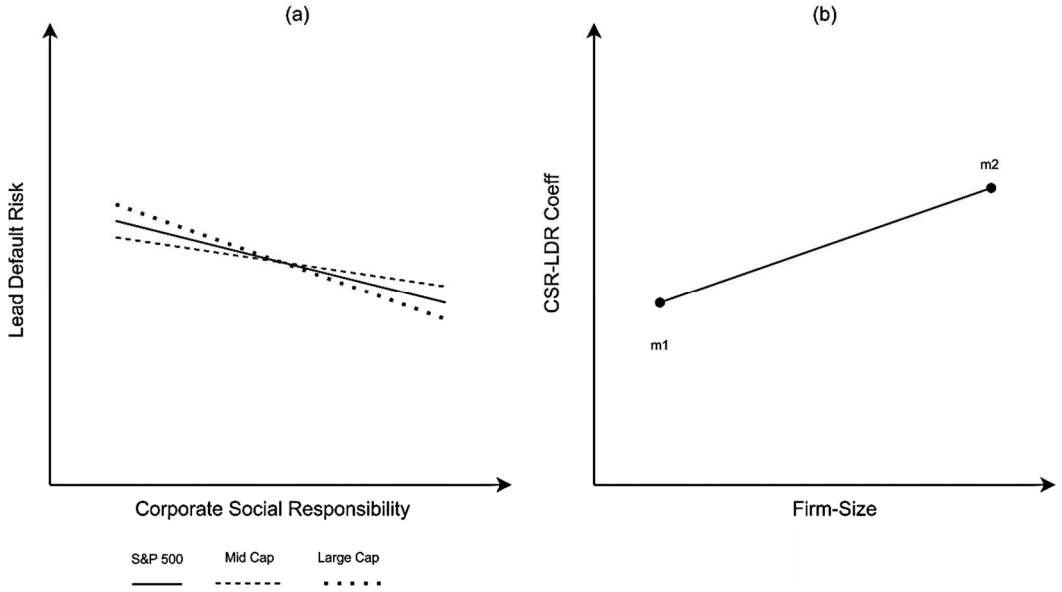

Figure 3. Firms' heterogeneous (size) effect on the relationship between CSR and FDR
Source: own elaboration.

Interestingly, although firm size and age have often been linked, this study suggests that the two are not necessarily co-dependent. We found that as the age of a firm increases, the effect of CSR on FDR diminishes. While we may see older firms as more established and therefore larger, younger firms may also exhibit larger sizes due to a variety of factors. Innovation is one such factor. Younger firms may be more disruptive and innovative, leading to rapid expansion. In contrast, older firms may be more risk-averse and focused on maintaining profitability, which can limit their growth potential.

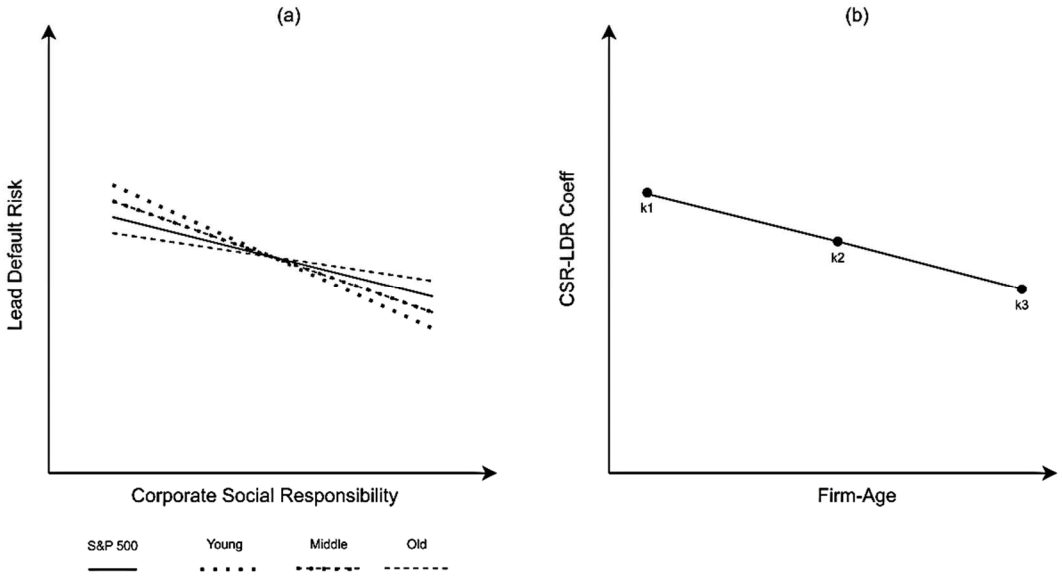

Figure 4. Firm's heterogeneous (age) effect on the relationship between CSR and FDR
Source: own elaboration.

Market conditions also play a critical role in determining firms' size, regardless of their age. Younger firms may enter a growing market and capture a large share of the market, while older firms may operate in a mature or declining market with limited growth opportunities. Resource constraints also contribute to differences in firm size. Older firms may have limited resources to invest in growth, particularly if they prioritize profitability over expansion. In contrast, younger firms may have greater access to funding or be

more willing to take on risks to invest for growth. Firm's organizational structure can impact its size and growth potential. Older firms may be more bureaucratic and hierarchical, hindering innovation and growth. Younger firms may have a more flexible and decentralized structure that allows for faster decision-making and innovation. Subsequently, this leads to the acceptance of the second and third hypotheses.

Finally, we found that industry heterogeneity impacts the relationship between CSR and FDR. Thus, we accepted the fourth hypothesis. Figure 5 shows this relationship from the context of industry heterogeneity, where industries with an intensive level of consumer interaction have a strong impact of CSR on FDR as compared to those firms which have less consumer interaction. Numerous mechanisms could account for this behaviour. Firstly, customer loyalty is critical to the success of businesses in industries that involve high consumer interaction, such as retail and hospitality. Companies in these sectors may face higher FDR if they fail to participate in CSR activities, as consumers are more likely to support businesses with a positive reputation for CSR, such as ethical labour practices and sustainable sourcing. As a result, firms may face higher FDR as consumers switch to competitors with a better CSR track record. Moreover, companies in high-consumer interaction industries may be more susceptible to negative publicity and reputational damage if they do not participate in CSR activities. Online platforms, including social media, make it easier for consumers to share information about firms, and unfavourable information can spread rapidly. Conversely, firms in sectors with less consumer interaction may be able to avoid negative publicity.

Companies in industries with high consumer interaction may face greater regulatory pressure to engage in CSR activities. Government agencies and consumer advocacy groups may be more inclined to investigate and punish businesses in sectors where customers are more vulnerable or at risk. Lastly, industries with high consumer interaction may have more opportunities to participate in CSR activities that can directly benefit their customers. For instance, a restaurant chain that sources local and organic ingredients may be able to charge a premium for its products and draw more customers. In contrast, firms in sectors with less customer interaction may not have as many opportunities to engage with their customers through CSR activities.

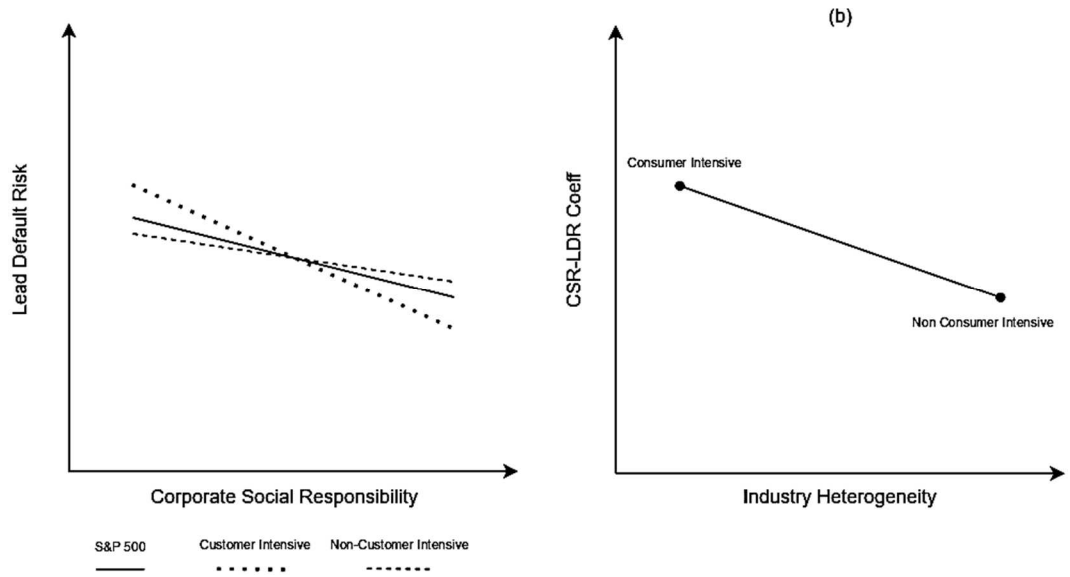

Figure 5. Heterogeneous effect of industry on the relationship of CSR and FDR
Source: own elaboration.

This study suggests two major policy implications. Firstly, from the firm heterogeneity perspective, even though CSR is a better shield for FDR in young firms, their total ESG scores prove to be in the second quantile of ESG performance. Therefore, mid-cap and young firms should introduce CSR policy to enhance their ESG performance but also guard them against FDR. Secondly, based on the findings which demonstrate that higher CSR lowers FDR in customer-oriented industries, this study strongly recommends that corporations operating in these industries enhance their CSR policies.

This will allow them to maximize CSR's positive impact on FDR. Conversely, for corporations in non-consumer-intensive industries, this study suggests emphasizing and effectively communicating their CSR performance to end consumers. This strategic approach is likely to create a stronger and more profound connection between CSR initiatives and FDR in the future. For instance, the energy and industrial industries have very limited customer interaction as they work specifically on chemicals or refineries of fuels. As this study found, in consequence, their non-customer-intensive nature does not allow them to better utilize the CSR effect, which might further protect them from default. Obviously, CSR is not just a vacuum practice; instead, it creates a connection or rather a pathway of enlightened self-interest-based exchange. Therefore, even industries with lower consumer interaction should create a channel of communication by educating their end consumer about efforts made by them to use, innovate, and improvise environmentally friendly business methods.

To some extent, this study was limited. Due to the availability of data, we studied only on the S&P 500 sample. Future research can focus on a comprehensive understanding of the financial implications of CSR by comparing its impact on various financial parameters, such as profitability, stock performance, or cost of capital, across firm and industry heterogeneity. To gain insights into the sustainability and persistence of the relationship between CSR engagement and FDR, conducting longitudinal studies that examine the long-term effects on financial indicators would be crucial. A deeper understanding of the underlying mechanisms can be achieved by exploring potential mediating or moderating factors, such as firm goodwill, financial performance, governance mechanisms, or industry competitiveness, that influence the relationship between CSR and FDR. Broadening the scope of research to different countries and regions will contribute to a broader understanding of the impact of CSR on FDR, taking into account variations in legal, cultural, and institutional contexts.

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Acknowledgements and Financial Disclosure

We obtained the data for the study from the LSEG Eikon database, based on the agreement between the London Stock Exchange Group and the University of Gdansk. University of Gdansk co-funded the publication.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120106

Factors affecting digital banking services acceptance: An empirical study in Vietnam during the COVID-19 pandemic

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ABSTRACT

Objective: The objective of this article is to examine some factors that affected the acceptance of digital banking services among consumers in Vietnam during the COVID-19 pandemic.

Research Design & Methods: A research model was proposed based on the unified theory of acceptance and use of technology (UTAUT). Multivariate data analysis techniques were used alongside partial least squares structural equation modelling (PLS-SEM). The survey data were collected from 779 respondents who have been using digital banking services in Vietnam. Those respondents were recruited through convenience sampling.

Findings: The results show that performance expectancy, effort expectancy, social influence, facilitating conditions, trust, and the perceived risk of COVID-19 affect the acceptance of digital banking services. Furthermore, the perceived risk of COVID-19 has the most significant impact on the acceptance of digital banking services, followed by effort expectancy, performance expectancy, social influence, and trust.

Implications & Recommendations: Therefore, banks have to enhance the quality of services as well as improve their advertising to help customers acknowledge the benefits of the financial services in question.

Contribution & Value Added: This study is among few studies that apply the unified theory of acceptance and use of technology (UTAUT) in the Vietnamese context of the banking industry, particularly during the COVID-19 pandemic. Thus, this study fills in the gap of the topic in a developing country context like Vietnam.

Article type: research article

Keywords: COVID-19; digital banking services; digital banking acceptance; UTAUT; Vietnam

JEL codes: M31, O33, P36

Received: 9 June 2023 Revised: 26 June 2023 Accepted: 5 October 2023

Suggested citation:

Nguyen, P.M., Vu, T.M.H., Luu, T.M.N, & Dang, T.H. (2023). Factors affecting digital banking services acceptance: An empirical study in Vietnam during the COVID-19 pandemic. *Entrepreneurial Business and Economics Review,* 12(1), 101-117. https://doi.org/10.15678/EBER.2024.120106

INTRODUCTION

In our rapidly evolving technological world, digital banking has emerged as a fundamental cornerstone of modern-day financial management. This revolutionary shift from traditional banking methods to digital platforms signifies a new era of convenience, accessibility, efficiency, and financial inclusion. The advent of digital banking has brought about substantial changes in both commercial operations and personal financial management (Jünger, 2019). The prevalence of online transactions, mobile banking, and financial automation indicates that digital banking is not only a transient phenomenon but rather an essential component of our socio-economic framework. It propels us towards a cashless society, reducing our dependency on physical currency, and has the potential to completely reshape the global economic landscape. Therefore, the importance of digital banking cannot be overstated; its role in promoting financial literacy, fostering transparency, and stimulating economic growth is pivotal in this digital age.

For banks that must devise strategies to attract customers, digital banking offers opportunities and challenges. For instance, digital banking has improved the efficiency and cost-effectiveness of technology-enabled service delivery processes. It has shifted the managerial focus toward enhancing the efficiency of digital channel operations to reduce operational costs. Adopting digital banking can intensify

rivalry among financial institutions, leading incumbents to prioritize previously neglected niches to maintain stable income streams. Overall, digital banking has democratized financial services, making them accessible, convenient, and more personalized than ever before. However, it has also introduced new challenges. Notably, cybersecurity threats are one of the most significant concerns as hackers' sophistication increases and banks deal with the increasing complexity of managing digital platforms securely. This poses a risk of financial loss and tarnishing the reputation of financial institutions. Moreover, there is a digital divide that leaves a portion of the population behind due to a lack of access to technology or digital literacy. Moreover, the continuous need for technological upgrades and maintenance can be costly and labour-intensive. The rapid pace of changing technology might render current digital banking platforms obsolete, necessitating continuous innovation and change that can be unwieldy. Finally, regulatory issues and the need for worldwide standardization are also a challenge since regulations may not keep pace with the speed of digital innovation. These are some of the challenges that banks and regulators must constantly address. Thus, research on the factors that impact the acceptance of digital banking services is crucial to promoting banks' competitive advantages of the banks.

The advent of digital banking has empowered banks to provide clients with immediate services via several distribution channels (Tam & Oliveira, 2017). The majority of scholarly investigations in this field focus primarily on the examination of consumers. Some major behavioural models have been applied to explain factors influencing the behaviour of consumers in the digital banking context such as the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT). Numerous research using the technology acceptance models have been conducted in developed and developing countries, including Bachoo (2017), Egala and Mensah (2021), Ghani *et al.* (2022), Juma (2014), Lavanya and Rajkumarb (2023), Lavanya and Rajkumarb (2023), Zhang *et al*. (2018), Khan (2022), and Anggraeni *et al.* (2021), just to name a few. These studies have provided both consistent and controversial findings about the determinants of digital banking in different research contexts.

Nowadays, it is undeniable that digitalization has become a strategic priority for the banking industry worldwide. Particularly, in the course of the Fourth Industrial Revolution and the complicated and unpredictable situation of the COVID-19 pandemic, the world witnessed the significant expansion and growth of digital banking. The necessity of digital technology for banks increased tremendously in early 2020. According to Allison Beer, a director of technology at JPMorgan Chase, the pandemic demonstrated that digital banking services are necessary for consumers of all ages to manage their finances confidently. A survey of 1500 JPMorgan Chase & Co. consumers showed that 5% had used digital tools to complete transactions during the pandemic (JPMorgan Chase & Co., 2020). The increase in digital banking services is inevitable, and consumers have continued to use digital banking to meet the demands of everyday life (JPMorgan Chase & Co., 2020). Galileo Financial Technologies surveyed banks in 2021, and 62% of consumers indicated that they were somewhat or highly likely to switch to a digital-only bank. The proportion of such users among millennials was 77%. The corresponding ratios of Generation Z and Generation X consumers were 72% and 55%, respectively (Galileo Financial Technologies, 2021).

In Vietnam, McKinsey reported that Vietnamese banks offer the fastest digital banking applications in the region. Nowadays, around 30 million individuals use online banking every day in Vietnam (McKinsey & Company, 2021). The growth rate of mobile banking is 200% (Fiin Research, 2022). The results show that Vietnam is a market that offers many opportunities for developing digital banking. Meanwhile, according to a survey by the State Bank of Vietnam in 2021, 95% of credit institutions in the country are developing and implementing digital transformation strategies, new technical solutions, and technologies such as artificial intelligence (AI), machine learning, and big data (Tran Thuy, 2022). Regarding the COVID-19 pandemic, it somehow motivated banks in Vietnam to become more proactive, adaptive, and innovative (Fiin Research, 2022).

From the practitioners' perspective, it is observed that digital banking in Vietnam has been tremendously growing in the context of the COVID-19 pandemic with the rising demand of consumers. However, from the academic viewpoint, there is not much research on factors that explain how the Vietnamese people adopt digital banking. A variety of factors that may affect the behaviours of Vietnamese bank consumers have not yet been adequately investigated. In this regard, this study aims

to examine factors affecting the acceptance of digital banking services by Vietnamese bank consumers during the COVID-19 pandemic. The article consists of five sections. Section 1 will introduce the topic. Section 2 will present the literature review and hypothesis development. Section 3 will demonstrate the research methods. Section 4 will elaborate on the research results. Finally, section 5 will mention implications and limitations.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Digital Banking and Digital Banking Services

Digital banking is a new banking service that simplifies procedures through the utilization of technology to conduct banking transactions smoothly and conveniently (Sardana & Singhania, 2020). It transforms all banking activities and services in the digital environment (Sharma *et al.*, 2017). Digital banking is a high-tech solution that includes innovative financial services for consumers and commercial customers who use mobile services and digital tools, AI, and technology distribution channels (Sharma *et al.*, 2017).

The notion of digital banking may be defined as the transformation of traditional banking services and products from offline to online platforms, enabling clients to access them remotely rather than just through physical bank branches. In digital banking, banks use financial technology to supply financial products and services to the public, intensifying competition between suppliers and boosting their reputation (Thakor, 2020).

The notion of digital banking encompasses the creation of a virtual platform that facilitates the provision and distribution of financial products and services (Cuesta, 2015). This technological advancement enables banks to gain a deeper understanding of their customers and promptly address their requirements. Furthermore, digital banking serves as an omni-channel solution, allowing customers to directly engage with their bank through mobile devices and the Internet.

Digital banking has many outstanding features, including an around-the-clock service, with all transactions conducted via the Internet and applications. Digital banking could be considered not to have banking agencies or auto banking (Scardovi, 2017). The foundation of digital banking is based on the exchange of information technology and the implementation of transactions between banks, consumers, and services (Wewege, 2017). The entire process is carried out with digital equipment. Consumers do not have to attend physical branches to conclude transactions. Likewise, bank employees do not have to meet customers. The provision of a digital banking service entails a combination of advanced financial technology and changes in internal and external relationships that improve customer service effectiveness. It is essential to promote adaptation to the competitive environment and to develop business management capabilities in the short term (Bachoo, 2017).

In a practitioner's opinion, digital banking is financial services delivered through mobile phones, personal computers, the Internet, or cards linked to a reliable digital banking system (Ozili, 2018). Digital banking services are activities that banks provide for customers with bank accounts, *e.g.* the ability to access an Internet connection via smart devices, such as laptops, personal computers, mobile phones, or tablets, to use digital banking products and services. Digital banking services include money deposits and transfers, downloadable bank statements, cash withdrawals, financial services, and account monitoring.

Unified Theory of Acceptance and Use of Technology (UTAUT) and Digital Banking Services Acceptance

The unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model formulated by Venkatesh *et al*. (2003). The UTAUT aims to explain user intention to use an information system and subsequent usage behaviour. The theory holds four fundamental constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions.

The UTAUT model was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain information systems usage behaviour. They are the theory of reasoned action, technology acceptance model, motivational model, theory of planned behaviour, a combined approach of planned behaviour and technology acceptance model, model of

personal computer use, diffusion of innovations theory, and social cognitive theory. Subsequent validation by Venkatesh *et al.* (2003) of UTAUT in a longitudinal study found it to account for 70% of the variance in behavioural intention to use (BI) and about 50% in actual use (Venkatesh *et al.,* 2003).

The UTAUT model has been widely used in many studies and then was modified to the UTAUT2 model with more factors to examine the behaviour intention of individuals in different research contexts, including e-learning (Marchewka & Kostiwa, 2007), online shopping (Yu, 2012), information technology adoption (Attuquayefio & Addo, 2014; Rozmi *et al*., 2019, Frans & Pather, 2022), e-government services (AlAwadhi & Morris, 2008), and particularly, digital banking services (Lavanya & Rajkumarb, 2023; Zhang *et al.*, 2018; Khan, 2022).

In the context of digital banking, Sathye (1999) showed that six factors affect digital banking acceptance, including a lack of security concerns, convenience, perceived service benefits, pricing, sustainability, and infrastructure. The results also demonstrate that anxiety over security and failure to recognize the benefits of online banking hampered its adoption in Australia. Grabner-Kräuter and Faullant (2008) studied the impact of trust in the Internet on risk perceptions and consumer attitudes to online banking. Trust, risk perceptions, familiarity with the Internet, and attitudes to online banking positively influenced its use. Nguyen (2020) and Frans and Pather (2022) suggested that perceived utility, awareness of the ease with the service usage, trust, risk, and convenience affect the acceptance of digital banking.

Furthermore, Anggraeni *et al.* (2021) examined factors that influence consumers' intention and usage of digital banking in Indonesia. These authors used the UTAUT2 model and confirmed that habit, hedonic motivation, and social influence affected the behavioural intention and behaviour of Indonesian people when using digital banking services. Similarly, Aria and Sacco (2023) built a model based on UTAUT and the technology acceptance model (TAM) to measure the factors affecting consumer satisfaction, retention levels towards digital banking, and financial services. In Vietnam, few studies using UTAUT have been conducted to examine factors affecting the intention to adopt digital banking services, including Nguyen *et al.* (2020) and Pham (2022).

Particularly, some studies have considered the context of COVID-19 that affects digital banking acceptance. For example, Riza (2021) applied the UTAUT2 model to examine the factors that drive the adoption of digital banking of Islamic banks during the COVID-19 pandemic. This author confirmed that people have trust, acceptance and satisfaction with the digital banking service of Islamic banking technology. Meanwhile, Musyaffi *et al.* (2021) examined factors that determine digital payment usage during the COVID-19 pandemic in Indonesia. Musyaffi *et al.* (2021) asserted that some factors in the UTAUT model positively affected behavioural intention to use digital banking but social influence did not affect behavioural intention. Some studies also tested the influence of factors in the UTAUT model on the digital banking usage of enterprises (Ahmed & Sur, 2021), and digital banking effectiveness (Ghani *et al.,* 2022). In several studies, some variables have been added to the UTAUT model to investigate their impact on digital banking acceptance, such as habit, satisfaction (Ibrahim *et al*., 2022), perceived risk, trust (Ali *et al.,* 2022), and credibility (Yuliana & Aprianingsih, 2022).

Research Model and Hypotheses

In this study, the research model was premised on the UTAUT (Venkatesh *et al.*, 2003) and adopted from the research of Kim and Gim (2017), Nguyen (2020), and other studies. The main factors in the research model were selected from UTAUT. They included (1) performance expectancy, (2) effort expectancy, (3) social influence, (4) facilitating conditions, and (5) trust in consumer behaviour research during the COVID-19 pandemic, to which the author added (6) perceived risk that affects the acceptance of the technology among consumers (Aji *et al.*, 2020; Hu *et al.*, 2019) (Figure 1).

Performance expectancy (PE) is defined as the expectation of accomplishments and results, the 'degree to which an individual believes using the system will enable him/her to attain gains in job performance' (Venkatesh *et al*., 2003). Previous studies, including Kim and Gim (2017), Martins *et al*. (2014), Egala *et al.* (2021), and Musyaffi *et al.* (2021) showed that PE positively influences digital banking adoption. In light of the previous research on the impact of performance expectancy on the acceptance of technology, we hypothesised:

H1: Performance expectancy positively correlates with bank consumers' UA.

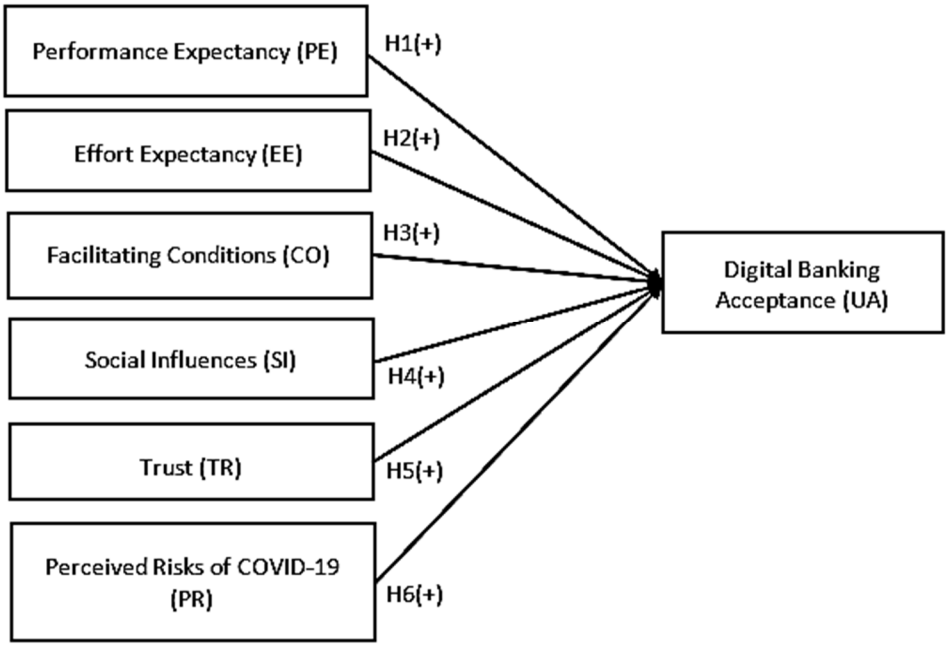

Figure 1. Research model
Source: own elaboration.

Venkatesh *et al.* (2003) showed that effort expectancy (EE) is the degree of ease of using a system. An effort is necessary to use any system, whether complicated or simple. User-friendly technology can be accepted and applied easily by users. Most users prefer technology because of its flexibility and usefulness and because they are aware of the ease with which it may be used. According to Giesing (2005), effort expectancy is a significant factor that impacts the decision to use a service. In the banking industry, Anggrani *et al.* (2021), Riza (2021), and Musyaffi *et al.* (2021) confirmed that EE has a positive impact on digital banking adoption. Thus, we developed the following hypothesis.

H2: Effort expectancy positively correlates with bank consumers' UA.

The notion of facilitating conditions (CO) captures the degree to which an individual believes that organizational and technical infrastructure exists to support the use of the system (Venkatesh *et al.*, 2003). Furthermore, Kim and Gim (2017), Senthye (1999), Nguyen (2020), and Thomas *et al.* (2023) suggested that facilitating conditions have a positive correlation with the acceptance of digital banking services. From those arguments, in this study, we proposed hypothesis H3:

H3: Facilitating conditions positively correlate with bank consumers' UA.

Social influence (SI) captures the degree to which an individual perceives that important others (colleagues, relatives, and subordinates) in their social circle believe that they should use the new system (Venkatesh *et al.*, 2003) such as the digital banking system (Osatuyi & Turel, 2019). In this context, the term 'social circle' pertains to the customer's subjective evaluations of the critical elements associated with digital banking, as influenced by those within their personal network, such as family members, coworkers, or friends. To gain acceptance within their social milieu, consumers conform to the prevailing group or societal standards (Osatuyi & Turel, 2019). Some studies have proved that SI positively impacts the usage of a technology-based system (Kunz & Santomier, 2020; Talukder *et al*., 2019; Musyaffi *et al.*, 2021). Therefore, in the banking industry context, we formulated the following hypothesis.

H4: Social influence positively correlates with bank consumers' UA.

Trust (TR) depends on whether customers can feel secure when using a service without having to preoccupy themselves with risks or other issues (Gefen *et al*., 2003). As far as the acceptance of digital banking is concerned, trust impacts attitudes and acceptance among potential consumers

(Page & Luding, 2003). Similarly, some researchers have shown that customer trust plays a vital role in the acceptance of digital banking services (Basak *et al*., 2016; Hanafizadeh *et al.*, 2014; Koksal, 2016). In this study, we also assumed the positive effect of trust on the digital banking acceptance of Vietnamese consumers. Thus, we hypothesised:

H5: Trust positively correlates with bank consumers' UA.

Most previous studies have focused exclusively on perceived privacy, security, or financial risks. Few contributions focus on the perceived risk of disease as a factor that impacts consumers' intention to use digital payments. Likewise, digital payments are considered to be a preventive health measure that mitigates the risks of contracting COVID-19 (Sreelakshmi & Prathap, 2020). Using cash and other payments that involve close physical contact could accelerate the spread of COVID-19. The WHO encourages consumers to use digital and contactless payments (Durr, 2020). Some studies on digital banking during the COVID-19 pandemic showed that the perceived risk (PR) of COVID-19 was associated with an increase in the use of digital wallets (e-wallets) for financial activities. For instance, Aji *et al.* (2020) reported that the outbreak of COVID-19 negatively impacted consumers' intention to use cash in Indonesia and Malaysia. Moreover, Daragmeh and colleagues (2021) showed that PR positively impacts the acceptance of financial technology (Daragmeh *et al*., 2021). Thus, we developed hypothesis H6 as follows.

H6: Perceived risk positively correlates with bank consumers' UA.

RESEARCH METHODOLOGY

Measurements

We adopted and adapted the measurements of the present study from existing literature related to UTAUT application in various contexts, including the studies of Kim and Gim (2017), Sathye (1999), Venkatesh *et al.* (2003), Nguyen (2020), Aji *et al.* (2020), and Sreelakshmiand and Prathap (2020). We selected six measurement items, which are performance expectancy (four items), effort expectancy (four items), facilitating conditions (five items), social influences (four items), trust (four items), and perceived risk of COVID-19 (four items).

Before the official survey, to verify the appropriateness of the research model and measurements in the Vietnamese context, we discussed the research model and the measurement scales with medical and economic experts and with banking consumers in Hanoi and Ho Chi Minh City (five economics experts, two medical experts, and five banking consumers). The results of the discussions and the interviews indicated that the acceptance of digital banking is affected by the following factors: (1) performance expectancy, (2) effort expectancy, (3) social influence, (4) facilitating conditions, (5) trust, and (6) the perceived risk of COVID-19. Specifically, the perceived risk of COVID-19 exerted a large influence on consumer acceptance of digital banking services during the pandemic. Experts and interviewees agreed that all 25 measurement items are suitable for the research context in Vietnam. Table 1 shows the items in the measurements. In each question, we asked the respondents to express their opinions about the impact of various factors on the acceptance of digital banking services on a five-point Likert scale, with response options ranging from 1= 'totally disagree' to 5 = 'totally agree.'

Sample and Data Collection

We conducted an experimental study before the official quantitative research to ensure that all questionnaires were understandable and to provide information appropriate for the research goals. We prepared the questionnaire in Vietnamese so that the banking consumers could fully understand the meaning of each question. The pilot sample consisted of 50 Hanoi and Ho Chi Minh City banking consumers. Due to the severe COVID-19 pandemic in mid-2020 in Vietnam, we could not approach the respondents in person. Thus, our research team posted the call for the survey in social groups and forums. Some active banking consumers answered our call in the groups and forums. Then, we approached them directly with instant messages and phone calls. Upon receiving the agreement of the 50 advocates for our pilot test, the questionnaires were sent to them to complete, and they were interviewed directly via phone calls or Zoom meetings. After a week, we added 41 valid responses

(provided by 22 women and 19 men) to SPSS 24.0 software for analysis. The reliability results showed that Cronbach's alpha coefficient of the independent variables was greater than 0.6 and that KMO = 0.881, which exceeded 0.5 with a significance of 0.000. Therefore, we concluded that the measurements are reliable for the official survey. We used Harman's single-factor test to assess the potential risk of common method variance. We subjected all categories to exploratory factor analysis using principal component analysis and varimax rotation. The first factor accounted for 37.37% of the total variance. Thus, common method bias was not a potential problem in this study.

Table 1. List of measurement items

Observed variables	Factors	Sources
Performance expectancy (PE)	Using digital banking services saves me time.	Kim & Gim (2017); Sathye (1999); Venkatesh *et al*. (2003)
	Using digital banking services helps me manage my financial plan efficiently.	
	Using digital banking services helps me make transactions easier.	
	Using digital banking services helps me save money.	
Effort expectancy (EE)	Signing up for digital banking services is extremely simple.	Giesing (2005); Kim & Gim (2017); Sathye (1999); Venkatesh *et al.* (2003)
	Digital banking functions are easy to use.	
	I spend little time getting used to digital banking services.	
	I spend little time retrieving my transaction history data.	
Facilitating conditions (CO)	Installing digital banking applications on mobile devices is easy and quick.	Kim & Gim (2017); Sathye (1999)
	Digital banking services satisfy my demand thanks to 24/7 availability.	
	The bank has a system to promptly respond to users' requests.	
	The bank provides me with many incentives to use the products and services of its partners.	
	Digital banks help me connect to online financial services (payment of expenses, invoices, etc.).	
Social influences (SI)	When I use digital banking services, I think people will appreciate me.	Kim & Gim (2017); Venkatesh *et al.* (2003)
	Others who use digital banking services significantly impress me.	
	My family thinks that I should use digital banking services.	
	My colleagues believe that digital banking services are beneficial.	
Trust (TR)	The websites and apps of the prestigious banks are reliable.	Hu *et al.* (2019); Nguyen (2020)
	Digital banks always try to benefit customers.	
	Banks comply with the announcements of digital banks.	
	Digital banks carry out what banks commit to their customers.	
Perceived risk of COVID-19 (PR)	I am worried about being infected with COVID-19 when I use cash and financial services that require in-person interaction.	Aji *et al. (*2020); Sreelakshmi & Prathap (2020)
	I am worried about being infected with COVID-19 when there are microscopic droplets on the surface of banknotes.	
	Using digital banking services helps me avoid contact with crowds.	
	I do not feel comfortable when paying in cash during financial transactions.	
Usage acceptance (UA)	I agree to use digital banking services even without the COVID-19 pandemic.	Kim & Gim (2017); Sathye (1999); Venkatesh *et al.* (2003)
	I agree to recommend digital banking services to others.	
	Digital banking will be a method that will completely replace direct transactions at banks.	

Source: own study.

We collected the data in the official sample through the convenience sampling method. Using social networks and forums, the author team sent the questionnaire to consumers in large cities, including Hanoi, Ho Chi Minh, Da Nang, Hai Phong, Ha Long, Hue, and Can Tho. We started the online survey with friends in our social network. We successfully approached 30 early advocates of our survey and encouraged them to spread our survey among other members of their social network.

We conducted the online poll over three months. After eliminating invalid responses, we analysed 779 valid ones. Table 2 summarises the results.

Table 2. Sample demographics

Information	Features	Number	Percentage
Gender	Male	282	36.3%
	Female	497	63.7%
Age	Aged 18-22	105	13.47%
	Aged 23-30	242	31.06%
	Aged 31-40	221	28.34%
	Aged 41-50	122	15.66%
	Aged 51-60	87	11.11%
	Above 60	2	0.36%
Names of banks	Vietcombank	152	19.51%
	BIDV	179	22.97%
	Techcombank	137	17.58%
	Vietinbank	81	10.4%
	MSB	24	3.2%
	VPBank	78	10.1%
	MB Bank	73	9.4%
	TP Bank	18	2.3%
	Agribank	12	1.6%
	Others	25	2.94%
Income per month	Under 5 million VND	34	4.36%
	5-10 million VND	134	17.20%
	10-15 million VND	176	22.59%
	15-20 million VND	195	25.03%
	Above 20 million VND	240	30.82%
Occupation	Civil servants	173	22.20%
	Students	76	9.75%
	Office staff	231	29.65%
	Businessman	257	32.99%
	Workers	28	3.59%
	Freelancers	14	1.82%
Academic degree	High school	42	5.39%
	Trade school	72	9.24%
	College	156	20.02%
	University	238	30.55%
	Postgraduate	271	34.8%

Source: own study.

Data Analysis

We tested the reliability and validity of measurements in SmartPLS 3.3.9. We also evaluated the factors that affected the acceptance of digital banking services among Vietnamese consumers during the COVID-19 pandemic using partial least squares path modelling (PSL-PM) and partial least squares structural equation modelling (PLS-SEM). We chose PLS-SEM for numerous reasons. Firstly, PLS-SEM allowed researchers to measure complex models with many constructs, indicator variables, and structural paths without imposing distributional assumptions on the data. Secondly, PLS-SEM is a causal-predictive approach to SEM that emphasizes prediction in estimation; that is, it is designed to provide causal explanations. Thirdly, PLS-SEM is also helpful for small samples. In this research, the number of respondents, 779, was much smaller than the national population. Therefore, PLS-SEM was suitable for the study.

RESULTS AND DISCUSSIONS

Research Results

The reliability of the scales was tested in SmartPLS by reference to many factors, including Cronbach's alpha and composite reliability (CR). Furthermore, the validity of the items was measured by reference to the variance inflation factor (VIF), average variance extracted (AVE), the Fornell-Larcker criterion, adjusted R^2, and SRMR. Both R^2 = 0.698 and SRMR = 0.069 were below 0.08 at a significance level of 0.000, which demonstrates the appropriateness of the model. Concluding, 68% of the variability in consumer acceptance can be explained by the six independent variables in the model. The remainder (32%) is explained by other variables (Table 3).

Table 3. Results of tests of the appropriateness of the research model

Constructs	Item	Loading	VIF	Cronbach'salpha	CR	AVE
Use acceptance (UA)	UA1	0.910	2.609	0.857	0.913	0.778
	UA2	0.908	2.558			
	UA3	0.826	1.779			
Facilitating conditions (CO)	CO1	0.868	2.264	0.881	0.912	0.676
	CO2	0.795	1.853			
	CO3	0.837	2.362			
	CO4	0.760	1.854			
	CO5	0.845	2.365			
Performance expectancy (PE)	PE1	0.904	3.012	0.846	0.894	0.681
	PE2	0.757	1.874			
	PE3	0.882	2.851			
	PE4	0.745	1.835			
Effort expectancy (EE)	EE1	0.896	3.022	0.912	0.938	0.792
	EE2	0.928	3.955			
	EE3	0.897	3.095			
	EE4	0.836	2.177			
Perceived risk of COVID-19 (PR)	PR1	0.853	2.494	0.833	0.890	0.670
	PR2	0.862	2.732			
	PR3	0.857	2.023			
	PR4	0.690	1.387			
Trust (TR)	TR1	0.875	2.426	0.881	0.918	0.738
	TR2	0.877	2.652			
	TR3	0.891	2.725			
	TR4	0.791	1.760			
Social influences (SI)	SI1	0.771	1.851	0.828	0.886	0.660
	SI2	0.843	0.190			
	SI3	0.834	0.860			
	SI4	0.799	0.663			

Note: Adjusted R^2 = 0.698; SRMR = 0.069; *F* = 64.181; Sig = 0.000[b]
Source: own study.

The results also show that the overall reliability scores of the scales were larger than 0.7 and that convergent validity was larger than 0.6 (Table 5), which means that all values met the test requirements. Moreover, VIF < 5 indicates that multicollinearity might not affect the results significantly. We tested discriminant validity by reference to the Fornell-Larcker criterion and the heterotrait-monotrait ratio of correlations (HTMT). Table 4 displays the results for the Fornell-Larcker criterion.

The results for the Fornell-Larcker criterion show that all values were also in the square, with values from 0.812 to 0.890 for all structures (bolded values), and they were more significant than any correlation coefficients horizontally and vertically pixels. Overall, the constructs of the research appeared to be valid.

Table 4. Results for Fornell-Larcker criterion

Variables	UA	CO	PE	EE	PR	TR	SI
UA	**0.882**						
CO	0.568	**0.822**					
PE	0.598	0.406	**0.825**				
EE	0.665	0.543	0.500	**0.890**			
PR	0.675	0.385	0.445	0.481	**0.819**		
TR	0.635	0.486	0.477	0.500	0.511	**0.859**	
SI	0.507	0.322	0.284	0.364	0.416	0.405	**0.812**

Source: own study.

Table 5 shows the results of the test of the heterotrait-monotrait ratio of correlations (HTMT). The results show that the value was less than 0.79, which was acceptable.

Table 5. Test of the heterotrait-monotrait ratio of correlations

Variables	UA	CO	PE	EE	PR	TR	SI
UA							
CO	0.638						
PE	0.674	0.451					
EE	0.746	0.586	0.548				
PR	0.791	0.436	0.491	0.549			
TR	0.722	0.544	0.531	0.555	0.586		
SI	0.592	0.379	0.333	0.418	0.497	0.466	

Source: own study.

At the same time, the results also showed that $p < 0.05$, which indicates that the relationship under observation was significant (Table 2).

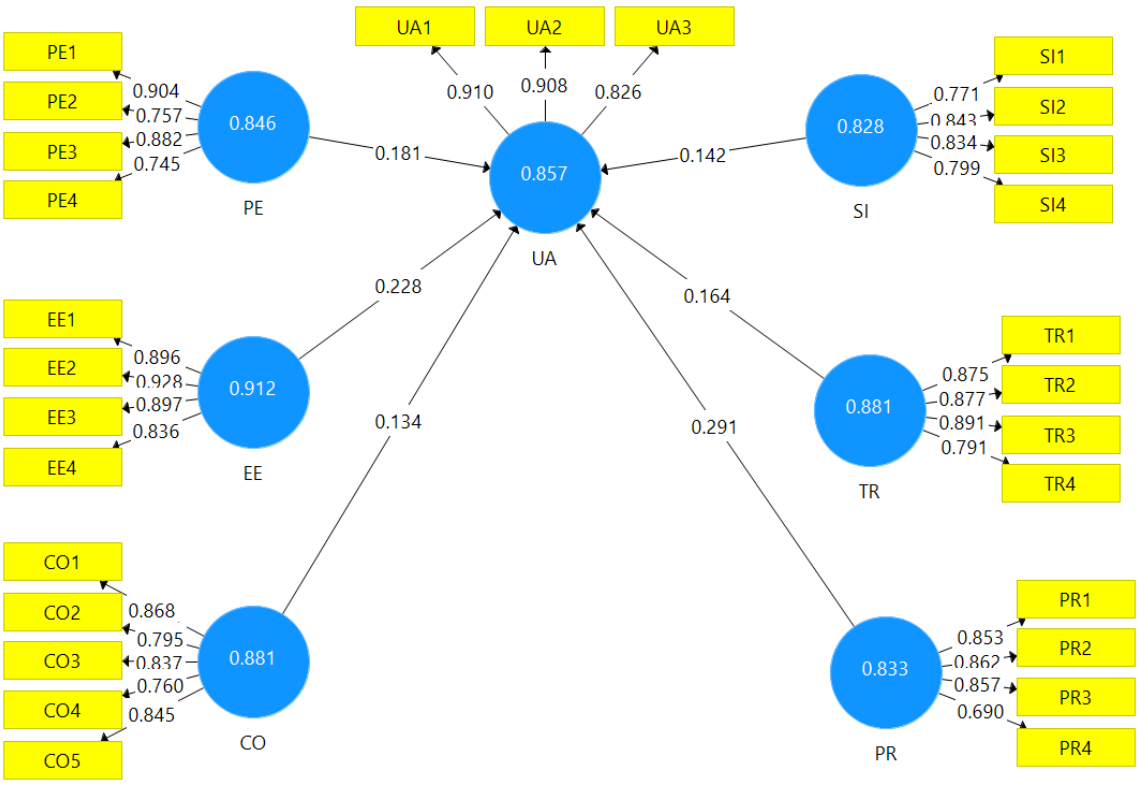

Figure 2. Structural model analysis results
Source: own elaboration in SmartPLS.

As illustrated in Figure 2, PR had the most significant impact on the acceptance of digital banking services (β = 0.291; t = 5.570; p = .000), followed by EE (β = 0.228; t = 4.126; p = 0.000), PE (β = 0.181; t = 3.370; p = 0.001), and TR (β = 0.164; t = 2.962; p = 0.003). Two factors, *i.e.* CO (β = 0.134; t = 2.573; p = 0.011) and SI (β = 0.142; t = 2.696; p = 0.008), had a small impact on the acceptance of digital banking. Thus, H1, H2, H3, H4, H5, H6 were accepted. All factors in the model had regression coefficients $\beta > 0$. Therefore, these factors positively impacted the acceptance of digital banking services. The results indicated that the regression equation for Vietnamese consumers' acceptance of digital banking services during the pandemic may be written as follows:

UA=0.076+0.181*PE+0.228*EE+0.134 *CO+0.142*SI+0.164*TR+0.291*PR

Discussion

The results show that six factors, which are (1) performance expectancy (PE), (2) effort expectancy (EE), (3) social influence (SI), (4) facilitating conditions (CO), (5) trust (TR), and (6) perceived risk of COVID-19 (PR), positively influenced Vietnamese bank consumers' acceptance of digital banking services during the COVID-19 pandemic. Our results cohere with other findings on the acceptance of digital banking services in Vietnam and globally such as Pham (2022), Anggraeni *et al.* (2021), Riza (2021), Musyaffi *et al.* (2021), and some others.

Interestingly, PR was the most important factor influencing digital banking acceptance in Vietnam. This finding is attributed to the research period when we were suffering from the disruption of all industries due to the COVID-19 pandemic. Moreover, in a cash-based transaction country like Vietnam, people are reluctant to using non-cash payments. We may consider the COVID-19 pandemic as a trigger that dramatically changed the conventional payment methods in Vietnam. Coronavirus preventive measures pushed Vietnamese bank consumers to use online payment more than ever before. Other studies in Malaysia, Indonesia, Pakistan, and India on digital banking usage during the COVID-19 pandemic provide findings similar to ours. They include Riza (2021), Jena (2023), and Yan *et al.* (2021). For example, Ali *et al.* (2022) investigated 254 Pakistanese people and found that PR moderates the relationship between UTAUT elements and bank consumers' intention to use digital banking services. However, some studies did not confirm the positive relationship between PR and intention to use digital banking services.

Furthermore, in our study, trust (TR) was very critical in determining the Vietnamese bank consumers' digital banking acceptance. This finding may be explained based on the specific context of Vietnam, a collectivist country. As our culture is characterized by collectivism, Vietnamese people are believed to be strongly influenced by referent others when making decisions in their lives, including the digital banking adoption. Our finding was in compliance with previous studies by Ibrahim *et al.* (2022), Juma (2014), Zhang *et al.* (2018).

Finally, our study confirmed that four main factors, *i.e.* PE, EE, CO, SI, have a positive impact on Vietnamese bank consumers' acceptance of digital banking services, indicating the the UTAUT model is suitable in the Vietnamese context. Our findings are in line with several studies, *e.g.* Yuliana and Aprianigsih (2022), Pham (2022), and Ibrahim *et al.* (2022). However, the study of Anggraeni *et al.* (2021) showed that effort expectancy, facilitating conditions, performance expectancy and price value do not have a significant relationship. The controversial findings about the impact of UTAUT factors on digital bank acceptance reveal that there should be more empirical research on this topic and the contextual factors might play their role as moderators.

CONCLUSIONS

Theoretical and Practical Implications

In terms of theory, the contributions of this study have two aspects. Firstly, this study confirms the application of UTAUT in an Asian emerging context (Vietnam), which is a new research context with few studies on digital banking acceptance. Thus, it provides more evidence of how effective UTAUT is in explaining the behaviour of individuals in various contexts. Secondly, we added two new variables,

i.e. trust and perceived risk of COVID-19, to the UTAUT model to test their impact on digital banking acceptance in the Vietnamese banking industry. Particularly, the perceived risk of the COVID-19 pandemic is a contextual factor that has been fully considered and added to the research framework. In our study, we demonstrated that the adaptation of UTAUT with new variables is a valid variant.

In terms of practice, this study has some implications for commercial banks in Vietnam. Our research findings indicate that, during the COVID-19 pandemic, the perceived risk of contracting the disease (PR) was tolerable and that it had a sizable impact on the acceptance of digital banking services. Although the pandemic affected the lives of Vietnamese individuals and enterprises negatively, it has also promoted the transformation and modernization of traditional business techniques and the use of technology in commerce. In the past, businesses and citizens were anxious about e-commerce and online payments. After the pandemic, online shopping became common. As a result, the use of cash declined while that of online payments increased significantly. According to the State Bank of Vietnam, as of April 2022, the number of cashless payments had increased by 69.7%, and their value had risen by 27.5% (Tran Thuy, 2022). Likewise, the number and volume of online transactions had increased by 48.39% and 32.76%, respectively. The number of payments via QR code had risen by 56.52%, and their total value had increased by 111.62% relative to the same period in 2021. The total number of active e-wallets was 10.7% higher than in 2021 (Tran Thuy, 2022). Online payment is considered a means of enabling retail businesses to overcome the difficulties that the outbreak of the pandemic created.

From our findings, we can identify the trends in digitalization and cashless payments in Vietnam. We found a positive impact of the UTAUT factors and two contextual factors. Therefore, digital banking services will grow considerably soon. In such a context, commercial banks in Vietnam must improve and innovate in line with customer demands while benefiting from government support to expand the market and see it grow. Firstly, digital banks should update and upgrade their software. Simplifying work processes, enhancing supporting features that improve the consumer experience, and ensuring the reliability and security of the service should also be prioritized.

Secondly, the cost of using the service should be optimized. Cost of usage is one factor that is decisive for consumer expectations about effectiveness. Most consumers can change their banking habits if all interactions are digitized. However, the cost could hinder acceptance. Thus, banks must introduce numerous promotion programs, decrease the costs of online payments, provide services tailored to the particularities of online transactions, support businesses when they encounter adversity, and guarantee social security benefits.

Thirdly, the registration process should be simplified. Furthermore, personal data should be incorporated into identifier codes. Finally, banks should change their procedures to create a convenient user experience.

Fourthly, marketing campaigns should be deployed to advertise digital banking services. Strategic approaches should be formulated and the market should be expanded via word-of-mouth marketing. Customer appreciation strategies should be developed to strengthen the relationship between consumers and digital banks.

Fifthly, connections should be enhanced by setting up an ecosystem associated with consumer services. Developing cooperation with businesses and launching incentives encouraging consumers to make digital payments would be helpful. The digital payment of bills for utilities, such as water, electricity, telecommunications, and such, should be promoted. Virtual assistants should be used to support consumers when they make online payments.

Sixthly, information technology infrastructures should be upgraded. Artificial intelligence AI should be used to store and handle work. Information should be encrypted, and, as far as modes of authentication are concerned, the use of virtual assistants should increase to avoid operational problems and minimize dependence on bank staff. Network security should be enhanced and risks should be controlled.

Limitations and Future Research Suggestions

This study has some limitations. Firstly, the research model was limited to the UTAUT framework and added only two new variables. Thus, the results show that the adjusted R^2 of the model was 0.68, indicating that 68% of the variation in the acceptance of digital banking services was explained by six

variables which were performance expectancy, effort expectancy, social influence, facilitating conditions, trust, and perceived risk of COVID-19. However, many other factors may affect the acceptance of digital banking services, but we did not mention them in this article. Furthermore, the convenience sampling method is not optimal, because it might cause potential biases in the sample and findings.

For the limitations mentioned above, we suggest that future research expands the research model with more variables as moderators and mediators. For example, if the research context can be extended to other countries in Asia, national culture might be considered a mediating variable in the research model. Moreover, we suggest that future studies expand the sample size to increase the ability to generalize the research results to the whole population. Furthermore, as AI applications have been becoming more popular recently in the banking industry, we also suggest that future research might consider examining digital banking services in the AI-driven and tailor-made consumer approach.

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Acknowledgements and Financial Disclosure

The authors would like to thank the anonymous referees for their useful comments, which allowed to increase the value of this article. This research is funded by International School, Vietnam National University, Hanoi.

Conflict of Interest

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120107

What drives export resilience? The case of post-transition country firms in the context of the COVID-19 pandemic

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ABSTRACT

Objective: The objective of this article is to explore the determinants of export resilience, considering the interactions of firm capabilities with prior export commitment and environmental hostility.

Research Design & Methods: We integrated insights from the organisational capabilities perspective, internationalisation process theory, and literature on environmental hostility to create a conceptual framework exploring how and under which boundary conditions firm capabilities drive export resilience. We proposed that this relationship is moderated by prior export commitment and environmental hostility. We tested the propositions on a sample of 500 Polish exporters in a COVID-19 environment.

Findings: We found empirical support for the positive interaction of firm capabilities with environmental hostility on export resilience.

Implications & Recommendations: Among others, we observed that firms facing higher environmental hostility must rely on their capabilities to a larger extent, leading to increased export resilience in terms of maintaining or expanding export operations and building up export-specific capabilities.

Contribution & Value Added: While economic crises have reinforced interest in organisational resilience, less attention has been paid to the resilience of exporting under crisis conditions. Export resilience has preferably been addressed from the point of view of its continuity or survival, rather than accounting for a more proactive view of the firms' approach to exports under conditions of environmental hostility.

Article type: research article

Keywords: export resilience; firm capabilities; environmental hostility; post-transition country firms; COVID-19

JEL codes: F23; M16; M21

Received: 19 June 2023 Revised: 16 September 2023 Accepted: 24 October 2023

Suggested citation:

Gorynia, M., Nowak, J., Trąpczyński, P., & Wolniak, R. (2024). What drives export resilience? The case of post-transition country firms in the context of the COVID-19 pandemic. *Entrepreneurial Business and Economics Review,* 12(1), 119-133. https://doi.org/10.15678/EBER.2024.120107

INTRODUCTION

Economic crises have attracted the attention of scholars from various disciplines studying their macroeconomic repercussions (Allen & Carletti, 2010) and microeconomic consequences on firm performance (Antonioli *et al.*, 2011; Kryeziu *et al*., 2022). Firms' strategic management during crises has gained importance (Cerrato *et al*., 2016), especially in the context of how crises affect performance based on firm characteristics (Pittiglio *et al.,* 2014). Scholars have also focused on resilience, which refers to organisational survival amid unexpected adverse conditions (Calabrò *et al*., 2020; Fombella *et al*., 2022; Tsiapa & Batsiolas, 2019) caused by large-scale disturbances or cumulative disruptions (Linnenluecke, 2017). However, as Linnenluecke (2017) indicates, conceptualisation and definitions of organisational resilience vary across studies. Hillman (2021) and Hepfer and Lawrence (2022) echo this as they point to conceptual ambiguity and the fragmented nature of literature on organisational resilience. Linnenluecke (2017) provides a useful conceptualisation of the various streams of studies in this field. He distinguishes five research streams on resilience. Our

study falls into two of them: resilience as an organisational response to external threats and the adaptability of business models (Linnenluecke, 2017).

The recent COVID-19 pandemic highlighted the vital role of organisational resilience towards crisis (Remeikienė *et al.*, 2023; Halmai, 2022; Fombella *et al.*, 2022; Grimmer, 2022; Rapaccini *et al*., 2020). Although some evidence exists regarding the sectoral impacts of the COVID-19 pandemic (Demirgüç-Kunt *et al.,* 2021; Tu *et al.,* 2021; Androniceanu & Marton, 2021; Marona & Tomal, 2023) and the impact of country-level variables on firm performance (Shen *et al*., 2020; Hu & Zhang, 2021), there is a scarcity of firm-level studies examining the determinants of export operations during crisis conditions (Massaro *et al*., 2017). While previous research has focused on the international business context of the 2007-2009 financial and economic crisis (Amendola *et al.*, 2012; Lee & Makhija, 2009; Filippov & Kalotay, 2011), the impact of the pandemic on firm performance remains to be studied.

Withdrawals from foreign markets are common even in the absence of crisis conditions, highlighting the challenges firms face in sustaining export activities (Arte & Larimo, 2019; Eduardsen Marinova, & Marinov, 2022; Larimo *et al*., 2022). External stimuli, along with internal factors such as firm resources, have been found to play a role in the reduction of foreign operations (Swoboda *et al.*, 2011). The interplay between these external and internal factors is closely linked to resilience (Conz & Magnani, 2020). Existing research suggests that firm capabilities, particularly innovativeness, positively influence export performance in times of crisis (Massaro *et al.*, 2017). However, the interplay of environmental hostility, firm capabilities, and resilience in the context of export activities remains largely unexplored (Balabanis & Spyropoulou, 2007). Moreover, export performance is reinforced by a company's history of international operations, although external factors can disrupt or reverse this process (Johanson & Vahlne, 2009).

We aimed to investigate the determinants of export resilience, while considering the interplay between firm capabilities, prior export commitment, and environmental hostility. We utilised primary data collected during the COVID-19 pandemic, focusing specifically on manufacturers exporting from Poland. We refer to these firms of diverse size and levels of export experience as post-transition country exporters, as they are headquartered in a country considered to have completed the institutional transition process to a market-led economic system (*e.g.* Jankowska *et al.,* 2021). The article will delve into theoretical foundations, present propositions, outline research design, showcase results on the repercussions of the COVID-19 pandemic, and thereafter discuss the findings with their implications for conceptual, managerial, and policy-related issues and considerations (Androniceanu, 2020).

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The Role of Firm Capabilities in Export Resilience

Many scholars have focused on the interface between economic crisis and company internationalisation (*e.g.* Massaro *et al.*, 2017). While extant macro-level evidence suggests that the outcomes of a crisis on firms' international business operations should primarily be negative, this link can depend on several factors. The role of internationalisation for firm performance is determined by various organisational variables, and we should not consider it in isolation as firms have to possess capabilities to handle internationalisation (Verbeke & Brugman, 2009; Urban *et al*., 2023). Organisational capabilities encompass non-imitable managerial competencies which convert financial and material resources into competences that are crucial for a firm's international competitiveness (Teece *et al.*, 1997). Spanos and Lioukas (2001) and Ruiz-Ortega *et al.* (2013) focus on technological and marketing capabilities, which play significant roles in different stages of the value chain. Technological capabilities relate to a firm being able to develop new products or processes which enhance operational effectiveness (Spanos & Lioukas, 2001). These abilities encompass technological know-how in different forms, such as patents. Marketing capabilities pertain to gaining a competitive edge in firm-customer relations (Teece *et al.*, 1997) and encompass abilities that enable firms to grasp market dynamics and operate effectively within them (Day, 1994).

Scholars have noted that firms equipped with such capabilities show a positive relationship with the level of export sales (Dhanaraj & Beamish, 2003; Ključnikov *et al*., 2022a). These resources facilitate export activities by addressing various export barriers (Majocchi *et al.*, 2005; Civelek & Krajčík,

2022; Ključnikov *et al*., 2022b). While capabilities have been generally found to drive export performance, they are also connected to the notion of resilience (Fombella *et al.*, 2022; Calabrò *et al.*, 2021). A part of extant research on firm resilience refers to it as an ability or capacity to withstand, adapt, and cope with turbulent changes, environmental risks, perturbations, or external shocks (Conz & Magnani, 2020). In particular, research emphasises three core competences: adaptability, innovativeness, and flexibility. Thus, being able to adapt, innovate, and stay flexible allows firms to swiftly adjust their routines and strategies, forging a resilient reaction to shocks. In line with the resource-based approach, having a superior resource mix gives firms a better chance to cope with crises (Calabrò *et al.*, 2021). When crisis arrives, such firms become more resilient because of their ability to muster their assets to sustain their operations (Fombella *et al.*, 2022).

Therefore, we argue that with a better endowment in managerial capabilities, exporters will be more able to develop their international presence. Without the necessary capabilities to make the right decisions concerning export markets under the conditions of dynamism and hostility, export performance can deteriorate (Balabanis & Spyropoulou, 2007). Moreover, if an exporting firm is to engage in new foreign commitments entailing the generation of new knowledge about foreign markets, it must in fact, have appropriate managerial capabilities to start with, particularly if it is relatively inexperienced (Hennart, 2012). On the other hand, technological capabilities, such as those which may enable incremental innovation, have also been found to sustain export performance under crisis conditions (Braja & Gemzik-Salwach, 2020; Massaro *et al.,* 2017).

Following the above arguments and previous evidence on the role of firm-level capabilities for firm performance (*e.g.* Zahra & Garvis, 2000), we argue that exporters with more pronounced marketing and technological capabilities will be better positioned to sustain their international market commitments under pandemic conditions. Accordingly, we hypothesised:

H1: Firm capabilities positively influence export resilience.

The Moderating Role of Prior Export Commitment

Further, when analysing the antecedents of export resilience, we had to consider the current context of firms' international commitments. Noteworthy, the revised Uppsala model recognizes the complexities of internationalisation, emphasising the significance of relationships, networks, and challenges associated with being foreign or uncertain in international business (Johanson & Vahlne, 2009). Recent studies highlight the importance of pre-crisis relationships for exporters' resilience during crises, indicating that highly internationalised and experienced firms may even enhance their performance through learning effects and leveraging business contacts (Fath *et al*., 2021). The strategic position of foreign ventures before the crisis plays a crucial role in supporting their expansion in challenging conditions (Filippov & Kalotay, 2011). A broad scope of export activities can also contribute to the parent firm's flexibility in crises (Lee & Makhija, 2009).

On the other hand, crises may induce exits from foreign markets as firms seek to reduce risks in uncertain locations, favouring less unstable countries (Hryckiewicz & Kowalewski, 2010). However, the decision to reduce international presence depends on earlier commitments to foreign operations (Williams & Martinez, 2012). Factors such as collaboration with international partners and prior international experience, which accompany higher exposure to this cross-border activity also influence success in such operations during crises. Thus, we hypothesized::

H2: The positive effect of firm capabilities on export resilience is moderated by prior export commitment such that for higher export commitment it becomes stronger (more positive).

The Moderating Role of Environmental Hostility

Secondly, we argue that the significance of marketing and technological capabilities in building up export resilience becomes more pronounced in hostile environments. While previous studies in the area of international business most often focused on dimensions like risk and uncertainty to conceptualise the international environment (Eduardsen & Marinova, 2020; Alimadadi *et al*., 2018), organisational studies have highlighted other aspects related to a firm's environment (Balabanis & Spyropoulo, 2017). Environ-

mental hostility, often characterised by unstable industry environments, fierce rivalry, and limited exploitable solutions, gains particular relevance during economic crises (Covin & Slevin, 1989). Zahra and Garvis (2000) conceptualised environmental hostility based on managers' perceptions of difficulties with access to channels of distribution, access to capital, access to skilled labour, bankruptcy among companies in the industry, products becoming obsolete quickly, as well as decline of demand for industry products.

These manifestations of environmental hostility have resurfaced in the empirical setting of the COVID-19 pandemic (Kudej *et al.*, 2021; Peñarroya-Farell & Miralles, 2022). In their qualitative study, Isip *et al.* (2023) found that environmental hostility was inter alia characterised by the uncertainty of supply of raw materials, lost opportunities to meet demand, increase in cost of operations, or a temporary shutdown of operations. Thus, they focused on how environmental hostility affects firms' operations. In the same vein, Serna and García Guerra (2021) showed that environmental hostility related to COVID-19, as expressed by the difficulty of companies to access distribution channels and capital, as well as the obsolescence that they present in their products or their business due to new market conditions, negatively affects the financial performance of exporting firms. Surviving and competing in a hostile environment is a challenging process for established firms, and SMEs with limited capabilities may face even more substantial threats in such circumstances. Scholars refer to hostile environments as marked by intense competition, unforeseeable behaviour, and quick competitor reactions, leading to increased uncertainty (Ruiz Ortega *et al.*, 2013). Firms require solid marketing capabilities to survive in such hostile conditions, thus focusing on developing their markets, satisfying customer needs, and retaining market share (Perez-Luno *et al.*, 2011). In the export context, firms that leverage their entrepreneurial capabilities tend to perform better in hostile international environments (Balabanis & Spyropoulo, 2017).

Moreover, possessing technological capabilities allows firms to adapt and take advantage of emerging opportunities in hostile environments (Bilan *et al.*, 2023; Ruiz-Ortega *et al.*, 2013). Firms operating in challenging settings become more inclined to move their technological competencies toward developing new products (Perez-Luno *et al.*, 2011). Technological strengths enable firms to succeed in dynamic environments by assuming risks associated with innovation generation, development, and market exploitation (Perez-Luno *et al.*, 2011).

Ultimately, we argue that marketing and technological capabilities play a vital role in building resilient operations in foreign markets, with their significance being further reinforced in highly hostile environments (Isip *et al.*, 2023). Based on this, we hypothesised:

H3: The positive effect of firm capabilities on export resilience is moderated by environmental hostility, such that for higher levels of environmental hostility it becomes stronger (more positive).

The conceptual framework in Figure 1 summarises the above research hypotheses.

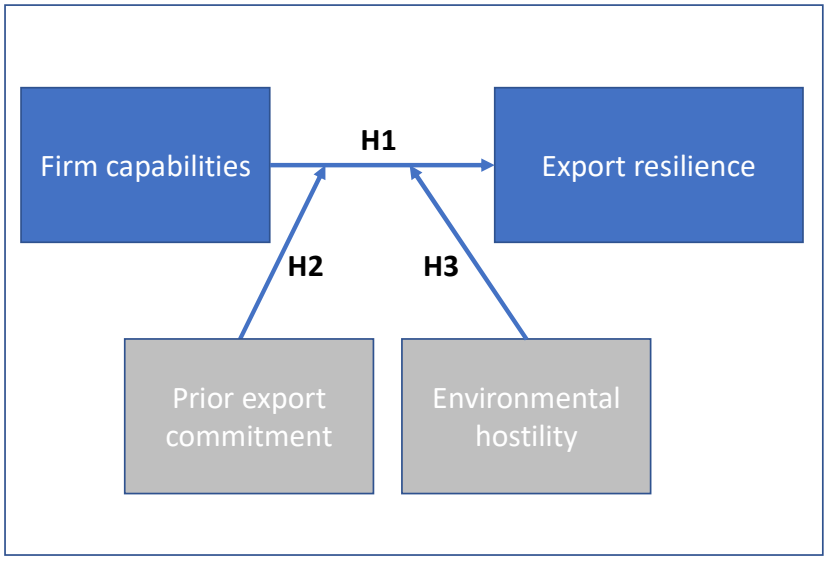

Figure 1. Conceptual framework of the study
Source: own elaboration.

RESEARCH METHODOLOGY

Data Collection and Sample

We based the study on primary data obtained from a sample of Polish manufacturers which fulfil, among others, the criteria of being majority-owned by Polish shareholders, active in manufacturing sectors, exporting to at least two countries, showing at least 10% of foreign sales to total sales (FSTS), and having at least 10 employees. The focus on manufacturing stemmed from the fact that firms from this sector demonstrate distinct internationalisation patterns, as their higher capital intensity makes their entry mode choices strongly affected by environmental uncertainty (Brouthers & Brouthers, 2003). Moreover, the people-oriented nature of services could have led to biased results in the empirical setting of the COVID-19 pandemic, since many such services were indeed completely disrupted due to the nature of this crisis.

We collected data by means of computer-assisted telephone interviews (CATI) with export executives of 500 firms between September and November 2020. This resulted in a response rate of 23%. The study aimed not so much to achieve a high degree of representativeness, but rather to generate a sufficiently large sample to enable analyses which could shed light on the hypothesised relationships. Table 1 presents the sample characteristics.

Table 1. Sample characteristics (N=500)

Employment (as of 2019)	**# firms**	**Manufacturing sectors**	**# firms**
10-49 *employees*	168	*Low-tech*	170
50-249 *employees*	167	*Mid-tech*	165
over 250 *employees*	165	*High-tech*	165
Revenue (as of 2019)	# firms	FSTS	# firms
< 10M PLN	59	10-19%	226
10-20M PLN	109	20-30%	188
20-50M PLN	130	>30%	86
50-200M PLN	134		
> 200M PLN	68		
#export markets			
1-10	351		
11-20	104		
>21	45		

Source: own study.

Operationalisation of Variables

With regard to our dependent variable, export resilience, there was no available scale to adopt directly, as we transferred the concept of organisational resilience to the context of exporting. Macro-level studies on export resilience adopt rather reactive measures relying on the comparison to pre-crisis values (*e.g.* He *et al.,* 2021). However, the application of the concept of resilience to other areas hints at a more proactive approach which draws attention to accumulating resources to sustain the business during difficult periods (Conz & Magnani, 2020). Therefore, we accounted both for the reactive and proactive aspects of resilience, measuring the former with questions on the number of served export markets, number of new products/services for foreign markets, intensity of export marketing activity and intensity of export sales activity, and the latter aspect with questions on investment in tools for serving foreign markets, export growth budget, and the staff assigned to serving foreign markets. Hereby, we asked respondents to evaluate all related statements on a 7-point Likert scale, where 1 meant – a significant decrease, 4 – no change, and 7 – a significant increase, in the period March-September of 2019 and 2020. Thereby, we could capture the evolution of exports during the most acute stage of the COVID-19 pandemic and the preceding period, which we can regard as our methodical contribution.

To capture firm capabilities, we referred to two types of capabilities, technological and marketing, as suggested by Spanos and Lioukas (2001) and Ruiz-Ortega *et al.* (2013). As far as the moderating

variables were concerned, we measured prior export commitment using the self-reported value of FSTS (*e.g.* Velez-Calle *et al.,* 2018) as of 2019, to proxy the export intensity before the crisis period.

With regard to environmental hostility, some earlier studies referred to such attributes as riskiness, stressfulness, and competitiveness (*e.g.* Balabanis & Spyropoulou, 2007; Covin & Slevin, 1989). To capture a broad spectrum of environmental impacts in the specific empirical setting of the COVID-19 pandemic, we used a proprietary scale, extending it on the basis of some earlier studies (*e.g.* Bartik *et al.,* 2020; Isip *et al*., 2023; Klyver & Nielsen, 2021) and consisting of sales suspension, supply interruption, demand decline or increase, limited personal contacts with clients, limited personal contacts with suppliers, delayed payments, employee fears, access to finance, transport problems, costs of adjustment, remote work coordination, unused capacity, distorted planning, and the increase of inventories. For this variable, like for export resilience and firm capabilities, we summarised single items and condensed them to construct an index.

Finally, in line with extant literature, we defined a number of control variables and integrated them into the analysis to neutralise the influence of economy-level, industry-level, and firm-level components in the regression equations as these could distort the empirical findings. Table 2 shows the reliability of the aforesaid operationalisations.

Table 2. Reliability values for the key variables

Variables	Number of items	Cronbach's Alpha
Export resilience	5	0.66
Firm capabilities	12	0.92
Environmental hostility	15	0.89

Source: own study.

To answer the research questions and test the hypotheses, we performed statistical analyses using the IBM SPSS Statistics 26 package. We performed one-way ANOVA and linear regression analysis with the use of that software. Moreover, using the PROCESS v3.4 macro, we conducted moderation analyses. We adopted, the typical threshold of $\alpha = 0.05$ as the level of statistical significance throughout the analyses. Before undertaking statistical analyses, due to accounting for moderation in our models, we searched for multicollinearity in our data. However, we did not identify any such issues. For all variables in the models, the VIF values did not exceed 2, while tolerance values were all above 0.1.

RESULTS AND DISCUSSION

First of all, we verified the variables' distributions. To this aim, we computed descriptive statistics together with the Kolmogorov-Smirnov test examining the distribution normality. We transformed the size of the firm and prior export commitment based on the decimal logarithm. In terms of the export resilience variable, we removed two outliers. The results of the Kolmogorov-Smirnov test were statistically significant for each variable. In the case of export resilience in the area of the number of export markets served, investments in tools and processes for serving foreign markets and the size of staff serving foreign markets, skewness values exceeded the absolute value of 2. This indicated a violation of the assumption with a normal distribution and the presence of observation outliers. For this reason, the analyses for these variables were based on non-parametric tests. For the remaining variables, we made comparisons using parametric tests. We used variables after the transformation and removal of observations for moderation analyses.

Subsequently, we performed moderation analyses using the PROCESS v3.4 macro to verify whether prior export commitment and environmental hostility were significant moderators for the link between firm capabilities and export resilience. Firstly, we added the interaction of firm capabilities with a prior export commitment to the model (Table 3). There was a slight and insignificant increase in the explained variance by 0.02%: $F(1.489) = 0.08$; $p = 0.779$; $\Delta R2 = 0.0002$. This means that prior export commitment was not a significant moderator of the relationship between firm capabilities and export resilience.

Table 3. Model with the moderation of prior export commitment

Variables	*B*	*SE*	*t*	*p*	95% *CI*	
					LL	*UL*
Constant	18.36	1.13	16.21	<0.001	16.13	20.58
Firm capabilities	-0.03	0.22	-0.12	0.905	-0.47	0.41
Prior export commitment	-0.09	0.44	-0.21	0.831	-0.95	0.77
Firm capabilities x Prior export comm.	**-0.17**	**0.62**	**-0.28**	**0.779**	**-1.39**	**1.04**
Control variables						
Export performance	0.41	0.18	2.24	0.026	0.05	0.77
Medium-technology	0.32	0.26	1.21	0.226	-0.20	0.83
High-technology	-0.23	0.27	-0.85	0.398	-0.75	0.30
Firm age	-0.01	0.01	-1.26	0.209	-0.04	0.01
Firm size	0.32	0.26	1.22	0.224	-0.20	0.83

Note: Reference level for the technological intensity of the sector: low-technology.
Source: own study.

Lastly, we considered environmental hostility as a moderator in this analysis (Table 4). Adding this interaction, the explained variance in export activities increased by 1.4%, which was a statistically significant change: F (1.489) = 7.25; p = 0.007; ΔR2 = 0.0141. Overall, the model with interaction explained 4.9% of the variance of the dependent variable (R2 = 0.0494).

Table 4. Model with the moderation of environmental hostility

Variables	*B*	*SE*	*t*	*p*	95% *CI*	
					LL	*UL*
Constant	18.34	1.11	16.46	<0.001	16.15	20.53
Firm capabilities	0.16	0.22	0.70	0.486	-0.28	0.59
Environmental hostility	0.25	0.13	1.97	0.050	0.00	0.50
Firm capabilities x environmental hostility	**0.49**	**0.18**	**2.69**	**0.007**	**0.13**	**0.84**
Control variables						
Export performance	0.43	0.18	2.42	0.016	0.08	0.78
Medium-technology	0.30	0.26	1.14	0.253	-0.21	0.80
High-technology	-0.20	0.26	-0.78	0.435	-0.72	0.31
Firm age	-0.01	0.01	-0.94	0.346	-0.03	0.01
Firm size	0.27	0.26	1.04	0.299	-0.24	0.78

Note: reference level for the technological intensity of the sector: low-technology.
Source: own study.

The analysis of conditional effects indicated that the moderating effect of environmental hostility was statistically insignificant at its two levels, *i.e.* low: B = -0.28; SE = 0.25; t (1,489) = 1.12; p = 0.264 and mean: B = 0.16; SE = 0.22; t (1.489) = 0.486. Among companies with a high level of challenges, this effect was statistically significant: B = 0.59; SE = 0.30; t (1.489) = 2.00; p = 0.046. In this group, as firm capabilities increased, so did the level of export commitment during the COVID-19 pandemic. Figure 2 illustrates this effect.

Thus, on the whole, we did not find support for Hypotheses 1 and 2, considering the role of capabilities on export resilience, and the moderating role of prior export commitment. In turn, the moderating effect proposed in Hypothesis 3 did receive empirical support.

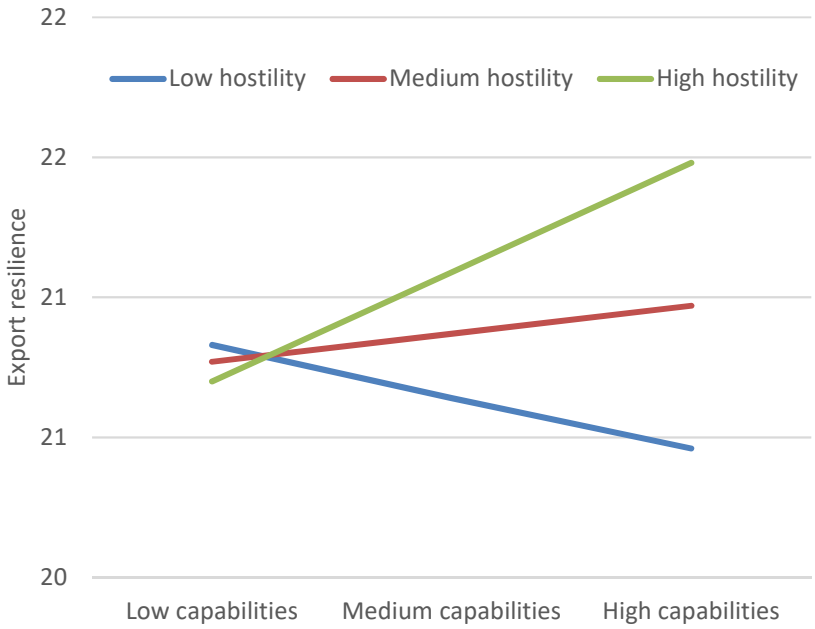

Figure 2. Interaction between firm capabilities and environmental hostility on export resilience
Source: own elaboration.

CONCLUSIONS

While the concept of organisational resilience has been studied from different perspectives (Hillmann & Guenther, 2021), its application in the area of firm exports provides some topical insights on how firm capabilities not only help to sustain export activities, but also develop the capacity to have them grow further.. We address this relationship in a recent empirical setting characterised by crisis. In the context of hostile environments, such as those created by the global COVID-19 pandemic (*e.g.* Grimmer, 2022; Isip *et al.*, 2023), our findings challenge certain established international business concepts.

Firstly, the resource-based view supported the importance of firm-level capabilities in maintaining or even developing export operations during crises (Balabanis & Spyropoulou, 2007). However, this holds even more true when considering the level of environmental hostility. In our empirical findings, we observed that firms facing higher environmental hostility must rely on their capabilities to a larger extent, leading to increased export resilience in terms of maintaining or expanding export operations and building up export-specific capabilities. In other words, more crisis-affected companies tend to leverage their capabilities to a larger extent to further dedicate themselves to international operations. This aids in coping with the crisis triggered by the COVID-19 pandemic. This also resonates with some earlier evidence by Zahra and Garvis (2000) that more entrepreneurial firms would display higher performance in more hostile environments. Furthermore, firms better equipped with capabilities might be better positioned to use the crisis period to grow and develop, while others remain overly conservative (Kreiser, 2020).

Secondly, the perspective of the internationalisation process did not strongly support the idea that prior export commitment (*i.e.* before the crisis period) directly affects export resilience, as our empirical findings do not endorse this idea, contrary to some recent evidence (*e.g.* Fath *et al.,* 2021). Therefore, it becomes necessary to explore additional theoretical concepts that decompose the nature of export activities. For example, considering the pandemic from the viewpoint of uncertainty in foreign markets, location-centred concepts draw attention to shifting operations to areas less impacted by the economic crisis. Therefore, other empirical studies could more explicitly consider the role of the export portfolio structure for export development under crisis conditions. Indeed, extant research on the relationships between firm internationalisation and innovation indicates that the effects of foreign expansion on the development of firm capabilities are not obvious, and they are contingent upon the characteristics of foreign markets in which a firm develops its activities (Du *et al.,* 2023). This perspective also justifies the

distinction between firm capabilities and the level of a firm's export commitment in our empirical models, as these two variables are not related to each other by default (Ding *et al.,* 2021).

Moreover, the COVID-19 pandemic has brought attention to the international activity of firms and its role in global interconnectedness, encompassing economic, ecological, and medical threats (McGee & Terry, 2022). While increased economic interdependence among nations has enhanced international political stability, it has also accelerated the transmission of crises. Therefore, the previous level of international exposure of firms may not necessarily contribute to its continuation, as higher degrees of internationalisation may not be beneficial for overall firm performance.

Our empirical contribution is rooted in the context of Central and Eastern Europe (CEE), providing specifically some evidence on the resilience of exporting firms from Poland. It would be pertinent to confront our results with those of other studies pertaining to companies from CEE. While there are a number of empirical studies on firm resilience in the CEE region (Mroczek-Dąbrowska *et al*., 2023; Burger *et al*., 2023; EIB-EBRD, 2022; Gittins *et al*., 2022; Jaklič & Burger, 2020; Tsiapa & Batsiolas, 2019), only the findings of some of them correspond to ours. However, due to the different configurations of variables investigated, a strict comparison of the results is not possible. Nevertheless, we note that the study by Tsiapa and Batsiolas (2019) corroborates some aspects of our results, *i.e.* that the resilience of firms is determined, among other factors, by their structural transformations, initial conditions (pre-existing experience), and firm characteristics and capabilities, as well as the irregularities of their broader environment (a construct somewhat similar to our environmental hostility). On the other hand, Gittins *et al*. (2022) indicate that firms with greater resource levels are better prepared to develop innovative solutions to crises. Interestingly, Jaklič and Burger's (2020) study indicates that Slovenian exporting firms with higher levels of market and product diversification came out of the global recession stronger. Here, contrary to our findings, prior export commitment, if it can be equalled to that diversification, did affect export resilience. At the same time, the said authors found that Slovenian exporters invested in digitalisation and automation, thus engaging in innovation, in the wake of the COVID-19 crisis, an aspect which we did not analyse.

We founded our analysis solely on survey data from exporters based in one home country. Beyond the possible bias related to subjective data measurement, the data used in the analysis were also cross-sectional, although an important advantage from the point of view of studying environmental hostility resides in the choice of the most challenging time frame of the COVID-19 pandemic which was taken as a reference point for respondents. At the same time, the moment of data collection was close to the analysed phenomena thus allowing for possibly knowledgeable answers.

The study's shortcomings open several avenues for further research devoted to export resilience and environmental hostility. With regard to the determinants of export resilience, by reverting to more advanced quantitative techniques, further variables including the nature of the underlying business models and the use of online channels could be added to the equation, linking the crisis-internationalisation discussion with another strand of IB scholarship devoted to understanding the influence of business models, and more specifically the effects of digitalisation on internationalisation patterns.

Moreover, an increasing number of publications on firm internationalisation, de-internationalisation, and export performance have used the institutional theory as a conceptual framework (see *e.g.* Lynch & Jin, 2016; Sahin & Mert, 2022). All the studies cited above corroborate the usefulness of the institutional perspective for explaining firms' international expansion and performance, whereby such perspective can be used as either the main or complementary theoretical framework.

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Acknowledgements and Financial Disclosure

This paper is based on the findings from the research project financed by the research grant of the National Science Centre (Poland) awarded based on the decision no. DEC-2017/27/B/HS4/02344.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120108

A new wave and the ripples it makes: Post-transition firm's digital maturity and its consequences in global value chains

Barbara Jankowska, Marta Götz, Ewa Mińska-Struzik, Małgorzata Bartosik-Purgat

ABSTRACT

Objective: The objective of the article is to assess the firms' digital maturity and examine how the adoption of Industry 4.0 solutions affects global value chain (GVC) relationships.

Research Design & Methods: The study combined a critical literature review with quantitative empirical research. We collected the primary data during computer-assisted telephone interviews (CATI) among 400 industrial manufacturing firms in Poland.

Findings: The study demonstrates that I4.0 technologies adoption modifies the awareness of partners' progress in digital transformation, affects integration among partners, and leads to changes in GVCs' diversification, geographic scope, and governance. Thanks to the study on the digital maturity of firms from a post-transition country, we demonstrated that I4.0 still requires conceptual development and that the emerging theory of the Fourth Industrial Revolution is interdependent with the theory of GVCs.

Implications & Recommendations: We focused on the disruption caused by the advancement of digital transformation in companies that operate in a constellation of relationships and are interdependent in the same GVC. The study recognizes the relationships within the GVC as channels of transmission of challenges, risks, and opportunities that emerge from the disruption. We referred to the case of a post-transition, post-communist country in Central and Eastern Europe under digital transformation, which is highly specific yet offers valuable findings transferable to other economies on the eve of the Fourth Industrial Revolution.

Contribution & Value Added: The novelty of the study lies in the integration of research on digital technology adoption as diagnosed among manufacturing companies in a post-transition country with the inquiry regarding their participation and role in GVCs. Thanks to this approach, we identified how firms' digital maturity reshapes their buyer-supplier relations and, thus, their position in value chains.

Article type: research article

Keywords: digital maturity; global value chains; post-transition economy; Poland; Industry 4.0

JEL codes: O33, M21

Received: 20 July 2023 Revised: 15 October 2022 Accepted: 25 October 2023

Suggested citation:

Jankowska, B., Götz, M., Mińska-Struzik, E., & Bartosik-Purgat, M. (2024). A new wave and the ripples it makes: Post-transition firm 's digital maturity and its consequences in global value chains. *Entrepreneurial Business and Economics Review,* 12(1), 135-152. https://doi.org/10.15678/EBER.2024.120108

INTRODUCTION

The literature on Industry 4.0 (I4.0) maturity is growing continuously (Müller *et al.,* 2018; Mittal *et al.*, 2018). Scholars have examined the implications of I4.0-entailed digital transformation for management and organization studies (Appio *et al.*, 2021; Ardito *et al.,* 2019; Correani *et al*., 2020; Usai *et al.,* 2021; Qin *et al.*, 2016). The adoption of I4.0 made the relations and interactions between products, processes, and systems more intricate and dynamic, leading to new challenges (Fareri *et al.,* 2020; Plekhanov *et al.,* 2022). Nevertheless, there is still no consensus regarding the precise definition and assessment of I4.0 maturity.

The main objective of this study is twofold. We will propose how to diagnose the level of digital maturity of firms operating in global value chains (GVCs). Secondly, we will identify the implications of the adoption of I4.0 technologies for firms operating in GVCs. In other words, we will argue that digital ma-

turity goes beyond the metrics that focus just on the I4.0 adoption and can be defined in terms of firms' broader awareness, knowledge, and understanding of partners in digital processes. We used synonymously I4.0 as the Fourth Industrial Revolution and digital business transformation. We will demonstrate that the implementation of I4.0 solutions bears consequences not only for a company but also echoes and reverberates in GVCs, sending ripples that affect cooperating partners. Moreover, we shed light on the adoption of I4.0 technologies by firms from a post-transition or in other words – post-communist country such as Poland. All available reports and statistical databases indicate the persistent laggardness of post-communist countries in the area of innovation or digital transformation with perhaps some sectoral or regional exceptions (PIE Report, 2019; Rostkowski, 2019; Fifekova *et al.*, 2018; Szalavetz, 2020b or see Cséfalvay, 2019 for sectoral differences). Rückert *et al.* (2020) confirmed the emergence of a digitization divide among European companies. Poland is one of the weakest countries in terms of its digital competitiveness among the EU member states (https://ec.europa.eu/digital-single-market/en/desi).

This exploratory study contributes to the research on digital maturity and GVCs as channels of transmission of risk and challenges generated by the Fourth Industrial Revolution (4IR). Studies are presenting how inter-firm relationships impact their innovation performance (Qian *et al*., 2022; Yang *et al*., 2020) but there remains a gap in how I4.0 technologies associated with technological and business innovations affect the cooperation patterns in GVCs (Chen, 2019). The novelty of the study lies in the integration of research on digital technology adoption as diagnosed among manufacturing companies in a post-transition country with the inquiry regarding their participation and role in GVCs. Thanks to this approach, we identified how the digital maturity of firms reshapes their buyer-supplier relations, thus their position in value chains (Kumar & Srivastava, 2020; Sharma *et al*., 2019). This study relied mainly on a critical literature review and primary data collected from November 2019 to January 2020 during computer-assisted telephone interviews (CATI) among 400 firms established in Poland.

Firstly, we will provide background information on I4.0 's premises and technologies. Then, we will refer to the measurement issue of I4.0 maturity and GVCs reorganization facilitated by I4.0 solutions. Next, we will report on the methodological approach applied in their study. This will be followed by the presentation of results based on secondary and primary data and a discussion of findings. The article will close with a general discussion and main conclusions.

LITERATURE REVIEW

Industry 4.0 Maturity

The literature on the 4IR steadily grows in number, including systematic reviews that summarize related definitional and conceptual aspects (Kamble *et al.,* 2018; Szalavetz, 2020; Götz *et al.*, 2018).

The most frequently used technologies in the context of Industry 4.0 's development include big data analysis (BDA), augmented reality (AR), autonomous robots, internet of things (IoT), simulation, horizontal and vertical system integration, cloud, cybersecurity, additive manufacturing (Rüßmann *et al.,* 2015; Mendhurwar & Mishra, 2018; Rymarczyk, 2020; Giza & Wilk, 2021; Gliszczyński & Ciszewska-Mlinarič, 2021; Doanh *et al*., 2023; Sieja & Wach, 2023). Besides these technologies, scholars also mention social media instruments as the manifestation of I4.0. They provide firms with a great amount of information that contributes to the benefits of the adoption of I4.0 technologies (Yang & Gu, 2021). Mobile technologies allow us to reach these social media instruments quickly, easily, and at a low cost. In this context, both social media and mobile technologies belong to the basket of I4.0 solutions.

The advancement of companies' digital transformation manifests itself in the number and diversity of adopted I4.0 technologies, which determines their level of I4.0 maturity. The literature provides more and more studies on the construction of I4.0 maturity indices (Tutak & Brodny, 2022; Pacchini *et al.,* 2019; Mittal *et al*., 2018; Schumacher *et al*., 2016; Demary & Matthes, 2015; Gracel, & Łebkowski, 2018). However, most of the works are conceptual and the proposed indices still need to be tested.

The indices differ in construction but what is characteristic is that they refer to the number and diversity of adopted I4.0 technologies, which determines the level of the firms' I4.0 maturity. Another typical aspect is that indices referring to the micro-level apply the self-assessment of companies and are often based on data collected in interviews with managers (Basl & Doucek, 2019; Gracel & Łebkowski, 2018).

The speed, scale, and scope of digital transformation necessitate far-reaching collaboration between partners, which makes the assessment of the I4.0 maturity even more challenging. The I4.0 's interlinked, integrated, and automated nature implies the need for interoperability and common standards. The question arises of how much particular technologies are known, appreciated, and adopted not only by single entities but how many economic actors are ready or mature enough to create value as interdependent agents. Thus, as argued by Agostini and Nosella (2020) and Sena *et al*. (2019), I4.0 implies a far-reaching transformation not only of individual companies but the whole ecosystems. The latter manifests itself in the growing compatibility among firms, resulting in the emergence of the phenomenon of connected companies and vanishing boundaries of single firms, which reflects the integration among them, accompanied by the need for more interoperability. Firms are no stand-alone units, so when they want to become more digitally mature, they must be aware what is their partners' status of digital maturity and make efforts to integrate with them, learn from them and share knowledge (Lane *et al.*, 2001; Lewis *et al.,* 2008; Medjani, & Barnes, 2021). Thus, we formulated the following research proposal:

Proposition* 1*: The greater the firm 's digital maturity, the higher the firm 's awareness of the progress in the digital transformation of its partners (RP1A) – including suppliers (RP1Aa), clients (RP1Ab), competitors (RP1Ac), and providers of the firm's products' substitutes (RP1Ad) – and the stronger the firm's attempts to integrate cooperating partners (RP1B).

Through the research, we wanted to emphasize the evolution in the approach to Industry 4.0 from a strictly technological attitude through an organizational and managerial approach to a wider horizontal lens involving partners of a given company's ecosystem.

Considering the universal character and transversality of I4.0 technologies, the related disappearance of borders between sectors and the spreading influence of I4.0 technology application in elements of the company's environment, we assumed that from the company's perspective, the introduction of such solutions forces more integration with its partners or even makes it beneficial.

Global Value Chain Reorganization Facilitated by Industry 4.0

Gereffi and Fernandez-Stark (2016) define GVCs as the full range of tangible and intangible activities undertaken by inter-firm networks on a global scale to introduce products or services from conception to end use and beyond. In other words, GVCs encompass firms with their suppliers and buyers.

Recent advances in digital technology promise formidable changes across supply chain activities (Kagermann, 2015), and I4.0 perceived as a business model innovation (Brettel *et al*., 2014) justifies the adoption of a novel approach to study supply chain management (Büyüközkan & Göçer, 2018). To properly identify the implications of I4.0 for GVCs, the specialization, geographic scope, and governance of networked actors must be considered (Gereffi & Fernandez-Stark, 2016), along with upgrading as the key analytical dimensions (Humphrey & Schmitz, 2002; Ponte & Ewert, 2009; Barrientos *et al.*, 2011; Sass & Szalavetz, 2013). As far as the specialization aspect is concerned, the emergence and application of technologies covered by the umbrella term 'Industry 4.0' can reverse the previous trends of offshoring (Laplume *et al*., 2016) and reduce the number of production stages – thus leading to a collapse of GVC lengths (Rezk *et al.*, 2016) – change the geographical location attractiveness of new investments' hosts (Gress & Kalafsky, 2015), and disintegrate previously established linkages (Rehnberg & Ponte, 2018). As argued by Chiarvesio and Romanello (2018), I4.0 may change the logic behind firms' decisions concerning the type or number of activities in value chains that they wish to control. Moreover, I4.0 could affect productivity, which in turn, would impact geographic choices. The combination of the impact of robotization and automatization with two dimensions of GVCs – specialization and geographic scope – may result in GVCs becoming structurally less complex and geographically much shorter (Csefalvay, 2020; De Backer & Flaig, 20172). The type of governance in GVCs may be reorganized thanks to collaboration and competition in the GVCs (Canning & Kelly, 2015). Thus, to capture the broad and multidimensional trends in GVCs, we formulated the following research proposal:

Proposition* 2*: The greater the firms' digital maturity, the greater the changes in the GVC in terms of diversification (RP2a), geographical scope (RP2b), and governance (RP2c).

Thus, referring to the still ambivalent assessments of the impact of I4.0 on the functioning of GVCs, we assumed that such reconfigurations will occur in terms of industry, geography, and functions, hence the above RP2.

RESEARCH METHODOLOGY

We combined a critical literature review with quantitative empirical research. The literature review allowed us to define the terms to be used in the empirical study and recognize the research problem concerning I4.0 technologies, the scope of companies' digital maturity, and their GVC engagement. In other words, this phase of the research procedure helped in data operationalization, formulation of research proposals, and gathering insight for preparing questions for computer-assisted telephone interviews (CATI) with company representatives.

According to the Digital Economy and Society Index (DESI) 2022, Poland remains one of the weakest countries in terms of digital competitiveness among all the EU member states. As a country from the CEE region, Poland lags behind *e.g*. Czechia, Hungary, and Slovakia, and just slightly overtakes Romania and Bulgaria (DESI, 2022). Recent available DESI 2022 shows that despite continuous progress much work in the area of digital transformation is required. Poland is still catching up in terms of the digitalisation level compared to other EU Member States. Digital Economy and Digital Society Index (DESI, 2022) published by the European Commission, Poland ranks 24th among all Member States in terms of digital development (https://digital-strategy.ec.europa.eu/pl/policies/desi-poland).

According to data analysed by the European Commission, the SME sector in Poland is characterised by a much lower rate of digital technology use – at least at a basic level – than the EU average (40% of SMEs in Poland vs. 55% EU average). It is possible to notice a significant backlog of Polish enterprises in the area of the use in their activities regarding social media, big data, cloud solutions, artificial intelligence (AI), and the use of e-invoices. There is also a large gap in the digital skills of Polish society in relation to communities in other member states. The data show that there is a particular need for measures to support small and medium-sized enterprises in digital transformation. The construction of advanced 5G networks is also important. Poland achieved the best result (22nd place) in the category of digital public services, thanks to a high score on the 'open data' indicator.

The state of digitisation of Polish enterprises can also be assessed on the basis of data from Statistics Poland (SP). Although access to the Internet in 2021 was declared by almost all enterprises in the industrial processing sector (98.4%), only 34.3% of enterprises in this sector used software supporting the flow of information between employees (ERP software). An even smaller percentage of companies in the manufacturing industry (31.6) declared that they used a CRM system to collect and store customer information.

Moreover, despite Poland's effective open data policy, only 15.3% of manufacturing companies used public data relating to the state of the economy and finances in 2021. In the same year, paid cloud services were used by 28.7% of enterprises, which invested mainly in services that consisted of providing access to email or office software (*e.g.* spreadsheets and word processors). In 2021, less than 19% of enterprises were using Internet of Things technology. The majority (51.2%) were large entities. On the other hand, less than 3% of enterprises declared the use of AI technology in 2021.

Although the SP data and the DESI 2022 results show that Polish enterprises are significantly behind in terms of the level of digitalisation compared to most member states, it is also evident that there is continuous progress and an increased interest in the use of new technologies among Polish entrepreneurs.

Thus, the relatively low position of Poland in terms of digitalisation justifies further studies on Polish firms' digital maturity and the consequences for the GVCs in which they operate.

We conducted structured CATI with managers who represented 400 industrial manufacturing firms located in Poland. We interviewed the participants from November 2019 to January 2020. Before the main study, we conducted a pre-research study. Firstly, to check the adequacy and intelligibility of the questionnaire, and secondly, to indicate the type of managers that should partake in the main measurement. We used the same research methods both the pre-research and the main study. Finally, we

conducted CATIs with managers responsible for the companies' international activities and those familiar with the new technologies in their companies' GVCs. We used the same selection criteria for companies both in the pre-research and main study. The managers in both studies were informed about the main purpose of the project. Moreover, the interviewers explained how new technologies are understood in the study so that all interviewees would have the same definition of the main aspects used in the project. One of the overall conclusions formulated after the pre-research study was that the managers had general knowledge concerning the situation on the market and almost all could share information about their partners. The research tool was a questionnaire with 24 questions.

Companies Profile

We conducted the study among firms representing industrial manufacturing small, medium, and large entities, according to NACE Rev. 2.0. Exactly 5.6% of firms were entities employing from 10 to 49 people, 15.4% – from 50 to 249 people, 12.8% – from 250 to 499, while 66.3% – the majority – were large enterprises with 500+ employees. The size structure of the sample corresponded with the involvement of particular types of enterprises in Poland – in terms of their size – in R&D operations, according to Statistics Poland (2020). The studied companies were selected randomly. We measured prevalence (p), *i.e.* the proportion of the population that had a specific characteristic in a given period, and the result was 0.663, which meant the share of the largest enterprises in the population. We assumed that the margin of error (e) was 5%, which conveyed the percentage that described how close the survey is expected to be relative to the real population value. The sampling confidence level showed the reliability of the research, which in this case was 90%, expressed as a percentage that showed the level of certainty in how accurately the sample reflected the population in the selected confidence interval.

The studied firms represented the whole manufacturing sector; Section C according to NACE Rev. 2.0, stemmed from the private sector (97.3%). The vast majority were Polish companies in terms of the ownership structure of capital (76.3%). These were established businesses with 11–15 years of history of operations in the Polish market. Their production facilities were mostly located in urban agglomerations. Nearly 90% of them were active exporters.

Variables

To assess firms' digital maturity of firms, we asked about the intensity of adoption of eleven different I4.0 technologies, *i.e.* autonomous robots, big data analytics, digital twin, internet of things, horizontal and vertical integration, cybersecurity, cloud computing, additive manufacturing, virtual reality, mobile technologies, and social media. While investigating the digital maturity of companies, the study referred to the list of I4.0 technologies indicated by Rüßmann *et al.* (2015), and we developed the set by adding social media solutions and mobile technologies. We asked the managers who represented the companies to use a five-point Likert scale for assessing the adoption of eleven I4.0 technologies, in which 1 stood for – 'we do not use it at all,' 2 – 'we use it very rarely,' 3 – 'we use it rarely,' 4 – 'we use it often,' 5 – 'we use very often. '

Awareness of Partners' Progress in Digital Transformation and Their Integration Attempts

We measured the awareness of the partners' progress in digital transformation using four indices that referred to suppliers, buyers, substitute providers, and competitors. We first asked the managers representing the studied firms to diagnose their knowledge about the risks, challenges, opportunities, and activities that accompanied the adoption of I4.0 performed by their partners. The challenges, risks, and opportunities were indicated, and the managers were to express if they agreed or not whether these elements appeared. They were asked to use a five-point Likert scale to assess whether they 1 – 'strongly disagree,' 2 – 'disagree,' 3 – 'it is difficult to say,' 4 – 'agree,' or 5 – 'strongly agree.' To assess the managers' awareness, we considered responses 1, 2, 4, and 5. We did not consider response 3. To learn about the integration attempts, we asked the managers whether their firms undertake such actions, which we measured with the five-point Likert scale as above.

GVC Changes Facilitated by The Adoption of I4.0 Technologies

Changes in GVCs were associated with 1) entering new sectors which meant diversification; 2) undertaking new functions in the GVC, which entailed changes in governance; and 3) space extension, which meant geographical expansion. The changes were evaluated on a five-point Likert scale, in which 1 stood for 'the partner does not implement the change at all,' 2 – 'the partner probably implements the change,' 3 – 'it is difficult to say if the partner implements that,' 4 – 'the partner implements the change,' 5 – 'the partner implements the change for sure. '

Analytical Strategy

While developing this analytical strategy, we followed the reasoning of Knight *et al.* (2021) to conduct exploratory research. Figure 1 depicts the overview of the conducted research problem and Figure 2 – the analytical scheme.

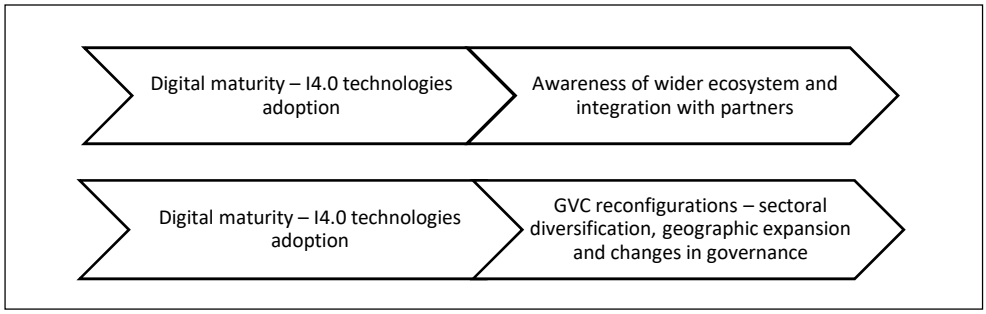

Figure 1. Overview of the research problem
Source: own elaboration.

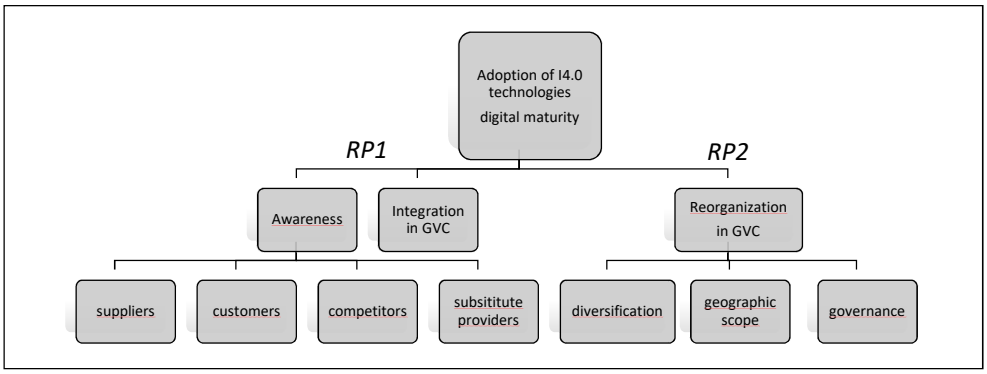

Figure 2. The analytical scheme presenting the interdependencies among the variables and the research proposals
Source: own elaboration.

The first step in the analysis was to assess the level of I4.0 technology adoption (digital maturity) by the interviewed companies. In the next part, we performed a two-step cluster analysis to identify patterns in the adoption of I4.0 technologies in enterprises. We measured the adoption assessment of the I4.0 solutions with basic descriptive statistics calculated together with the Kolmogorov-Smirnov test, which examined the distribution normality. Next, we calculated descriptive statistics for the challenges, opportunities, and threats related to the adoption of I4.0 technologies by suppliers, customers, substitute producers, and competitors of the interviewed companies.

In the next part of the analysis, we checked the correlation between the level of digital maturity of the interviewed companies and their awareness of challenges, risks, and opportunities related to the adoption of I4.0 technologies by their partners. For this purpose, Spearman 's rho correlation analyses were performed. We used a similar methodological approach to identify the changes facilitated by the

adoption of I4.0 technologies in the companies' GVCs, for which we referred to descriptive statistics indicators. Furthermore, we used Spearman's rho correlation index to establish the relationship between the level of digital maturity of the interviewed companies and the changes they introduced in their GVCs.

RESEARCH METHODOLOGY

Digital Maturity Assessment

Table 1 presents the level of I4.0 technology adoption. As indicated by the minimum and maximum values of the level of I4.0 technologies adoption, the intensity of using these solutions among the interviewed companies ranged from 1 – 'we do not use it at all' to 4 – 'we use it often' and 5 – 'we use it very often.' The average and median values showed that companies most extensively used only solutions in the field of cybersecurity and social media.

Table 1. The level of I4.0 technology adoption

I4.0 technologies	M	Me	SD	Min.	Max
Big data analytics	1.65	1.00	1.00	1.00	5.00
Autonomous robots	1.32	1.00	0.95	1.00	5.00
Simulation (digital twin)	1.98	1.00	1.40	1.00	5.00
Horizontal and vertical system integration	1.39	1.00	0.95	1.00	5.00
Industrial Internet of Things (IoT)	1.31	1.00	0.79	1.00	4.00
Cybersecurity	4.35	4.00	0.65	1.00	5.00
Cloud computing	3.05	3.00	1.14	1.00	5.00
Additive manufacturing (3D production)	1.35	1.00	0.80	1.00	4.00
Augmented reality	1.19	1.00	0.61	1.00	4.00
Mobile technologies	2.19	2.00	1.08	1.00	5.00
Social media	3.53	4.00	1.07	1.00	5.00

Source: own study.

We performed a two-stage cluster analysis to identify patterns of using digital solutions in enterprises. The conducted analysis showed that two clusters could be distinguished based on the introduced variables (Table 2). The average value of the silhouette measure of consistency and distinctiveness was 0.2, which means that the quality of the identified groups was correct. Thus, the analysis allowed us to distinguish two groups: the first cluster included 333 companies (83.2% of the interviewed companies), while the second group included 67 companies (16.8%).

The most important predictors in the model turned out to be augmented reality (virtual reality), additive manufacturing (3D production), and simulation (digital twin). Autonomous robots and the industrial Internet of Things (IoT) followed. The least important in distinguishing clusters turned out to be mobile technologies, big data analytics, horizontal and vertical system integration, cloud computing, and cybersecurity.

The first group included mostly enterprises that often use cloud computing solutions and cybersecurity but do not use any other type of technological solutions studied.

The second cluster included mainly entities that also often use both solutions used in the case of companies from the first cluster, but they additionally often employ such technologies as simulation (digital twin) and – albeit rarely – additive manufacturing (3D production) and mobile technologies (Table 2).

The comparison of Cluster 1 and Cluster 2 in terms of the use intensity of the proposed I4.0 technologies showed that Cluster 2 included a lower percentage of the studied sample, but in relation to the three technologies, it showed a higher intensity of use than Cluster 1. Therefore, Cluster 1 comprised entities with a lower, and Cluster 2 – with a higher degree of digital maturity. Companies considered to be more digitally mature were entities that distinguished themselves with the use of simulation (digital twin), additive manufacturing, and mobile technologies.

In the last step of this part of the analysis, we checked the distribution of the quantitative variable, *i.e.* firms' digital maturity (Table 3).

Table 2. Cluster of firms and the level of adoption of I4.0 technologies

Variable	Significance of predictors	Cluster 1 – Laggards (n = 333; 83.2%)	Cluster 2 – Leaders (n = 67; 16.8%)
Augmented reality	1.00	They do not use it at all (98.8%)	They do not use it at all (46.3%)
Additive manufacturing (3D production)	0.98	They use it very rarely (92.2%)	They use it rarely (37.3%)
Simulation (digital twin)	0.97	They do not use it at all (77.5%)	They use it often (71.6%)
Autonomous robots	0.78	They do not use it at all (96.7%)	They do not use it at all (52.2%)
Industrial Internet of Things (IoT)	0.70	They do not use it at all (93.4%)	They do not use it at all (41.8%)
Mobile technologies	0.07	They do not use it at all (33.9%)	They use it rarely (31.3%)
Big data analytics	0.06	They do not use it at all (67.3%)	They use it rarely (46,3%)
Horizontal and vertical integration	0.03	They do not use it at all (85.6%)	They do not use it at all (76.1%)
Cloud computing	0.02	They use it often (55.0%)	They use it often (61.2%)
Cybersecurity	0.01	They use it often (38.1%)	They use it often (44.8%)

Source: own study.

Table 3. Level of I4.0 technologies adoption (digital maturity index): basic descriptive statistics of the studied variables together with the Kolmogorov-Smirnov test [N=400]

Statistics:	M	Me	SD	Sk.	Kurt.	Min.	Max.	D	p
Digital maturity index :	23.30	22.00	4.92	1.02	1.62	11.00	43.00	0.12	<0.001

Note: M – mean; Me – median; SD – standard deviation; Sk – coefficient of skewness; Kurt – kurtosis, Min. – minimum value; Max. – maximum value; D – Kolmogorov-Smirnov statistic; p – significance level.
Source: own study.

The median for the level of I4.0 technology adoption was higher than the average, which indicated a positively skewed distribution. The results of the Kolmogorov-Smirnov test emerged as statistically significant, which proved that the distribution of the variable differed significantly from the normal distribution.

Digital Maturity Versus Awareness of Partners' Progress in Digital Transformation and Integration Attempts

The digital maturity of the interviewed entities could be evidenced by the number and diversity of I4.0 technologies adoption, albeit to more thoroughly diagnose how much a firm is digitally mature, the study should consider its awareness and understanding of the challenges, opportunities, and risks posed by the I4.0 technology among its partners in the same GVC. Partnership in the same GVCs is characterized not only by flows of material goods and services but also by the exchange of knowledge and ideas, not to mention sharing diverse perspectives. It turned out that thanks to the adoption of I4.0 solutions, suppliers of the studied firms enjoyed greater chances of joining GVCs (M=3.55), and they noticed the risk of losing their position in GVCs (M=3.14; Table 4). The I4.0 technologies adoption offered them chances to increase sales (M=4.14) and upgrade the competitiveness of buyers (M=4.29). For substitute providers, I4.0 technologies represented a chance to improve innovation performance and better exploit existing technologies (both M=3.37). Competitors were aware of the pressure on investment in new equipment, machines (M=3.97), and the development of proper skills among their workforce (M=3.92).

Table 4. Chances, threats, and challenges for partners: The perspective of the studied companies [N=400]

Suppliers	**M**	**Me**	**SD**	**Min.**	**Max.**
Industry 4.0 technologies create the pressure on standardisation of processes.	3.05	3.00	1.01	1.00	5.00
Industry 4.0 technologies are a threat to the position in the GVCs.	3.14	3.00	1.02	1.00	5.00
Industry 4.0 technologies are a chance to reduce costs.	3.08	3.00	1.01	1.00	5.00
Industry 4.0 technologies are a chance to join GVCs.	3.55	4.00	1.03	1.00	5.00
Buyers	M	Me	SD	Min.	Max.
Industry 4.0 technologies create pressure to look for new distribution channels.	1.90	2.00	0.72	1.00	4.00
Industry 4.0 technologies are a threat to their present economic benefits.	2.55	2.00	0.99	1.00	4.00
Industry 4.0 technologies are a chance to increase their sales.	4.14	4.00	0.64	2.00	5.00
Industry 4.0 technologies are a chance to upgrade their competitiveness.	4.29	4.00	0.70	2.00	5.00
Substitutes' producers	**M**	**Me**	**SD**	**Min.**	**Max.**
Digitalization is a threat to present business models	2.63	2.00	0.93	2.00	4.00
Industry 4.0 technologies create pressure on investment.	3.18	4.00	1.11	1.00	5.00
Industry 4.0 technologies are a chance to improve innovation performance.	3.37	4.00	1.40	1.00	5.00
Industry 4.0 technologies are the opportunity to better exploit their existing technologies	3.37	4.00	1.37	1.00	5.00
Competitors	**M**	**Me**	**SD**	**Min.**	**Max.**
Industry 4.0 technologies are a chance to reduce costs	2.77	3.00	0.89	1.00	5.00
Industry 4.0 technologies are a chance to reduce the time needed to complete processes	3.30	4.00	1.25	1.00	5.00
Industry 4.0 technologies create pressure to spend more on the training of the professional workforce	3.92	4.00	0.98	1.00	5.00
Industry 4.0 technologies create pressure to increase investment outlays	3.97	4.00	1.02	1.00	5.00

Source: own study.

Table 5 presents the basic descriptive statistics for the awareness of the progress in digital transformation among suppliers, customers, substitute providers, and competitors of the studied firms. The results of the Kolmogorov-Smirnov test turned out to be statistically significant, which proved that the distribution of the variable significantly differed from the normal distribution.

Table 5. Index of awareness of the partners' progress in digital transformation [N=400]

Awareness of progress in digital transformation among:	**M**	**Me**	**SD**	**Sk.**	**Kurt.**	**Min.**	**Max.**	**D**	**p**
Suppliers	6.94	8.00	2.69	-1.23	0.20	0.00	9.00	0.23	<0.001
Customers	3.87	4.00	0.57	-5.01	26.29	0.00	4.00	0.53	<0.001
Substitutes' Producers	5.91	6.00	0.44	-6.82	53.67	2.00	6.00	0.52	<0.001
Competitors	15.68	16.00	2.79	-1.10	2.07	0.00	19.00	0.15	<0.001

Source: own study.

Managers were the most aware of the challenges, opportunities, and threats generated by the I4.0 technologies adoption for the studied firms' competitors (M=15.68, Me=16.00) and the least aware of the situation of their own customers (M=3.87; Me=4.00).

In the next part of the analysis, we checked whether there was a correlation between the level of digital maturity of the studied companies (the index in Table 2) and their awareness of the challenges, risks, and opportunities related to the implementation of I4.0 technology by their partners (the indices in Table 5). To verify the first research proposal (RP1), we used Spearman 's rho correlation analysis (Table 6).

Table 6. Correlation coefficients between the awareness of the partners' progress in digital transformation and the interviewed companies' digital maturity [N=400]

Awareness of the progress in the digital transformation of:	Correlation coefficients	
Suppliers	*rho* Spearman	0.12
	significance	0.020
Customers	*rho* Spearman	-0.05
	significance	0.319
Substitutes Producers	*rho* Spearman	0.01
	significance	0.784
Competitors	*rho* Spearman	-0.02
	significance	0.653

Source: own study.

The analysis showed that only the level of awareness about digital transformation among suppliers correlated in a statistically significant way with the digital maturity index of the studied companies. This correlation was weak but positive. It meant that the greater the digital maturity of the studied firms, the higher their awareness of the progress in the digital transformation of their suppliers. The remaining tested compounds turned out to be statistically insignificant. Thus, the results agree only with the RP1Aa.

Moreover, the digital maturity of enterprises was evidenced by the efforts made to integrate the partners with whom the entity cooperated in GVCs. Therefore, we checked whether the adoption of I4.0 solutions by the interviewed companies correlated with attempts to integrate their partners in GVCs. The analysis of Spearman 's rho correlation showed a positive and strong relationship between variables (rho = 0.50; p <0.001), which meant that the more advanced the enterprise was in the use of digital solutions, the more managers recognized that their company strives to integrate its partners. Thus, the results agree with the RP1B.

As part of the study, we attempted to determine how much the implementation of digital solutions was associated with changes in the GVC in which the surveyed company participated. We checked whether the adoption of I4.0 technologies was associated, first, by assuming increasingly more diverse functions in the GVC, which epitomized the changes in governance. Secondly, we investigated whether the companies entered new sectors of activity, which would translate into increased diversification. Thirdly, we checked whether the companies expanded their geographical area of activity, which was associated with assuming activities on a global scale (Table 7).

Table 7. Changes in the GVCs implied by the adoption of I4.0 technologies [N=400]

Changes in GVC	M	Me	SD	Min.	Max.
The firm enters new business sectors.	2.31	4.00	0.71	1.00	5.00
The firm tries to operate globally.	4.23	4.00	0.80	2.00	5.00
The firm performs more diverse and sophisticated operations.	3.70	4.00	0.88	2.00	5.00

Source: own study.

The analysis of means and middle values showed that most respondents agreed their companies perform more diverse functions – which means changes to the governance of GVCs (M=3.70) – and try to act globally (M=4.23). In the last step of this part of the analysis, we verified whether the level of digital maturity correlates with changes in GVCs. The results of Spearman's rho correlation analyses are presented in Table 8 below.

The analysis showed that all tested compounds were statistically significant and positive. Moderately strong correlations occurred between the level of digital maturity and changes in the governance of GVCs. Weak correlations were linked to changes in the spatial scope of operations. Thus, the second research proposal (RP2) was reflected in the obtained results. Nevertheless, the greater digital maturity of the firms accompanied the diversification of functions implemented in the value chain (governance) rather than their actions in new sectors or geographic expansions associated with operating on a global scale.

Table 8. Correlations between the level of digital maturity and changes in the GVCs of interviewed companies

Changes in GVC	Correlation coefficients	
The firm enters new business sectors.	*rho* Spearman	0.10
	significance	0.038
The firm tries to operate globally	*rho* Spearman	0.17
	significance	<0.001
The firm performs more diverse and sophisticated operations	*rho* Spearman	0.38
	significance	<0.001

Source: own study.

CONCLUSIONS

Early studies on I4.0 concentrated on technology adoption. Later research dealt with organizational adjustments, recognized as the complementary and necessary elements of digital transformation. The study went further to demonstrate the wider consequences of the I4.0 adoption on partner relationships in GVCs. We do not claim readiness differs due to GVC but that it is a key factor that needs to be taken into account, accounting for supply partners and other actors in the company's network so far neglected deserve particular attention as I.40 or digital transformation does not happen in a vacuum but is inherently related to firm 's relationships (*e.g.* inspired, motivated or forced and required by partners). Available studies stress the importance of I4.0 GVC implications, *e.g.* new technologies provide new options for dispersed modular activities, yet they allow the shortening of production stages (Strange & Zuchella, 2017). Processes may increase the power of MNEs as coordinators of GVC, or conversely, empower many small geographically scattered networks or chain members (UNCTAD WIR, 2017). Additive manufacturing (AM) related to I4.0 can disrupt the configurations and operations of IB; the specific continuum of household – to global-level manufacturing (Hannibal & Knight, 2018). Basically, digitization influences internationalization in terms of timing, pace, rhythm, location and entry mode; it questions the basic notions about the configuration of global production (Coviello *et al.*, 2017). Luo and Zahra (2023) highlight that the Fourth Industrial Revolution is rife with challenges, and firms must 'remake' themselves and rethink the concept of the firm and its boundaries to thrive in this new environment (Ancarani *et al.,* 2019). Moreover, the Fourth Industrial Revolution expands the ways of bundling and leveraging FSAs and CSAs and changes the ways MNEs monitor global operations and mobilize global resources.

The focus on digital transformation goes beyond the implementation of technological innovations so as to consider their impact on the companies' external partners in GVCs. By drawing on the Polish 400 manufacturing companies, the article examined how I4.0 technology adoption modifies the awareness of partners' progress in digital transformation, affects the integration with GVC partners, and leads to changes in the diversification, geographic scope, and governance of value chains. In that way, we illuminated how the disruptive innovation of the I4.0 wave in one firm sends ripples that affect other entities and their partners along the value chain they jointly create.

The study offers a compelling case that opens space for further discussion and rethinks, firstly, how to assess the digital maturity of companies that operate together in the GVC. Secondly, how I4.0 technologies and their adoption by partners operating in one GVC impact the GVC.

After examining the adoption of 11 I4.0 technologies, we found that it is not just the level of their adoption itself that matters for digital maturity but the broader awareness of progress in digital transformation among partners. Despite intensive work on standardization – how to measure the digital maturity of firms – there is no one-size-fits-all strategy that suits all businesses or industries. It means that the I4.0 roadmap for each company is highly idiosyncratic, and it should be devised by drawing on each company's core competencies, strengths, motivations, capabilities, intent, goals, priorities, and budgets (Ghobakhloo, 2019). Thus, what seems inevitable is the enlargement of the I4.0 domain from a purely technological focus to a broader scope that would cover the whole organization. For instance, instead of measuring technology adoption levels, one could use broader intelligence and awareness concerning the GVC partners as an indicator of I4.0 readiness.

Specifically, we posit that the level of I4.0 technology adoption resonates with the companies' awareness of their suppliers' digital progress. There exists an interdependence between the level of I4.0 technology adoption and the knowledge of the related opportunities or threats for the firm 's suppliers. After all, we confirmed research proposal 1A only for suppliers. Thus, the more companies are digitally mature in terms of I4.0 technology adoption, the more they know about the challenges experienced by their suppliers. This diagnosed correlation contributes to the debate on how outside thinking may accelerate business model innovations (cf. Wu *et al.*, 2021). The knowledge of the challenges, risks, and opportunities facilitated by I4.0 technologies that the suppliers face may direct companies toward particular business model innovations. Simultaneously, this research can add to the discussion on the impact of the digitization of GVCs, as an important aspect of GVC studies (Kano *et al.*, 2020).

Furthermore, the study elucidated that companies adopting I4.0 solutions know they must develop common standards with their partners, so they try to integrate the partners in GVCs. Thus, research proposal 1B fully resonates with the obtained results. The empirical findings showed that I4.0 technologies facilitate reconfigurations in GVCs in terms of diversification, spatial expansion, and governance, which translates to business model innovations (cf. *e.g.* Kumar & Srivastava, 2020; Sharma *et al.,* 2019). Moreover, we found that the adoption of I4.0 technologies facilitates changes in company business models, which translates into reconfigurations in their GVC, which fully reflects research proposal 2.

The examination of I4.0 technologies adopted by the studied companies revealed that the entities develop their digital maturity gradually, which agrees with other studies that found different types of companies engage in digital transformation with varying degrees (*i.e.* Müller *et al.,* 2018). The conducted research foregrounded two different types of entities in terms of their adoption of I4.0 technologies, *i.e.* leaders and laggards. Laggards are companies that adopted diverse cybersecurity solutions and exploited cloud computing. Leaders are firms that adopt more sophisticated technologies. Thus, cybersecurity issues represent the prerequisite to becoming more digitally mature. Moreover, the impact of digital transformation on the transformation of their business models may be gradual in nature.

The findings obtained speak to one of the most timely and significant discussions on how to properly assess the digital maturity of firms that today operate in GVCs. Being part of a constellation means being interdependent. Thus, it does not suffice for a firm to digitally transform its own organization, as it also requires the firm to partly contribute to the digital transformation of its partners. Otherwise, the digital progress of the company will be wasted or not fully utilized. The novelty of the presented study is to some extent related to the context, namely the post-transition economy of Poland, which remains digitally less mature than other European countries.

Furthermore, Polish companies remain poorly researched in terms of the Digital Revolution. Firms in post-transition countries such as Poland are exposed to harsh competition from firms all around the globe and faced with a globalization-deglobalization narrative (Witt, 2019), 'wicked problems' (Rašković, 2022) new types of risks, such as populism, nationalism, and xenophobia (Lonergan & Blyth, 2020; Hartwell & Devinney, 2021), or technonationalism (Luo, 2022) and they need to swiftly adapt and adjust to standard and general patterns which govern international business activities. Nevertheless, their legacy of representing previously a communist regime and the fact they exemplify the country seen as a unique research laboratory (magnitude of changes, cultural heritage) make them quite atypical – suffering liability of latecomers, being less advanced and endangered by middle-income trap – all this requires a special attention. By referring to the context of a post-transition country, we demonstrated that the progress in digital transformation at the microeconomic level – which may be measured by diverse digital maturity indices and is reflected in the innovation performance of firms – does not happen in a vacuum, and the peculiarity of a post-transition economy related to its institutional and cultural specificity plays a considerable role. The empirical findings reported here can serve as a basis for future theory building and, then, testing how to measure the digital maturity of firms and how to recognize its implications for business models. Research can extend this analysis of responses of companies to the challenges that I4.0 technologies pose for them and their partners, thus, how to keep pace with the 4IR not only as a single company with its own business model but as a part of a whole GVC. Keeping in mind that business model alterations imply changes in the business models of the firm 's partners, future studies must consider more than individual firms.

The 4IR that claims close network relations and compatibility are prerequisites for future international business cooperation in GVCs and can be seen as an extension of another approach forwarded by the European Commission, which applies DESI. This composite index tracks the evolution of EU member states in digital competitiveness. Acknowledging that the sheer increase of ICT use and improvement in indices of digital economies do not guarantee to reap concrete economic and social benefits. Just as the availability of hardware, software, and the development of ICT infrastructure must not necessarily translate into real economic growth and an increase in social welfare, so pure facts and figures on computers, the Internet use by firms, and the availability of cloud computing must not necessarily enable and safeguard collaboration among partners along value chains.

The key limitation of the conducted study is that CATI is drawn on a five-point Likert scale. We focused on manufacturing companies, *i.e.* NACE Section C without considering differences in market structures and other factors that may influence companies' performance and their relationships with the studied technologies, such as companies' and GVCs' structures, product characteristics, or organizational cultures. Future research would require in-depth interviews, which would allow us to better confront interviewees' declarations with processes that occur in the studied companies. Moreover, the set of I4.0 solutions must be broadened in future studies to incorporate the most recent technologies such as blockchain, NFT, general tokenization, fintech structures, and the metaverse. These technological solutions strongly impact companies and supply chains. Furthermore, we are aware of complementarities among the studied technologies, so in the future, the effect of technology combinations in different industry sectors needs adequate analysis.

The adopted approach considered the intensity and extension of I4.0 technologies adoption, as we asked 'How many out of the 11 technologies are used?' and 'How much (Likert scale) these technologies are used (intensive and extensive aspect)?' The digital maturity or readiness index could be three-dimensional, accounting not only for the intensity of application (how often?) or the number of technologies adopted (how many?) but also for the functional aspects of the adoption (for what purpose?

To conclude, the novelty of the study lies in the comprehensive and systematic investigation of the impact of I4.0 technologies adoption on companies that operate in GVCs. This article focuses on the disruption caused by the advancement of digital transformation in companies that operate in a constellation of relationships (Cuypers *et al*., 2020) and are interdependent in the same GVC. It recognizes the relationships within the GVC as channels of transmission of challenges, risks, and opportunities that emerge from the disruption.

In this study, we touched upon the case of a post-transition, post-communist country in Central and Eastern Europe under digital transformation, which is highly specific yet offers valuable findings transferable to other economies on the eve of the Fourth Industrial Revolution. The presented study contributes to current studies on I4.0, which mostly focus on the most advanced countries-leaders in implementing Industry 4.0, thus neglecting the less advanced economies. In the last decade, I4.0 has garnered much attention among scholars and industry practitioners, but the research landscape of I4.0 implementation remains fragmented. Given the deficit of studies on the CEE region and I4.0, this article can contribute to the emerging literature by addressing the above research gap.

Thanks to the conducted study on the digital maturity of firms from a post-transition country, we demonstrated that I4.0 is a concept that still requires conceptual development. Following the reasoning of Golini and Kalschmidt (2019), we aimed to bridge the global value chain approach and the issue of I4.0 by focusing on the perspective of single companies. Thus, the study elucidated that the emerging theory of the 4IR is interdependent with the theory of GVCs.

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Acknowledgements and Financial Disclosure

The article came into being within project no. 004/RID/2018/19 entitled "Economics in the face of the New Economy" financed by the Ministry of Science and Higher Education in Poland within the Regional Excellence Initiative conducted by Barbara Jankowska, Małgorzata Bartosik-Purgat and Ewa Mińska-Struzik in the years 2019-2022.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120109

Strategy versus control orientation and firm performance: Evidence from Europe

Michael Troilo, Svetlana Orlova, Miklos Stocker, Michal Zdziarski

ABSTRACT

Objective: The objective of the article is to investigate the relationship between strategy and control in national-level corporate governance (CG) codes impact firm-level financial and strategic performance.

Research Design & Methods: We build on existing CG literature to offer a conceptual matrix showing the evolution of CG codes as they balance strategy and control. We relate the emphasis on strategy versus control at the national level to the firm level for both strategic outcomes as well as more traditional financial measures. Using Compustat data from 12 700 unique firms across 31 countries for the period 1990-2016, we estimate the impact of CG codes on various financial performance measures with multivariate regression and logistics (logit) models.

Findings: We find that there is a positive and significant relationship between higher emphasis on strategy in CG codes and return on assets (ROA). We also find a positive and significant relationship between the former and the probability of paying dividends, investing in research and development (R&D), and spending on capital expenditures (CAPEX).

Implications & Recommendations: Stronger legal institutions associate with a higher emphasis on strategy in CG codes. We suggest that policymakers should refine their CG Codes to focus more on strategy where feasible given our findings. We also recommend strengthening legal institutions, such as rule of law, as this will accelerate the evolution of CG codes from monitoring to strategy.

Contribution & Value Added: Our findings indicate that policymakers should refine their CG codes to emphasize strategy where feasible. In addition, strengthening legal institutions would accelerate the evolution of CG codes.

Article type:	research article
Keywords:	Corporate Governance; Corporate Governance Codes; Strategy-Control Ratio; Firm performance; Institutions
JEL codes:	G30, M16, F38

Received: 11 August 2023 Revised: 24 October 2023 Accepted: 9 November 2023

Suggested citation:
Troilo, M., Orlova, S., Stocker, M., & Zdziarski, M. (2024). Strategy versus control orientation and firm performance: Evidence from Europe. *Entrepreneurial Business and Economics Review,* 12(1), 153-176. https://doi.org/10.15678/EBER.2024.120109

INTRODUCTION

Corporate governance (hereafter CG), the processes and policies that direct companies, is indispensable for increasing the value of the firm (Gompers *et al.*, 2003). This direction spans time; in the short term CG manifests itself in the monitoring of daily operations and in the long term it concerns strategy. While CG embraces both control and strategy, there are necessary tradeoffs. Since resources are finite, including the attention and effort of the board of directors and the employees at all levels, often there will be more emphasis on either control or strategy in a given company at a given point in time.

In this paper, we examine the relationship between strategy and control in CG. Using a dataset of nearly 17 000 firms across 31 European and Central Asian countries over 26 years, we analyze the prevalence of strategy versus control in CG codes on firm-level outcomes. A higher incidence of strategy corresponds with a higher likelihood of paying dividends, spending on capital expenditures, and in investing in research and development (R&D). There is also a positive relationship

between strategy and ROA. At the country level, stronger legal institutions associate with a higher degree of strategy in CG codes.

Our work builds upon an extant literature spanning several decades, but in particular we are extending the recent studies of Almaskati *et al*. (2020), Haxhi and Aguilera (2017), Martins *et al*. (2017), and Schiehll and Martins (2016), at both the national institutional and firm levels of analysis. At the national level, we offer a conceptual matrix of strategy versus control as well as data of where countries stand on this matrix. While Haxhi and Aguilera (2017) and Schiehll and Martins (2016) are the inspiration, this matrix represents a contribution. At the firm level, we are contributing findings about the impact of strategy in CG codes on important metrics of firm performance, building on the work of Renders *et al.* (2010). Although there are a multitude of studies concerning CG and firm outcomes, there are relatively few that examine the issue of strategy versus control at the national level and relate it to firms across countries and across time in the manner we have, particularly for metrics of strategic performance. The scope of this analysis in terms of countries and time is another addition to the literature. According to Cuomo, Mallin, and Zattoni (2016), comparisons of the content of national CG codes at the international level are relatively rare, particularly for large panel data sets such as ours.

We begin with a literature review, in which we not only canvas the vast prior work on CG but also describe our contributions and how they connect to earlier studies via our hypothesis development. We then describe our data and methods and offer our results. A discussion of these findings, as well as limitations of the study, conclude the paper.

LITERATURE REVIEW

Corporate Governance and Institutional Context

The importance of corporate governance cannot be overemphasized. Extant literature recognizes that "good governance" facilitates value creation (Gompers *et al*., 2003; Anokhin *et al*., 2016), and correlates positively with higher financial performance as measured by firm value, profitability, and sales growth (Bebchuk *et al*., 2009; Renders *et al*., 2010; Fuenzalida *et al*., 2013; Cumming *et al*., 2017). Corporate governance is a function of strong property rights and rule of law; Bhagat and Hubbard (2022) posit that strong rule of law reassure shareholders that their contractual rights vis-à-vis debtholders and other stakeholders will be upheld. Corporate governance embraces both the strategic vision for the long-term viability of the firm as well as the daily accountability necessary to maintain the firm as a going concern. This mirrors the exchange of the two primary theories in the CG literature. The necessity of control and monitoring springs from agency theory (Jensen & Meckling, 1976); boards attempt to align the motivations and behaviours of the agents (management) with those of the principals (owners). In this sense corporate governance is about all tasks and activities that are intended to supervise and steer the behaviour of top management (Fuenzalida *et al*., 2013; De Witt, 2017).

On the other hand, resource dependency theory advocates the board as strategic advisors to the firm (Pfeffer & Salancik, 1978), guiding the company forward as it copes with emerging competition and dynamic market conditions. Monks and Minow (1995) express the crux of this idea as "the relationship among various participants in determining the direction and performance of corporations" (Monks & Minow, 1995, p. 1). Filatotchev and Wright (2011) capture the strategic function of CG, noting that, "corporate governance is at the heart of the strategic decision-making process in the MNE, and, by affecting risk preferences and interest congruence among various stakeholders, various constellations of governance factors such as ownership structure, board characteristics, and incentive systems may have profound effects on the MNE's global strategy, operations, and performance" (Filatotchev & Wright, 2011, p. 484). Beyond these considerations, Peng (2014) broadens the main factors of corporate governance to the legal system and regulation, the role of stakeholders, the financial institutes and the role of private, public and state partnerships.

Boards of directors have two basic tasks to perform: to control and monitor management on behalf of the firm's shareholders, and to provide advice and counsel to the CEO and other top managers in strategy (Forbes & Milliken, 1999). Regarding strategy versus control, Cumming *et al*. (2017) remark

that, as the role of management is essentially to identify and implement an efficient strategy, the "organization control processes are equally important in terms of creating value in the context of globalization. These processes facilitate accountability, monitoring, and trust within and outside of the firm, and should ultimately lead to improvements in the firm's performance and long-term survival" (Cumming *et al.*, 2017, p. 123). Bezemer *et al*. (2022) emphasize that the strategy role of corporate boards is still broadening and evolving, with a current focus on corporate social responsibility (CSR) issues.

It is apparent from these quotes, and from the body of corporate governance literature as a whole, that strategy and control complement one another in the operations of the firm. This idea of complementarity is the crux of Hillman and Dalziel's (2003) board capital construct, which attempts to integrate agency theory and resource dependency theory. On the other hand, the board of directors, management, and other employees of the firm have scarce resources, including time and energy, for running the company. Their governance may then be more directed to long-term strategy or short-term control as they choose how to allocate their time. A complex set of interactive factors at the country, industry, and firm levels will influence which orientation, strategic or control, seems paramount for corporate governance.

CG codes exist at the country level as part of the national institutional framework; this relationship is still relatively under-researched (Aguilera *et al*., 2016; Schiehll & Martins, 2016; Bhagat & Hubbard, 2022). For nations, institutions are metasystems that govern human behaviour, e.g. the "rules of the game" in North's (1990, p. 3) oft-repeated description. These institutions include facets of the legal system such as property rights and rule of law that influence CG codes. In an environment where property rights and rule of law are weak, e.g. countries transitioning from planned to market economies (cf. Pissarides *et al*., 2003), it is understandable why the focus of corporate governance would be on monitoring versus strategy. It is necessary to prevent tunnelling of assets in the present before considering the future. Conversely, where related institutions are robust, fraud on the part of management is likely less of a concern and boards of directors can pay more attention to the long-term vision of the company.

As firm-level governance mechanisms are embedded to the institutional environment, their functioning as well as their organizational impact may be different, even in very similar countries (Schiehll *et al*., 2014; Filatotchev *et al*., 2013). Although multinational enterprises can export (or import) their corporate governance practices through acquisitions, restructurings, or cross-listings on a foreign exchange, the mobility of CG practices are limited by the cross-national institutional differences (Cumming *et al.*, 2017; Boivie *et al.*, 2021).

Returning to the concept of interaction, we highlight some relevant studies concerning the impact of national institutions on corporate governance. Bell *et al*. (2014) describes corporate governance as "part of a broader system of interrelated elements, wherein firm-level governance interacts with other organizational contingencies and country-level institutions in determining organizational outcomes" (Bell *et al.,* 2014, p. 316). Chu *et al*. (2016) find that common-law regimes correspond to better CG practices, which in turn leads to more R&D spending. Almaskati *et al*. (2020) find the expected positive relationship between rule of law and their constructed CG index. Hubbard and Bhagat (2022) emphasize that property rights and rule of law have a positive association with CG, since these two institutions are the foundation of limited liability and contractual obligations necessary for equity investment.

Interrelated national level institutions affect national corporate governance patterns. These patterns lead to the evolution of CG practices, which can be observed by the development of CG codes. CG codes are tangible outcomes of this evolutionary process, and they serve as appropriate level of analysis for debate on comparison of different national CG practices. With empirical analysis of CG codes adopted in different countries, cross-national comparisons of CG systems can be achieved. Good corporate governance codes intensify transparency and minimize non-compliance and serve as best practices which became an important part of CG systems and mechanisms. CG codes vary, however among countries in their key attributes as well as in their enforcement, the entities issuing them and the degree of institutionalization within the overall regulatory system (Aguilera & Cuervo-Cazurra, 2004; Haxhi & van Ees, 2010; Hermes *et al*., 2016; Haxhi & Aguilera, 2017; Almaskati *et al*., 2020; Mertzanis *et al*., 2023).

These notions of corporate governance embedded in a set of national-level institutions (cf. La Porta *et al*., 1999; Aguilera & Jackson, 2003; Doidge *et al*., 2007; Aguilera *et al*., 2016; McCahery *et al*., 2016; Schiehll & Martins, 2016; Martins *et al*., 2017; Bhagat & Hubbard, 2022) are fundamental to our analysis

of governance orientation and we use CG codes and their focus of strategy or control as key variables in the empirical analysis.

In terms of characterizing CG, we offer a familiar 2 x 2 matrix along the dimensions of strategy and control (Figure 1.):

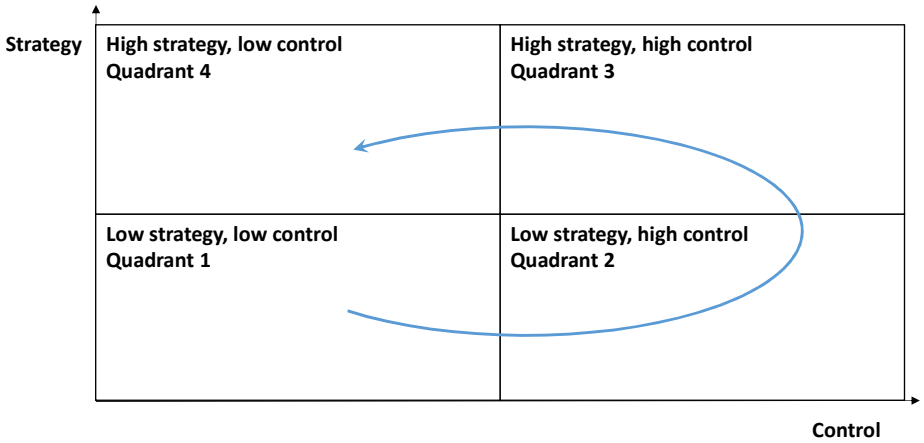

Figure 1. Characteristics of Corporate Governance along the dimensions of Strategy and Control
Source: own elaboration.

The emphasis on strategy versus control is relative, as it is expected that CG codes will in general have much more to say about the latter than the former. Considering the national institutional context, we picture the lower left quadrant as an environment where CG is ineffective because the supporting institutions, e.g. property rights, rule of law, stability of the political regime, etc. are weak. On the other hand, the lower right quadrant exemplifies a milieu where CG functions in terms of accountability, but is not sufficiently developed to aid corporate strategy. The upper right quadrant is more evolved, providing both monitoring and strategic decision-making. This leaves the upper left quadrant: given what we know about the evolution of institutions, it is difficult to imagine CG that emphasizes strategy but is deficient in control. It could be that over time; however, that countries are lower in the control emphasis not due to deficiency but the opposite; proper monitoring is taken for granted because solid control is endemic in CG and in supporting institutions. The arrows represent the progression of CG codes in conjunction with the development of national institutional frameworks.

It is to be expected that stronger institutions will enable the focus of corporate governance to pivot more towards strategy than control. For example, Doidge *et al*. (2007) and Almaskati *et al*. (2020) both find a positive relationship between rule of law and corporate governance. We would not only expect this same result in our analysis, but also that related institutions would have a similar relationship. Regulations and regulatory quality are clearly related to rule of law (cf. Djankov *et al*., 2002; Bowen & DeClercq, 2008; Levie & Autio, 2011; Troilo, 2011; Bhagat & Hubbard, 2022), yet are distinct from it. We include measures of corporate governance from World Bank Corporate Governance database as control variables in our full specifications.

Corporate Governance and Firm Performance

As noted by Agrawal and Knoeber (2013), the literature on CG and firm performance is sizable and spans several decades. Building on the foundation of agency theory (Jensen & Meckling, 1976), scholars first examined CG in the context of owner concentration, inside ownership, and firm performance (Demsetz, 1983; Morck *et al*., 1988; McConnell & Servaes, 1990). This stream of literature continues today, with more recent offerings such as Bhagat and Bolton (2008) and Gompers *et al*. (2010) tackling issues such as the endogeneity inherent in the relationship between inside ownership and firm performance. The impact of cultural context, specifically the difference between the insider approach to CG and the market-based approach, has also emerged (cf. Pillai & al-Malkawi, 2018; Ciftci *et al*., 2019, Almaskati *et al*., 2020). Lastly, the issue of capital structure as a moderating influence between CG and firm performance is a recent topic of study (Mansour *et al*., 2022).

The study of ownership, CG, and firm performance led naturally in the literature to the role of large stockholders, boards of directors, and monitoring effectiveness. Yermack (1996) is a seminal example; he finds that board size has an inverse effect on Tobin's Q. Duchin *et al.* (2010) investigate the impact of outside directors; they find that more outsiders on the board correlate with better firm performance. Tulung and Ramdani (2018) also find a positive effect between board size and firm performance as well as board independence and firm performance. Obeitoh *et al*. (2023) study the boards of 40 listed Nigerian firms and discover that board expertise, in conjunction with board size, has a positive impact on firm performance, as does the number of female directors.

Shareholder rights, particularly minority shareholders, also is a focus of CG scholarship. A path-breaking effort in this regard is the work of Gompers *et al*. (2003), who constructed a Governance Index comprised of 24 indicators to measure the degree of shareholder rights. The use of this index begat a resurgence of interest in overall CG and firm performance (cf. Bhagat & Bolton, 2019), as well as more specialized topics such as debt structure (Bharath & Hertzel, 2019; Mansour *et al*., 2022), CEO compensation (Agrawal & Nasser, 2019), and board decision-making and firm value (Vafeas & Vlittis, 2019).

Whereas the vast majority of the research concerning CG and firm performance has focused on the internal workings of the firm, e.g. board composition, our work highlights the relationship between the external emphasis on strategy vs. control at the national level (CG codes) and firm outcomes. Moreover, our research considers firm performance on both strategic dimensions as well as traditional financial results. We examine the influence of CG codes orientation (strategy vs. control) on firms' ROA, research and development expenditures, dividend payments and capital expenditure. Our intuition is that as CG codes evolve from a monitoring function (control) to a strategic function (strategy), firm-level outcomes will improve on both the strategic and financial dimensions.

Our work builds directly on, inter alia, Bhagat and Hubbard (2022), Martins *et al*. (2017) Haxhi and Aguilera (2017), and Schiehll and Martins (2016). While these scholars delineated the complex relationship of CG quality within a configuration of national institutions, they left for future work the impact of various kinds of CG codes on firm-level outcomes (Although Martins *et al*., 2017 did estimate the impact of CG quality on debt maturity and ownership concentration, we are focusing on CG codes and different firm outcomes such as ROA). As described, we are examining the extent to which these codes emphasize strategy, and how that will correlate with firm performance.

In particular, we cite the work of Renders *et al*. (2010) and Mertzanis *et al*. (2023), who established a positive relationship between a higher level of corporate governance at the country level and firm performance, in expectation that more emphasis on strategy in CG codes will correlate with better company outcomes. Renders *et al*. (2010) found this positive relationship explicitly for ROA, which is one of our proxies as well. Mertzanis *et al*. (2023) studied the relationship among institutions, CG and corporate liquidity in the MENA region. They found that the firm level of cash holdings was sensitive to the level of regulation, contract enforcement, attitudes towards risk, and degree of economic development among other factors.

We are extending their work in several ways. First, we are testing different metrics that capture strategic dimensions such as R&D spending as well as financial outcomes such as ROA and dividend payouts. Second, we are using a broader range of 38 countries (mainly European) compared to their 14. Third, our panel is longer at 16 years (2000-2016) than their 5-year span from 1999-2003.

Based upon the above, we propose the following hypothesis for testing:

H1: A higher SC ratio associates with a higher ROA.

Concerning the relationship between CG and dividend payouts, most research treats it as an ancillary effect of another component, such as executive remuneration (Geiler & Renneboog, 2016) or risk disclosure and market liquidity (Elshandidy & Neri, 2015). Gugler (2003), tested dividend payouts directly as a function of CG, but he was researching the aspect of ownership and control. For a panel of Austrian firms between 1991-1999, he found that state-controlled firms "smooth" dividend payouts, have large target payout ratios, and are reluctant to cut dividends relative to family-controlled firms (Gugler, 2003, p. 1318). In recent scholarship, Rajput and Jhunjhunwala (2019) discover a positive relationship between the quality of corporate governance and the likelihood of paying dividends, due to

the fact that in strong CG environments, investors are more able to compel managers to share excess profits. We also analyse the probability of dividend payout and expect a similar result, as a higher emphasis on strategy in a CG code indicates higher CG quality. We test the following:

H2: A higher SC ratio associates with a higher likelihood of paying dividends.

Prior studies of the impact of CG on R&D spending show mixed results (Honore *et al*., 2015). Much depends on the facet of CG researchers are investigating, and what countries are included. For example, Pindado *et al.* (2015) find a positive relationship between investor protection (nested in various legal and financial institutions) and the market valuation of firms' R&D in a sample of U.S., European, and Japanese companies. Seitz and Waltzinger (2017) discover a positive relationship between contract enforcement and R&D investment over 22 OECD countries for the decade 1995-2005. On the other hand, Rodrigues *et al.* (2019) find the opposite result of Pindado *et al*. (2015) for firms in Europe between 2002-2013; companies in common-law countries such as Great Britain and Ireland had lower R&D than those in continental Europe. Seifert and Gonenc (2012) find that stronger creditor rights correlates with reduced R&D intensity for 21 000 firms over 41 countries for 1980-2006.

We are examining the relationship between the strength of CG for investors as opposed to creditors and its impact on R&D. We are not evaluating the type of legal system, i.e. common-law versus civil law; rather, the emphasis on strategy in the CG code and its effect on R&D. Firms spend on R&D in the hopes of gaining long-term strategic advantage against rivals. Based on Render's (2010) idea that more emphasis on strategy leads to better firm performance, we hypothesize the following:

H3: A higher SC ratio associates with a higher likelihood of spending on R&D.

Prior research on the relationship between CG and capital expenditures (CAPEX) is similar in nature to CG and dividend payouts; CAPEX is not the main focus. For example, Inci *et al.* (2009) examine the impact of earnings on capital investment, where CG figures as a key institution/outgrowth of level of financial development and type of legal system (common versus civil law). Gugler (2003) finds a negative relationship between dividend payouts and capital investment; the ownership and control of the firm (state versus family) significantly impacts the former.

Retracing our steps to Renders *et al*. (2010), we anticipate that a higher emphasis on strategy associates with a higher probability of CAPEX:

H4: A higher SC ratio associates with a higher capital expenditures (CAPEX).

RESEARCH METHODOLOGY

Data

The initial sample consists of firms in the Compustat Global database for the period 1990-2016, which is the source of data for firm-level financial variables. We exclude firms in the financial sector (SIC codes 6000-6999). Further, we limit our sample to European and Central Asian countries for which accounting/financial data is available. Our final sample has data for 31 countries: 29 from Europe plus Turkey and Kazakhstan. At the country level, we collected macroeconomic and corporate governance data from the World Bank. Financial and economic development variables are from the World Bank's World Development Indicators. Corporate Governance variables are from the World Bank's Worldwide Governance Indicators database. Due to the fact that majority of Corporate Governance codes were adopted after 2000, our analysis mainly uses data from 2000-2016 timeframe. Our sample is unbalanced panel data, due to data availability, as not all firms have data available for very year, as new firms are added to the Compustat database, while some firms cease to exist due to discontinuation of their business or mergers. We use the two-digit SIC industry code to distinguish among different industries.

Table 1 shows the raw data behind the construction of the key variable in our analysis, "SC (Strategy/Control) Ratio". We examined CG codes for each country for key words related to "Strategy" and "Control" and counted them. The words "strategy", "strategic", and "leadership" were summed for StrategyFocus, while the words "control", "audit", and "monitor" were added for ControlFocus. Dividing StrategyFocus by ControlFocus yields the SC Ratio. A number of countries revised their CG codes

over time, so new ratios appear in the panel for these countries from the year the revisions occurred. The ratios are multiplied by 100 for ease of reading and use. This semantic analysis of CG codes has its basis in prior literature, e.g. Cicon *et al*. (2012).

Table 1. Corporate Governance Codes by Country

Country	Strategy Focus	Control Focus	Ratio	Firm Obs.	Year	Quadrant
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Austria	5	100	5	6.022	2009	2 -LS, HC
Austria	5	119	4.2	9.898	2012	2 -LS, HC
Belgium	18	26	69.23	643	2005	4 -HS, LC
Belgium	13	162	8.02	1.127	2009	3 -HS, HC
Bulgaria	5	28	17.86	315	2007	1 -LS, LC
Bulgaria	4	23	17.39	358	2012	1 -LS, LC
Croatia	10	140	7.14	533	2010	3 -HS, HC
Czech Republic	22	168	13.1	32	2014	3 -HS, HC
Denmark	8	65	12.31	808	2008	4 -HS, LC
Denmark	20	47	42.55	820	2012	4 -HS, LC
Estonia	12	99	12.12	196	2005	3 -HS, HC
Finland	1	161	0.62	1.026	2008	2 -LS, HC
Finland	5	182	2.75	295	2015	2 -LS, HC
France	11	59	18.64	3.753	2008	4 -HS, LC
France	13	77	16.88	2.484	2013	4 -HS, LC
Germany	5	33	15.15	4.984	2009	1 -LS, LC
Germany	5	38	13.16	1.065	2015	1 -LS, LC
Greece	0	22	0	2.782	2001	1 -LS, LC
Greece	16	129	12.4	704	2013	3 -HS, HC
Hungary	16	224	7.14	116	2008	3 -HS, HC
Hungary	16	238	6.72	116	2012	3 -HS, HC
Italy	19	155	12.26	2.889	2006	3 -HS, HC
Italy	16	138	11.59	540	2015	3 -HS, HC
Kazakhstan	5	40	12.5	363	2005	1 -LS, LC
Latvia	8	48	16.67	159	2005	1 -LS, LC
Latvia	9	60	15	194	2010	1 -LS, LC
Lithuania	6	37	16.22	274	2003	1 -LS, LC
Lithuania	6	72	8.33	245	2010	1 -LS, LC
Luxembourg	7	103	6.8	298	2009	2 -LS, HC
Luxembourg	7	115	6.09	104	2011	2 -LS, HC
Norway	7	167	4.19	1.283	2009	2 -LS, HC
Norway	7	133	5.26	649	2014	2 -LS, HC
Poland	0	4	0	5.534	2007	1 -LS, LC
Poland	6	24	25	598	2016	1 -LS, LC
Portugal	5	29	17.24	340	2007	1 -LS, LC
Portugal	4	23	17.39	192	2013	1 -LS, LC
Romania	3	53	5.66	295	2009	1 -LS, LC
Romania	2	47	4.26	784	2011	1 -LS, LC
Russia	41	320	12.81	2.569	2004	3 -HS, HC
Russia	17	285	5.96	660	2014	3 -HS, HC
Serbia	4	54	7.41	96	2008	1 -LS, LC
Slovenia	10	138	7.25	35	2008	3 -HS, HC
Slovenia	11	58	18.97	233	2009	4 -HS, LC
Spain	13	149	8.72	1.547	2006	3 -HS, HC
Spain	12	76	15.79	316	2015	3 -HS, HC
Sweden	1	58	1.72	5.310	2008	1 -LS, LC

Country	Strategy Focus	Control Focus	Ratio	Firm Obs.	Year	Quadrant
Switzerland	5	53	9.43	1.749	2008	1 -LS, LC
Switzerland	6	39	15.38	750	2014	1 -LS, LC
The Netherlands	25	130	19.23	1.321	2008	3 -HS, HC
The Netherlands	25	154	16.23	110	2016	3 -HS, HC
Turkey	6	85	7.06	3.146	2005	1 -LS, LC
Turkey	2	44	4.55	1.189	2014	1 -LS, LC
United Kingdom	27	106	25.47	4.800	2014	3 -HS, HC
Ukraine	19	108	17.59	383	2003	3 -HS, HC
Total	–	–	–	77.032	–	–

Note: This Table presents the information regarding the Corporate Governance Codes for different countries in our sample. Columns 2 and 3 provides the information on number of strategy- and focus- related words used in the codes respectively. Column 4 indicates the ratio of strategy to focus mentionings. Column 5 indicates year during which the CG Codes were adopted.
Source: own study.

Using the concept of the strategy/control matrix above, we sorted the CG codes into quadrants. The average words for StrategyFocus was just above 9 and for ControlFocus just above 94; we used 10 and 100 respectively. Not surprisingly, most national codes are in Quadrant 1: Low Strategy, Low Control. We plot the level of StrategyFocus versus ControlFocus for all countries on Figure 2.

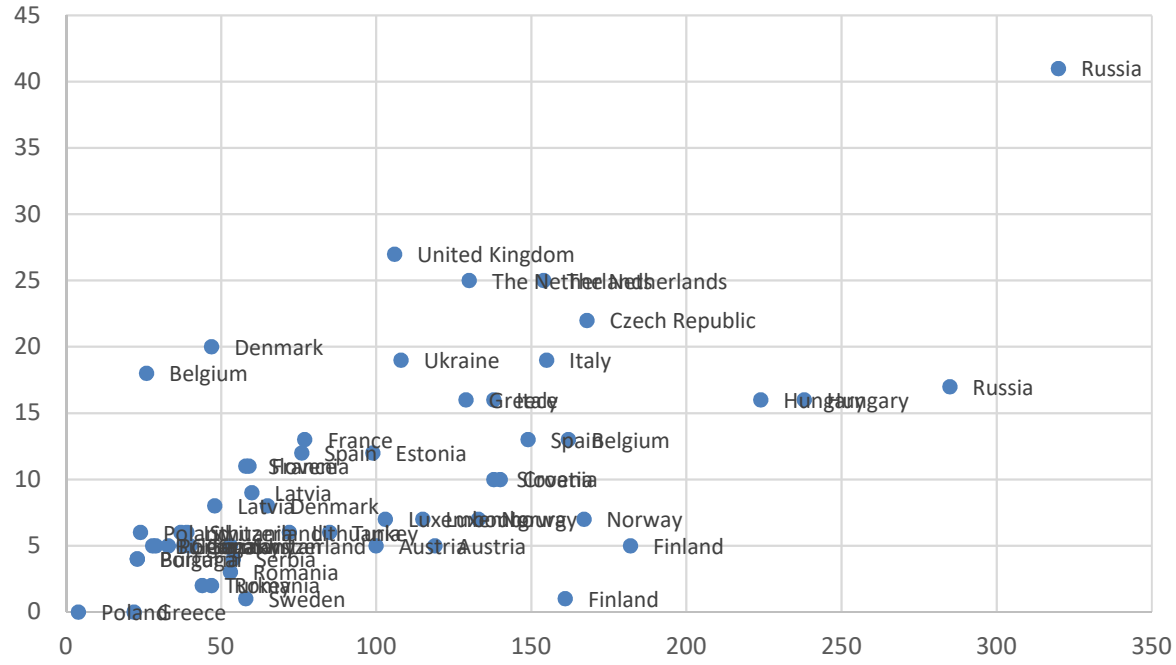

Figure 2. Strategy and Control Matrix-All Countries
Source: own elaboration.

Variables

We use a number of financial measures as dependent variables in our analysis. Return on Assets, *ROA*, is calculated as earnings before interest, taxes, depreciation, and amortization (EBITDA) divided by the value of the total assets. Dividends, *Div*, are calculated as a value of common dividends divided by value of the total assets. We use an indicator variable, *Div_D*, which takes on a value of one if a firm pays dividends and zero otherwise. *R&D* is research and development expenses divided by sales, with *R&D_D* an indicator value taking a value of one if the firm spends on R&D and zero otherwise. *CapEx* is capital expenditures divided by total assets, while *CapExHigh* is an indicator variable that takes on value of one when capital expenditure of a firm in a specific year is above the sample median, and zero otherwise. All

dependent variables are constructed based on data from the Compustat Global database. The dataset provides information about firms' common/ordinary dividends (dvc), total assets (at), capital expenditures (capx), earnings before interest, taxes, depreciation, and amortization (ebitda), research and development expenses (xrd) and sales (sale). Our dependent (as well as firm-level independent) variables are scaled by size (total assets or sales) to ensure proper comparison across all firms.

Our main independent variable as described above is *SC Ratio*. The value of the index ranges from 0.00 to 69.23, where higher values indicate more emphasis on strategy relative to control.

We use several firm-level characteristics as controls. These variables include size, leverage, market-to-book, cash, tangibility and cash flow. *Size* is the natural logarithm of the book value of total assets. *Leverage* is short-term debt plus long-term debt, divided by total assets. *Market-to-book* ratio is the market value of assets, defined as total assets minus book equity plus market value of equity, divided by total assets. *Cash* is cash and short-term investments scaled by total assets. *Cash Flow* is measured as earnings less interest and taxes, divided by total assets. *Tangibility* is property, plant, equipment scaled by total assets. All firm-level dependent variables are constructed based on data from the Compustat Global database.

At the country level we use *Political Stability*, *Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption* and *Voice and Accountability* from the World Bank's Worldwide Governance Indicators database to measure the overall level of countries' institutional framework. As mentioned, incorporating these institutional characteristics is based on the idea that corporate governance codes operate in a web of national-level institutions (Schiehll & Martins, 2016; Haxhi & Aguilera, 2017; Martins *et al*., 2017). We further control for country economic and financial markets development by incorporating the following variables in our regression analysis: *Stocks Traded* (total value), *Market Capitalization*, and *GDP per capita*. All of the economic and financial variables are from World Bank's World Development Indicators.

Table 2 summarizes statistics by country, while Table 3 contains the descriptive statistics for the main variables. At the country level, most firms are operating in stable environments as indicated by the relatively high median values for institutional factors, e.g. 0.924 for rule of law and 0.972 for government effectiveness. The median GDP per capita is 19 369 USD. The firms in our sample have a median return on assets (ROA) of 8.1%. Table 4 shows correlation coefficients for our dependent and independent variables. While we see high degree of correlation among some controls (for example, country level corporate governance variables), the correlation between these variables and our main independent variable SCRatio does not exceed 0.158.

Methods

For our main analysis we use the following model:

$$Firm\ performance\ (or\ policy)\ variable_{i,t+1} = \beta SCRatio_{i,t} + \gamma \mathrm{X}_{i,t} + \delta \mathrm{Y}_{j,t} + \eta \mathrm{Z}_{j,t} + \varepsilon \qquad (1)$$

Where *Firm performance (or policy) variable* is ROA, Div_D, R&D_D or CapExHigh. *SC Ratio* is the ratio of strategy to control previously described; β is a coefficient; $\mathrm{X}_{i,t}$ is a vector of observable firm-specific factors, and γ is a vector of coefficients; $\mathrm{Y}_{j,t}$ is a vector of observable corporate governance country-specific factors, and δ is a vector of coefficients; $\mathrm{Z}_{j,t}$ is a vector of observable economic and financial country-specific factors that, and η is a vector of coefficients, We employ panel ordinary least squares (OLS) with industry fixed effects, and year fixed effects.

For the tests when the dependent variable is binary (e.g., *Div_D*) we use logistic regression (logit).

Table 2. Summary statistics by countries

Country Name (1)	Number of obs. (2)	Number of firms (3)	Strategy vs Control Ratio (4)	Dividends (5)	R&D (6)	ROA (7)	CapEx (9)	Size (10)	Leverage (11)	Market-to- Book (12)	Cash (13)	Cash Flow (14)	Tangibility (15)	GDP per Capita (16)	Stocks Traded (total value) (17)	Market Capitalizatiion (18)	Control of Corrup tion (19)	Government Effectiveness (20)	Political Stability (21)	Regulatory Quality (22)	Rule of Law (23)	Voice and Accounta bility (24)
Austria	26,492	2,407	0.0420	0.033	0.032	-0.052	0.034	2.930	0.000	11.220	0.144	-0.013	2.079	43132.180	77.504	105.361	1.974	1.699	0.927	1.692	1.754	1.436
Belgium	1,903	170	0.0802	0.015	0.029	0.101	0.030	5.755	0.101	1.137	0.082	0.074	0.078	36213.760	22.474	66.807	1.381	1.737	0.845	1.248	1.311	1.388
Bulgaria	383	57	0.1786	0.018	0.006	0.091	0.033	4.825	0.012	4.702	0.039	0.068	2.619	6375.295	2.588	19.110	-0.234	0.110	0.326	0.624	-0.127	0.524
Croatia	821	78	0.0714	0.015	0.037	0.061	0.036	6.897	0.030	0.906	0.037	0.042	0.150	12080.720	2.308	43.659	0.009	0.569	0.578	0.494	0.093	0.472
Czech Republic	362	39	0.1310	0.015	0.002	0.106	0.056	8.964	0.330	0.559	0.046	0.084	0.005	12676.370	10.657	18.921	0.328	0.891	0.945	1.079	0.841	0.964
Denmark	2,509	211	0.1231	0.013	0.053	0.098	0.036	6.489	0.156	0.929	0.075	0.069	0.051	47582.540	31.015	53.945	2.426	2.093	1.097	1.775	1.897	1.583
Estonia	221	18	0.1212	0.028	0.011	0.148	0.062	5.879	0.160	0.997	0.070	0.122	0.134	10985.260	6.019	n/a	0.870	0.972	0.657	1.366	0.924	1.057
Finland	2,249	185	0.0062	0.027	0.024	0.110	0.040	5.298	0.091	1.393	0.084	0.079	0.164	38583.820	89.732	135.269	2.372	2.134	1.425	1.808	1.954	1.565
France	12,438	1,126	0.1864	0.013	0.032	0.091	0.028	5.071	0.053	1.766	0.106	0.066	0.157	34074.340	57.883	73.263	1.357	1.578	0.552	1.155	1.428	1.210
Germany	12,780	1,103	0.1515	0.014	0.037	0.092	0.030	4.773	0.014	2.233	0.097	0.064	0.250	35713.370	55.142	46.013	1.859	1.623	0.925	1.511	1.626	1.358
Greece	2,782	257	0.0000	0.014	0.003	0.068	0.016	5.161	0.031	1.890	0.048	0.039	0.140	22602.360	25.826	44.294	0.337	0.648	0.467	0.814	0.776	0.956
Hungary	382	40	0.0714	0.025	0.047	0.124	0.058	10.402	0.573	0.451	0.069	0.099	0.002	9809.266	17.294	22.470	0.578	0.837	0.817	1.066	0.829	1.038
Italy	4,520	414	0.1226	0.012	0.013	0.081	0.026	6.111	0.163	1.038	0.072	0.051	0.030	30959.050	51.813	37.449	0.306	0.454	0.500	0.826	0.420	1.023
Kazakhstan	226	21	0.1250	0.003	0.001	0.104	0.072	9.760	0.748	0.458	0.044	0.071	0.002	8240.641	2.004	20.008	-0.906	-0.445	0.176	-0.340	-0.660	-1.124
Latvia	385	31	0.1667	0.034	0.008	0.086	0.038	2.299	0.001	21.361	0.036	0.072	3.375	10909.980	1.638	n/a	0.188	0.647	0.494	0.998	0.750	0.761
Lithuania	425	42	0.1622	0.028	0.002	0.103	0.048	5.460	0.046	1.466	0.023	0.085	0.375	11353.390	2.176	n/a	0.224	0.746	0.725	1.066	0.679	0.882
Luxembourg	513	49	0.0680	0.019	0.008	0.092	0.036	6.785	0.246	0.948	0.087	0.065	0.074	88174.790	1.432	151.277	2.063	1.738	1.398	1.710	1.801	1.534
Netherlands	2,973	268	0.1923	0.021	0.026	0.118	0.039	6.187	0.125	1.109	0.068	0.088	0.089	39097.000	91.731	100.550	2.179	2.004	1.132	1.799	1.745	1.604
Norway	3,692	390	0.0419	0.016	0.025	0.074	0.039	6.545	0.202	0.923	0.110	0.049	0.060	70311.660	40.588	50.744	2.174	1.905	1.304	1.449	1.919	1.585
Poland	5,705	615	0,0000	0.023	0.002	0.084	0.033	4.592	0.004	3.219	0.057	0.062	0.968	11081.620	11.659	30.994	0.413	0.622	0.859	0.928	0.658	1.015
Portugal	889	85	0.1379	0.011	0.001	0.087	0.030	7.004	0.499	0.945	0.037	0.058	0.014	17182.480	24.613	38.552	1.117	1.096	1.021	1.101	1.167	1.383
Romania	1.362	137	0.0426	0.042	0.001	0.061	0.000	5.016	0.000	2.087	0.013	0.038	0.135	7609.895	1.017	11.062	-0.202	-0.273	0.164	0.580	0.029	0.414
Russian Federati	3,121	293	0.0531	0.009	0.002	0.111	0.048	9.322	0.536	0.650	0.047	0.074	0.010	9730.874	32.637	40.751	-0.952	-0.397	-0.941	-0.359	-0.814	-0.896
Serbia	65	9	0.0741	0.034	0.000	0.106	0.016	9.979	0.551	0.487	0.097	0.081	0.005	5687.032	2.193	31.307	-0.284	-0.096	-0.299	-0.064	-0.378	0.252
Slovenia	404	31	0.1897	0.012	0.026	0.078	0.048	7.337	0.397	0.721	0.046	0.055	0.009	19368.560	2.429	22.519	0.892	0.990	1.027	0.801	0.982	1.056
Spain	2.080	211	0.0872	0.016	0.003	0.095	0.023	7.630	0.501	0.810	0.059	0.068	0.009	23373.370	103.525	104.339	1.120	1.489	0.038	1.218	1.176	1.246
Sweden	5,756	724	0.0172	0.022	0.038	0.070	0.020	5.595	0.018	1.342	0.106	0.050	0.118	44358.690	86.679	100.892	2.248	1.972	1.258	1.617	1.879	1.564
Switzerland	3,001	286	0.0943	0.014	0.042	0.106	0.036	6.024	0.123	1.044	0.114	0.082	0.102	53231.150	151.038	214.982	2.128	2.023	1.280	1.655	1.906	1.454
Turkey	3,599	328	0.0706	0.029	0.003	0.077	0.021	5,685	0.014	1.370	0.056	0.041	0.129	8671.531	43.698	29.884	0.030	0.289	-0.954	0.328	0.079	-0.161
Ukraine	188	24	0.1759	0.036	0.001	0.120	0.023	8.162	0.030	0.659	0.020	0.083	0.033	2808.929	0.793	22.161	-0.980	-0.584	-0.102	-0.580	-0.790	-0.095
United Kingdom	29,819	3,064	0.2547	0.024	0.034	0.084	0.028	3.729	0.002	5.062	0.097	0.064	0.867	37117.530	87.643	127.569	1.895	1.747	0.487	1.776	1.664	1.312
Total/median	132,045	12,713	0.0943	0.018	0.011	0.092	0.034	6.024	0.101	1.044	0.068	0.068	0.102	19368.560	24.613	43.977	0.870	0.972	0.725	1.079	0.924	1.056

This Table includes summary statistics for all countries in the sample. The initial sample consists of European firms in the Compustat Global database for the period 2000-2016. Column 1 identifies the country, column 2 reports the number of observations and column 3 reports the number firms in the sample. Columns 4 reports Strategy vs Control Ratio. Column 5-15 reports median values of firm characteristics. Columns 16-24 report median values of economic and institutional variables. See data and methodology section for variable definitions.
Source: own elaboration.

Table 3. Summary Statistics for main dependent and independent variables – full sample

Variable (1)	**Mean** (2)	**Sd** (3)	**p25** (4)	**p50** (5)	**p75** (6)
Strategy Control Ratio	0.097	0.096	0.042	0.053	0.152
ROA	-0.138	9.290	-0.014	0.081	0.141
Capital Expenditure	0.075	3.501	0.006	0.028	0.068
Dividend	0.103	12.188	0.009	0.021	0.038
R&D	0.107	1.585	0.006	0.025	0.084
Size	5.076	2.978	3.081	4.828	6.799
Control of Corruption	1.540	0.799	1.350	1.819	2.078
Government Effectiveness	1.479	0.597	1.483	1.670	1.849
Political Stability	0.715	0.541	0.472	0.868	1.017
Regulatory Quality	1.406	0.510	1.160	1.593	1.775
Rule of Law	1.420	0.621	1.404	1.664	1.758
Voice and Accountability	1.229	0.481	1.198	1.343	1.455

Note: This Table presents the summary statistics information for main dependent and independent variable. The initial sample consists of European firms in the Compustat Global database for the period 2000-2016. See data and methodology section for variable definitions.
Source: own study.

RESULTS AND DISCUSSION

Table 5 displays the results for the OLS estimations of *ROA*. For this table and subsequent tables, we show three separate models, with each specification having more control variables than the one previous. For all models, we include year and industry fixed effects as mentioned, but for brevity we omit them in the table 5. For all three specifications, the *SC Ratio* is positively and significantly correlated with ROA at the 10 % level or better, as hypothesized (Hypothesis 1).

Table 6 offers results for the panel logit estimations of dividend payouts. The *SC Ratio* is positive and significant at 1% for all models. These findings support Hypothesis 2.

In Table 7, we view the panel logit findings for R&D. For all three models, the *SC Ratio* is positive and significant at 1%, reinforcing Hypothesis 3.

Our last set of results appear on Table 8: panel logit regressions for capital expenditures (*CapExHigh*). The findings are mixed. In Model 1 and 2, the *SC Ratio* is insignificant. In Model 3, it is negative and significant at 1%, which does not support Hypothesis 4.

Because of high degree of correlation between corporate governance variables from the World Bank's dataset (as can be seen in Table 4), there is a potential concern regarding an effect of multicollinearity on the precision of our estimates (for highly correlated regressors). To address this concern, we use principal component analysis (PCA). We rerun our tests replacing our corporate governance variables with (uncorrelated) principal components into our regression analysis. The estimation results for our main independent variable are virtually identical. For brevity the results are not included in the paper, but available upon request.

As a robustness test, we examine if there is a difference in results for former socialistic vs capitalistic countries. We interact SC Ratio variable with *FormerSocialistic*, a indicator variable that equals to one if a country previously was a socialistic economy, and zero otherwise. Table 9 presents the results of the SC Ratio impact on ROA. While we see a statistically significant difference in Models 1 and 2, in full specification (Model 3) the difference is insignificant once we control for country-level economic and corporate governance characteristics. We observe similar situation with other variables. Table 10 presents the results of a multivariate logit regression analysis of the full sample with *Div_D, R&D_D,* or *CapExHigh*, as a dependent variable.

Table 4. Correlation matrix

Variable (1)	**Strategy Control Ratio** (2)	**ROA** (3)	**Capital Expenditure** (4)	**Dividend** (5)	**R&D** (6)	**Control of Corruption** (7)	**Government Effectiveness** (8)	**Political Stability** (9)	**Regulatory Quality** (10)	**Rule of Law** (11)	**Voice and Accountability** (12)
Strategy Control Ratio	1.000										
ROA	0.012	1.000									
Capital Expenditure	-0.014	0.024	1.000								
Dividend	0.000	0.027	-0.002	1.000							
R&D	0.018	0.015	-0.003	0.000	1.000						
Control of Corruption	0.103	0.026	-0.030	0.004	0.015	1.000					
Government Effectiveness	0.158	0.016	-0.029	0.003	0.017	0.976	1.000				
Political Stability	-0.032	0.000	-0.015	0.001	0.016	0.793	0.799	1.000			
Regulatory Quality	0.111	0.022	-0.027	0.002	0.018	0.946	0.929	0.809	1.000		
Rule of Law	0.116	0.010	-0.031	0.003	0.014	0.972	0.970	0.810	0.965	1.000	
Voice and Accountability	0.107	-0.012	-0.026	0.001	0.020	0.875	0.879	0.882	0.909	0.917	1.000

Note: This Table shows correlations among the main variables of interest. The initial sample consists of European firms in the Compustat Global database for the period 2000-2016.The sample period spans the years 2000 to 2016. See data and methodology section for variable definitions.
Source: own study.

Table 5. Panel OLS Estimates of Strategy vs Control Ratio on ROA

Variables	**ROA (1)**	**ROA (2)**	**ROA (3)**
Strategy to Control Ratio	1.140***	0.807***	2.264*
	(0.214)	(0.276)	(1.201)
Size		0.320***	0.691**
		(0.096)	(0.285)
Leverage		-1.338***	-2.661**
		(0.437)	(1.110)
Market - to- Book		-0.000***	-0.000
		(0.000)	(0.000)
Cash		-0.867*	-1.300
		(0.509)	(1.051)
R&D		-1.408***	-1.388***
		(0.042)	(0.051)
Tangibility		-0.000	-0.000
		(0.000)	(0.000)
Inflation (CPI)			0.026
			(0.040)
Interest rate (real)			0.088**
			(0.041)
Domestic Credit			-0.007
			(0.006)
GDP per Capita			0.000*
			(0.000)
Gross Domestic Savings			-0.077
			(0.047)
Stocks Traded (total value)			0.009***
			(0.003)
Market Capitalization			-0.006
			(0.004)

Variables	ROA (1)	ROA (2)	ROA (3)
Stocks Market Turnover			0.005**
			(0.002)
Control of Corruption			1.314**
			(0.646)
Government Effectiveness			0.274
			(0.596)
Political Stability			0.266
			(0.710)
Regulatory Quality			3.808**
			(1.513)
Rule of Law			-3.265***
			(1.220)
Voice and Accountability			-1.023
			(0.983)
Constant	0.290***	-1.156***	-3.582**
	(0.088)	(0.415)	(1.488)
Year fixed effects	yes	yes	yes
Industry fixed effects	yes	yes	yes
Observations	53.743	32.110	10.915
R-squared	0.003	0.079	0.074

Note: This table reports the results of a multivariate OLS regression analysis of the full sample with *ROA* as a dependent variable. The initial sample consists of European firms in the Compustat Global database for the period 2000-2016. See data and methodology section for variable definitions. All specifications include industry fixed effects and year fixed effects. Standard errors are heteroskedasticity consistent and clustered at the firm level. Significance levels are indicated as follows: * = 10%, ** = 5%, and *** = 1%.
Source: own study.

Table 6. Panel Logit Estimates of Strategy vs Control Ratio on Dividends

Variables	Div_D (1)	Div_D (2)	Div_D (3)
Strategy to Control Ratio	1.263***	1.474***	5.029***
	(0.489)	(0.499)	(1.505)
Size		0.545***	0.679***
		(0.029)	(0.056)
Leverage		-0.109	-0.267
		(0.101)	(0.198)
Market - to- Book		0.000	-0.000
		(0.000)	(0.000)
Cash		0.465	-0.109
		(0.288)	(0.480)
Profitability		8.596***	9.391***
		(1.334)	(3.267)
Tangibility		-0.001***	-0.001
		(0.000)	(0.001)
Cash Flow		0.665***	-2.318**
		(0.146)	(0.944)
Inflation (CPI)			-0.059
			(0.070)
Interest rate (real)			0.026
			(0.081)
Domestic Credit			-0.003
			(0.007)
GDP per Capita			0.000***
			(0.000)
Gross Domestic Savings			-0.096**

Variables	Div_D (1)	Div_D (2)	Div_D (3)
			(0.049)
Stocks Traded (total value)			0.016***
			(0.005)
Market Capitalization			0.004
			(0.004)
Stocks Market Turnover			0.002
			(0.002)
Control of Corruption			-1.194
			(0.800)
Government Effectiveness			-1.786**
			(0.735)
Political Stability			-1.375
			(0.996)
Regulatory Quality			2.470***
			(0.905)
Rule of Law			3.314***
			(1.075)
Voice and Accountability			-0.628
			(1.251)
Constant	-3.294***	-5.925***	-7.965***
	(0.483)	(0.594)	(2.102)
Observations	54.338	27.610	8.203
Number of gvkey1	9.011	7.943	2.983
Likelihood-ratio test of rho=0	18161	5618	814.3
Prob	0	0	0

Note: This Table reports the results of a multivariate logit regression analysis of the full sample with *Div_D*, an indicator variable, as a dependent variable. The initial sample consists of European firms in the Compustat Global database for the period 2000-2016. See data and methodology section for variable definitions. All specifications include industry fixed effects and year fixed effects. Standard errors are heteroskedasticity consistent and clustered at the firm level. Significance levels are indicated as follows: * = 10%, ** = 5%, and *** = 1%.
Source: own study.

Table 7. Panel Logit Estimates of Strategy vs Control Ratio on R&D

Variables	R&D_D (1)	R&D_D (2)	R&D_D (3)
Strategy to Control Ratio	1.992***	2.776***	8.285***
	(0.472)	(0.579)	(2.178)
Size		0.526***	0.504***
		(0.035)	(0.064)
Leverage		0.146	0.230
		(0.130)	(0.261)
Market – to- Book		-0.000	-0.000
		(0.000)	(0.000)
Cash		1.464***	1.363***
		(0.316)	(0.522)
Profitability		-0.019	0.096
		(0.158)	(0.208)
Tangibility		0.000	0.000
		(0.000)	(0.000)
Cash Flow		0.016	-0.097
		(0.159)	(0.209)
Inflation (CPI)			0.160
			(0.100)
Interest rate (real)			-0.079
			(0.115)

Variables	R&D_D (1)	R&D_D (2)	R&D_D (3)
Domestic Credit			0.016
			(0.010)
GDP per Capita			0.000***
			(0.000)
Gross Domestic Savings			-0.172**
			(0.068)
Stocks Traded (total value)			0.004
			(0.008)
Market Capitalization			0.009
			(0.006)
Stocks Market Turnover			0.005
			(0.003)
Control of Corruption			0.566
			(1.158)
Government Effectiveness			-0.098
			(1.076)
Political Stability			-0.695
			(1.444)
Regulatory Quality			1.260
			(1.194)
Rule of Law			0.648
			(1.513)
Voice and Accountability			-1.384
			(1.708)
Constant	-3.658***	-6.842***	-12.125***
	(0.636)	(0.750)	(3.080)
Observations	54,362	27,598	8,101
Number of gvkey1	8.991	7.920	2.933
Likelihood-ratio test of rho=0	22407	9281	1821
Prob	0	0	0

Note: This Table reports the results of a multivariate logit regression analysis of the full sample with *R&D_D*, an indicator variable, as a dependent variable. The initial sample consists of European firms in the Compustat Global database for the period 2000-2016. See data and methodology section for variable definitions. All specifications include industry fixed effects and year fixed effects. Standard errors are heteroskedasticity consistent and clustered at the firm level. Significance levels are indicated as follows: * = 10%, ** = 5%, and *** = 1%.
Source: own study.

Table 8. Panel Logit Estimates of Strategy vs Control Ratio on CapEx

Variables	CapExHigh (1)	CapExHigh (2)	CapExHigh (3)
Strategy to Control Ratio	-0.268	-0.223	-3.177***
	(0.272)	(0.303)	(1.110)
Size		0.216***	0.231***
		(0.016)	(0.030)
Leverage		0.366***	0.507***
		(0.083)	(0.163)
Market - to- Book		-0.000	0.000
		(0.000)	(0.000)
Cash		-1.328***	-1.782***
		(0.156)	(0.257)
Profitability		-0.170*	-0.351*
		(0.096)	(0.197)
Tangibility		-0.000**	-0.000**
		(0.000)	(0.000)
Cash Flow		0.167*	0.348*

		(0.096)	(0.196)
Inflation (CPI)			0.003
			(0.050)
Interest rate (real)			-0.019
			(0.058)
Domestic Credit			-0.002
			(0.005)
GDP per Capita			-0.000*
			(0.000)
Gross Domestic Savings			0.048
			(0.035)
Stocks Traded (total value)			-0.009*
			(0.005)
Market Capitalization			0.010**
			(0.004)
Stocks Market Turnover			0.001
			(0.002)
Control of Corruption			-1.549**
			(0.613)
Government Effectiveness			2.762***
			(0.527)
Political Stability			-1.182
			(0.781)
Regulatory Quality			1.402**
			(0.697)
Rule of Law			-1.432*
			(0.799)
Voice and Accountability			1.526
			(0.949)
Constant	-1.782***	-2.712***	-5.030***
	(0.355)	(0.398)	(1.522)
Observations	54.516	27.697	8.253
Number of gvkey1	9.016	7.948	3.000
Likelihood-ratio test of rho=0	14306	4622	1040
Prob	0	0	0

Note: This Table reports the results of a multivariate logit regression analysis of the full sample with CapExHigh, an indicator variable, as a dependent variable. The initial sample consists of European firms in the Compustat Global database for the period 2000-2016. See data and methodology section for variable definitions. All specifications include industry fixed effects and year fixed effects. Standard errors are heteroskedasticity consistent and clustered at the firm level. Significance levels are indicated as follows: * = 10%, ** = 5%, and *** = 1%.
Source: own study.

Table 9. Effect of Strategy vs Control on ROA: Capitalistic vs Former Socialistic Economies

Variables	ROA (1)	ROA (2)	ROA (3)
Strategy Control Ratio	1.109***	0.851***	2.355*
	(0.214)	(0.283)	(1.253)
SCR*FormerSocialistic	1.489***	-2.689***	2.486
	(0.288)	(0.965)	(3.576)
Size		0.327***	0.691**
		(0.098)	(0.285)
Leverage		-1.356***	-2.661**
		(0.443)	(1.110)
Market - to- Book		-0.000***	-0.000
		(0.000)	(0.000)
Cash		-0.876*	-1.300

Variables	ROA (1)	ROA (2)	ROA (3)
		(0.510)	(1.051)
R&D		-1.408***	-1.388***
		(0.042)	(0.051)
Tangibility		-0.000	-0.000
		(0.000)	(0.000)
Inflation (CPI)			0.012
			(0.050)
Interest rate (real)			0.096**
			(0.040)
Domestic Credit			-0.006
			(0.006)
GDP per Capita			0.000*
			(0.000)
Gross Domestic Savings			-0.080
			(0.050)
Stocks Traded (total value)			0.009***
			(0.003)
Market Capitalization			-0.005
			(0.004)
Stocks Market Turnover			0.006**
			(0.003)
Control of Corruption			1.029
			(0.644)
Government Effectiveness			0.135
			(0.702)
Political Stability			0.167
			(0.747)
Regulatory Quality			3.908**
			(1.538)
Rule of Law			-2.690*
			(1.540)
Voice and Accountability			-1.234
			(0.991)
Constant	0.063	-1.133***	-3.644**
	(0.141)	(0.409)	(1.495)
Year fixed effects	yes	yes	yes
Industry fixed effects	yes	yes	yes
Observations	53.743	32.110	10.969
R-squared	0.003	0.080	0.074

Note: This Table reports the results of a multivariate OLS regression analysis of the full sample with ROA as a dependent variable. The initial sample consists of European firms in the Compustat Global database for the period 2000-2016. See data and methodology section for variable definitions. All specifications include industry fixed effects and year fixed effects. Standard errors are heteroskedasticity consistent and clustered at the firm level. Significance levels are indicated as follows: * = 10%, ** = 5%, and *** = 1%.
Source: own study.

Table 10. Effect of Strategy vs Control Ratio on Dividends, CapEx, and R&D: Capitalistic vs Former Socialistic Economies

Variables	Div_D (1)	R&D_D (2)	CapExHigh (3)
Strategy Control Ratio	5.263***	7.999***	-3.065***
	(1.574)	(2.178)	(1.111)
SCR*FormerSocialistic	6.103	-6.696	5.180
	(5.088)	(7.847)	(3.735)
Size	0.681***	0.502***	0.234***

	(0.056)	(0.064)	(0.030)
Leverage	-0.266	0.226	0.506***
	(0.198)	(0.262)	(0.163)
Market - to- Book	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Cash	-0.106	1.356***	-1.775***
	(0.480)	(0.522)	(0.257)
Profitability	9.392***	0.094	-0.350*
	(3.264)	(0.207)	(0.196)
Tangibility	-0.001	0.000	-0.000**
	(0.001)	(0.000)	(0.000)
Cash Flow	-2.328**	-0.096	0.347*
	(0.930)	(0.209)	(0.196)
Inflation (CPI)	-0.086	0.188*	-0.020
	(0.070)	(0.104)	(0.055)
Interest rate (real)	0.036	-0.091	-0.008
	(0.080)	(0.115)	(0.059)
Domestic Credit	-0.001	0.013	-0.001
	(0.007)	(0.010)	(0.006)
GDP per Capita	0.000***	0.000***	-0.000
	(0.000)	(0.000)	(0.000)
Gross Domestic Savings	-0.103**	-0.168**	0.043
	(0.050)	(0.068)	(0.035)
Stocks Traded (total value)	0.017***	0.003	-0.008*
	(0.006)	(0.008)	(0.005)
Market Capitalization	0.005	0.008	0.011***
	(0.004)	(0.006)	(0.004)
Stocks Market Turnover	0.003	0.004	0.002
	(0.003)	(0.003)	(0.002)
Control of Corruption	-1.803**	1.252	-2.134***
	(0.908)	(1.447)	(0.750)
Government Effectiveness	-2.083***	0.243	2.531***
	(0.791)	(1.109)	(0.559)
Political Stability	-1.666	-0.351	-1.409*
	(1.014)	(1.472)	(0.792)
Regulatory Quality	2.782***	0.855	1.676**
	(0.975)	(1.294)	(0.704)
Rule of Law	4.450***	-0.539	-0.376
	(1.316)	(2.053)	(1.129)
Voice and Accountability	-0.965	-1.085	1.184
	(1.324)	(1.707)	(0.970)
Constant	-8.935***	-10.969***	-5.961***
	(2.210)	(3.325)	(1.701)
Observations	8.203	8.101	8.253
Number of gvkey1	2.983	2.933	3.000
Likelihood-ratio test of rho=0	813.3	1821	1037
Prob	0	0	0

Note: This Table reports the results of a multivariate logit regression analysis of the full sample with *Div_D, R&D_D,* or *CapExHigh*, as a dependent variable. The initial sample consists of European firms in the Compustat Global database for the period 2000-2016. See data and methodology section for variable definitions. All specifications include industry fixed effects and year fixed effects. Standard errors are heteroskedasticity consistent and clustered at the firm level. Significance levels are indicated as follows: * = 10%, ** = 5%, and *** = 1%.
Source: own study.

Among other uses, corporate governance codes are instruments to compare country level CG practices. We categorized corporate governance codes based upon the dimensions of strategy and control as these purposes are the two most dominant in CG. Building on the insights of Schiehll and Martins (2016), Haxhi and Aguilera (2017), Martins *et al*. (2017), and Bhagat and Hubbard (2022), of CG codes as embedded in a configuration of institutions, we surmised that CG codes evolve from being relatively ineffective at promoting either strategy or control, to becoming proficient at promoting both, and finally to a position where strategy is the focus because the monitoring function is second nature due to the development of the supporting institutions (Figure 1). The contribution to the work of Bhagat and Hubbard (2022) is specifically that while they relate the importance of rule of law to economic development via corporate governance, they do not move beyond this to estimate the impact on firm performance.

While we view this matrix as a contribution, we then added analysis as to how the movement from control to strategy in national CG codes impact firm-level outcomes. Again, the four papers cited in the preceding paragraph are the foundation of this work; these authors investigated country-level conditions and left firm performance for future research. We also considered in our literature review that there is an extensive body of work spanning decades which examines the relationship between CG and firm performance; however, the vast majority of it looks at internal factors such as board size, board composition, and shareholder rights (cf. Bhagat & Bolton, 2019; Bharath & Hertzel, 2019; Agrawal & Nasser, 2019; Vafeas & Vlittis, 2019; Obeitoh *et al.,* 2023). We are relating national-level codes to firm-level outcomes; moreover, we are testing not only traditional measures of financial performance such as ROA and dividends but also strategic outcomes such as CAPEX, and R&D spending. This is an extension of the research of Renders *et al*. (2010) and Mertzanis *et al.* (2023); the latter studied corporate liquidity in the context of the MENA region whereas we measure a range of metrics across an even broader cross-section of nations over time. The use of a large panel data set comparing the content of CG codes is rare in the CG literature (Cuomo *et al*., 2016) and furthers this avenue of inquiry. We are researching codes from 1990-2016 retrieved from European Corporate Governance Institute (ECGI) collection covering a period in which country codes were constituted and proclaimed by national institutions across Europe.

Regarding the pattern of statistically significant outcomes, we find support for most of our hypotheses. A higher SC ratio does associate with higher ROA (Hypothesis 1), a higher likelihood of dividend payouts (Hypothesis 2), and a higher probability of R&D spending (Hypothesis 3). These findings are positive and statistically significant across all specifications. For capital expenditures (Hypothesis 4), the results are mixed.

CONCLUSIONS

CG codes exist in a configuration of country-level institutions. Our stated objective in this paper is to consider how CG codes balance the competing demands of strategy and control in a given country context, and then to apply this balance in the form of the SC Ratio to various firm-level outcomes. We offer the concept matrix in Figure 1 to demonstrate the evolution of CG codes from a context where both the strategy and control functions exist at a low level, to a preference for high control and then high strategy, to the most advanced state where strategy is the focus because the nexus of national-level institutions provide ample monitoring.

We find that an emphasis on strategy in CG codes correlates positively and significantly with ROA, and with the higher likelihood of dividend payments, R&D investment, and CapEx spending. We also find that stronger legal institutions associate with a higher emphasis on strategy in CG codes.

There are several limitations to our study. We have found correlations but have not demonstrated causality. In addition, despite our inclusion of control variables it is possible that there are omitted variables that would explain part of the relationships we observed. Despite the size of the entire sample, there are a number of missing observations for some countries.

Concerning policy recommendations, we would suggest to policymakers to refine their CG Codes to focus more on strategy where feasible given our findings. There are positive influences at the level of the firm where national CG codes tilt towards strategy. We also recommend strengthening legal

institutions, such as rule of law, as this will accelerate the evolution of CG codes from monitoring to strategy per our Figure 1.

Future research should examine if findings from our study hold true in extended scope of countries with higher anticipated institutional variance including corporate governance traditions. Additional findings should also be possible as time scope of the analysis extends. More recent account for ESG related issues in corporate governance becomes so important it may establish yet another dimension in codes orientation in addition to strategy and control. Finally we anticipate exploring more nuanced measures of strategy versus control and their impact by extending the scope of our semantic analysis or developing new proxies for the concept.

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Acknowledgements and Financial Disclosure

The authors would like to thank the anonymous referees for their useful comments, which allowed to increase the value of this article.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120110

Shackled feet: A review of women entrepreneurs' challenges in developing countries

Md. Mizanur Rahman, Aidin Salamzadeh, Leo Paul Dana

ABSTRACT

Objective: The fundamental objective of this systematic literature review (SLR) is to explore the current challenges for women entrepreneurs in developing countries and discuss future research opportunities.

Research Design & Methods: We applied a SLR approach to fulfil the objective. We selected 29 articles from SCOPUS and Google Scholar databases to synthesize reviews. To ensure the quality of the articles collected from Google Scholar, we used Scimago Journal & Country Rank (SJR).

Findings: We categorised the key findings into themes (T), contexts (C), and methodologies (M). The major challenges for women entrepreneurs in developing countries cover five themes, i.e. (1) financial, (2) socio-cultural, (3) educational and skills, (4) networking and marketing, (5) political and legal. Developing countries were the main context (C) of this review. Regarding methodologies (M), 51.72% of the collected articles were qualitative.

Implications & Recommendations: Policymakers can help make more specialized women entrepreneurship policies by assembling research identifying national barriers empirically and drawing comparisons between the realities of both countries and regions. We proposed a conceptual framework or model based on the challenges of women entrepreneurship and other future research agendas.

Contribution & Value Added: This review article is one of the leading studies which helps academics, researchers, and readers gain a deeper understanding of challenges for women entrepreneurs in developing countries by providing a foundation for future studies and encouraging researchers to investigate this topic.

Article type:	review article
Keywords:	challenges; entrepreneurship; developing countries; economic development; systematic literature review; women
JEL codes:	L26

Received: 6 August 2023 | Revised: 21 September 2023 | Accepted: 22 October 2023

Suggested citation:

Rahman, M.M., Salamzadeh, A., & Dana, L.P. (2024). Shackled feet: A review of women entrepreneurs' challenges in developing countries. *Entrepreneurial Business and Economics Review,* 12(1), 177-193. https://doi.org/10.15678/EBER.2024.120110

INTRODUCTION

Entrepreneurship, particularly women entrepreneurship, significantly develops and expands new business avenues within the global economy. The disparity between the levels of entrepreneurial endeavours undertaken by men and women has attracted increasing global attention (Ramadani *et al.,* 2022; Abd *et al.,* 2022). These differences show much-untapped potential for reducing poverty, creating jobs, boosting economic growth, and developing new ideas (Dong *et al.,* 2021; Aparicio *et al.,* 2022). The elimination of gender disparities in entrepreneurial endeavours has the potential to transform the business landscape. Currently, the difference between men and women entrepreneurship draws international attention (Abd *et al.,* 2022; Franzke *et al.,* 2022). For decades, steady development has been seen in women entrepreneurship's growth. However, in recent years, it has been noticed that women entrepreneurship has increased notably (Rahman *et al.,* 2022; Barrachina Fernández *et al.*, 2021; Abd *et al.,* 2022). Specifically, since 2014, women entrepreneurship has started to progress in total numbers, and it is expected to reach the number of global women entrepreneurs approximately

274 million, and the gender gap will be reduced by 5% (GEM, 2021; Aljarodi, 2022). However, the global rate of women entrepreneurship is still lower than that of men, indicating that there is still room for improvement in this area and, as a result, the potential for more significant economic growth (Aljarodi *et al.,* 2022; Gimenez-Jimenez *et al.,* 2020). According to the GEM (2021/2022) study, the number of women who launched their business between 2019 and 2020 dropped by 15% before staying the same in 2021. This statistic was different in countries with a higher middle income, though. However, GEM (2022) states that developing economic women are starting their businesses more than women in developed countries, despite many challenges. More abstractly, low-income and lower-middle-income countries represent 25% and 13% of women consecutively who started their businesses compared to global women entrepreneurs, which is only 10% (GEM, 2022; Ahmetaj *et al.,* 2023). Even though, considering many challenges, women entrepreneurship has seen drastic progress in developing countries worldwide because of technological advancement (Masterson, 2022; Hossain *et al.,* 2023). Many women fail to capitalize on market opportunities because of the shortage of capital. Besides, they cannot manage capital from formal financial institutions like banks for security issues. The inability to build networks with different stakeholders is one of the main problems of women entrepreneurs to sustain in the competitive markets in Bangladesh (Rahman *et al.,* 2022a; Ramadani *et al.,* 2022). Hence, most women-owned businesses have experienced substantial profit losses and many are closed at the beginning of the business (Rahman *et al.,* 2022; Paramba *et al.,* 2023). Moreover, in patriarchal societies, women have to maintain family and business jobs simultaneously, which compels them to additional problems to continue their ventures effectively (Ghouse *et al.,* 2017; Jaim, 2022). Many women's entrepreneurial ventures are closing down in developing countries due to improper support from husbands and other family members (Anggadwita *et al.,* 2017; Rahman *et al.,* 2022).

However, in developing countries, women entrepreneurs encounter many challenges which impede them from contributing to the country's economic development. Socio-cultural challenges, financial constraints, limited education and skills, networking and marketing problems, political and legal obstacles, and infrastructural limitations are the main challenges for women entrepreneurs in developing countries (Dutta *et al.,* 2020; Kogut & Mejri, 2022). Therefore, these problems are significant concerns because they impact not just individual entrepreneurs but also the entire economy of a country. Overall business growth and the country's economy can be halted due to these challenges in different ways (Rahman *et al.,* 2022; Kogut & Mejri, 2022). The leading cause of this scenario is that women from low-income countries thought they could contribute to their family income if they could start entrepreneurial ventures. Moreover, many researchers have explored that business competence, performance and entrepreneurial orientation are the main attributes of entrepreneurship which can work as driving forces of women's entrepreneurial motivation (Corrêa *et al.,* 2022).

Moreover, many previous studies stated that entrepreneurial policy, managerial skills, and practical experiences are women entrepreneurs' main strengths in overcoming challenges (Corrêa *et al.,* 2022). However, women entrepreneurs have faced social and cultural challenges based on regional specifics (Rashid & Ratten, 2020). This situation necessitates conducting more studies to help understand the issues deeply in the context of a developing country (Rashid & Ratten, 2020). Furthermore, to figure out the specific relationship between women entrepreneurship and developing countries' economic development, it is highly required to investigate and analyze the challenges of women entrepreneurs. Gradually, SLR as a research approach is becoming increasingly popular in the business arena, including international entrepreneurship (Kiss *et al.,* 2012; Terjesen *et al.,* 2016), rural entrepreneurial ecosystems (Aguilar, 2021), crisis management (Salamzadeh & Dana, 2023), Immigrant entrepreneurship (Dabić *et al.,* 2020), entrepreneurial strategy (Branco *et al.,* 2021), opportunity recognition (Mary George *et al.,* 2016), and social entrepreneurship (Phillips *et al.,* 2015). Several SLRs have also focused on developing economies (Dana *et al.,* 2023; Raman *et al.,* 2022; Kogut & Mejri, 2022). However, This SLR explores recent circumstances in women entrepreneurship and discusses future research opportunities by setting two research questions.

RQ1: What are the key challenges (themes) for women entrepreneurs considering research areas (contexts) and methodologies (used methodology)?

RQ2: What are the future research agendas for women entrepreneurship in developing countries?

In the first part of the introduction, we discussed the importance of women entrepreneurship and women's current situation, in the second paragraph – the current challenges faced by women entrepreneurs in developing countries, and in the last paragraph – the significant importance of SLR by setting research questions. The remainder of the article looks as follows: Section 2 will describes the research methodology, and Sections 4, 5, and 6 will present the findings based on the major themes, contexts, and methodologies. Sections 7 and 8 will illustrate the future research directions, conclusions, and contributions.

LITERATURE REVIEW

Women entrepreneurship, in particular, alleviates poverty by creating employment opportunities which help to stimulate a nation's economic growth (Bullough *et al.*, 2022). Despite their economic importance, developing countries continue discriminating against women entrepreneurs (Ramadani *et al.,* 2022). Many developing countries recognize the significance of entrepreneurship in driving economic growth. Moreover, there is a growing emphasis in these countries on the economic and societal advantages associated with women entrepreneurship (Dana *et al.,* 2023; Rahman *et al.,* 2022b; Rahman *et al.,* 2022c; Rahman *et al.,* 2022d; Abdul *et al.,* 2019). However, examining the prevailing circumstances in numerous Asian nations, it becomes evident that a significant portion of the population believes that women should primarily engage in domestic responsibilities rather than pursue entrepreneurial endeavours. According to the Global Entrepreneurship Monitor (GEM, 2021), women are less likely than men to establish new enterprises in most economies. Gender and cultural prejudices have a detrimental impact on the self-esteem of women entrepreneurs, ultimately undermining their aspirations. The presence of cultural superstitions and gender stereotypes contributes to the perpetuation of these biases, hence presenting significant challenges for women in initiating entrepreneurial endeavours. A recent survey by the Cherie Blair Foundation for Women (2021) encompassed a sample of 221 women entrepreneurs hailing from 42 countries categorized as low- and middle-income. The research revealed that most women entrepreneurs, precisely 70%, believed that gender stereotypes harm their professional endeavours. Furthermore, a substantial proportion of these entrepreneurs, precisely 61%, opined that these preconceptions also negatively affect the performance and success of their respective enterprises. Moreover, women entrepreneurs face a variety of challenges, such as societal norms, gender bias, commitments to their families, and extra responsibilities (Rahman *et al.,* 2022a; Garg & Agarwal, 2017). Previous studies have shown that societal preconceptions and gender-specific characteristics account for many of the challenges women entrepreneurs face. A lack of support from the cultural context exacerbates these issues, which eventually results in unequal access to entrepreneurial opportunities for both genders (Igwe *et al.,* 2018; Ramadani *et al.,* 2022). Women entrepreneurs in developing countries face several challenges that hinder their ability to impact the economy positively. The obstacles women entrepreneurs face in developing nations include those related to society, culture, finances, education, networking, marketing, politics, law, and infrastructure. A successful women entrepreneur can help other women who are in poverty and have the potential to become self-sufficient. Researchers observed that women entrepreneurs can help reduce poverty and social injustices. Furthermore, financially successful women frequently take on important societal roles and lead independent lives. Like their male counterparts, women contribute to society and continuously seek to better themselves via education and learning. Over the last few decades, social movements specifically concerned with defending women's rights have emerged worldwide to confront and address issues of inequality, such as the #MeToo movement (Bell *et al.,* 2019). Furthermore, it is critical to create environments for women that support their achievement of emancipation and empowerment outside of patriarchal norms (Alkhaled & Berglund, 2018; Jennings *et al.,* 2016). Corrêa *et al.*, (2022) found that women entrepreneurs can overcome difficulties through entrepreneurial policies, managerial skills, and practical experience. However, geographical variables have caused various social and cultural challenges for women entrepreneurs (Rashid & Ratten, 2020). As a result of this circumstance, it is typically necessary to conduct further research that contributes to a more in-depth understanding of the challenges in the context of a developing country (Rashid & Ratten, 2020). Further-

more, a thorough examination and analysis of the obstacles women entrepreneurs face is imperative to determine the precise correlation between their enterprise and the economic advancement of emerging nations. Thus, we set the following two objectives:

1. To draw attention to essential themes, contexts, and methodologies (TCM) considering women entrepreneurship challenges.
2. To recommend future research agenda related to women entrepreneurship research in developing countries.

RESEARCH METHODOLOGY

Based on the five steps given by Rowley and Stack (2004), we employed an SLR approach to fulfil the study objectives (Figure 1). The SLR methodology is a systematic process that involves examining data or other sources of knowledge and developing a strategy plan for analyzing literature, including the features and elements that explain it (Paul & Barari, 2022). Researchers commonly use the SLR method in the social sciences (Tranfield *et al.,* 2003), most notably in the fields of entrepreneurship research, intending to present data in a manner that is not only valuable to researchers and decision-makers but is also simple to understand for those individuals (Williams Jr. *et al.,* 2021).

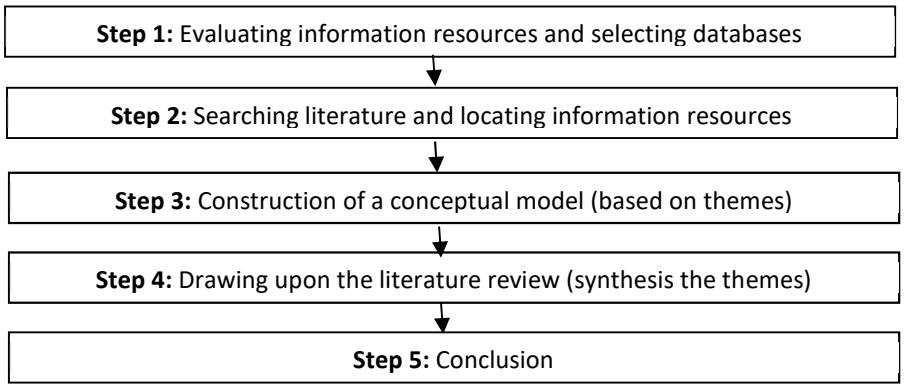

Figure 1. SLR approach by Rowley and Slack (2004)
Source: own elaboration.

We designed a protocol to cover the first two parts of the process.

Table 1. Protocol of literature evaluation, selection, and search

Themes	Explanations
Research questions	- What are the key challenges (themes) for women entrepreneurs considering research areas (contexts) and methodologies (used methodology)? - What are the future research agendas for women entrepreneurship in developing countries?
Objectives	- To draw attention to the challenges for women entrepreneurs considering these themes, contexts, and methodologies (TCM). - To recommend future research agendas related to women entrepreneurship research in developing countries.
Data string	'women entrepreneurship' OR 'female entrepreneurship' AND 'developing countries' OR 'developing economic'*' OR 'developing nations' OR 'developing countries'
Search strategy	Step 1: Total articles based on search string (SCOPUS): 3054. Step 2: After applying inclusion and exclusion criteria: 110. Step 3: The total number of articles based on the search string (Google Scholar): 4040. Step 4: The number of articles selected after checking through SJR=95. Step 5: Selected the common articles between steps 2 & 4=60. Step 6: The total number of most suitable articles selected after reading the full text: 29. **Note:** Based on these 29 articles, we have highlighted our key findings (themes, contexts, and methodologies).

Themes	Explanations
Inclusion-criteria	- SJR (2022), Quartiles 1 and 2 included only peer-reviewed journal publications. - We considered empirical (quantitative, qualitative, and mixed) articles related to the topic. - Selection of articles from 2013-2023. **Note:** Out of 29 selected articles, 24 articles (82.75%) are from Q1 (SJR, 2022) journals.
Exclusion criteria	- Books, chapters in books, review articles, conference proceedings - Articles published in other languages - Articles in press - Articles from other disciplines
Time period	2013-2023 (17 July 2023).
Data sources	SCOPUS and Google Scholar **Note:** To confirm the quality of the articles, we checked those collected from Google Scholar with SJR as of the year 2022.

Source: own study.

Data Reporting

This part will present some statistics concerning the 29 collected articles. It will help the readers understand the quality of our collected articles, areas of research (contexts), and methodologies.

Figure 2 indicates four articles from the *Journal of Entrepreneurship and Emerging Economies*, a Q1 (SJR, 2022) ranked journal.

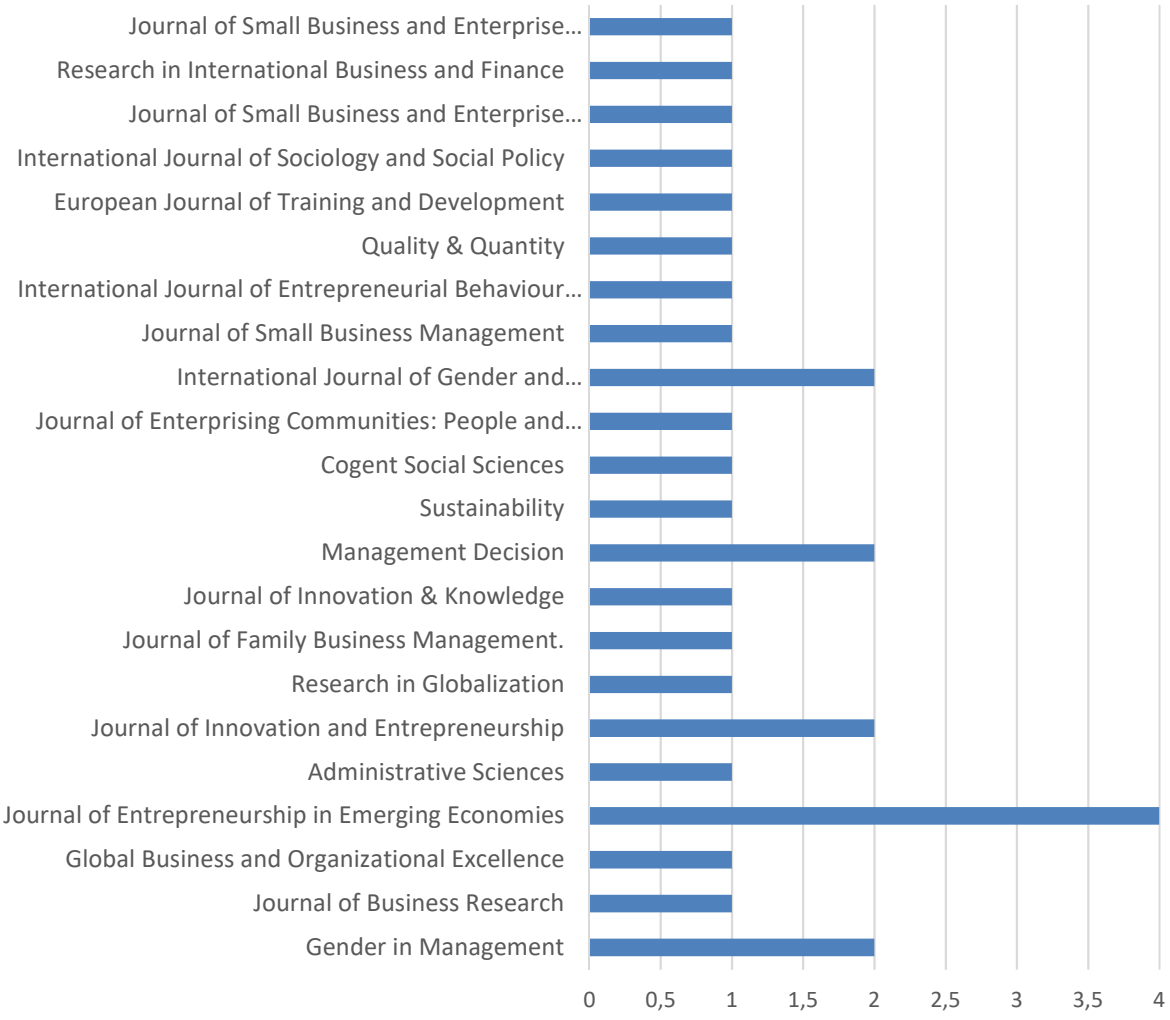

Figure 2. Number of articles from journals
Source: own elaboration.

Figure 3 indicates that out of 29 collected articles, 24 (82.75%) were from Q1 (SJR, 2022) journals and 05 (17.25%) – from Q2 journals.

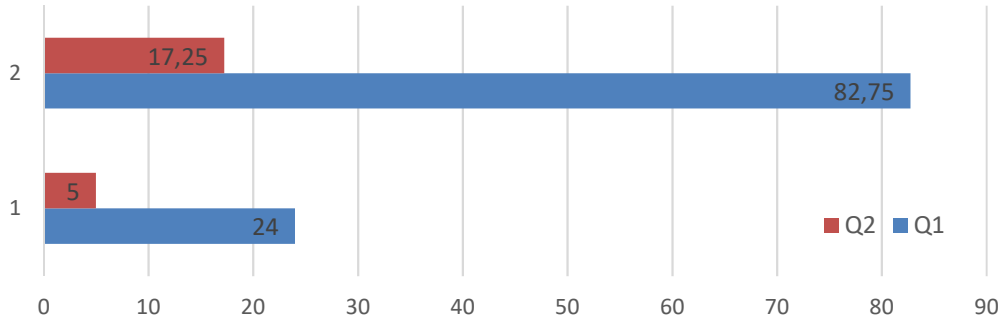

Figure 3. Number of articles from SJR ranked Journals (SJR, 2022)
Source: own elaboration.

Figure 4 demonstrates that four articles were from India and three were from Bangladesh. However, one article was related to developed and developing countries' context; one article was from the South Asian context, and another article was based on Russia and Ukraine context.

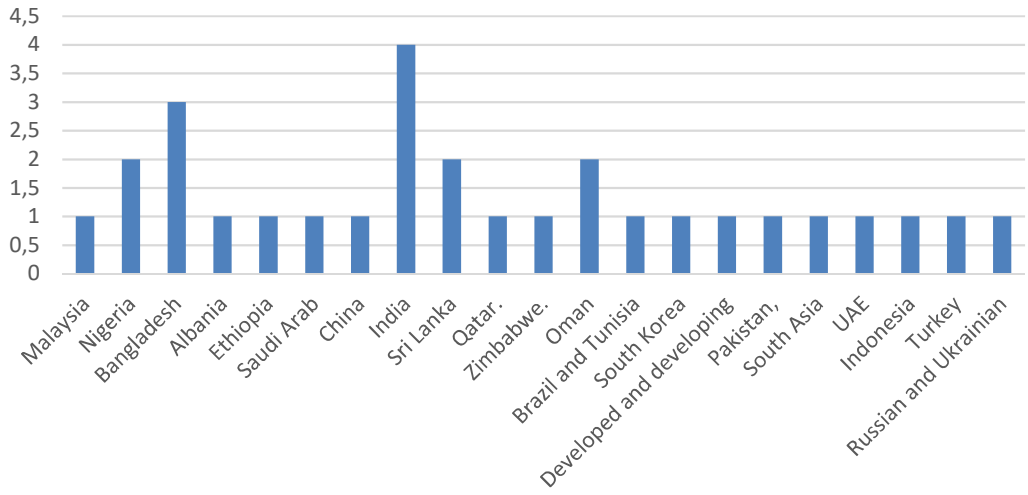

Figure 4. Number of articles from different countries
Source: own elaboration.

Figure 5 demonstrates that out of twenty-nine articles, 51.72% were qualitative articles, 34.48% were quantitative articles, and 13.80% were mixed methods.

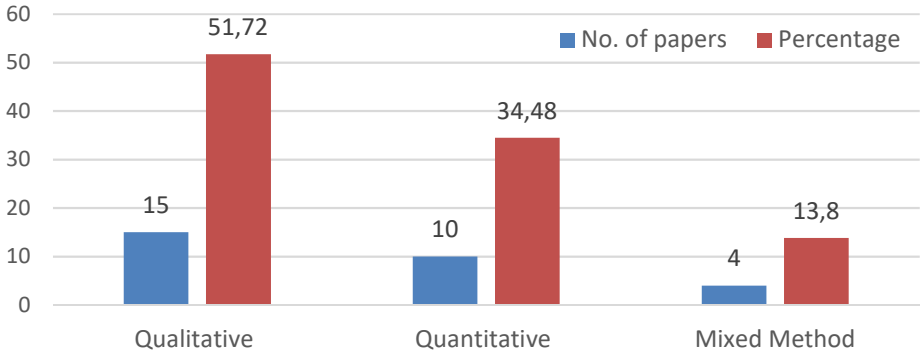

Figure 5. Methodologies used in the collected articles
Source: own elaboration.

Figure 6 describes that the number of publications concerning women entrepreneurship is gradually increasing. Out of 29 selected articles, sixteen (55.17%) were published between 2022-2023. However, we only considered the first half of 2023.

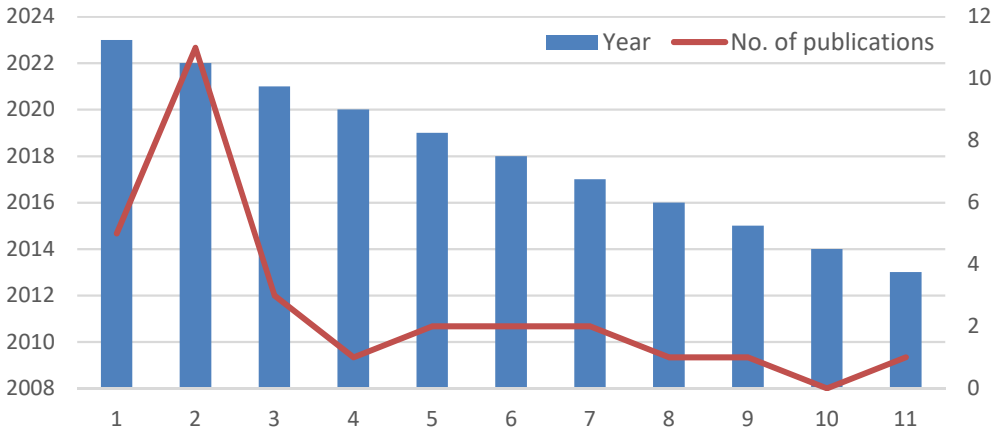

Figure 6. Year-wise publications
Source: own elaboration.

RESULTS AND DISCUSSION

We divided our key findings into three categories (*i.e.* themes=T, contexts=C, and methodologies=M) which is also known as the TCM framework and it was previously used in earlier review studies (Paul *et al.,* 2023; Paul *et al.,* 2017; Paul & Rosado-Serrano, 2019; Mishra *et al.,* 2021). For identifying the major themes (T), we prepared Table 2, while Table 3 serves to highlight the contexts (C) and methodologies (M).

We highlighted five significant challenges (themes) in Table 2. Each of the challenges (theme) has several factors. In the discussion part, we will discuss our findings concerning the findings of other studies.

Our review showed that lack of adequate capital and loan facilities, increased collateral obligations, fewer financing alternatives, and lack of loan guarantor are the main factors of *financial challenge (T1)*. The findings drawn from the review are consistent with those of previous studies. For example, according to Agrawal (2018), women entrepreneurs struggle to manage finances because they lack financial security and are incapable of dealing with microfinance companies. Most banks think it is a significant risk to finance a business run and managed by a woman. Because financial institutions view loans for women as carrying a higher level of risk than loans for men, they establish unrealistic protections for the credit applications of women entrepreneurs (Mashapure *et al.,* 2022). Besides, previous studies stated that the biggest obstacle to sustaining women's entrepreneurial ventures in developing economies is the lack of access to resources and loan systems (Kogut & Mejri, 2022; Andriamahery & Qamruzzaman, 2022; Latifi *et al.,* 2022 Mulaudzi & Schachtebeck, 2022). Moreover, Alanakyan (2014) found in his study that the primary obstacles for women entrepreneurs are high tax rates, challenging sales conditions, and the cost of utilities. Regarding the second theme, *socio-cultural challenges (T2)*, our review showed that role conflict, socio-cultural restraints, and gender discrimination are the main factors of socio-cultural challenges for developing countries' women entrepreneurs The findings drawn from the review are consistent with those of previous studies. For example, due to traditional social beliefs, people believe that women should stay at home and raise children (Kogut & Mejri, 2022; Raman *et al.,* 2022; Mejri, 2022). Many women who own their own businesses also said their partners were sceptical that they would succeed (Guma, 2015; Ślusarczyk, 2023). For instance, women may not inherit property in some cultures and may not be allowed to own parental land (Adom & Anambane, 2020; Mensah & Derera, 2023). Besides, socio-cultural challenges, low education, and work experience, less training and development facilities, lack of entrepreneurial skills, and lack of managerial

Table 2. Research themes - challenges encountered by women entrepreneurs

Main themes	Challenging factors	Cited authors
Financial challenges	Lack of adequate capital and loan facilities	Adikaram & Razik (2022), Aljarodi *et al.* (2022), Simba *et al.* (2023), Jha & Alam (2022), Mashapure *et al.* (2022), Hossain *et al.* (2023), Cho *et al.* (2021), Wellalage & Locke (2017).
	Increased collateral obligations	Panda S. (2018), Rahman *et al.* (2022), Adikaram & Razik (2022), Ogundana *et al.* (2021), Jha & Alam (2022), Kogut & Mejri (2022).
	Fewer financing alternatives	Panda S. (2018), Rahman *et al.* (2022a), Ghouse *et al.* (2021), Adikaram & Razik (2022), Jha & Alam (2022), Yap *et al. (*2023).
	Lack of loan guarantor	Panda S. (2018), Rahman *et al.* (2022a), Ayinaddis (2023), Adikaram & Razik (2022), Jha & Alam (2022), Kogut & Mejri (2022), Wellalage & Locke (2017).
Socio-cultural challenges	Sociocultural restraints	Mashapure *et al.* (2022), Jha & Alam (2022), Sobhan & Hassan (2023), Roomi *et al.* (2018).
	Role conflict	Mashapure *et al.* (2022), Ghouse *et al.* (2021), Hossain *et al.* (2023), Cho *et al.* (2021), Maden (2015).
	Gender discrimination	Mashapure *et al.* (2022), Ojong *et al.* (2021), Ayinaddis (2023), Ahmetaj *et al.* (2023), Barrachina Fernández *et al.* (2021), Cho *et al.* (2021), Maden (2015).
Education and skill challenges	low education and work experience	Mashapure *et al.* (2022), Rahman *et al.* (2022a), Sobhan & Hassan (2023), Cho *et al.* (2021).
	Less training and development facilities	Abd El Basset *et al.* (2022), Jha & Alam (2022), Rahman *et al.* (2022a), Jha & Alam (2022), Cho *et al.* (2021).
	Lack of entrepreneurial skill	Abd El Basset *et al.* (2022), Ahmetaj *et al.* (2023), Ojong *et al.* (2021), Ghouse *et al.* (2021), Rahman *et al.* (2022a), Jha & Alam (2022), Cho *et al.* (2021).
	Lack of management skill	Abd El Basset *et al.* (2022), Jha & Alam (2022), Cho *et al.* (2021), Huang *et al.*, (2022).
Networking and marketing challenges	Insufficient networks and opportunities	Adikaram & Razik (2022), Mashapure *et al.* (2022), Jha & Alam (2022), Kogut & Mejri (2022), Panda S. (2018), Surangi (2022).
	Business model misunderstanding	Adikaram & Razik (2022), Jha & Alam (2022).
	Difficulties in staffing	Adikaram & Razik (2022), Panda (2018), Surangi (2022).
	Lack of access to information	Mashapure *et al.* (2022), Kogut & Mejri (2022), Panda (2018), Jha & Alam (2022).
Political and legal challenges	Political volatility	Ogundana *et al.* (2021), Al-Qahtani *et al.* (2022), Ayinaddis (2023).
	Insufficient political support for women-owned businesses	Ogundana *et al.* (2021), Al-Qahtani *et al.* (2022).
	Business owners rarely know about new laws.	Al-Qahtani *et al.* (2022), Ghouse *et al.* (2021).
	High incidences of corruption	Ogundana *et al.* (2021), l-Qahtani *et al.* (2022).

Source: own study.

skills are the main factors of *education and skill-related challenges (T3)* for women entrepreneurs in developing countries. Lack of education and skill makes it more challenging for women business owners to obtain loans for their enterprises and develop the necessary day-to-day managerial abilities (Ojong *et al.*, 2021; Jaim, 2021). According to the findings of Neri *et al.* (2019), women in business need to receive the appropriate education and training in entrepreneurship to maintain their firms. It is realistic to expect some women entrepreneurs' business ventures to fail. This is probably a result of the inadequate training and education that women receive, which makes it challenging for them to start and run businesses. *Networking and marketing challenges (T4)* are one of the main challenges for women entrepreneurs in developing countries. Our review showed that insufficient networking, business model misunderstanding, and managing staffing, less information are the main factors of networking and marketing challenges. Previous studies showed that men are more likely to be members of business and financial networks, despite women being likelier to belong to family and community networks (Carranza *et al.*, 2018; Kogut & Mejri, 2022). Women who spend much time on their children are less likely to

Table 3. Research contexts (C) and methodologies (M)

No.	Authors	Name of the Journal	SRJ rank	Context	Methodology
1.	Yap *et al.* (2023)	*Gender in Management*	Q1	Malaysia	Qualitative
2.	Simba *et al.* (2023)	*Journal of Business Research*	Q1	Nigeria	Qualitative
3.	Hossain *et al.* (2023)	*Global Business and Organizational Excellence*	Q2	Bangladesh	Qualitative
4.	Sobhan & Hassan (2023)	*Journal of Entrepreneurship in Emerging Economies*	Q1	Bangladesh	Quantitative
5.	Ahmetaj *et al.* (2023)	*Administrative Sciences*	Q2	Albania	Qualitative
6.	Ayinaddis (2023)	*Journal of Innovation and Entrepreneurship*	Q1	Ethiopia	Quantitative
7.	Aljarodi *et al.* (2022)	*Research in Globalization*	Q1	Saudi Arab	Quantitative
8.	Rahman *et al.* (2022)	*Journal of Family Business Management.*	Q1	Bangladesh	Qualitative
9.	Huang *et al.* (2022)	*Journal of Innovation & Knowledge*	Q1	China	Quantitative
10.	Jha & Alam (2022)	*Management Decision,*	Q1	India	Quantitative
11.	Surangi (2022)	*Journal of Innovation and Entrepreneurship*	Q1	Sri Lanka	Qualitative
12.	Al-Qahtani *et al.* (2022)	*Sustainability*	Q1	Qatar.	Mixed
13.	Mashapure *et al.* (2022)	*Cogent Social Sciences*	Q2	Zimbabwe.	Qualitative
14.	Adikaram & Razik (2022)	*Journal of Entrepreneurship in Emerging Economies*	Q1	Sri Lanka	Qualitative
15..	Abd El Basset *et al.* (2022)	*Journal of Enterprising Communities: People and Places in the Global Economy.*	Q2	Oman	Quantitative
16.	Kogut & Mejri (2022)	*International Journal of Gender and Entrepreneurship*	Q1	Brazil and Tunisia),	Qualitative
17.	Ogundana *et al.* (2021)	*Journal of Small Business Management*	Q1	Nigeria	Qualitative
18.	Ghouse *et al.* (2021)	*International Journal of Entrepreneurial Behaviour and Research*	Q1	Oman	Mixed
19.	Abrar ul Haq *et al.* (2021)	*Quality & Quantity*	Q1	India	Quantitative
20.	Cho *et al.* (2021)	*European Journal of Training and Development*	Q2	South Korea	Mixed
21.	Shastri *et al.* (2019)	*International Journal of Sociology and Social Policy*	Q1	India	Qualitative
22.	Solesvik *et al.* (2019)	*Journal of Small Business and Enterprise Development*	Q1	Developed and developing	Qualitative
23.	Amrita *et al.* (2018)	*Journal of Entrepreneurship in Emerging Economies*	Q1	India	Fuzzy analytical hierarchy (Mixed)
24.	Roomi *et al.* (2018)	*International Journal of Gender and Entrepreneurship*	Q1	Pakistan,	Qualitative
25.	Wellalage & Locke (2017)	*Research in International Business and Finance*	Q1	South Asia	Quantitative
26.	Gupta & Mirchandani (2018)	*Management Decision*	Q1	UAE	Quantitative
27.	Anggadwita *et al.* (2017)	*Journal of Entrepreneurship in Emerging Economies*	Q1	Indonesia	Quantitative
28.	Maden (2015)	*Gender in Management*	Q1	Turkey	Qualitative
29.	Iakovleva *et al.* (2013)	*Journal of Small Business and Enterprise Development*	Q1	Russian and Ukrainian	Qualitative

Source: own study.

expand their market, financial, and industry networks (Brush *et al.*, 2020; Kogut & Mejri, 2022). Along with the above challenges, *political and legal challenges (T5)* concern women entrepreneurs in developing countries. Political volatility, insufficient political support, lack of knowledge regarding new laws, and high corruption are the main political and legal challenges. From the previous studies, uncertainty is caused by political instability, which also hinders the expansion of women-owned enterprises (Panda, 2018; Ślusarczyk *et al.*, 2023; Jaouadi *et al.*, 2014; Jaim, 2022). Moreover, these policies are rarely implemented, even in nations with policies encouraging women to establish their businesses (Akanji, 2016). In Botswana, married women cannot acquire land, buildings, or money, which restricts their ability to start businesses (Hovorka & Dietrich, 2011). Women entrepreneurs can overcome obstacles with the help of entrepreneurial policies, managerial abilities, and real-world experience, according to Corrêa *et al.* (2022). However, for women entrepreneurs, regional differences have resulted in various social and cultural difficulties (Rashid & Ratten, 2020). Because of this, we conducted this SLR to comprehend the challenges women entrepreneurs encounter in a developing nation.

To illustrate the geographic contexts of the research on women-owned enterprises, we included in the review a Table with the names of the nations and the total number of articles discovered for each country. These studies were already stated in Table 3. We did not consider the districts, divisions, or major cities to highlight the contexts. Instead, we focused solely on the nation's name. India was first based on where this study was conducted and most of its articles were empirical. Most of those studies (Indian context) focused on the challenging and motivating factors of women entrepreneurship. Some studies from South Asian countries like Bangladesh, Sri Lanka, and Pakistan also focus on women entrepreneurship research. Some studies from African countries like Nigeria and Zimbabwe also focus on women entrepreneurship research. We also found some studies concerning women entrepreneurship in the Middle East/North Africa (MENA) countries (UAE, Oman, Tunisia, and Qatar). Most of the studies focus on the challenges of women entrepreneurship.

Table 3 outlines the methodologies we utilized in the study on women entrepreneurs. According to the reported frequencies, 51.72% of the selected articles used the qualitative method, 34.48% – the quantitative method, and 13.80% – the mixed method. In the subsequent section of the study, we will present the conceptual model based on a survey of the previous relevant literature.

Future Research Directions

In light of the many obstacles and the significant increase in women entrepreneurs in developing nations, it is essential to determine how women acquire social capital, alternative business channels with different market opportunities, and innovative capabilities. Therefore, these areas are critical for further research (Raman *et al.,* 2022). Besides, digitization and the adoption of e-commerce are crucial for the survival of their business (Tabassum, 2022; Raman *et al.,* 2022). Institutional and sociocultural barriers may also differ from one nation to another. Thus, it is required to conduct more comparative research between developed and developing countries. However, few recent studies have already been done (Lingappa & Rodrigues, 2023; Solesvik *et al.,* 2019). Nevertheless, still, some comparative studies are essential to see the accurate picture of women entrepreneurship in developing nations. We found that women entrepreneurs in developing countries are facing networking and marketing challenges. According to the report of GEM 2021, women in developing countries are less proficient in using the Internet and communication technologies than men (Raman *et al.*, 2022). This might be one of the main causes for facing networking and marketing challenges. Further research on this topic is required because the application of cutting-edge and emerging technologies, like blockchain, might enhance their market reach (Ariyarathne & Lakmali, 2021).

Women entrepreneurs in developing countries face financial and legal issues related to challenges, which reduce the economic development of a country. Lack of financial literacy, financial knowledge, financial inclusion, and investment decisions are the leading causes of financial and legal issues related to challenges. Thus, financial literacy and investment-related research concerning women entrepreneurship will be essential in the future. Furthermore, investments in sustainable development are essential to create long-term sustainability solutions applicable to society and industry. Future research

on capital investment may be examined, and connections between related research fields are essential (Raman, 2022), minimum capital requirement and availability of raw materials (Gupta & Mirchandani, 2018). Social support, family support, and an opportunity to retain cultural heritage are the social-cultural opportunities for women entrepreneurship in developing nations (Gupta & Mirchandani, 2018; Ojong *et al.,* 2021). We found that scholars give less attention to the motivating factors of women entrepreneurship in developing countries. Thus, in the future, researchers may focus more on motivating factors of women entrepreneurship in developing countries. Moreover, researchers could explore the motivational factors of women entrepreneurship, providing valuable insight into this context that can enhance the positive impact of women entrepreneurship on economic development. However, we propose a framework based on our themes (challenges) and future directions.

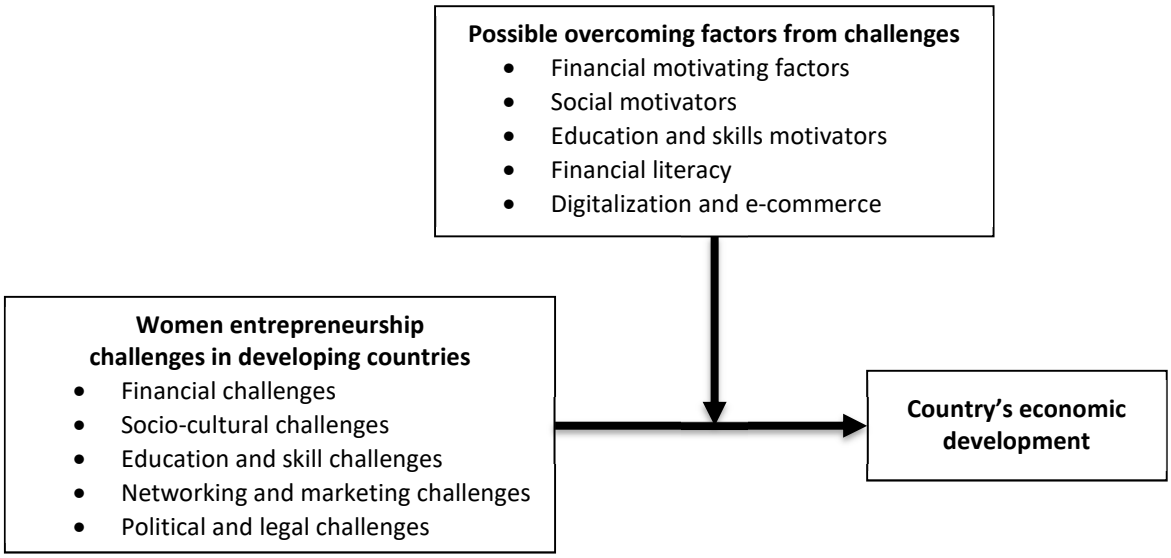

Figure 7. Proposed framework
Source: own elaboration.

A critical analysis of our proposed framework (Figure 7) provides some research variables (independent, moderating, and dependent) from our reviews. Whatever we got from the earlier reviews, the challenging factors (theme) for women entrepreneurs in developing countries are considered independent variables, with the country's economic development as a dependent variable. It is assumed that those challenges of women entrepreneurship might reduce the women entrepreneurs' performance, which might reduce the country's overall economic development or growth. Thus, a country's economic development is a dependent variable or outcome variable. Besides, future research directions (financial motivators, social motivators, education, and skill motivators, digitalization and e-commerce, and financial literacy) are moderating variables. It is assumed that if women entrepreneurs get these types of support (moderating variable), the challenge might be reduced, and economic growth might increase.

CONCLUSIONS

This review article has some notable practical and theoretical implications. Firstly, the findings are significant for women who want to start their businesses, because they show women's problems and the skills they need to overcome them. Secondly, policymakers can help make more specialized FE policies by assembling research identifying national barriers empirically and drawing comparisons between the realities of both countries and regions. Thirdly, international organizations can help make more effective gender equality assistance programs by comparing the realities of both countries and regions. Fourthly, the researchers proposed a conceptual framework or model based on the challenges of women entrepreneurship and other future research agendas. In the future, researchers may empirically test this conceptual model. Fifthly, this research aimed to enrich the literature for the developing

countries context. In the future, researchers might compare these challenges and motivating factors with developed countries. Finally, by providing the framework for future studies and inciting researchers to look further into this topic, this review aids scholars, researchers, and readers in learning more about women entrepreneurship in developing countries.

Numerous academic studies have found that the rise of women entrepreneurship is an impending phenomenon that will significantly impact the twenty-first century. To link this research with managerial and practical implications that can help entrepreneurs overcome their challenges, several studies have focused on examining the entrepreneurs' distinctiveness, the factors that motivate them, and the drivers of their performance. Most of the previous studies were empirical and embedded in a particular country context. In this study, we did not focus on any specific country. Instead, we adopted an SLR to explore the recent circumstances in women entrepreneurship and discuss future research directions for developing countries. We categorized the key findings of this review into themes (T), contexts (C), and methodologies (M). Based on our review, we covered the major challenges of women entrepreneurship in developing countries under five themes, *i.e.* (1) financial, (2) socio-cultural, (3) educational skills, (4) networking and marketing, and (5) political and legal. Developing countries were the main context (C) of this review. Regarding methodologies (M), 51.72% of the collected articles were qualitative. We also suggested essential future research variables to mitigate those challenges, *i.e.* different motivating factors (financial, social, educational and skill, technological adoption, and financial literacy).

We rigorously completed this review by following SLR principles. Nonetheless, it is crucial to consider significant limitations. We limited our search to published peer-reviewed articles and focused on those written in English. Based on our research, it is evident that there exists a significant level of interest in the field of women entrepreneurship. Consequently, studies conducted in different languages may provide additional support, validation, or contradiction to our current findings. Moreover, we could have discovered the final sample more efficiently using the created inclusion/exclusion criteria instead of alternative methods such as alternate nomenclature or researchers.

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Acknowledgements and Financial Disclosure

The authors did not receive any funding.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 1

10.15678/EBER.2024.120111

Environmental support and entrepreneurial intentions: Exploring the mediating role of attitude and behavioural control and moderating effect of family background

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ABSTRACT

Objective: The objective of the article is to investigate the relationship between environmental support and entrepreneurial intention, as well as the mediating and moderating effects involved.

Research Design & Methods: A web-based survey was conducted among a sample of 612 students from institutions of higher education in Spain and Poland. Structural equation modelling (SEM) was used to evaluate the conceptual framework and hypotheses.

Findings: The findings revealed a positive impact of environmental support (ENSUP) on attitude, behavioural control, and intentions. Furthermore, the research reveals that attitude and behavioural control act as mediating factors in the relationship between ENSUP and intentions. The research showed that environmental support significantly predicted attitudes and intentions among Spanish students but not Poles. Moreover, the influence of support on perceived behavioural control was greater for individuals from non-entrepreneurial backgrounds compared to those with entrepreneurial backgrounds. Lastly, the influence of a person's attitude towards entrepreneurship on their level of entrepreneurial intentions was stronger in families with entrepreneurship backgrounds compared to families without such a history.

Implications & Recommendations: The practical implications of this research extend to universities and policymakers, providing recommendations for supporting young entrepreneurs and their networks.

Contribution & Value Added: This article contributes to the existing entrepreneurship literature by enhancing the understanding of the connection between environmental support and intentions, the mediating role of attitude and behavioural control, and the moderating effect of family background.

Article type: research article

Keywords: environmental support; attitude; perceived behavioural control/entrepreneurial self-efficacy; Spain; Poland

JEL codes: I23, L26

Received: 9 August 2023 Revised: 31 October 2023 Accepted: 14 November 2023

Suggested citation:

Amofah, K., Gameli Dziwornu, M., Rachwał, T., Saladrigues, R., & Agyarko, F.F. (2024). Environmental support and entrepreneurial intentions: Exploring the mediating role of attitude and behavioural control and moderating effect of family background. *Entrepreneurial Business and Economics Review,* 12(1), 195-213. https://doi.org/10.15678/EBER.2024.120111

INTRODUCTION

Entrepreneurs are positively influenced by a robust business environment, while they are likely to be adversely affected by a weak one (Davidsson & Henrekson, 2002; Van Stel & Storey, 2004). Consequently, those who perceive regulatory organizations or supportive environments as beneficial are more inclined to initiate their businesses. Del Brío González *et al.* (2022) assert that students' intentions to become entrepreneurs are significantly and positively affected by environmental awareness. The extent of environmental support can have a substantial impact on entrepreneurial intention (EIs). This support may

manifest in various forms, such as resource accessibility, available financing, supportive government policies, favourable cultural attitudes, and well-established entrepreneurial networks (Iershova *et al*., 2022).

Previous studies predominantly utilize data from the Global Entrepreneurship Monitor (GEM) to explore how institutions influence EI. However, due to data limitations, these studies provide only limited insights into entrepreneurs' goals and personal motivations for starting new businesses (Cinar *et al.*, 2018). Though data obtained from secondary sources has been identified as valid, they do not always provide precise information (Aragon-Mendoza *et al.*, 2016). Consequently, it is crucial to utilize primary data sources and conduct comprehensive country-level investigations (Valdez & Richardson, 2013). Furthermore, the investigation of students' entrepreneurial intention is still in its nascent stages, marked by ongoing theoretical and conceptual advancements (Fayolle & Liñán, 2014; Liñán & Chen, 2009). Consequently, Fayolle and Liñán (2014) posited that a deeper understanding of entrepreneurial intention has the potential to enhance the development of more effective educational initiatives. In light of this, we utilized primary data to examine the relationship between environmental support and EI among Spanish and Polish students. Moreover, there is a limited understanding of how institutional dynamics interact with personal entrepreneurial motivations, particularly concerning the mediating roles played by micro-level variables (Mickiewicz *et al.*, 2021).

Despite the growing research on entrepreneurial aspirations, there is limited knowledge about how various aspects of institutions, such as environmental support, influence the development of individuals' EI (Chew, 2022). Therefore, in response to recommendations to examine individual-level mediating factors in the link between institutional support and intentions (Chew, 2022), this study investigates two European economies through the framework of the theory of planned behaviour.

Stabingis and Raupelienė (2023) conducted a study examining factors influencing students' intentions to start their businesses. They collected data from a total of 10 054 students in Estonia, Finland, Lithuania, Poland, and Sweden. The authors argue that students represent the most dynamic and motivated subset of youth. Therefore, identifying the factors impacting students' EI and the relative importance of each factor has significant relevance for multiple stakeholders – including the students themselves, institutions of higher education, labour market analysts, and policymakers (Stabingis & Raupelienė, 2023).

We excluded the subjective norm (SN) component from this study due to the conflicting, inconsistent, and inconclusive results. Contrary to numerous assertions in diverse global contexts, scholars observed that SNs do not hold a pivotal role in catalyzing EI in Poland (Wach & Bilan, 2023). Nawi *et al.* (2022) and Hoda *et al.* (2021) both found no significant relationship between SN and entrepreneurial intention. Similarly, in a combined sample of Indian and Saudi students, SN had no significant impact on EI (Hoda *et al.*, 2021). Kobylińska's study (2022) involving 330 Polish students also revealed that SNs do not significantly influence the intention for self-employment. These conclusions were supported by other authors (Steinbrink & Ströhle, 2023; Yasir *et al.*, 2023). Previous research by Barba-Sánchez *et al.* (2022) and Liñán and Chen (2009) showed that subjective norms have the least influence on EI among individuals in Spain. Anjum *et al.* (2022) conducted a study of factors impacting the EI of business students in Pakistan. They suggested exploring and comparing regions like Europe and countries including Austria, Belgium, Latvia, Spain and Sweden to gain deeper insights. Though Spain and Poland have similar public sector contributions to GDP, Spain tends to rank as more innovative than Poland across various criteria (Kobylinska & Vila-Biglieri, 2015). Stabingis and Raupelienė (2023) noted that limited international surveys on EI do exist. Many scholars agree that personal attitude and perceived behavioural control (PBC) are the predominant determinants. Moreover, Mbuya and Schachtebeck (2016) found that most researchers identify personal inclination and perceived ability as the two key factors influencing aspirations towards entrepreneurship and self-employment. Stabingis and Raupelienė (2023) further showed attitude and PBC exert the strongest influence on students' EI across the Baltic region regardless of nationality. As European Union members, Spain and Poland share comparable historical, cultural, economic and social backgrounds. Moreover, the theory of planned behaviour is an established model in entrepreneurship research, which may serve as a justification for understanding the similarities and differences between Poland and Spain in relation to EI.

Notwithstanding the burgeoning corpus of research on the subject, additional empirical explorations are crucial to elucidate the mediating role that individual motives play in the relationship be-

tween institutional support and entrepreneurial endeavours (Bağış *et al.,* 2023). This study contributes to the understanding of entrepreneurial intention in two ways: firstly, by examining the mediating effects of attitude and behavioural control on intention, and secondly, by exploring the interaction or moderating influence of family support on these relationships. The article comprises five sections: introduction, literature review, materials and methods, findings and discussions, and conclusion.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Entrepreneurial Intention and Theory of Planned Behaviour

Entrepreneurial intention refers to an individual's inclination, interest, or aspiration to engage in entrepreneurial behaviour or business formation (Thompson, 2009; Sabary *et al*., 2023; Sabary & Ključnikov, 2023). It represents a deliberate mental state that guides actions towards planned entrepreneurial conduct (Bird, 1988; Le *et al*., 2023; Duong, 2023). The theory of planned behaviour (TPB) is a widely used framework for modelling EI. This study empirically examined two TPB precursors – attitude and PBC – in relation to environmental support factors. Attitude towards entrepreneurship refers to how positively or negatively an individual views performing a specific behaviour (Miralles *et al*., 2017; Bałandynowicz-Panfil *et al.*, 2023). Perceived behavioural control demonstrates the perceived ease or difficulty of carrying out a behaviour (Miralles *et al*., 2017). Entrepreneurial intention can be understood as the cognitive mindset (Karimi *et al*., 2016) that motivates an individual to pursue self-employment rather than traditional employment (Martínez-González *et al.*, 2019; Andronicеanu & Georgescu, 2023; Andronicеanu *et al*., 2023).

The TPB is a psychological concept that establishes a connection between thoughts and actions. Ajzen (1991) argued that the intention to establish a new venture can be considered the best predictor for the actual venture creation. As per TPB, an individual's intentions and behaviours are shaped by their attitude, social norms, and perceived control over their actions (Ajzen, 1991). In TPB, Ajzen (1991) further elaborates that the propensity of an individual to engage in a specific activity is directly proportional to the likelihood of them executing it.

Attitude Towards Entrepreneurship and Perceived Behavioural Control

Wach and Wojciechowski (2016) contend that students' attitude toward entrepreneurship (ATE) and their PBC shape their EI. However, their article focused on Polish universities. The correlation between attitude and intention, as well as PBC and intention, demonstrated a significant positive relationship (Steinbrink & Ströhle, 2023). The same is proved for the digital entrepreneurship intention of students (Alkhalaileh *et al.,* 2023). Entrepreneurial intention exhibits a positive correlation with an entrepreneur's PBC (Nguyen, 2020). This study contributes to the field by expanding upon the work of Nguyen (2020) by applying the research to diverse regions. Gubik (2021) contends that students who exhibit a more positive attitude are inclined to consider entrepreneurship as a viable career path. Furthermore, Gubik (2021) posits that students are more likely to exhibit an entrepreneurial mindset when they possess a robust sense of self-efficacy, as evidenced by the application of binary logistic regression analysis. Hamdani *et al.* (2023) affirm that self-efficacy significantly influences women's intentions to become entrepreneurs. The sustainable business startup intentions of university students in Punjab, Pakistan are influenced by attitudes and PBC (Dat & Hung, 2023). Yasir *et al.* (2023) further indicate that PBC and attitude positively impact intention. Wang *et al.* (2010) propose that self-efficacy positively affects intentions. Loan (2023) emphasizes that entrepreneurial self-efficacy strongly influences students' intentions to initiate their businesses. Mahmoud *et al.* (2023) argue that entrepreneurial self-efficacy positively affects intention. Urban and Ratsimanetrimanana (2019) report that PBC and attitude exert a favourable influence on intention among students in Madagascar. Martínez-González *et al*. (2019) posited that there are no significant discrepancies between the causal frameworks of Spain and Poland concerning the precursors of EI. Moreover, the authors underscored the significance of a unifying generational strategy on a global scale, which facilitates the implementation of policies aimed at fostering EI. Mamun *et al*. (2017) found that the EI of university students in Malaysia are

significantly positive, influenced by their attitudes towards entrepreneurship. Moreover, the intentions of women entrepreneurs are positively impacted by entrepreneurial attitudes (Jalil *et al.*, 2023). The plans to start a business among Malaysian university students are highly influenced by PBC (Mamun *et al.*, 2017). The study conducted by Barba-Sánchez *et al.* (2022) provides valuable insights into the factors that influence entrepreneurial intention among university students in Spain. Specifically, the research reveals that attitudes towards entrepreneurial behaviour and PBC are significant determinants of entrepreneurial intention. Noteworthy, the present study is cross-cultural in nature.

Based on the aforementioned arguments, we hypothesised:

H1: Entrepreneurial attitude positively impacts EI for both genders across Spain and Poland.

H2: Behavioural control positively impacts EI for both genders across Spain and Poland.

Environmental Support

Inspired by the work of Dubey and Sahu (2022), we define environmental support as the various factors that assist with entrepreneurial ventures, either directly or indirectly. These factors include private associations, public support bodies, specialized training for young entrepreneurs, favourable loan terms, technical aid for business start-ups, and business centres (Domańska & Zajkowski, 2022). A growing body of scholarly research suggests that the institutional framework (Diaz Tautiva *et al.*, 2023), as defined by Estrin *et al*. (2013), plays a significant role in shaping entrepreneurial intention (Ilczuk *et al*., 2023). In a study conducted in Malaysia, Mamun *et al.* (2017) observed that government funding significantly impacts university students' perceptions of behavioural control. The study further revealed that entrepreneurial development programs exert a substantial positive influence on the behavioural control perceptions among these students. Furthermore, Loan (2023) highlights the pivotal role of entrepreneurship-supporting policies in moulding students' intentions to embark on entrepreneurial ventures. The important role in this regard has a higher education and promoting entrepreneurship in university (Barrientos-Báez *et al.* 2022).

Hamdani *et al*. (2023) conducted a study examining the impact of various forms of support on EI among women business owners in the micro, small, and medium enterprises sector of the batik craft industry in West Java, Indonesia. The study surveyed 150 women business owners and found that material, practical, and emotional assistance did not significantly influence EI among women. While Hamdani *et al*. (2023) focused exclusively on women, we aimed to expand on their findings by investigating EI among both men and women in two countries, *i.e.* Spain and Poland. Chew (2022) argues that encouraging and advantageous government policies can significantly contribute to the successful launch and management of businesses, both for existing and aspiring entrepreneurs. Positive associations exist between the development of EI and favourable perceptions of regulatory agencies or environmental support (Chew, 2022).

Shahid *et al.* (2018), sampled 37 universities in Pakistan and revealed a positive correlation between environmental support and EI. In the Indian state of Chhattisgarh, environmental factors significantly influence engineering students' intentions to initiate their businesses (Dubey & Sahu, 2022). Elali and Al-Yacoub (2015) highlight the significant role of social networks in stimulating EI. However, they determined that the impact of both identifying opportunities and the availability of resources (environmental support) on the EI of individuals from Kuwait is not statistically significant. Unlike Elali and Al-Yacoub (2015), who used correlations and regression statistics to assess EI, this article uses the SEM approach. Wang *et al.* (2010) discovered that environmental variables, such as social networks and governmental support, indirectly affect the intention to start a business. Access to finance, as a form of environmental support, increases the likelihood of individuals starting their businesses (De Clercq *et al.*, 2013; Urban & Ratsimanetrimanana, 2019). Nguyen (2020) suggests that students' perceptions of their ability to manage entrepreneurial activities are greatly influenced by perceived environmental factors, and support positively affects PBC. Furthermore, the perception of entrepreneurial behavioural control has a positive correlation with financial accessibility (Nguyen, 2020).

Jalil *et al.* (2023) argue that social capital and psychological capital, as forms of environmental support, have a favourable impact on the intentions of women entrepreneurs. These results are aligned

with the findings on social capital overall influence on personal development and entrepreneurial success obtained by Mishchuk *et al.* (2023). According to Yasir *et al.* (2023), who gathered survey data from 418 students in Lahore and Faisalabad, Pakistan, environmental values, such as supportive cultural attitudes, positively affect attitudes and PBC. Yasir *et al.* (2023) also provide evidence demonstrating the positive effects of environmental values, like supportive cultural attitudes, on EI. Previous studies (*e.g.* Estrin *et al.*, 2013; Raza *et al.*, 2020; Stephan *et al.*, 2015) have shown the beneficial impact of supportive and helpful regulations on various aspects of entrepreneurship. However, these previous studies have employed the GEM cross-sectional panel dataset of various countries, whereas our investigation utilized primarily primary data. Environmental support has been found to positively influence EI among German, Russian, and American students, as observed by Engle *et al*. (2011). However, the generalizability of these findings was limited due to the sampling of only business students. To address this limitation, the present study used a more comprehensive and varied sample in terms of age, gender, program, and field of study, to uncover greater cross-country differences. For instance, Bağış *et al*. (2023) suggested that future investigations should utilize broader cross-national samples and provide a nuanced explanation of the impact of institutions on entrepreneurial aspirations. Lemire and Rouillard (2005) examined 132 Canadian civil servants using bivariate analysis and found a strong relationship between psychological factors, environmental support, and behavioural control. Moreover, Yasir *et al*. (2023) suggested that comparing the perspectives of university students on intentions across various regions of the globe has the potential to yield more comprehensive insights.

In light of these arguments, we hypothesised:

H3: Environmental support positively impacts the attitude towards entrepreneurship.

H4: Environmental support positively impacts perceived behavioural control.

H5: Environmental support positively impacts entrepreneurial intention.

Mediation Effect of Attitude and Perceived Behavioural Control Between Environmental Support and Entrepreneurial Intention

In a recent study published by Villanueva-Flores *et al*. (2023), the authors examined the relationship between psychological capital (environmental support) and entrepreneurial intention among 632 students at the University of Cadiz in Spain. Their findings revealed the presence of a mediating function performed by PBC and subjective norms in this association. However, the present study aims to extend this research by focusing specifically on the mediating role of attitude and PBC in shaping EI. Mamun *et al.* (2017) posit that the impact of support (governmental assistance, entrepreneurial development programs, etc.) on the entrepreneurial inclination of Malaysian university students is intermediated by PBC. Hamdani *et al.* (2023) as well as Rodríguez Loor and Muñoz-Fernández (2022) suggest that self-efficacy acts as an intermediary in the connection between support and women's aspirations to initiate their businesses. Bağış *et al.* (2023) conducted research investigating, among other factors, the influence of institutions on individuals' entrepreneurial intent and how personal motivations mediate this relationship. Employing quantitative research methods, they analyzed a sample of 678 questionnaires from Kosovo and Turkey. The findings demonstrate a partial mediating relationship between normative and cultural-cognitive institutions (support) and EI, as well as a complete mediation between personal attitudes and PBC. Nguyen (2020) states that the relationship between financial accessibility (environmental support) and entrepreneurial intent is mediated by the perception of behavioural control. Moreover, the entrepreneurial attitude was found to have a partial mediating role in the motivations or intentions of women entrepreneurs with respect to social capital (Jalil *et al.*, 2023). Furthermore, the influential connection between psychological capital and the EI of women was discovered to be partially mediated by entrepreneurial attitudes (Jalil *et al.*, 2023). A comprehensive review of the existing scholarship has revealed a dearth of empirical evidence about the intermediate role of PBC and ATE in the relationship between environmental support and EI. This study aimed to address this gap in the current body of knowledge and provide empirical validation of the intermediate influence of PBC and ATE in the connection between environmental support and EI among university students, with a particular focus on the Spanish and Polish contexts. Consequently, we formulated the subsequent hypothesis:

H6: Irrespective of the country, ATE and PBC mediate the relationship between environmental support and intentions.

The Moderating Effect of Entrepreneurial Family Background on Attitude and Perceived Behavioural Control

Family support and an ancestral connection to the family enterprise emerge as crucial elements in the realm of entrepreneurship and the establishment of new businesses (Gubik & Farkas, 2016). This arises from the fact that students who have parents with entrepreneurial backgrounds often develop entrepreneurial skills through their interactions with their parents and exposure to their business endeavours. Research conducted by Nguyen (2017) and Ranwala (2016) has consistently shown a strong correlation between the entrepreneurial backgrounds of families and the entrepreneurial intent displayed by their offspring. Specifically, exposure to a family business environment has been found to have a positive impact on students' aspirations to pursue entrepreneurship (Shahid *et al*., 2018). Furthermore, Engle *et al*. (2011) discovered that in both German and U.S. samples, students who held a more positive perception of their parents' entrepreneurial background were more likely to start their firm compared to those who held a less positive perception. However, this relationship was not observed in the Russian sample. The inclination of students to pursue entrepreneurial endeavours gains strength when they have family members who epitomize entrepreneurship (Del Brío González *et al.*, 2022). Gubik (2021) contends that the impact of familial entrepreneurial experiences on students' career choices holds substantial weight. The connection between entrepreneurial self-assurance and EI is influenced by one's family background (FB) (Mahmoud *et al.*, 2023).

From the foregoing, we hypothesize that:

H7: Family background moderates the positive relationship between entrepreneurial support and the antecedents of the TPB (ATE and PBC).

H8: Family background moderates the positive relationship between the antecedents of the TPB (ATE and PBC and entrepreneurial intention).

In light of the preceding review of literature, the following conceptual framework (Figure 1) explains the relationship between environmental support and intentions by examining the mediating and moderating effects.

RESEARCH METHODOLOGY

Variables/research instrument

The research employed previously validated instruments to assess the key variables of the study. These instruments were developed by Liñán and Chen (2006, 2009), Gubik (2021), and Liñán *et al.* (2013).

Measure

We measured all factors using a 5-point Likert scale, with 1 indicating strong disagreement and 5 indicating strong agreement, unless otherwise stated. We measured the dependent variable, entrepreneurial intention using a six-item questionnaire developed by Liñán and Chen (2006). Sample items include statements such as 'I am willing to do whatever it takes to become an entrepreneur,' 'My professional aspiration is to become an entrepreneur,' and 'I am determined to establish a company in the future.' We assessed the questionnaire's reliability using Cronbach's alpha coefficient, which was reported to be 0.95 in the original study by Liñán and Chen and 0.966 in the present study.

We used the following independent variables:

Attitude

In this study, we evaluated the students' attitudes toward entrepreneurship using the methodology established by Liñán and Chen (2009). The assessment included a series of statements such as 'To me, being an entrepreneur has more benefits than drawbacks,' 'I find the prospect of a career as an entrepreneur appealing,' 'Given the opportunity and resources, I would pursue entrepreneurship,'

'I believe that being an entrepreneur would bring me great satisfaction,' and 'Of all the options available to me, I would prefer to become an entrepreneur.' The reliability of this measurement by Liñán and Chen (2009) using Cronbach's Alpha, was reported to be 0.955. In our study, Cronbach's alpha was found to be 0.860 as indicated in Table 2.

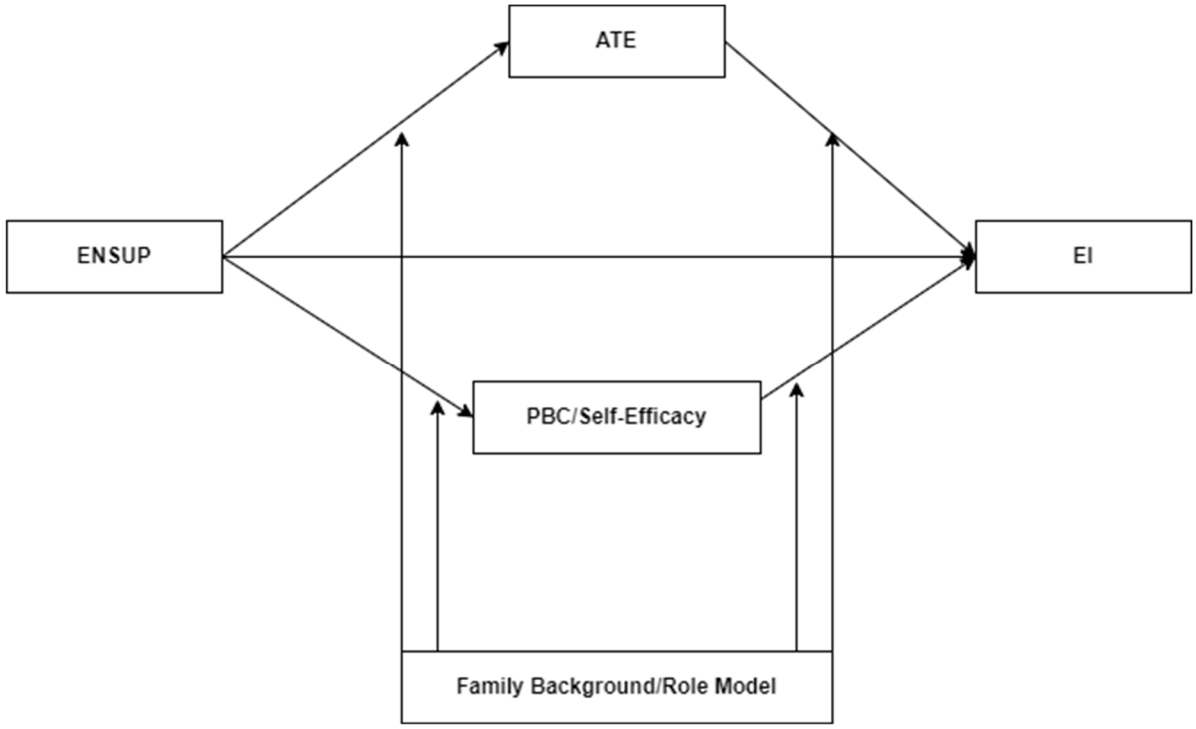

Figure 1. Conceptual framework
Source: own elaboration.

Perceived Behavioural Control

In terms of PBC, we employed the scales developed by Liñán and Chen (2009). Examples of items on the scale include statements such as 'I am equipped to launch a viable business,' 'If I were to start a business, my chances of success would be high,' and 'I possess the knowledge necessary to execute an entrepreneurial venture.'

Entrepreneurial Family Background

This study evaluated the students' entrepreneurial FB using the methodology established by Gubik (2021), who introduced a variable called 'has/does not have a family business background.'

Entrepreneurial Support

In terms of entrepreneurial support, the study assessed environmental support using the approach developed by Liñán *et al.* (2013). Examples of items on the scale include 'private associations,' 'public support bodies,' and 'specific training for young entrepreneurs.'

Sampling and Data Collection

The information was gathered via an online survey conducted using the Google Docs application, involving students from two universities located in Spain and Poland. Spain and Poland are both part of the broader European economic landscape, yet possess distinct geographical and demographic profiles. However, Poland has been converging with Spain across various economic indicators. For example, when adjusted for purchasing power parity, Poland's GDP per capita is now at a similar level to

Spain's.[1] Stabingis and Raupelienė (2023) suggest that understanding the factors that influence EI within nations with similar mentalities can prove beneficial in enhancing research initiatives, fostering the development of entrepreneurship-friendly infrastructure, establishing business incubators, and formulating policies that support start-ups.

The students were given the choice to participate in the survey voluntarily, with the understanding that they were not obligated to complete the questionnaire. The respondents' personal information was kept strictly confidential and used solely for research purposes. Table 1 presents the demographic characteristics of the respondents. The majority (67.4%) of survey respondents were women. The most common age group was 20-24 years old. First-year students made up the largest proportion of respondents. The field of study distribution was relatively balanced across categories. The majority of respondents were from Spain.

Table 1. Demographic characteristics of respondents

Variables	Characteristics	Frequency (%)
Gender	Male	199 (32.5%)
	Female	413 (67.5%)
Age	Under 20 years	98 (16.0%)
	20-24 years	299 (48.9%)
	25-29 years	101 (16.5%)
	30-34 years	65 (10.6%)
	35 years and over	49 (8.0%)
Year of study	1st year	202 (33.0%)
	2nd year	109 (17.8%)
	3rd year	107 (17.5%)
	4th year	155 (25.3%)
	5th year	39 (6.3%)
Fields of study	Economics and management	309 (50.5%)
	Engineering and others (exact and natural sciences)	303 (49.5%)
Country	Spain	369 (60.3%)
	Poland	243 (39.7%)
Entrepreneurial family background	Yes	206 (33.7%)
	No	406 (66.3%)

Source: own study based on survey, 2021.

RESULTS AND DISCUSSION

The Measurement Model

We examined the evaluation model to verify the internal consistency reliability, convergent validity, and discriminant validity of the constructs employed in this research. Internal consistency reliability gauges the extent to which the items accurately represent the underlying constructs (Hair *et al.*, 2014a). We used composite reliability to evaluate internal consistency (Hair *et al.*, 2017). If the composite reliability of each construct exceeded the threshold value of 0.7, the measurement model was considered satisfactory (Richter *et al.*, 2016). As shown in Table 2, only items that met the cut-off point were included in further analysis. Discriminant validity measures the extent to which a construct is distinct from other constructs in the model (Hair *et al.*, 2017). We used two methods to assess discriminant validity (Table 3). Initially, we utilized the Fornell-Larcker criterion (1981), which entails comparing the correlation between constructs with the square root of the average variance extracted (AVE) for each construct. According to Fornell and Larcker (1981), discriminant validity is achieved when the square root of the AVE for each latent variable surpasses the correlation value for that construct. As

[1] According to Eurostat (https://ec.europa.eu/eurostat/databrowser/view/tec00114/default/table) and International Monetary Fund (https://www.imf.org/external/datamapper/PPPPC@WEO/POL/ESP) data for 2022.

demonstrated in Table 3, the results suggest satisfactory discriminant validity, as the square root values of the AVE exceed the correlation values across both rows and columns (Fornell & Larcker, 1981).

The Structural Model

We evaluated the structural model using the PLS method and the bootstrap resampling technique (Henseler *et al.*, 2009), with 5000 iterations to ensure stability (Hair *et al.*, 2014). This process allows for the testing of hypotheses and the examination of relationships between constructs using established procedures. Table 4 presents the results of our analysis. Table 6 also shows the findings of the moderation analysis. It indicates that FB has a moderating effect on the relationship between support and intention. Table 5 displays the variance explained (R square) in the dependent constructs and the path coefficients for the model; attitude (91.1%), intention (86.1%), and behavioural control (26.5%), which are promising when compared to previous studies.

Table 2. Full-sample measurement model (reliability indicators)/composites and measures

Code	Variables	Loadings	Composite Reliability	AVE	Cronbach's Alpha	rho_A
ATE	**Attitude towards entrepreneurship (Author)**		**0.934**	**0.876**	**0.860**	**0.878**
ATE2	A career as an entrepreneur is attractive for me	**0.947**				
ATE4	Being an entrepreneur would entail great satisfaction for me	**0.925**				
EI	**Entrepreneurial intention**		**0.978**	**0.936**	**0.966**	**0.966**
EI2	My professional goal is to be an entrepreneur	**0.962**				
EI4	I am determined to create a firm in the future	**0.970**				
EI6	I have got the firm intention to start a company someday	**0.970**				
PBC	**Perceived behavioural control**		**0.951**	**0.906**	**0.897**	**0.897**
PBC2	I am prepared to start a viable firm	**0.951**				
PBC5	If I tried to start a firm, I would have a high probability of succeeding	**0.953**				
ENSUP	**Environmental support**		**0.949**	**0.758**	**0.936**	**0.937**
ENSUP1	Private associations	**0.847**				
ENSUP2	Public support bodies	**0.842**				
ENSUP3	Specific training for young entrepreneurs	**0.886**				
ENSUP4	Loans in especially favourable terms	**0.872**				
ENSUP5	Technical aid for business start-ups	**0.900**				
ENSUP6	Business centres	**0.875**				

Source: own study based on survey, 2021.

Table 3. Discriminant validity

Items	ATE	EI	ENSUP	PBC
ATE	0.936			
EI	0.891	0.968		
ENSUP	0.437	0.492	0.871	
PBC	0.767	0.850	0.515	0.952

Source: own study based on survey, 2021.

Table 4. Predictive measure

Items	R Square
ATE	0.191
EI	0.861
PBC	0.265

Source: own study based on survey, 2021.

The research results confirmed hypotheses 1-5, as shown in Table 4. These results are in line with previous research. According to TPB (Mamun *et al.*, 2017), individuals who perceive a supportive and favourable entrepreneurship Support Policy – such as easy access to capital, information,

and infrastructure – are more likely to engage in entrepreneurial decision-making (Huang *et al.*, 2021). According to Martínez-González *et al.* (2019), self-efficacy positively impacts entrepreneurial intention among young adults in both Spain and Poland. Entrepreneurship support policies, as described by Mamun *et al.* (2017), encompass a range of measures that facilitate the establishment of a business, including the creation of a favourable business environment (Turker & Selcuk, 2009) and the provision of training for new businesses (Gasse & Tremblay, 2011). Entrepreneurship support policies provide infrastructure, financial assistance, access to business networks, and trade information to facilitate business launches (Huang *et al.*, 2021).

Hypothesis (H6) aims to determine whether the effect of ENSUP or support on EI is mediated by changes in both ATE and PBC. As shown in Table 4, the direct effect of ENSUP on EI was found to be partially statistically significant. This is consistent with Nguyen (2020), who argued that the relationship between support and entrepreneurial intention is mediated by PBC. The indirect effect of ENSUP on EI with ATE as the mediating variable was found to be statistically significant. The same result was obtained when PBC was used as the mediating variable for the indirect effect of ENSUP on EI. Thus, based on our data, it can be concluded that both ATE and PBC fully mediate the relationship between ENSUP and EI. This means that the impact of ENSUP on EI is completely mediated by both ATE and PBC. However, partial mediation was reported in Jalil *et al.* (2023)'s study. Our findings align with the study by Bağış *et al*. (2023), which suggests that individual motives of ATE and PBC act as intervening variables in the relationship between environmental support, including government backing, policies, financial aid, and EI. These results are also consistent with prior research (Oftedal *et al*., 2018; Schlaegel *et al*., 2013; Schlaegel & Koenig, 2014). Notably, Barba-Sánchez *et al*. (2022) have found that the perception of entrepreneurial behaviour plays a critical role within our model, as it directly influences entrepreneurial intention and serves as a mediator for the relationship between other variables associated with this intention.

Concerning Hypothesis 7 (H7: FB moderates the positive relationship between ENSUP and the antecedents of TPB (ATE and PBC)), Table 6 shows that the interaction effect of FB on the relationship between ATE and EI is statistically significant at the 5% level, with an estimate of 0.171. This suggests that a family's entrepreneurial background positively moderates the relationship between an individual's attitude towards entrepreneurship and their EI. In other words, a family's history of entrepreneurship strengthens the link between an individual's attitude and their EI. Rachmawan *et al.* (2015) posited that there exists a significant disparity in EI between students lacking experience in entrepreneurship and those possessing familiarity with entrepreneurial endeavours. Moreover, it is asserted that families who expose their offspring to their business ventures at a young age and actively involve them in the operations of said enterprises foster potent entrepreneurial bonds (Bandura, 1977; Carr & Sequeira, 2007). According to Escolar-llamazares *et al.* (2019), few Spanish young individuals demonstrated a noteworthy level of entrepreneurial interest and among those who did, the majority were males who hailed from a lineage of entrepreneurial parents. Figure 2 provides a visual representation of how a family's entrepreneurial background moderates the relationship between ATE and EI. The slope analysis shows that CPSE (entrepreneurial FB) at one and FB at zero represent families with and without a history of entrepreneurship, respectively. The left-hand side of Figure 2 depicts the moderating effect of a family's entrepreneurial background on the relationship between ATE and EI. The slope for families with an entrepreneurial background is steeper than that for families without such a history. This indicates that the influence of an individual's attitude towards entrepreneurship on their level of EI is stronger in families with an entrepreneurial background compared to those without such a history. According to del Brío González *et al.* (2022), having family members who are entrepreneurs reinforces students' desire to pursue entrepreneurship. On the other hand, the estimate for PBC recorded a p-value of 0.927, which is greater than the threshold value of 0.05, indicating that entrepreneurial FB does not have a statistically significant moderating effect on the relationship between PBC and EI. This is evident in the diagram on the right-hand side of Figure 2, which shows that both the red and green lines are parallel, indicating that a family's entrepreneurial background does not influence the relationship between an individual's PBC and their level of EI. However, a study by Mahmoud *et al.* (2023) found that FB does moderate the relationship between entrepreneurial self-efficacy and EI.

Hypothesis 8 aims to investigate the moderating effect of a family's entrepreneurial background on the relationship between support and the antecedents of TPB (ATE and PBC). Noteworthy, the interaction effect of a family's entrepreneurial background on the relationship between ENSUP and ATE is not statistically significant, indicating that FB does not moderate the relationship between support and attitude. However, the interaction effect of a family's entrepreneurial background on the relationship between ENSUP and PBC is statistically significant at the 1% level, with an estimate of -0.278. This suggests that families without an entrepreneurial background have a stronger moderating effect on the relationship between ENSUP and PBC compared to families with an entrepreneurial background. The diagram on the right-hand side of Figure 3 provides a visual representation of the moderating effect of FB on the relationship between support and PBC. The interaction plot shows a steeper gradient for families without an entrepreneurial background compared to families with a history of entrepreneurship. This diagram also indicates that the impact of support on PBC is greater in families without an entrepreneurial background compared to those with a history of entrepreneurship. Evidence suggests that family support can promote EI and serve as a primary source of support in unfavourable business environments (Manolova *et al.*, 2019). Evidence indicates that family support can foster EI and act as a primary pillar of support in challenging business climates (Manolova *et al.*, 2019). Conversely, certain studies have discovered that family support can potentially have an adverse effect on a young individual's decision to initiate a business. Young entrepreneurs might exhibit reluctance to accept financial aid from their families due to the potential risks it could pose to both the venture and the family's future (Welsh *et al*., 2018).

Table 5. Structural model results

Construct	Complete	HYPOTHESIS	Spain	Poland
ATE -> EI	0.581***	Accepted	0.595***	0.544***
ENSUP -> ATE	0.437***	Accepted	0.392***	-0.201
ENSUP -> PBC	0.515***	Accepted	0.141***	0.026
ENSUP -> EI	0.04*	Accepted	0.559***	-0.162
PBC -> EI	0.404***	Accepted	0.243***	0.338***
ENSUP -> ATE -> EI	0.254***	Accepted	0.233***	-0.109
ENSUP -> PBC -> EI	0.208***	Accepted	0.136***	-0.055

Note: Significance codes ***P < 0.001, **P < 0.01, *P < 0.05.
Source: own study based on survey, 2021.

Although the path coefficients recorded for the complete sample were all statistically significant, the majority of the path coefficients were not statistically significant at 5% for Poland. Thus, environmental support had no significant effect on the attitude towards entrepreneurship in Poland (Table 5). Again, environmental support had no significant effect on PBC and EI amongst the people in Poland. However, the impact of PBC on EI was greater amongst the residents in Poland as compared to those in Spain.

Table 6. Interaction effect of FB on the relationship between ATE and EI

INTERACTION	STANDARDISED ESTIMATES	STANDARD ERROR	P-VALUE
CPSE (FB) x ATE -> EI	0.171	0.075	0.028
CPSE (FB) x PBC -> EI	-0.011	0.068	0.927
CPSE (FB) x ENSUP -> ATE	-0.049	0.076	0.500
CPSE (FB) x ENSUP -> PBC	-0.278	0.085	0.001

Source: own study based on survey, 2021.

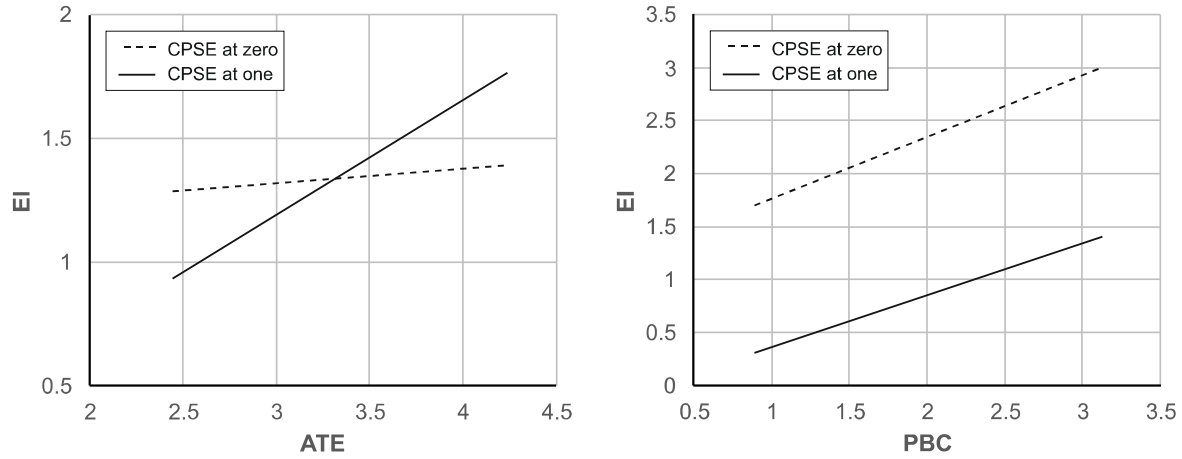

Figure 2. Interaction plot of family's entrepreneurship background on the relationship between entrepreneurial intention and TPB
Source: own elaboration.

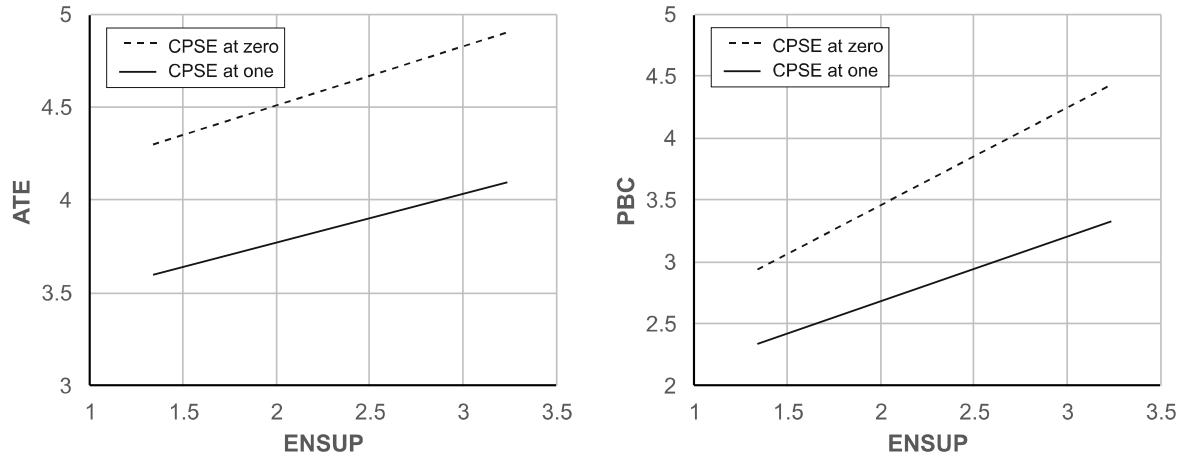

Figure 3. Interaction plot of family's entrepreneurship background on the relationship between ENSUP and TPB
Source: own elaboration.

CONCLUSIONS

We aimed to investigate the relationship between environmental support and entrepreneurial intention while examining the mediating and moderating effects in the process. This article makes significant theoretical contributions to the entrepreneurship literature by deepening our understanding of the mediating and moderating effects of the theory of planned behaviour in an international context. The results demonstrate that while environmental support does not fully determine entrepreneurial intention, it significantly impacts attitude and behavioural control. While environmental support did not significantly impact perceived control for either group, this factor more strongly shaped EI in Poland versus Spain. Thus, differences emerged between countries regarding how external conditions shape entrepreneurial cognitive drivers. The findings imply external support may play a more limited role in motivating Polish youth towards entrepreneurship compared to their Spanish counterparts. This research has practical implications for both academics and policymakers. Firstly, it provides insights into the environmental factors that can foster entrepreneurial inclinations. The findings suggest that supportive environmental factors can encourage and promote EI. Therefore, policymakers should give greater consideration to environmental support systems, such as business centres, technical assistance for business start-ups, and specialized training for young entrepreneurs, which can foster entrepreneurial inclination

in Spain and Poland. As a result, politicians and related organizations seeking to promote entrepreneurial ambitions can establish support mechanisms that align favourably with the EI of these two countries. The theoretical implications for the governments of Spain and Poland, as well as other private institutions, include the development of support systems for individuals intending to start their businesses. This research can be useful in determining the support needs of those with EI for economic viability. However, we acknowledge that this study may have several limitations that could be addressed in future research. Firstly, it is important to recognize that intentions do not necessarily culminate in behaviour, thus, future investigations may concentrate on the behavioural aspect. Secondly, there is a need to expand the scope of research to include a greater number of European countries, as well as other nations, to enhance the generalizability of the findings. Future studies may employ qualitative methods, which may provide a more comprehensive understanding of the topic.

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Acknowledgements and Financial Disclosure

The article in the part co-authored by Tomasz Rachwał presents the result of Project no 020/EEZ/2023/POT financed from the subsidy granted to the Krakow University of Economics, Poland. We have no other funding to report.

The data supporting the findings of this study are available upon request from the corresponding author (Michael Gemelli Dziwornu) and are included within the article. However, due to privacy and ethical considerations, the data are not publicly accessible.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme “Development of Scientific Journals” (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

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ISSN 2353-883X

eISSN 2353-8821