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The dark side of generative artificial intelligence: A critical analysis of controversies and risks of ChatGPT

Krzysztof Wach, Cong Doanh Duong, Joanna Ejdys, Rūta Kazlauskaitė, Pawel Korzynski, Grzegorz Mazurek, Joanna Paliszkiewicz, Ewa Ziemba

ABSTRACT

Objective: The objective of the article is to provide a comprehensive identification and understanding of the challenges and opportunities associated with the use of generative artificial intelligence (GAI) in business. This study sought to develop a conceptual framework that gathers the negative aspects of GAI development in management and economics, with a focus on ChatGPT.

Research Design & Methods: The study employed a narrative and critical literature review and developed a conceptual framework based on prior literature. We used a line of deductive reasoning in formulating our theoretical framework to make the study's overall structure rational and productive. Therefore, this article should be viewed as a conceptual article that highlights the controversies and threats of GAI in management and economics, with ChatGPT as a case study.

Findings: Based on the conducted deep and extensive query of academic literature on the subject as well as professional press and Internet portals, we identified various controversies, threats, defects, and disadvantages of GAI, in particular ChatGPT. Next, we grouped the identified threats into clusters to summarize the seven main threats we see. In our opinion they are as follows: (i) no regulation of the AI market and urgent need for regulation, (ii) poor quality, lack of quality control, disinformation, deepfake content, algorithmic bias, (iii) automation-spurred job losses, (iv) personal data violation, social surveillance, and privacy violation, (v) social manipulation, weakening ethics and goodwill, (vi) widening socio-economic inequalities, and (vii) AI technostress.

Implications & Recommendations: It is important to regulate the AI/GAI market. Advocating for the regulation of the AI market is crucial to ensure a level playing field, promote fair competition, protect intellectual property rights and privacy, and prevent potential geopolitical risks. The changing job market requires workers to continuously acquire new (digital) skills through education and retraining. As the training of AI systems becomes a prominent job category, it is important to adapt and take advantage of new opportunities. To mitigate the risks related to personal data violation, social surveillance, and privacy violation, GAI developers must prioritize ethical considerations and work to develop systems that prioritize user privacy and security. To avoid social manipulation and weaken ethics and goodwill, it is important to implement responsible AI practices and ethical guidelines: transparency in data usage, bias mitigation techniques, and monitoring of generated content for harmful or misleading information.

Contribution & Value Added: This article may aid in bringing attention to the significance of resolving the ethical and legal considerations that arise from the use of GAI and ChatGPT by drawing attention to the controversies and hazards associated with these technologies.

Article type:	review article
Keywords:	artificial intelligence (AI); generative artificial intelligence (GAI); ChatGPT; technology adoption; digital transformation; OpenAI; chatbots; technostress
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INTRODUCTION

Artificial intelligence (AI) has rapidly advanced in recent years and its applications are becoming increasingly widespread (Tlili *et al.*, 2023, Adetayo, 2023). Early AI research concentrated on creating rule-based systems, which carried out tasks according to a set of established rules. The development of machine learning (ML) algorithms allowed AI systems to learn from data and enhance their performance over time starting in the 1980s. Significant progress has been made in generative artificial intelligence (GAI) development in recent years as a result of the emergence of deep learning (DL) techniques like neural networks. Natural language processing, picture and audio recognition, and autonomous systems are only a few of the current uses for GAI. Artificial intelligence has come a long way in the last few years, with much of the progress focused on developing more lifelike generative models (Bengio *et al*., 2013). Several fields, including business, management and economics, have recently shown considerable interest in the concept of GAI (Lăzăroiu *et al.*, 2022; Reshetnikova & Mikhaylov, 2023).

One of the areas in which AI has been gaining significant attention is the chatbot industry with ChatGPT being a prominent example (Costello, 2023; Ekanazake & Saputhanthri; 2020). ChatGPT is a generative model built on the transformer architecture that enables the production of natural-sounding text, and it is a tool that has acquired considerable popularity (Radford *et al*., 2019). ChatGPT is a language model developed by OpenAI that uses deep learning and machine learning algorithms to generate text-based responses in a conversational manner by producing human-like text (Korzynski *et al.*, 2023; Slapeta, 2023). ChatGPT was created in 2018 by OpenAI. The first iteration of GPT, GPT-1, had 117 million parameters and was trained using unsupervised learning on a large corpus of text data. It performed exceptionally well in tasks like language modelling and text completion (Radford *et al*., 2019). Later versions, GPT-2 and GPT-3, increased the number of parameters to 1.5 billion and 175 billion, respectively, making them among the largest language models ever created (Radford *et al*., 2019). Due to the controversy surrounding GPT-2's potential to generate misleading or harmful content, OpenAI initially withheld the complete model from the public.

Numerous prominent business leaders, even business tycoons, including Bill Gates and Elon Musk, emphasize that GAI and ChatGPT would alter our work and daily lives (Bove, 2023; Olinga, 2022). Van Dis *et al*. (2023) indicate that ChatGPT would impact researchers' work. Thorp (2023) acknowledges some factual inaccuracies in ChatGPT but argues that it would transform our education. In the Italian region of Marche, the authorities temporarily banned ChatGPT due to data privacy concerns (Robertson, 2023). However, OpenAI addressed and clarified issues raised by data protection regulators.

While ChatGPT and GAI have the potential to revolutionize how we approach data analysis and report generation, they also raise significant doubts and questions about their potential effects on society, including ethics, privacy, and security (Floridi & Cowls, 2019; Florek-Paszkowska *et al*., 2021). The hazards and unfavourable effects of GAI, notably with regard to ethics, privacy, and employment displacement, are also a source of worry. In this study, we analysed ChatGPT to shed light on the debates and dangers surrounding the advancement of GAI in the context of management and economics. We looked at the potential advantages and disadvantages of GAI and ChatGPT, as well as how they may affect how people and society as a whole work in the future (Kaplan & Haenlein, 2021). In doing so, we hope to inspire more conversation and investigation on this crucial subject while providing a thorough review of the difficulties and potential that result from the application of GAI in these fields.

This study is essentially a continuation of our investigation on ChatGPT in light of the current flurry of media attention and academic debate. In our very first publication (Korzynski *et al.*, 2023), which almost had the same authors, we wrote about the positive aspects, advantages, and opportunities provided by ChatGPT. In contrast, the second part of this article addresses ChatGPT's negative features, including controversies, threats, drawbacks, disadvantages, and obstacles. Nonetheless, this is not our final statement on the subject, as we already planned further stages of our research, which will undoubtedly approach this topic from a different angle.

The objective of the article is to provide a comprehensive identification and understanding of the challenges and opportunities associated with the use of generative models in business. This study aimed

to develop a conceptual framework that gathers the negative aspects of GAI development in management and economics, with a focus on ChatGPT. We do hope this article will foster further discussion and research on the ethical, legal, and societal implications of GAI in management and economics.

On the sidelines of our scientific inquiries, we want to mention that when creating our text, we adopted the title 'Controversies and threats of GAI development and use: A case of ChatGPT,' after which we asked ChatGPT if it had an idea for a better, more catchy title. We received several suggestions:

- 'The Dark Side of AI: Controversies and Threats of Generative Artificial Intelligence Development and Use in Chatbots';
- 'Unleashing the Beast: Examining the Controversies and Threats Surrounding Chatbot Development with Generative AI';
- 'Chatbots in the Age of Generative AI: A Critical Analysis of Controversies and Threats';
- 'Beyond Human Capabilities: The Risks and Controversies of Chatbot Development with Generative AI'.

Finally, we decided to use the title 'The dark side of generative artificial intelligence: A critical analysis of controversies and risks of ChatGPT.'

The article begins with the presentation of the methodological assumptions regarding the literature review. The main part of the article applies the classic narrative review of the literature, which was built around seven identified risks. The article ends with conclusions including a discussion of research limitations and further possible directions of research.

MATERIAL AND METHODS

We employed a narrative and critical literature review in this study (Ratten, 2023). This article is founded on prior literature. Based on a literature review and desk research, this article will develop a conceptual framework, gathering altogether what was raised as the negative aspects of AI. This conceptual study's research questions and theoretical framework were derived from an overview of the relevant literature and desk research, as this topic is still relatively new to the fields of economics, management, and business studies. To achieve the most beneficial cognitive results from the study process, smooth and efficient conduct of scientific research requires a procedure following pre-determined procedures (Babbie, 2012, pp. 112-113). The research endeavour had exploratory, descriptive, analytic, and prescriptive objectives (Collis & Hussey, 2009, p. 5). A comprehensive literature review was conducted to conceptualize and operationalize the research endeavour. Therefore, the primary method of research was a literature review with constructive criticisms. Fisher's (2010, pp. 94-130) five-stage model for a critical literature review was utilized in this investigation, namely: (i) preliminary search for sources, (ii) mapping and describing the literature, (iii) evaluating the literature, (iv) radical critique, and (v) summarising and revising.

The study's objective was defined based on a preliminary literature evaluation, which prompted the preparation of the conceptual framework for this study using a line of deductive reasoning. Deductive reasoning is a component of this type of research methodology, which makes the study's overall structure rational and productive. In conclusion, this article should be viewed as a conceptual article in which a literature review and desk research result in the formulation of the theoretical framework gathering controversies and threats of GAI.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Based on the conducted deep and extensive query of academic literature on the subject, as well as professional press and Internet portals, we identified various controversies, threats, risks, defects, and disadvantages of GAI, in particular, ChatGPT. Then, in some cases, we grouped the identified threats into clusters to present the seven main threats we see. In our opinion they are as follows:

- No regulation of the AI market and urgent need for regulation (Amariles & Baquero, 2023; Hsu, 2022);
- Poor quality, lack of quality control, disinformation, deepfake content, and algorithmic bias (Norori *et al.*, 2021; Rana *et al.*, 2022; Moravec, Kim, & Dennis 2020);

- Automation-spurred job losses, job displacement (Gruetzemacher *et al*., 2020; Khogali & Mekid, 2023);
- Personal data violation, social surveillance, and privacy violation (Teubner *et al.*, 2023; Mazurek & Małagocka, 2019; Piotrowski, 2023);
- Social manipulation, weakening ethics and goodwill (Mazurek, 2023; Oduro *et al.*, 2022);
- Widening socio-economic inequalities (Efe *et al*., 2022; Lutz, 2019; Kitsara, 2022; Kopalle *et al.*, 2022; Zajko, 2022);
- AI-related technostress (Chen *et al*., 2022; Korzynski *et al*., 2021; Newman *et al*., 2022).

No Regulation of the AI Market and Urgent Need for Regulation

While ChatGPT and similar AI-powered chatbots offer numerous benefits, the lack of regulation in the AI market poses significant risks, drawbacks, and controversies that warrant careful consideration. Moreover, the development and deployment of AI technologies (such as ChatGPT) in the management and economics domains raise several controversies and threats, particularly in the absence of adequate regulation (Hsu, 2022). Unlike the pharmaceutical and financial industries, the AI market currently lacks comprehensive regulation, which has implications for various aspects, including ethical concerns, biases, accountability, economic disparities, and potential misuse (Oduro *et al.*, 2022). This section aims to analyse the controversies and threats associated with the no regulation of the AI market, with a specific focus on the case of ChatGPT, and discuss the implications for management and economics as well as call for the urgent need for regulating AI technologies.

An important point of contention regarding the lack of regulation in the AI market relates to the ethical issues linked to the creation and utilization of AI technologies such as ChatGPT (Hsu, 2022). The training of AI models involves extensive data, which may introduce biases into their responses (Norori *et al.*, 2021). For instance, ChatGPT learns from a diverse range of text data available on the internet, which may contain biases related to race, gender, religion, and other sensitive attributes (Varsha, 2023). As a result, ChatGPT's generated responses may reflect these biases, leading to unfair or discriminatory outcomes. Biases in AI-generated responses can have serious consequences, particularly in the management and economics domains (Dwivedi *et al.*, 2023; Palladino, 2022). For instance, when ChatGPT is utilized for customer service in a financial institution, biased responses could result in discriminatory treatment of customers based on their race or gender. Such biases can perpetuate existing inequalities and reinforce discriminatory practices, leading to ethical dilemmas and legal challenges. Moreover, in the absence of regulation, there may be limited mechanisms to detect and mitigate biases in AI models like ChatGPT, leading to potential negative impacts on individuals, organizations, and society at large (Eke, 2023).

Another significant concern related to the no regulation of the AI market is the issue of accountability and responsibility (Amariles & Baquero, 2023). Artificial intelligence models like ChatGPT operate autonomously, generating responses based on their learned patterns without human intervention (Eke, 2023). This makes it challenging to attribute accountability and responsibility for the actions or outputs of AI systems. In case of errors, biases, or harmful consequences arising from ChatGPT's responses, questions may arise about who should be held accountable – the developers, the users, or the AI model itself? The lack of clear accountability and responsibility mechanisms can have serious implications for management and economics (Short & Short, 2023, Königstorfer & Thalmann, 2022). For instance, if ChatGPT provides inaccurate financial advice to users, resulting in financial losses, it may be challenging to determine who is responsible for the losses. This can result in legal disputes and challenges in establishing liability, which can result in financial and reputational damages for organizations and individuals. Consequently, in the absence of regulation, ensuring accountability and responsibility in the development and use of AI technologies like ChatGPT becomes a significant challenge, with potential repercussions for the management and economics domains.

The absence of regulation related to the AI market can also exacerbate economic disparities. Artificial intelligence technologies, including ChatGPT, have the potential to automate tasks that are currently performed by humans, which may lead to job displacement (Gruetzemacher *et al.*, 2020). This can result in economic disparities, particularly in industries where chatbots are used for customer service, support, or other repetitive tasks. Without proper regulation, there may be limited mechanisms to ensure that

the economic benefits of AI technologies are distributed equitably (Kopalle *et al.*, 2022). Additionally, in the absence of regulation, certain companies or entities may dominate the AI market, leading to a concentration of power and influence. This can result in limited competition, reduced innovation, and restricted access to AI technologies for smaller players or underrepresented groups. Economic disparities arising from unregulated AI markets might also affect the adoption of AI technologies in management and economics. For instance, smaller businesses or organizations may not have the resources or expertise to develop or deploy AI models like ChatGPT, resulting in a competitive disadvantage compared to larger enterprises that can afford advanced AI technologies. This might lead to a growing economic gap between different organizations and industries, further exacerbating existing inequalities. Furthermore, the economic disparities arising from an unregulated AI market can also impact the pricing and affordability of AI technologies. Without proper regulation, companies/firms may set arbitrary prices for AI services, making them unaffordable for small businesses or individuals. This can establish a barrier to entry for those who cannot afford the high costs associated with AI technologies, limiting their access and opportunities to benefit from the potential advantages of AI in management and economics. Consequently, economic disparities arising from the lack of regulation in the AI market can have far-reaching consequences, affecting competitiveness, innovation, and inclusivity.

Lacking regulation of the AI market also raises concerns about the impacts of AI technologies on decision-making and human autonomy (Korzynski *et al.*, 2023). As AI models like ChatGPT gain more capabilities in generating human-like text responses, there is a risk that humans may rely excessively on AI-generated content, without critically evaluating or verifying the information (Eke, 2023). This can impact decision-making processes in management and economics, where accurate and reliable information is crucial for making informed choices (Fu *et al.*, 2023; Li & Liao, 2023; Verma *et al.*, 2022). The adoption of AI-generated content can also diminish human autonomy and creativity (Regona *et al.*, 2022). When AI technologies like ChatGPT are used extensively for tasks that require human creativity, such as content creation, writing, or strategy development, it can potentially diminish and lessen human contributions and reduce the need for human involvement in such tasks. This might have implications for the job market, where human creativity, critical thinking, and decision-making skills are highly valued in management and economics.

The absence of regulation related to the AI market can also have geopolitical risks and implications. As AI technologies like ChatGPT continue to advance, countries and organizations that have a dominant position in AI development can obtain significant economic, political, and strategic advantages. This might cause a power imbalance, with some countries or organizations having more access to AI technologies and reaping the benefits, while others lag behind. Moreover, the lack of regulation in the AI market can also raise concerns about international competition and the race to develop AI technologies. The absence of a level playing field and standardized regulations can lead to unfair competition practices, such as data theft, intellectual property infringement, or unethical practices, which can have geopolitical implications and impact the global economy. Finally, the unregulated AI market might lead to legal ambiguities related to ownership, privacy, and intellectual property rights (Teubner *et al.*, 2023). For instance, AI-generated content, such as articles, images, or designs, may raise questions about the original authorship, copyright, or ownership. The lack of regulation in the AI market can lead to legal disputes and challenges related to intellectual property rights, data ownership, and privacy concerns, which can have implications for the management and economics domains.

Poor Quality, Lack of Quality Control, Disinformation, Deepfake Content, Algorithmic Bias

The arrival of the AI language model known as ChatGPT sparked a keen interest and high hopes, which were soon followed by a growing awareness of the limitations and drawbacks this technology suffers from. The biggest concerns are lack of information quality control, disinformation, deepfake applications, and algorithmic bias caused by bad data.

The quality of the generated responses is one of the primary limitations of ChatGPT. Although the model is able to produce coherent and contextually appropriate responses, their content can often be irrelevant, nonsensical, or even offensive at times. This is because ChatGPT responds to inquiries based on correlations in large datasets and statistical patterns and does not understand

the questions asked. However, apart from the confusion caused in purely casual applications, with AI-integrated business analytics (AI-BA) making increasing use of AI-generated information, the poor quality of this information may translate into bad business decisions and operational inefficiency in the long run (Rana, Chatterjee, Dwivedi, & Akter, 2022).

The matter discussed above is related to the issue of disinformation. ChatGPT is trained on massive amounts of all sorts of data scraped from the internet, which – quite naturally – raises concerns regarding the reliability and accuracy of these data, not to mention the appropriateness of the responses provided. As a result, it is not uncommon to expect the spread of misinformation and false narratives (both intentional and unintentional), as well as the preservation of harmful stereotypes and biases (Moravec, Kim, & Dennis, 2020; Freelon *et al.*, 2022). With no supervision or accountability mechanisms in place, ChatGPT remains highly vulnerable to misuse and abuse.

This leads us to the problem of deepfake content. With the latest technological advances in AI and machine learning, fake content is harder and harder for human observers to detect and the possibilities to deceive are virtually endless (Kietzmann *et al.*, 2020; Jones-Jang, Mortensen, & Liu, 2021). Even though the model itself has not been designed with this specific purpose in mind, its ability to produce convincing, believable text makes it a powerful tool in the service of propaganda and other forms of disinformation. This, in turn, calls the credibility of and trust in public authorities and media into question (Androniceanu *et al.*, 2022).

Lastly, there is the algorithmic bias caused by bad data. Algorithms can systematically introduce inadvertent bias, reinforce historical discrimination, favour a political orientation or reinforce undesired practices (Janssen & Kuk, 2016). ChatGPT's output depends heavily on the quality and representativeness of the data it is trained on. This means that if these data include biases like racial or gender stereotypes, these biases will be reflected in the responses provided. An artificially learned inclination to represent certain interests and underrepresent others is certainly distant from the neutrality the model was supposed to guarantee (Janssen *et al.*, 2020).

To conclude, ChatGPT is a tool powerful enough to change the accessibility and availability of information for both better and worse. When it comes to its deficiencies, the most obvious and impactful ones include the lack of information quality control and the potential to misinform, generate deepfake content, and cause algorithmic bias. If this technology is to be used ethically and responsibly, we must address the above challenges. Only in this way can we take full advantage of the technology, help it advance our collective well-being, and minimize the risks involved with its rapid evolution.

There are several ways to mitigate the risks associated with the development of ChatGPT. When it comes to the poor quality of information that ChatGPT produces and the general lack of quality control mechanisms, diverse and high-quality pre-approved datasets could be used to train the model to refine its output. Another way to make the model generate more relevant and reliable data could be to put a human feedback loop in place, with users providing feedback to help the model learn from mistakes and improve over time. It may also be reasonable to establish clear guidelines and standards for the use of ChatGPT in customer service interactions: to leave a minimum margin for responses that do not meet the quality standards set by the organization; which should be verified through regular monitoring and evaluation. Having customer service agents proficient in the use of ChatGPT could also translate into the best possible customer service and support.

Combating disinformation could involve implementing fact-checking mechanisms to verify the accuracy of the responses generated by ChatGPT and monitoring social media platforms and other online channels for the spread of disinformation, followed by taking action aimed at its removal or countering. What is promising is that in order to tackle the rise and spread of fake news, automatic detection techniques have been researched based on AI and machine learning (Nasir, Khan, & Varlamis, 2021). Educating users on how to identify and avoid disinformation and encouraging them to report any instances of it plays a great part here as well.

The battle against deepfake content can be especially challenging, but the recent achievements of deep learning techniques in complex natural language processing tasks, make them a promising solution for fake news detection (Nasir, Khan, & Varlamis, 2021). Moreover, establishing clear and strict

policies and guidelines for the use of deepfake technology in *e.g*. political campaigns, news media, and entertainment might improve the digital landscape too.

As for the algorithm bias, it would be necessary to make algorithms adopt a more holistic perspective and operate in a more inclusive way, so to speak. The role of the human factor in this context is essential, because it is up to us to set the right parameters for algorithm performance and carry out regular spot checks, feed extensive datasets to algorithms, and review how algorithms work from different perspectives to have them work to our advantage – not against us, or some of us.

All in all, a combination of technological solutions, the 'human in the loop' approach, and user education is necessary to mitigate the risks brought about by ChatGPT and to make sure that it is used ethically and responsibly for the good of humanity.

Automation-Spurred Job Losses

The rise of AI and automation technologies has brought about significant changes in the labour market. Out of all the general topics related to human resource management (Kandoth & Kushe Shekhar, 2022), most articles concentrate on the effects of AI on jobs, specifically on technological unemployment and the future of work (Pan & Froese, 2023; Pereira *et al*., 2023). While AI technologies have the potential to create new jobs and increase productivity (Puzzo *et al*., 2020; Oliinyk *et al*., 2021; Lazaroiu *et al*., 2022), they also pose risks and challenges to workers and society as a whole (Morandini *et al*., 2023; Małkowska *et al.*, 2021).

The current literature on AI and automation does not effectively discuss the actual societal issues and worries, such as job loss and the displacement of workers (Khogali & Mekid, 2023). According to the AI job replacement theory, the influence of AI on employment is transforming job roles and can represent both an opportunity for innovation and a potential risk (Huang & Rust, 2018). West distinguishes several possible ramifications for the workforce: job loss, job dislocation, job redefinition, job mismatch, and job churn (West, 2020).

Those who report feeling more concerned worry about the loss of human jobs (19%); surveillance, hacking, and digital privacy (16%); and the lack of human connection (12%) (Maslej *et al*., 2023). Artificial intelligence and automation technologies are expected to replace many jobs that are currently done by humans. This could lead to significant job losses in certain industries and occupations (Acemoglu & Restrepo, 2019; Green & Lamby, 2023; Georgieff & Hyee, 2022; Khogali & Mekid, 2023). According to Berg *et al*. (2018), AI has the potential to bring about negative outcomes, one of which could be the elimination of more than 45% of all jobs. Chen and Xu (2018) predict that within the next 20 years, AI will replace 76.76% of China's currently employed workforce. Other researchers found that companies that implement AI technology tend to decrease their need for workers with low levels of skill or education (Li *et al*., 2021). From an organizational perspective, simply unemployment risk perception due to AI can lead to a negative perception of the opportunities presented by AI, weakened learning processes, and a lack of improvement in workplace well-being (Xu, Xue, & Zhao, 2023).

The implementation of AI has consequences for both knowledge (high-skilled) workers and manual workers (low-skilled), given that AI can potentially automate numerous tasks that are presently executed by humans (Leinen *et al*., 2020).

By 2030, it is projected that around 375 million individuals (equivalent to 14% of the global workforce) may have to switch professions due to technological advancements related to AI (Morandini *et al*., 2023). The OECD report suggests that low-skilled jobs in construction, extraction, farming, fishing, and forestry are highly susceptible to automation, as they require skills that can easily be replaced by machines. Jobs in production and transportation are also at risk but to a lesser extent (Lassébie & Quintini, 2022). On average, across OECD countries, jobs that are at the highest risk of automation account for around 28% of employment. This percentage is higher than the previous estimate published by the OECD, which suggested that about 14% of workers were at high risk of automation (Lassébie & Quintini, 2022). The occupations that face the greatest risk of being automated include construction and extraction, farming, fishing, forestry, production, and transportation. Conversely, jobs in legal, education, management, and community and social services sectors are at lower risk of automation (Lassébie & Quintini, 2022).

Many studies do not provide detailed information on how high-skilled occupations will be affected by automation. This is because these studies typically focus on skills and abilities that can be easily replicated by machines and do not take into account bottleneck items. Consequently, these studies cannot determine whether AI technologies will replace or complement human labour in high-skilled occupations (Lane & Saint-Martin, 2021). Fortunately, most occupations require a blend of bottleneck skills and abilities (*i.e*., those that cannot be automated with current technologies) and automatable ones, so studies that solely concentrate on a limited number of bottlenecks or highly automatable skills and abilities are likely to present an inaccurate picture of job automatability (Lassébie & Quintini, 2022).

Many research findings validated that although certain tasks within a profession can be automated, the entirety of an occupation cannot be replaced by AI (Dengler & Matthes, 2018). The replacement of humans by AI will happen from mechanical to empathetic tasks, as AI has limited capabilities. Unlike computers that required codified environments and were limited to replacing humans in routine tasks, AI has the potential to automate non-routine activities (Lassébie & Quintini, 2022; Kedziora, 2022). Therefore, it will require time for AI to replace an entire job (Pan & Froese, 2023).

Some authors are more optimistic when it comes to the impact of AI on the job market. The impact of AI technology on employment is not characterized by overall job losses, but rather by changes in the overall composition of the workforce (Dipankar Das, 2023). According to Willcocks (2020), AI is expected to restructure jobs instead of completely replacing human labour due to technological and social limitations. Even though AI is capable of eliminating analytical tasks, it will require time for AI to take over job tasks that involve interpersonal and empathetic skills (Huang & Rust, 2018; Huang, Rust, & Maksimovic, 2019).

The development and implementation of AI technology may generate fresh job opportunities in various fields, particularly in areas that concentrate on AI research and development (Morandini *et al*., 2023) which can drive up efficiency and economic expansion. There are scenarios where automation can give rise to new job categories that necessitate expertise in fields like data analysis, machine learning, software engineering, and cyber security. Skills needed to create AI technologies include expertise in areas like neural networks, deep learning, and machine learning. According to the OECD report, the number of people employed in the AI workforce in OECD countries is currently low, accounting for less than 0.3% of total employment. However, the report notes that this workforce is expanding quickly (Green & Lamby, 2023).

To mitigate the adverse effects of automation on workers, policymakers and employers should prioritize investing in training and education initiatives that equip workers with the skills required to excel in an ever-evolving economy. To prevent long-term unemployment and guarantee a skilled workforce, education and training will be vital (Khogali & Mekid, 2023). Moreover, it is crucial to implement policies that facilitate worker transition and retraining, including job placement services and income support programs, to ensure that individuals displaced by automation can secure new job prospects and sustain a reasonable standard of living. Additionally, it may involve investing in education and training programs that prepare workers for new types of jobs and skills and supporting worker transition and retraining programs.

The integration of AI systems in organizations has highlighted the significance of recognizing and developing transversal skills among their employees. Transversal skills, also referred to as transferable or soft skills, are those skills that can be utilized across different tasks and industries (Hart *et al*., 2021). Such skills include critical thinking, problem-solving, communication, and collaboration, which are crucial for working productively with AI systems. Besides being crucial for working effectively with AI systems, transversal skills can also be enhanced and acquired with the help of AI. Automation of certain tasks and processes by AI can release staff resources and time to concentrate on more intricate and demanding tasks that require transversal skills (Morandini *et al*., 2023).

According to Huang and Rust (2018), the replacement of jobs by AI fundamentally occurs at the task level, rather than the job level, which can be a useful guideline for managers when making strategic decisions regarding the replacement of workers with AI. This insight can also provide suggestions for business educators on how to train students to adapt to the changing job landscape. Since AI has replaced routine tasks, humans must shift their focus to tasks that require cognitive and emotional

skills, which are unlikely to be performed by AI. Huang and Rust (2018) and Huang *et al*. (2019) emphasize the importance of tasks that necessitate 'thinking' and 'feeling' skills.

According to the dynamic skills theory (Fischer *et al*., 2003), the worth of an individual's skills can fluctuate as technology and the economy progress. Initially, it is crucial to identify the cross-functional skills that employees require to minimize the existing skill gaps in the workplace (Morandini *et al*., 2023).

Companies can aid their employees in recognizing the skills necessary for AI implementation, enhancing their current competencies, and acquiring new ones. Morandini *et al*. suggest that organizations need to establish procedures to assist their workers by offering customized training and development opportunities, ensuring that their attitudes and perceptions towards AI are receptive and adaptable to the evolving job market and its associated complexities (Morandini *et al*., 2023). In order to effectively adapt to this transformation, companies and institutions will need to adopt new working and organizational models, which will entail implementing measures and strategies to enhance or develop the skills of their workforce (Morandini *et al*., 2023), including skills required for managerial positions (Gladden *et al*., 2022). The World Economic Forum (WEF) estimates that within the next five years, the percentage of key skills will change by 40%, and approximately 50% of the workforce will require additional training and education. The essential skills expected to grow in importance by 2025 include technical competencies necessary for the proficient use of AI systems, as well as soft skills, also known as cross-functional skills, such as critical thinking, problem-solving, and self-management (The World Economic Forum, 2019).

Workers should deconstruct their current skills and acquire new ones to remain employable and competitive. This may require a constant effort to educate, retrain, learn, or re-learn new skills to adapt to the changing job market conditions and take advantage of new opportunities (Morandini *et al*., 2023).

Certainly, the training of AI systems will become one of the most prominent job categories in the near future, and this change is happening rapidly (Oliveira & Braga, 2020).

Personal Data Violation, Social Surveillance, and Privacy Violation

The development of GAI raises concerns regarding personal data violation, social surveillance, and privacy violation.

The term 'personal data' refers to any information that pertains to a specific individual who can be directly or indirectly identified, such as by their name, ID number, location data, network identifier, or unique characteristics related to their physical, physiological, genetic, mental, economic, cultural, or social identity (European Parliament and Council, 2016). Personal data violation means 'a breach of security leading to the accidental or unlawful destruction, loss, alteration, unauthorized disclosure of, or access to, personal data transmitted, stored or otherwise processed' (GDPR, 2023). One of the main controversies surrounding GAI and personal data violation is the potential for technology to create synthetic images or videos of people without their consent. This could lead to a range of negative consequences, including identity theft and blackmail. Generative AI could be used to create fake news or to create propaganda content that could influence public opinion.

Social surveillance refers to the gathering, retention, manipulation, and evaluation of data concerning individuals or groups by a party seeking to achieve its objectives through the use of violence or other means, which are aided by the information gathered from those under observation (Fuchs & Trottier, 2015). One of the main controversies surrounding the use of GAI for social surveillance is the potential for the technology to infringe on individuals' privacy rights. With the ability to analyse data from social media platforms and other online sources, GAI could be used to build highly detailed profiles of individuals, including their personal interests, beliefs, and relationships. This could be used to target individuals with highly personalized advertising, manipulate public opinion, or even discriminate against certain groups of people. Generative AI can be used for cyberbullying or other forms of online harassment. By using AI to generate highly personalized attacks, individuals or groups could use social surveillance to identify vulnerable targets and launch highly targeted campaigns of harassment or abuse.

Due to the growing economic interest in personal data in recent years, privacy has become increasingly important in the daily lives of both individuals and businesses. The definition of privacy varies depending on the source and cultural context. According to Politou *et al*. (2018), privacy can be characterized as the right to be left alone, the ability to selectively disclose oneself to others, control over

personal information, and the right to freedom from others' judgments. Culver *et al*. (1994) and Moor (1997) both examine privacy in terms of protecting an individual from intrusion, interference, and information access by others. One of the main concerns related to privacy violations is the potential for GAI to create synthetic data that can be used to identify individuals or groups of people. Generative AI can be used for targeted advertising or other forms of marketing that violate individuals' privacy. With access to large amounts of personal data, GAI could create highly personalized marketing content that could be used to manipulate people's purchasing decisions. This could lead to individuals feeling as if their privacy has been violated, as they may not be aware of how their personal data is being used.

To mitigate the risks related to personal data violation, social surveillance, and privacy violation it is important for developers of GAI to prioritize ethical considerations and work to develop systems that prioritize user privacy and security. This includes implementing strong data protection measures, ensuring transparency in the collection and use of personal data, and regularly assessing and updating security protocols. Additionally, it is important for individuals to be aware of protecting their personal information online and to stay informed about new developments and possibilities in AI technology (Mazurek & Małagocka, 2019). To achieve the vision of responsible AI design, serious governance structures must be established at all levels, including individual developers, communities, institutions, industries, sectors, and international organizations. This may involve training, codes of practice, standards, regulations, and/or legislation (Garibay *et al*., 2023).

Social Manipulation, Weakening Ethics, and Goodwill

Another downside of the GAI, briefly addressed in other sections of this article, relates to its potential to lead to different forms and modes of social manipulations, namely a person may use AI to manipulate another person, a person may manipulate AI, AI may manipulate a person, etc. (Eliot, 2023; Piotrowski, 2022). Given the ability of the GAI, such as ChatGPT, to produce credible and human-like texts, its usage may facilitate the development of misleading or false information (Chan, 2023), which then may be used to influence and manipulate people's emotions, perceptions, or behaviour, often without people even realising it (Stahl, 2021). For instance, with the use of ChatGPT corporations may generate plausible stories on their engagement in CSR activities in order to boost their corporate reputation (Illia *et al*., 2023), or generate descriptions of their products to elicit positive consumer attitudes towards their products and drive them into purchasing behaviour (Paul *et al*., 2023), etc. Manipulations of people's emotional, cognitive and/or behavioural responses for commercial gains may take place in many other areas too, such as employment, finance, health care, education, etc. Malicious use of such manipulations raises serious ethical concerns and, in many cases, may be even unlawful. Respectively, authorities have started taking measures against it. For instance, the US Federal Trade Commission has recently warned companies against the use of such practices (Atleson, 2023). To mitigate the violation of user autonomy and preclude social manipulations, organisations need to explore and employ different methods that would ensure transparency in AI deployment, as AI algorithms tend to be opaque to the public (Vaassen, 2022).

However, transparency may not always guarantee a reliable deployment of GAI. ChatGPT is often used by people to seek advice on diverse matters, and given its ability to generate human-like credible content, users tend to find advice provided by ChatGPT convincing. Therefore, they tend to rely on it (Krügel *et al*., 2022), thus allowing their decision-making to be influenced by ChatGPT, even when they are aware that the advice has been generated by AI. Findings of a recent experiment have shown that users underestimate the influence of ChatGPT on their judgment, including judgements on moral issues (Krügel *et al*., 2023). In turn, this raises moral judgement concerns, as information provided by ChatGPT is not always correct (Borji, 2023), and may be even made up when ChatGPT does not have an answer to a question. Furthermore, its advice in case of moral judgements has been found inconsistent (Krügel *et al*., 2023). This in turn questions the safety of relying on ChatGPT and accountability for the harm inflicted by its content. Research showed that when people perceive that moral violations have been committed by AI, they tend to blame all involved parties, namely AI, its developers, and organisations as users of such AI (Sullivan & Fosso Wamba, 2022). Thus, organisations and developers need to take responsibility for designing AI tools that are safe to use and are

under human control. The tendency of people and organisations to anthropomorphise GAI and rely on and its advice may also undermine the reputation of human experts, which as discussed earlier in this article, may threaten some jobs and occupations.

Corporate usage of ChatGPT and alike AI tools in developing their professional content may also be at risk of violating yet another principle of ethics, *i.e*., lead to plagiarism. In the academic world, providing other people's work as one's own has been long acknowledged as an act of plagiarism. Since the release of ChatGPT, plagiarism has been a heated discussion in the field of education and research (Mazurek, 2023) as AI tools have been used by both students (to pass an exam, write an essay, etc.) and researchers, for instance to generate texts for their publications, without acknowledging the use of AI or attributing authorship to it. Given its potential to economise on human and financial resources, corporate deployment of ChatGPR and alike tools is likely to continue growing. Thus, it is of high importance for businesses to assume responsibility for reporting their reliance on AI. Furthermore, as discussed in the above sections of the article, firms need to take responsibility for ensuring the quality of data they use and its governance, as well as provide efficient training to their employees (Rana *et al*., 2022).

Artificial intelligence usage is also associated with the risk of intellectual property infringements. On the one hand, heated discussions are undergoing in regard to the unlicensed use and imitation of human-developed and copyright-protected content. Organisations that market AI tools often do not own the material they use to train AI, which questions the legitimacy of its use (Peres *et al*., 2023; Smits & Borghuis, 2022). In fact, a number of lawsuits have already been filed against such unauthorised use of content, and in case the court finds such usage not falling under the fair use doctrine, organisations may be heavily penalised for using such content for AI training (Appel *et al*., 2023). It is thus highly important for AI developers and organisations that use GAI tools to take necessary measures to protect themselves and act in compliance with legal requirements. On the other hand, there is still no consensus on the applicability of intellectual property rights to the content and products generated by GAI (Peres *et al*., 2023; Smits & Borghuis, 2022). To what extent content produced by AI may be considered original? May it be copyrighted? May a person get credit for a product generated with the use of GAI?

Widening Socio-Economic Inequalities

Generative AI, such as ChatGPT, has other unintended socio-economic consequences in addition to those mentioned above, including socio-economic inequalities. While ChatGPT itself may not directly create socio-economic inequalities, its development and deployment can perpetuate and even exacerbate existing socio-economic disparities (Efe *et al*., 2022; Lutz, 2019; Kitsara, 2022; Zajko, 2022).

Important socio-economic disparities are related to digital inequalities (Efe, 2022; Pahl, 2023). Such inequalities can appear at three levels (Lutz, 2019). The first level relates to inequalities in access to ChatGPT, whereas the second level means inequalities in digital skills and technology use. The third and final level of digital inequalities concerns the benefits or harms resulting from the use of ChatGPT. ChatGPT does not require large investments by users, it is (as of 16 February 2023) free to use and only access to the Internet must be ensured. Therefore, it is widely accessible across a large set of countries and for many people. However, it turns out that ChatGPT usage is not widespread. According to Google Trends as of 26 January 2023, there is a positive correlation between human capital and ChatGPT search trends (Pahl, 2023). As human capital indicators are strongly correlated with the gross domestic product (GDP) per capita, it can be inferred that people in lower-income countries search for and use ChatGPT less. Furthermore, a positive correlation was also found between the number of STEM (science, technology, engineering, and mathematics) articles per capita and ChatGPT search trends (Pahl, 2023). This suggests that populations with lower scientific and innovation capacities also search for and use ChatGPT less. Taking all of this into consideration, we may infer that people in lower-income countries make less use of ChatGPT, even if it is free and widely accessible. The underlying causes of this inequality are many and varied. For example, there are some infrastructure barriers people may not have the appropriate skills or knowledge of how to use ChatGPT effectively. Additionally, people may not be aware of the potential benefits that can result from AI usage, both professionally and personally. People can also face infrastructure barriers, especially with the launch of a premium version of ChatGPT, which requires an access fee (Dwivedi *et al*., 2023).

These digital inequalities resulting from ChatGPT can be referred to as the 'AI divides,' which involve a competitive advantage gap, skillset gap, development level gap, and economic growth gap between countries, companies, universities, and individuals (Kitsara, 2022). Bughin and van Zeebroeck (2018) indicate that 'AI divides' fuel economic inequality and undermine competition. They also identify three emerging divide areas. The first divide is at the company level. It can be assumed that innovative and leading-edge companies could fully adopt ChatGPT and use it to strengthen their competitive advantage in the market, whereas companies that are unwilling or unable to implement ChatGPT at the same rate will lose market share and lag behind in the market. The second divide is related to the demand for high digital skills and labour demand toward socially or cognitively driven tasks. This could contribute to an increase in wage differentials and workers in the repetitive and low-digital-skills categories may experience wage stagnation or even reduction. The third divide concerns countries. Advanced economies are well-positioned to adopt AI, such as ChatGPT, due to their greater progress in implementing previous digital technologies, thus providing them with a clear advantage. By contrast, numerous developing economies face hindrances such as inadequate digital infrastructure, limited innovation and investment capacity, and low-skilled population, which prevent them from catching up with advanced nations in terms of AI adoption, including ChatGPT. Generally, the result of AI and ChatGPT better replacing human labour is that workers, populations, companies, countries, and regions lose their economic and political bargaining power and become increasingly dependent on those who control technology (Brynjolfsson, 2022). Based on the patenting and research activities, Kitsara (2022) revealed that the United States of America and China are leaders in AI innovation with Europe ranked third, whereas Asia, Latin America, and Africa are lagging behind.

In addition to 'AI divides,' bias and discrimination are potential threats to the use of AI (Efe, 2022; Farrokhnia *et al*., 2023; Khogali & Mekid, 2023). The problem of bias and discrimination in data and algorithms is a prominent concern in research on AI and chatbots (Dwivedi *et al*., 2023). One potential cause of bias in ChatGPT is the training data or the values held by the creators and users. This is a common issue with machine learning programs that are trained on data that represents only certain demographic groups or contains social biases (Khogali & Mekid, 2023). Generally, any biases or inaccuracies present in the training data can affect the model's output (Dwivedi *et al.,* 2023). The second cause of bias and discrimination is related to algorithmic decision mechanisms employed by creators of AI. The field of AI is highly homogeneous and dominated by white males, who are responsible for creating training models and selecting the data to train these models (Farrokhnia *et al*., 2023; Getahun, 2023). Efe (2022) confirmed that the limitations in gender and ethnicity diversity within the process of ChatGPT development are reflected in the algorithmic classification, training models, and estimation stages, resulting in a similar form of bias and limitations. Biased ChatGPT can have an extensive impact on specific societal groups and some demographic groups due to gender, race, age, income, and geography may be excluded from using ChatGPT and benefiting from it. The examples of bias are identified by Getahun (2023), *e.g*., when using AI by law enforcement turned out that Black people were twice as likely as White people to be misclassified as recidivists by AI, Amazon recruitment AI tool discriminated against female applicants, and the large language model Galactica – similar to ChatGPT – delivered false and racist information. Regrettably, unfiltered and extensive datasets obtained from the internet often contain biased information that subsequently influences the ChatGPT models. Moreover, since such data is drawn from the past, it tends to exhibit a regressive bias that does not capture the advancements made by social and economic movements (Getahun, 2023).

To avoid the emergence of 'AI divides' and tackle global disparities, it is essential to address the financial and physical capital deficits as well as the skills gap (Pahl, 2023). Firstly, it is critical to provide international financial and technical cooperation to assist the Global South countries in overcoming the cost and digital infrastructure barriers. Secondly, there is a need to focus on skills development and awareness-raising to bridge the skills gap. Generally, it is imperative to establish the appropriate circumstances to ensure that, like the objectives of the UN Sustainable Development Goals, nobody is left behind in the AI revolution (Kitsara, 2022). Based on the report of the UN Committee for Development Policy (UNCDP, 2018), it may be recommended to use macroeconomic and fiscal instruments to

promote AI development and usage, implement mechanisms that empower and encourage participation in AI development and usage, adopt social, legal, and economic policies to drive AI development and usage and prioritize support for the development and usage of AI in the least developed countries

To mitigate the potential risk of bias and discrimination in GAI, it is important to explore methods for increasing transparency and reducing bias in GAI, specifically ChatGPT. It is recommended to train ChatGPT on a large corpus of text and use a high-quality dataset that is relevant to the input prompt to ensure accurate and unbiased results (Dwivedi *et al*., 2023). There is a need for ongoing research to develop methods for detecting deep fake and stereotype data, which generate biases in the model's training data. Dwivedi *et al*. (2023) also stressed that it is equally crucial to examine how GAI and ChatGPT will impact the acquisition and transfer of knowledge for individuals, teams, organizations, populations, and countries. Simultaneously, we need to incorporate AI literacy into learning curricula and increase people's awareness to enhance their ability to properly evaluate, assess, and make use of these new technologies (Farrokhnia *et al*., 2023). Generally, Manyika *et al*. (2019) propose six steps to lead the way on bias and fairness related to AI development and usage. Firstly, organization leaders need to stay up-to-date on fast-moving AI research. Secondly, they should establish responsible processes that can mitigate bias when AI is deployed. Thirdly, they should engage in fact-based conversations around potential human biases. Fourthly, they should consider how humans and machines can work together to mitigate bias. Fifthly, they should invest more, provide more data, and take a multi-disciplinary approach to biased research. Finally, they should invest more in diversifying the AI field itself.

AI-Related Technostress

Technostress, as defined by Weil and Rosen (1997), refers to the negative psychological and physiological impact of technology on individuals. This may include increased anxiety, stress, and burnout due to the adoption or use of new technologies (Brod, 1984). With the increasing prevalence of AI-powered applications like ChatGPT, it is important to examine how GAI may be related to technostress. According to Ragu-Nathan *et al*. (2008), technostress concerns five dimensions: techno-overload (increased workload caused by ICTs), techno-invasion (intrusive influence on one's personal life), techno-complexity (difficulty learning to use ICTs), techno-insecurity (risk to jobs from ICTs), and techno-uncertainty (related to the constantly evolving nature of ICT developments).

Generative AI such as ChatGPT might lead to techno-overload if it accelerates work processes, causing users to work faster or handle more work than they can manage (Sayed *et al.*, 2022). Additionally, users might feel forced to adapt their work habits to incorporate the AI or face increased workloads due to increased standards for working norms and skills (Newman, Mintrom, & O'Neill, 2022). Moreover, GAI could contribute to techno-invasion if users feel obligated to use it outside of work hours to stay updated or maintain their professional competitiveness (Chen *et al.*, 2022). This may lead to reduced time spent with family or the feeling that personal life is being invaded by technology (Wu *et al.*, 2022). Furthermore, techno-complexity can be also boosted by GAI, if users find it challenging to understand and use the new technology (Hang *et al.*, 2022; Dijmărescu *et al*., 2022). This could lead to users not knowing enough about the technology to handle their job satisfactorily or finding it too complex to use new technologies (Wang & Zhao, 2023). Additionally, the use of technologies such as ChatGPT might contribute to techno-insecurity if employees feel threatened by co-workers with newer technology skills (Korzynski *et al.*, 2021). This could also result in reduced knowledge sharing among co-workers for fear of being replaced (Zhang *et al.*, 2022). Finally, continuous updates and improvements in AI tools might lead to techno-uncertainty due to constant changes in computer software, hardware, and networks within the organization (Li & Wang, 2021). As a result, users may struggle to adapt to the ever-evolving technology landscape (Ramos, Ferrittu, & Goulart, 2023).

To minimize technostress risks in relation to GAI, organizations may emphasize the importance of adequate training, manage expectations, create a healthy work-life balance, and foster a supportive organizational culture. A key aspect of minimizing technostress is providing users with sufficient training and support to enhance their understanding and proficiency in using AI technologies. Management should develop comprehensive training programs that cover essential features and functionalities, allowing users to navigate technology confidently (Kelley, 2022). Moreover, providing ongoing support

in the form of help desks, peer mentoring, and tutorials can address user concerns and alleviate the techno-complexity and uncertainty aspect of technostress (Brumfield, 2008).

To avoid techno-overload and techno-insecurity, it is crucial for management to communicate the capabilities and limitations of ChatGPT clearly (Tarafdar *et al.*, 2007). By setting realistic expectations and emphasizing that ChatGPT is a tool designed to enhance rather than replace human capabilities, employees will be more likely to adopt a collaborative attitude towards the technology. This approach can help to mitigate the fear of job loss and the pressure to constantly update skills (Arslan *et al.*, 2022). Addressing the techno-invasion aspect of technostress requires management to establish policies that promote a healthy work-life balance (Nabawanuka & Ekmekcioglu, 2022). For instance, organizations could set guidelines for using ChatGPT outside regular working hours, encouraging employees to disconnect during vacations and personal time. By fostering a culture that respects personal boundaries, employees will be less likely to feel that their lives are invaded by technology (Korzynski, Kozminski, & Baczynska, 2023).

CONCLUSIONS

There have been many debates about the dangers associated with the development and application of GAI, especially ChatGPT. Potential biases, privacy and security hazards, ethical questions, and the creation of damaging or deceptive content all fall under this category. Generative AI is still being created and used in many different contexts, despite these worries, which raises serious considerations regarding the social and ethical consequences of these technologies.

It is important to regulate the AI/GAI market. Advocating for the regulation of the AI market is crucial to ensure a level playing field, promote fair competition, protect intellectual property rights and privacy, and prevent potential geopolitical risks. To mitigate risks connected with a lack of information quality control, disinformation, deepfake content, and algorithmic bias, the use of diverse and high-quality pre-approved datasets and the implementation of human feedback loops is recommended. Other recommendations include establishing clear guidelines and standards for the use of ChatGPT, implementing fact-checking mechanisms, monitoring social media platforms, and educating users on how to identify and avoid disinformation. Moreover, establishing clear and strict policies and guidelines for the use of deepfake technology in various industries could improve the digital landscape. The changing job market requires workers to continuously acquire new (digital) skills through education and retraining. As the training of AI systems becomes a prominent job category, it is important to adapt and take advantage of new opportunities. To mitigate the risks related to personal data violation, social surveillance, and privacy violation, GAI developers must prioritize ethical considerations and work to develop systems that prioritize user privacy and security. To avoid social manipulation and weaken ethics and goodwill, it is important to implement responsible AI practices and ethical guidelines: transparency in data usage, bias mitigation techniques, and monitoring of generated content for harmful or misleading information. There is a need to address financial and physical capital deficits and skills gaps to tackle global disparities and avoid the emergence of 'AI divides.' Providing international financial and technical cooperation and focusing on skills development and awareness-raising are crucial actions to assist Global South countries in overcoming the cost and digital infrastructure barriers. It is imperative to establish appropriate circumstances to ensure that no one is left behind in the AI revolution and to use macroeconomic and fiscal instruments to promote AI development and usage.

More research is required to fully comprehend these concerns and design adequate safeguards to limit the potential repercussions of GAI. This involves creating ethical and legal frameworks that take into account the potential benefits and drawbacks of these technologies.

Researchers, politicians, and business leaders must collaborate to guarantee GAI is developed and implemented responsibly and ethically in light of the rapid pace of technological advancement in this domain. This way, we can make sure these technologies reach their maximum potential while limiting any bad effects they might have on society.

Despite the risks and threats associated with GAI, particularly with ChatGPT, we recognize its tremendous potential for use in various sectors and industries of the economy. It is undeniable that GAI will be increasingly utilized in the future. Thus, we recognize the need for responsible develop-

ment and use of GAI, while also acknowledging its potential benefits. That said, we believe that with proper regulation and ethical considerations, GAI – including ChatGPT – can greatly enhance human capabilities and improve various aspects of our lives. Therefore, we are supporters of the continued development and use of GAI technology.

This article, like any other in scientific literature, has its limitations. Being a kind of investigation report, the article refers to the very beginning of the study, so it can only be considered exploratory. When it comes to economy and business (economics, finance, marketing, management, informatics, law and related fields), we have not reviewed every article that touches on the risks and dangers of GAI and Chat GPT. As a result, the next round of research needs to have a much broader subject approach. This article's overview provides a high-level response to the article's exploratory inquiry. This means that the next phase of research should consider a broader perspective of the findings that have already been published and employ a more methodological approach like a bibliometric analysis and proper software.

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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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An evolution of entrepreneurial culture studies: A systematic literature review and future research agenda

Quoc Hoang Thai, Khuong Ngoc Mai

ABSTRACT

Objective: The objective of the article is to review entrepreneurial culture (EC) literature by seeking, analysing, and synthesising the research findings of extant journal articles. This study aims to demonstrate the evolutionary trends and current trends in EC research, which cannot be found in extant literature reviews of EC due to the limited number of analysed articles which focused only on the associations between national EC (NEC) and entrepreneurship.

Research Design & Methods: This research employed a systematic literature review (SLR) approach. The research technique of Garrard (2004) was utilized to create an SLR matrix to analyse the EC literature in peer-reviewed English journal articles. This study gathered and analysed 83 publications in 57 journals in the period between 1992 and 2021.

Findings: The article proposes four essential outcomes as the results of integrating the information that was investigated and approved in the literature. Firstly, there is an extreme development tendency in the number of EC articles which started rapidly in 2012. Secondly, this study offers the holistic framework of NEC which is the combination of five forms or indications including needs and motives, beliefs and behaviours, cognition, cultural values (societal and individual levels), and social context; while organizational entrepreneurial culture (OEC) is a unidimensional construct or a combination of the organizational characteristics that stimulates, promotes, and sustains the entrepreneurial activities of the organizations. Thirdly, this research generated two nomological networks that recapitulate and display the causal relationships of both veins of EC, which can be employed and expanded to enrich institutional theory and social cognitive theory. Finally, it provides promising research areas for future EC research in terms of research context, research design, theory, framework, measurement, and nomological network of NEC and OEC.

Implications & Recommendations: These findings provide meaningful implications for both theory and practice. In the theoretical context, we integrated and described the most recent and exclusive trends, frameworks, theories, measurements of both veins of EC and their causal relationships, and the research guideline for further research, thus, contributing to the theoretical development in EC literature. In a practical context, two nomological networks of EC contribute to the positive perceptions, awareness, and acknowledgement of the importance of developing and sustaining an appropriate EC amongst individuals, organizations, and nations.

Contribution & Value Added: This research integrates and demonstrates the most recent and exclusive trends, frameworks, theories, and measurements of EC and their causal relationships, proposing the research guideline for further studies. By offering the evolutionary trend of EC articles, this study provides evidence for selecting a suitable methodology through which future research can be conducted to create novel knowledge to develop the EC field. This study offers the holistic frameworks and two nomological networks of NEC and OEC that can be leveraged to enlarge the institutional theory and social cognitive theory, resolving the problems of disintegration and disjointedness that emerged in the literature.

Article type: research article

Keywords: entrepreneurial culture; entrepreneurship culture; entrepreneurial climate; entrepreneurial environment; systematic literature review

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INTRODUCTION

Entrepreneurial culture (EC) is a fascinating notion that was built and developed by scientists and governors to stimulate the development, societal advancement, and economic growth of a nation (Van der Westhuizen, 2017). Moreover, EC was proved to have an essential role in the entrepreneurial activities of a country by affecting the attitude of residents especially in the field of generating new business ideas and risk-taking (Mueller & Thomas, 2001). The entrepreneurial culture was developed as the shared set of behaviours, attitudes, assumptions, values, mindsets, viewpoints, knowledge, motivations, experiences, and patterns of an individual (especially the entrepreneur), organization, or geographical region which generated income for the individuals, led to growth and success of the organizations, and facilitated and sustained the entrepreneurship in a nation (Fernández-Serrano *et al.*, 2018; Danish *et al.*, 2019; Opper & Andersson, 2019; Mukhtar *et al.*, 2021). In the literature, EC was investigated and evaluated regarding two veins encompassing organizational EC (OEC) (*e.g*., Dimitratos *et al.*, 2021; Sim *et al.*, 2021) and national EC (NEC) (*e.g*., Coleman & Kariv, 2014; Samuel *et al.*, 2021).

There are two classical literature reviews of EC (Hayton *et al.*, 2002; Hayton & Cacciotti, 2013) that investigate the relationships between NEC and collective measures of entrepreneurship, individual characteristics of entrepreneurs, and facets of corporate entrepreneurship. Hayton *et al.* (2002) suggested that NEC is illustrated through four forms or indications of EC combining needs and motives, beliefs and behaviours, cognition, and cultural values (societal and individual levels); creating a framework of NEC and entrepreneurship in which NEC acts as a moderator of the association between contextual factors and entrepreneurial outcomes rather than a causal factor of entrepreneurial outcomes. Those findings were enhanced by Hayton and Cacciotti (2013) who also promoted the utilization of the framework of Busenitz and Lau (1996) in the EC field to examine the causal relationships from cultural values through individual motives, traits and cognition, to behaviours and collective measures of behavioural outcomes. However, those studies concluded that they were less confident in the presence of a single EC, providing various research gaps and suggestions which can be further explored and investigated. Moreover, despite a great number of EC studies in the literature, research gaps remain because of the following reasons. Firstly, there is a deficiency of a literature review in the EC literature which integrates its related articles' characteristics, causing ambiguity regarding the extant trends in the literature. Secondly, there is a massive disintegration in terms of the frameworks, measurements, and theories applied in the EC literature; resulting in the deficiency of the typical relevant knowledge in both veins of EC. The meaning of the concept has not been well-defined, researched, and constituted accurately enough to promote EC (Malecki, 2018). Two literature reviews of EC (Hayton *et al.*, 2002; Hayton & Cacciotti, 2013) concentrated only on the NEC, which was dominated by the utilization of Hofstede's conceptualization and ignored the other dimensions and the OEC and thus required the development of a rigorous and coherent theoretical framework of EC (Hayton & Cacciotti, 2013) and investigation of the effects of NEC and OEC upon entrepreneurship (Hayton *et al.,* 2002). Thirdly, the researchers put their effort into examining and certifying the causes and effects of the EC (Ruël *et al.*, 2012; Leal-Rodríguez *et al.*, 2017; Rahman *et al.*, 2019; Okoi *et al.*, 2021) but their findings were incoherent and were not aggregated, leading to the absence of an appropriate analytical framework that indicates and explicates the causal relationships of EC and the rational research agenda for future studies in this area.

Because of the growing quantity of EC research in diverse industries, contexts, and countries, a literature review which would epitomize and incorporate the research findings from those investigations emerges as a crucial concern in the entrepreneurship literature (Kraus *et al.*, 2020). Due to the restricted number of literature reviews conducted in the previous periods and their limitations and research gaps (Hayton *et al*., 2002; Hayton & Cacciotti, 2013), this research utilized the systematic literature review (SLR) to leverage its benefits of dealing with the lack of synthesis capacity in the traditional literature review. In this research, we focused on critical investigation and synthesis of the remarkable frameworks, measurements, causal relationships of the EC, and other appropriate findings related to the EC research. By using the SLR approach to synthesise a series of research which can represent entirely the EC literature, we will demonstrate the evolutionary trends and current trends

in EC research combining research approach, research context, data collection and analysis method, research time-frame, and level of analysis, thus showing a wide picture that may help other scholars recognize and form the ideas to perform a study in EC field. These trends cannot be found in extant literature reviews of EC (Hayton *et al.*, 2002; Hayton & Cacciotti, 2013) due to the limited number of articles which were analysed and those studies only focused on the associations between NEC and entrepreneurship. Moreover, we will summarise and clarify the EC frameworks and measurements regarding two veins of EC including NEC and OEC, while illustrating the preeminent theories which were utilized in the literature; which fulfil the recommendations of Malecki (2018); Hayton *et al.* (2002); and Hayton and Cacciotti (2013). After that, we will also indicate a comprehensive view of what was investigated and approved in the EC literature by developing two nomological networks expressing the causal relationships of two veins of EC that satisfy the need for constructing a comprehensive theoretical framework of the causal relationships between culture and distinct outcomes of entrepreneurial behaviours, entrepreneurial activities, and entrepreneurship (Hayton *et al.*, 2002; Hayton & Cacciotti, 2013). Thus, by delivering those findings, this research proposes the recommendations in terms of research direction for the further EC research. To summarize, the purpose of this research is to answer the following research questions.

1. What are the evolutionary trends and present trends in EC research?
2. What are the important contents addressed in EC research in terms of theory, conceptual framework, measurement, and causal relationships?
3. What are the promising areas for the upcoming EC research?

The structure of this study is formulated as follows. Section 2 will demonstrate the research methodology presenting the research approach and process of data collection and analysis. Then, section 3 will provide an interpretation of the literature review and clarification of the originality and definition of the EC. The findings and discussions will be illustrated in section 4, and section 5 will present conclusions.

RESEARCH METHODOLOGY

Research Approach

This research aims to analyse and synthesise research findings of extant EC articles in systematic progress, proposing potential research areas for future studies. This research was conducted to satisfy the recommendation of Kraus *et al.* (2020) whereas the context for further SLR review methodology and urgency of conducting an SLR exceptionally in the entrepreneurship field is illustrated. An SLR was depicted as a procedure of determining, evaluating, and illustrating all extant research evidence with the intention to produce answers for particular research questions and to give professionals and legislators a trustworthy foundation for making decisions and enforcing practices (Tranfield *et al.*, 2003). It was widely utilized in the management and entrepreneurship area (Liñán & Fayolle, 2015) because of its transparency, accuracy, fairness, approachability, consolidated, focused, and thus duplicatable (Pittaway & Cope, 2007) when compared to traditional types.

Search Strategy

Initial search and articles eliminated based on the title. We obtained the related research publications through a comprehensive advanced search in several databases including Scopus, Web of Science, and Google Scholar. We employed a combination of keywords including 'entrepreneurial culture' (124), 'entrepreneurship culture' (32), 'entrepreneurial climate' (47), 'entrepreneurship climate' (2), 'entrepreneurial environment' (50), and 'entrepreneurship environment' (5), which was demonstrated exactly in the title. We concurrently used a set of criteria: the publication must be (1) written in English, (2) peer-reviewed, and (3) a journal article because it provides highly valuable impact influence and is more trustworthy than other research types (Podsakoff *et al.*, 2003). The publication year and research context were not restricted, so this SLR encompasses journal articles up to December 2021. We skimmed the search outcomes and organized the appropriate articles in a single publication pool. The

initial database included 260 articles which satisfied the search filter, which was then decreased to 220 articles after excluding the duplicates and inappropriate publications.

Articles eliminated based on the abstract. The abstract of the remaining 220 articles was scanned based on a set of inclusive criteria. The articles had to (1) focus on the EC as a crucial variable or research area, (2) exhibit the conceptualizations, characteristics, theories, and measurements of the EC, (3) examine the EC and its causal relationships in either conceptual or empirical approach to remove the unrelated articles which complied the research objectives. The database was then decreased to 148 articles.

Articles eliminated based on the full text. The whole text of the leftover 148 articles was then analysed individually to re-evaluate whether they suited the research objectives or not by utilizing the suggested criteria, which disqualified the irrelevant articles while keeping only proper ones. Thus, the database shrunk to 73 articles according to the convention between the authors on the evaluation of the articles' full text.

Snowballing: through rigorously reading the full text of the 73 articles, the authors decided to operate a snowballing process to enlarge the critical articles which are regularly demonstrated in those articles but were not manifested in the searching procedure because of different key terms, turning into 10 additional articles. In summary, the final number of qualified publications selected for forthcoming analysis in this study was 83.

Data Analysis

We utilized the technique of Garrard (2004) to create an SLR matrix as the content analysis approach to analyse and assemble the crucial data which was excepted from 83 selected articles. The crucial data included the name of the author, year of publication, journal title, research types (conceptual, qualitative, quantitative, or mixed method), research context including country and industry, data collection and data analysis technique, level of analysis, the definition of EC, theory foundation, characteristics of EC, measurement of EC, and causal relationships of EC.

LITERATURE REVIEW

Hofstede (1984, p. 21) defines culture as the 'collective programming of the mind which distinguishes the members of a human group from another, and includes systems of values.' Culture was also clarified as the systems of values, beliefs, processes, and other typical designs shared among businesses, which was the key element in the forming of individual behaviour (Kroeber & Parson, 1985). Culture was centrally associated with business chances which were the creation of novel value to community partially or generally (Nikolova-Alexieva & Angelova, 2020). This study defines the concept of the EC according to two veins including NEC and OEC.

Regarding OEC, the financial targets of firms and the self-actualizing capabilities of the staff are connected through EC. Hence, entrepreneurial culture transforms the staff into entrepreneurs who are eager to take risks and estimated responsibilities, and manage themselves for the good of the firm (Kelemen & Hristov, 1998; Okoi *et al.*, 2021). Entrepreneurial culture also refers to the total quantity of energetic and creative approaches and methods whereas a firm handles the shifts in the business context (Rohmetra, 1998). Entrepreneurial culture is also defined as the culture of an enterprise which promoted and sustained entrepreneurial actions of the enterprise in the international context through pursuing new international favourable chances to encourage new notions and creativity (Dimitratos *et al.*, 2012; Buccieri *et al.*, 2021). According to Mukhtar *et al.* (2021), it encompasses the shared combination of behaviours, assumptions, values, objectives, motivations, experiences, self-concepts, and procedures; impacting the organizational propensity towards creativity and innovativeness to encourage and maintain entrepreneurship. In particular, it demonstrates the organizational orientation regarding investigating novel alternatives or methods through seeking novel resources, and generating novel products; facilitating entrepreneurial mindset, creativity (Moh'd Adnan Homsi *et al.*, 2020), innovation, and a higher level of capabilities or competencies (Atiku & Fields, 2016). In general, Leal-Rodríguez *et al.* (2017) propose that EC comprises a series of internal and subjective elements associated with the organizations' and executives' entrepreneurial orientation. Moreover, EC relates to the

characteristics and environment linked with entrepreneurial movements including the pursuit of entrepreneurial chances, promoting novel concepts and creativity, establishing new firms, or other forms of entrepreneurial attitudes (Bergmann *et al.*, 2018; Sancho *et al.*, 2021). It may also be related to social norms, organizational policies, and processes that help the organizational members to acknowledge appropriate behaviours in a specific context (Sim *et al.*, 2021). Due to the development of the OEC concept, there have been various theories that were utilized and enriched in the literature with the domination of social cognitive theory and institutional theory. Social cognitive theory (Bandura, 1986; Bandura, 2001) exhibits human functioning as the interactions between environmental elements, personal elements, and behaviour elements. While environmental elements indicate external environments, which encompass the characteristics of OEC, influencing individual cognition and further generated behaviours, personal elements demonstrate cognitive or other internal characteristics which manipulate individual attitude, cognition, and understanding. Thus, the evolution of OEC improved social cognitive theory by enhancing the conceptualization of OEC which is embedded in environmental elements. Moreover, social cognitive theory was also enlarged by examining the connections between OEC, personal elements such as entrepreneurial knowledge and mindset (Cui, 2021), and personal behaviours such as entrepreneurial intention (Mukhtar *et al.*, 2021) providing a coherent framework for understanding the role of OEC. Besides that, the institutional theory of organizations (DiMaggio & Powell, 1983; Zucker, 1987) proposes that institutional elements ordinarily emerged from within the organization itself or from the reproduction of identical organizations, not from power or coercive processes presented in the regions. It describes the institutions as 'multifaceted, durable social structures, made up of symbolic elements, social activities, and material resources' which can be classified into formal and informal institutions (North, 1990; Scott, 2001). Hence, institutional theory takes advantage of the conceptualization and development of OEC as the information contexts which generate rules and norms prescribing entrepreneurial behaviours amongst the organization's individuals like entrepreneurial intention (Sim *et al.,* 2021).

Regarding NEC, Swierczek and Jatusripatak (1994) introduced EC as a theoretical concept that comprises two crucial facets, including (1) traits and beliefs, and (2) behaviours and acts. On the other hand, Stuetzer *et al.* (2018) suggest that it combines all three perspectives of entrepreneurship, namely organization, behaviour, and performance. Besides, EC is a combination of values, mindsets, and viewpoints commonly shared in a society which underpin the notion of any entrepreneurial 'way of life as' being desirable and in turn supports the pursuit of 'effective' entrepreneurial behaviour by individuals or groups (Gibb, 1999; Ruël *et al.*, 2012). Most acknowledge this as an essential factor of a territorial culture promoting the prosperity of regional clusters and economies (Beugelsdijk, 2007). It is utilized to represent the new ventures' establishment in a particular context (Majocchi & Presutti, 2009). Moreover, it is also the component of territorial culture which influences the likelihood of a human being elected to turn into an entrepreneur by inspiring (Foreman-Peck & Zhou, 2013). Furthermore, EC refers to the patterns, assumptions, and communal values of a specific region and society (Afriyie & Boohene, 2014). It is depicted as 'a positive collective programming of the mind,' aggregated cognitive feature, and orientation of the regional community with regard to entrepreneurial characteristics like 'individualism, independence, and achievement;' tuning into the communal acknowledgement of the entrepreneurs and their actions (Šebestová *et al.*, 2015; Fritsch & Wyrwich, 2018; Stuetzer *et al.*, 2018). Entrepreneurial culture combines the components elected, generated, utilized, and demonstrated by the business society throughout the business production procedures (Nguyen, 2016). Furthermore, Obschonka (2017) recommends that EC of a regional context can be clarified through the aggregation of entrepreneurial characterizations. Besides that, EC could be expressed as a set of mutual assumptions, communal norms, cultural values, entrepreneurial features and behaviours transferred and internalized throughout numerous generations (Fernández-Serrano *et al.*, 2018; Opper & Andersson, 2019; Bischoff, 2021). Moreover, EC was also analysed as the consequence of the energetic, creative, and innovative competencies of the entrepreneurs which were recognized and appreciated by the community (Prasetyo, 2019), causing the efficiency of the procedures and deliverables of creative and innovative notions of the entrepreneurship-based business actors who intensely chased their ambition to acquire exceptional economic and shared outcomes. Entrepreneurial culture is also conceptualized as a society

with entrepreneurial characteristics, values, thinking, and attitudes (Rahman *et al.*, 2019; Samuel *et al.*, 2021). Furthermore, EC is associated with the spread of entrepreneurial role models and the communal appreciation of entrepreneurship combined with the presence of supporting organizations (Capelleras *et al.*, 2019). Thus, it is rooted in the willingness to promote entrepreneurial competencies and skills in the people who are concerned about the revolutionary movements (Chabani, 2021). Numerous theories have been pursued in the NEC field with the predominance of institutional theory and cultural dimension theory. Cultural dimensions theory (Hofstede, 1980) determines the structure for cross-cultural communication by demonstrating the dimensions whereas distinct cultures differ and acknowledge the distinctness in culture between nations. In EC literature, six cultural dimensions which were proposed by Hofstede (1980) have been applied and modified in order to examine the cultural values of the nations that promote entrepreneurship (Swierczek & Jatusripatak, 1994; Swierczek & Quang, 2004; Autio *et al.*, 2013; Thampi *et al.*, 2015; Stephan & Pathak, 2016; Thampi *et al.*, 2018; Samuel *et al.*, 2021). Besides that, institutional theory (Scott, 1995) demonstrates the procedures through which structures combining patterns, regulations, norms, and practices, were generated like authorized direction behaviours amongst society (Scott, 2004). Scholars concentrate on improving the institutional theory, which reflects the institutional context stimulating entrepreneurship, by clarifying the constructs of NEC and its causal associations in order to provide the way to create a NEC which shapes the human behaviours (*e.g.*, entrepreneurial activities) (Stephan & Uhlaner, 2010; Aidis *et al.*, 2012; Ruël *et al.*, 2012; Stephan *et al.*, 2015; Capelleras *et al.*, 2019).

RESULTS AND DISCUSSION

Figure 1 depicts the types of EC publications over the years of publication. Despite some negligible shifts, we see an extreme development tendency in the number of EC articles throughout a lengthened time frame which is 29 years (1992-2021), starting with the earliest investigation in this publication pool which is the qualitative research of Chan (1992), and the extraordinary milestone, namely 2012, which opened the magnificent development of EC field afterwards. The most commonly utilized research methodology in EC literature is a quantitative method which was applied in 59 articles. Next is a qualitative method (13 articles), conceptual article (7 articles), and mixed method (4 articles). Due to the emerging and dominant quantity of quantitative research in the EC literature, the research purpose of EC research evolved from theory building to theory validation. Furthermore, because entrepreneurship possesses the characteristics of multidisciplinary, EC publications can be found in a broad range of journals (n=57). Noteworthy, 63 articles were published in 47 SCOPUS-indexed journals; see Table 1.

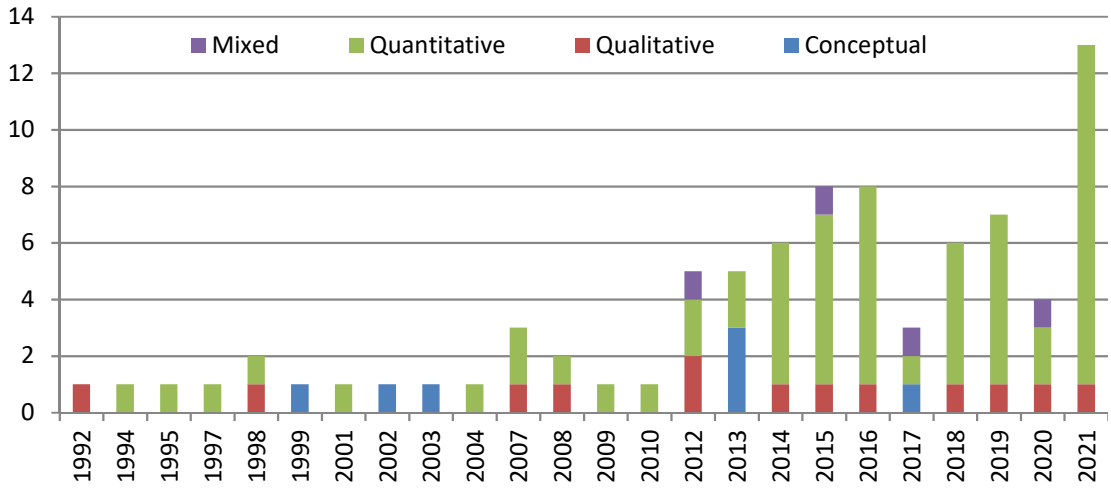

Figure 1. Types of EC publications over time 1992-2021
Source: own elaboration based on Scopus database.

Table 1. Summary of EC research

Authors	Journal	Research approach	Country of study	Industries	Data collection	Research method	Timeframe
NEC							
Swierczek and Jatusripatak (1994)	*Journal of Enterprising Culture*	Quantitative (QUAN)	Cross-national (CNT)	Multi-industry (MI)	Questionnaire (QUE)	Comparative analysis	Cross-sectional (CS)
Davidsson (1995)	*Entrepreneurship & Regional Development*	QUAN	Sweden	MI	QUE	Entrepreneurial values index (EVI)	CS
Davidsson and Wiklund (1997)	*Journal of Economic Psychology*	QUAN	Sweden	MI	QUE	Sign tests	CS
Gibb (1999)	*Small Enterprise Development*	Conceptual (CONC)	N/A	N/A	N/A	N/A	CS
Minguzzi and Passaro (2001)	*Journal of Business Venturing*	QUAN	Italy	MID	QUE	Multivariate analysis	CS
Hayton *et al.* (2002)	*Entrepreneurship Theory and Practice*	CONC	N/A	N/A	N/A	N/A	CS
Swierczek and Quang (2004)	*Journal of Enterprising Culture*	QUAN	CNT	Not specified (NS)	QUE	Cluster; correlation, and comparative analysis	CS
Beugelsdijk (2007)	*Journal of Evolutionary Economics*	QUAN	CNT	NS	Database (DAT)	OLS and SLS regression analysis	CS
Uhlaner and Thurik (2007)	*Journal of Evolutionary Economics*	QUAN	CNT	NS	DAT	Multiple regression analysis (MRA)	CS
Beugelsdijk and Smeets (2008)	*American Journal of Economics and Sociology*	QUAN	CNT	NS	DAT	Robustness analysis	CS
Majocchi and Presutti (2009)	*International Business Review*	QUAN	Italy	Manufacturing	DAT	MRA	CS
Stephan and Uhlaner (2010)	*Journal of International Business Studies*	QUAN	CNT	NS	DAT	MRA	CS
Aidis *et al.* (2012)	*Small Business Economics*	QUAN	CNT	NS	DAT	Factor analysis	CS
Ruël *et al.* (2012)	*International Journal of Entrepreneurship and Small Business*	Mixed (MIX)	CNT	Biotech	Semi-structured interviews (INT) and QUE	Content and cluster analysis	CS
Autio *et al.* (2013)	*Journal of International Business Studies*	QUAN	CNT	NS	DAT	Multilevel regression analysis	CS
Foreman-Peck and Zhou (2013)	*Journal of Evolutionary Economics*	QUAN	CNT	NS	DAT	Comparative analysis	CS

Authors	Journal	Research approach	Country of study	Industries	Data collection	Research method	Timeframe
Hayton and Cacciotti (2013)	*Entrepreneurship & Regional Development*	CONC	N/A	N/A	N/A	N/A	CS
Spigel (2013)	*Entrepreneurship & Regional Development*	CONC	N/A	N/A	N/A	N/A	CS
Afriyie and Boohene (2014)	*Athens Journal of Education*	QUAN	Ghana	Education (EDU)	QUE	Pearson correlation and Chi-square test	CS
Coleman and Kariv (2014)	*Venture Capital*	QUAN	CNT	NS	QUE	MRA	CS
Meyer (2014)	*Mediterranean Journal of Social Sciences*	QUAN	South Africa	EDU	QUE	Z-tests and p-tests	CS
Thai and Turkina (2014)	*Journal of Business Venturing*	QUAN	CNT	NS	DAT	PLS-SEM	CS
Mwaura *et al.* (2015)	*International Journal of Academic Research in Business and Social Sciences*	QUAN	Kenya	EDU	QUE	SEM	CS
Breazeale *et al.* (2015)	*Community Development*	MIX	US	MID	Semi-structured INT, Focus group, and QUE	CFA and ANCOVA	CS
Thampi *et al.* (2015)	*International Journal of Business and Globalisation*	Qualitative (QUAL)	India	MID	Structured INT	Content analysis (CA)	CS
Šebestová *et al.* (2015)	*Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*	QUAN	Czech	MID	QUE	Cross tabs and forward stepwise regression analysis	CS
Stephan *et al.* (2015)	*Journal of International Business Studies*	QUAN	CNT	NS	DAT	Logistic multilevel regression analysis	CS
Leustean *et al.* (2016)	*FAIMA Business & Management Journal*	QUAN	Romania	MID	QUE	Fuzzy logic	CS
Nguyen (2016)	*Economic Horizons*	QUAN	Vietnam	MID	QUE	Sociological statistics method	CS
Stuetzer *et al.* (2016)	*European Economic Review*	QUAN	UK	NS	DAT	OLS and IV regressions analysis	CS
Stephan and Pathak (2016)	*Journal of Business Venturing*	QUAN	CNT	NS	DAT	Multilevel regression analysis	CS
Obschonka (2017)	*Current Opinion in Behavioral Sciences*	CONC	N/A	N/A	N/A	N/A	CS
Fernández-Serrano *et al.* (2018)	*International Entrepreneurship and Management Journal*	QUAN	CNT	NS	DAT	Data envelopment analysis	CS

Authors	Journal	Research approach	Country of study	Industries	Data collection	Research method	Timeframe
Fritsch and Wyrwich (2018)	*Small Business Economics*	QUAN	Germany	MID	DAT	MRA	CS
Thampi *et al.* (2018)	*International Journal of Entrepreneurship and Small Business*	QUAN	India	MID	QUE	MRA	CS
Stuetzer *et al.* (2018)	*Regional Studies*	QUAN	UK	NS	DAT	OLS and IV regressions analysis	CS
Capelleras *et al.* (2019)	*Small Business Economics*	QUAN	Spain	MID	DAT	Hierarchical linear regression analysis	CS
Göleç and Maksudunov (2019)	*South African Journal of Industrial Engineering*	QUAN	Kyrgyzstan	NS	QUE	Fuzzy multicriteria decision-making model	CS
Opper and Andersson (2019)	*Asia Pacific Journal of Management*	QUAN	China	NS	DAT	Principal component analysis and panel data analysis	Longitudinal (3 phases)
Prasetyo (2019)	*International Journal of Economics and Financial Issues*	QUAN	Indonesia	MID	DAT	SEM	CS
Rahman *et al.* (2019)	*Udayana Journal of Law and Culture*	QUAL	Indonesia	MID	Reflexive observations	Descriptive-reflexive observatory method	CS
Galambos (2020)	*Enterprise & Society*	QUAL	US	MID	DAT	CA	Longitudinal (2 phases)
Chabani (2021)	*Academy of Entrepreneurship Journal*	QUAN	CNT	NS	DAT	MRA	CS
Sipola (2021)	*Journal of Entrepreneurship in Emerging Economies*	QUAL	Finland	NS	DAT	CA	CS
Bischoff (2021)	*Small Business Economics*	QUAN	Cross-national	MID	QUE	OLS regression analysis	CS
Samuel *et al.* (2021)	*International Journal of Entrepreneurship*	QUAN	Nigeria	EDU	QUE	Pearson moment correlation and regression models	CS
OEC							
Chan (1992)	*Journal of Small Business & Entrepreneurship*	QUAL	US	Service	INT	CA	CS
Kelemen and Hristov (1998)	*Journal of Enterprising Culture*	QUAL	CNT	MI	In-depth and semi-structured INT	CTA	CS
Rohmetra (1998)	*Journal of Enterprising Culture*	QUAN	India	Banking	QUE	ANOVA	CS

Authors	Journal	Research approach	Country of study	Industries	Data collection	Research method	Timeframe
Dimitratos and Plakoyiannaki (2003)	*Journal of International Entrepreneurship*	CONC	N/A	N/A	N/A	N/A	CS
Boojihawon *et al.* (2007)	*International Business Review*	QUAL	UK	Advertising	In-depth INT	CA	CS
Göktepe-Hultén (2008)	*Science and Public Policy*	QUAL	Sweden	EDU	In-depth INT	CA	CS
Dimitratos *et al.* (2012)	*International Business Review*	QUAN	CNT	NS	QUE	CFA	CS
Cruz *et al.* (2012)	*Journal of Family Business Strategy*	QUAL	Honduras	MI	In-depth INT	Interpretive method	CS
Botezat (2012)	*International Journal of e-Education, e-Business, e-Management and e-Learning*	QUAL	Romania	MI	In-depth and semi-structured INT	CA	CS
Osiri *et al.* (2013)	*Journal of Entrepreneurship Education*	CONC	N/A	N/A	N/A	N/A	CS
Gabrielsson *et al.* (2014)	*Management International Review*	QUAL	Finland	MI	In-depth INT	CA	CS
Atiku *et al.* (2014)	*Mediterranean Journal of Social Sciences*	QUAN	Nigeria	Banking	QUE	MRA	CS
Baimai and Mukherji (2015)	*Journal of Global Entrepreneurship Research*	QUAN	Thailand	MI	QUE	SEM	CS
Li and Lee (2015)	*Journal of World Business*	QUAN	China	MI	QUE	Hierarchical linear regression analysis	CS
Bau and Wagner (2015)	*International Journal of Entrepreneurship and Small Business*	QUAN	Sweden	Health insurance	QUE	EFA	CS
Abulhanova *et al.* (2016)	*Academy of Strategic Management Journal*	QUAN	Russia	Hospitality	QUE	Descriptive analysis	CS
Akuegwu and Nwi-Ue (2016)	*Mediterranean Journal of Social Sciences*	QUAN	Nigeria	EDU	QUE	T-test	CS
Dimitratos *et al.*(2016)	*International Business Review*	QUAL	CNT	MI	Multiple sources	CA	CS
Atiku and Fields (2016)	*Journal of Economics and Behavioral Studies*	QUAN	Nigeria	Banking	QUE	SEM	CS
Aryana *et al.* (2017)	*International Review of Management and Marketing*	MIX	Iran	EDU	In-depth INT and QUE	Explorative testing and Pearson correlation	CS
Leal-Rodríguez *et al.* (2017)	*International Entrepreneurship and Management Journal*	QUAN	Spain	Manufacturing	QUE	PLS-SEM	CS
Dutta (2018)	*Technology Innovation Management Review*	QUAL	US	Retail	DAT	CA	CS
Bergmann *et al.* (2018)	*Research Policy*	QUAN	CNT	EDU	QUE	Linear multilevel regression analysis	CS

Authors	Journal	Research approach	Country of study	Industries	Data collection	Research method	Timeframe
Basargekar *et al.* (2019)	*Journal of Asia Entrepreneurship and Sustainability*	QUAN	India	MI	QUE	MRA	CS
Danish *et al.* (2019)	*Journal of Innovation and Entrepreneurship*	QUAN	Pakistan	Information technology	QUE	SEM	CS
Nikolova-Alexieva and Angelova (2020)	*International Journal of Entrepreneurship and Small Business*	MIX	Bulgaria	Food	In-depth INT and QUE	EFA and CFA	CS
Buccieri *et al.* (2020)	*International Business Review*	QUAN	India	High-technology	QUE	SEM	CS
Moh'd Adnan Homsi *et al.* (2020)	*Innovative Marketing*	QUAN	Jordan	Banking	QUE	MRA	CS
Buccieri *et al.* (2021)	*International Small Business Journal*	QUAN	India	High-technology	QUE	SEM	CS
Hassan *et al.* (2021)	*Entrepreneurial Business and Economics Review*	QUAN	Malaysia	EDU	QUE	SEM	CS
Cui (2021)	*Sustainability*	QUAN	China	EDU	QUE	MRA	CS
Sancho *et al.* (2021)	*The International Journal of Management Education*	QUAN	CNT	EDU	QUE	PLS-SEM	CS
Lahikainen *et al.* (2021)	*Industry and Higher Education*	QUAN	Finland	EDU	QUE	ANOVA and MRA	CS
Mukhtar *et al.* (2021)	*Cogent Education*	QUAN	Indonesia	EDU	QUE	PLS-SEM	CS
Nguyen *et al.* (2021)	*Journal of Entrepreneurship in Emerging Economies*	QUAN	Vietnam	MI	QUE	PLS-SEM	CS
Okoi *et al.* (2021)	*Webology*	QUAN	Nigeria	NS	QUE	MRA	CS
Sim *et al.* (2021)	*Journal of Entrepreneurship in Emerging Economies*	QUAN	Malaysia	EDU	QUE	PLS-SEM	CS

Source: own study.

Research Context and Methodology

According to Table 1, EC arose universally as an appealing research field which resulted in extensive applications of this concept in numerous nations. Concerning the 76 empirical articles, there is a high amount of the selected studies (n=22) which were conducted in at least two nations to identify, evaluate, and compare the EC in proposed nations in order to determine the most appropriate culture that stimulated entrepreneurship. The remaining 54 studies were in 26 countries, of which India (n=6), Nigeria (n=5), the United States (n=4), and Sweden (n=4) took the highest proportion; followed by China (n=3), Finland (n=3), Indonesia (n=3), the United Kingdom (n=3), and other nations, thus presenting that the EC received a lot of attention in a wide range of territories from Western countries to Asia.

Moreover, because of the multidisciplinarity embedded in entrepreneurship and EC, the studies which investigated multi-industry sectors were the most numerous in the publication pool and amounted to 25 articles. Besides that, there is also a great number of the elected articles which did not interpret their research industry (n=21), because their objective was to appraise the overall EC in

a particular region. The residual publications were implemented in education (n=14), banking (n=4), manufacturing (n=2), high-technology (n=2), and others.

Moreover, we observed a prominent trend of conducting cross-sectional (CS) research within the EC literature, in which 81 out of 83 selected studies gathered, analysed, and measure all variables concurrently, while only two studies applied a longitudinal approach to evaluate the EC of an appropriate context in distinct timelines, including two phases and three phases.

Besides that, in the publication pool, the EC studies performed within the national context were the most numerous (n=46) to clarify the social culture of a particular region that encouraged entrepreneurial activities. They were followed by studies within the organizational context (n=37) in which the researchers tended to determine and evaluate the organizational culture which facilitated the development of the firms, especially the new ventures, causing the growth of entrepreneurship in society.

Amongst the quantitative research, 40 out of 59 studies gathered quantitative data by conducting a survey with the questionnaire, while the remaining studies employed the extant database. Moreover, the researchers had a high tendency to apply the multiple regression analysis, structural equation model (SEM), and partial least squares-structural equation modelling (PLS-SEM) to evaluate the EC in a particular level of analysis and its causal relationships, which were utilized in 13, seven, and six studies, respectively. A wide range of statistical analysis techniques can be found in the leftover studies, which are illustrated in Table 1. In 13 qualitative studies, the researchers tended to mainly collect qualitative information from interviews; combining in-depth interviews, structured interviews, and the combination of in-depth and semi-structured interviews which was utilized in five, one, and two studies, respectively. The data was also gathered through the extant database, pursuing multiple sources, and reflexive observations, which was adopted in three, one, and one studies, respectively. Concerning the data analysis, the EC literature is dominated by content analysis (n=11) in which the researchers coded and synthesised the underlying themes to determine and assess an EC. There were two leftover studies that utilized the interpretive method and descriptive-reflexive observatory method to translate the qualitative data into findings. The four remaining mixed-method studies commonly performed a survey as a follow-up to interviews to validate the findings of the qualitative stage or performed the pilot test before spreading the questionnaire to assure research reliability and validity.

Theories Utilized in EC Research

The literature reviews of EC (Hayton *et al.*, 2002; Hayton & Cacciotti, 2013) analyse mainly the studies that used Hofstede's cultural dimensions theory, ignoring other crucial theories in the NEC literature turning into the significant research gaps for future research in theory development. Moreover, they only concentrated on the first vein-NEC which thus led to the deficient analysis of the second vein-OEC. Therefore, this study is an extended version of those examinations by providing a holistic view of theories utilized in both veins of EC, generating the research guidelines to enrich efficiently those theories in the EC literature. The summary of the theories, which were applied in the EC literature, is illustrated in Table 2. Cultural dimensions theory and institutional theory are represented as the most frequently utilized theories in the NEC articles; while the institutional theory of organizations and social cognitive theory dominate the OEC studies.

Theories Utilized in NEC Research

Cultural dimensions theory (Hofstede, 1980) clarifies the structure for cross-cultural communication through demonstrating the dimensions in which distinct cultures differ and acknowledging the distinctness in culture between nations. It reduces cross-cultural diversification to national records regarding a restricted number of dimensions. The theory recommends that individuals of diverse nations vary in terms of the degree to which they permit the essential cultural dimensions including power, individualism (vs. collectivism), uncertainty avoidance (vs. tolerance), masculinity (vs. femininity), temporal (short-term vs. long-term) orientation, and indulgence (vs. restraint) (Hofstede, 1980; 1984). Although various studies were conducted to determine appropriate cultural dimensions, Hofstede's work was acknowledged to be one of the most extensive and integrated frameworks (Thampi *et al.*, 2018). In EC, cultural dimensions theory was utilized as the foundation to formulate

and evaluate the cultural values of the nations and their members that stimulated the entrepreneurship procedures based on original six dimensions (Thampi *et al.*, 2015; Thampi *et al.*, 2018), or modified framework in order to fit with the context (Swierczek & Jatusripatak, 1994; Swierczek & Quang, 2004; Stephan & Pathak, 2016). However, Hofstede's cultural dimensions were generally defined, which clarified the overall culture of a nation, and did not particularly explain facets of culture that were most meaningful to entrepreneurship (Busenitz *et al.*, 2000; Brancu *et al.*, 2012). Furthermore, McGrath *et al.* (1992) claim that nations' scores on those dimensions are not constant but may fluctuate with time. Thus, the urgency of constructing an independent measure of NEC values emerged in the literature (Hayton *et al.*, 2002; Hayton & Cacciotti, 2013).

We recommend that future studies investigate other theories, especially the institutional theory, to clarify an independent measure of NEC values, which goes beyond normative facets of cultural dimensions, to examine institutional elements associated with entrepreneurship, instead of over-relying on cultural dimensions theory.

The institutional theory proved exceptionally advantageous in entrepreneurship investigations (Bruton *et al.*, 2010; Ruël *et al.*, 2012). The utilization of the institutional theory (Scott, 1995) represents the procedures through which structures containing patterns, regulations, norms, and practices, were generated like authorized direction behaviours among society (Scott, 2004). In NEC literature, Stephan and Uhlaner (2010) employ the perspective of NEC as informal institutions – patterns or reiterations of common behaviours and as practised codes of conduct – that structure societal interactions. Stephan *et al.* (2015) enlarged those practices by configuring the NEC embedded in the information institutions, influencing individuals' engagement in social entrepreneurship. Ruël *et al.* (2012) examined how an EC was constructed in a biotech cluster regarding its antecedents based on the institutional viewpoint that was affected by ministries and lawmakers, consisting of formal and informal institutions. Through an institutional perspective, Capelleras *et al.* (2019) claim that EC epitomizes the mutual values and assumptions schemes (Foreman-Peck & Zhou, 2013) which form the climates, in which individual behaviours (*e.g.*, entrepreneurial actions) are generated and entrepreneurs are entrenched. However, the EC literature has not been able to properly figure out the factors demonstrating a NEC (Ruël *et al.*, 2012). We integrated various models which have been exploited in EC literature and on this basis, we propose a comprehensive framework displaying the essential elements of a NEC and their causal connections that can be leveraged to research further in order to enhance the institutional theory.

We strongly suggest that future studies utilize the findings of this study and in particular the framework of NEC and its causal relationships to enhance the institutional theory by clarifying the crucial factors of a NEC and investigating their causal relationships to deal with the over-dependence on cultural dimensions theory.

Theories Utilized in OEC Research

When analysing the organizational level, researchers also applied the institutional theory of organizations (DiMaggio & Powell, 1983; Zucker, 1987), which views institutions as 'multifaceted, durable social structures, made up of symbolic elements, social activities, and material resources' that can be classified into formal and informal institutions (North, 1990; Scott, 2001). The OEC was clarified as the informal institutional elements generally emerged from within the organization itself or from the recreation of an identical organization, not from power or coercive processes presented in the regions. Sancho (2021) defines OEC as the institutional environment utilized by universities to constitute entrepreneurship amongst their members by stimulating entrepreneurial activities. In a similar context, Sim *et al.* (2021) applied the institutional theory to view the universities as institutions, in which the institutional components typically emerged from within the institution itself or from the mimicry of identical institutions, which was determined as OEC (informal context) combining codes of conduct, norms of behaviour and conventions; playing a mediating role in the relationship between the university's support for entrepreneurship (formal context) and the students' entrepreneurial intention. Nevertheless, the OEC vein also did not provide a coherent framework to clarify the cultural dimensions entrenched in an organization. Thus, according to our findings, we propose.

There is a need for making the dimensions of OEC and their causal effects explicit to promote the institutional theory.

Social cognitive theory (Bandura, 1986; Bandura, 2001) describes human functioning as the interactions between environmental elements, personal elements, and behaviour elements. While environmental elements indicate external environments, which encompass the characteristics of OEC, and influence individual cognition and further generate behaviours, personal elements demonstrate cognitive or other internal characteristics which manipulate individual attitude, cognition, and understanding. Cui (2021) expanded the social cognitive theory by integrating and confirming the relationships between educational (teaching methods), cognitive (entrepreneurial mindset), and environment elements (OEC) in the holistic entrepreneurship education context. In the same context, those findings were supported and enlarged in the work of Mukhtar *et al.* (2021) by certifying the interactions between OEC (environment factors), entrepreneurial mindset (cognitive factors), and students' entrepreneurial intention (individual behaviours). However, in OEC literature, due to the restricted number of articles that utilized the social cognitive theory, the opportunities to strengthen that theory emerge, which can be found in the nomological network of OEC of this study. There were numerous causal relationships between the environmental factors, cognitive factors, and behaviours factors confirmed in the EC literature. However, those findings have not been employed to enhance the social cognitive theory, which thus requires further investigation.

We advise that future research leverage the causal relationships of OEC in our nomological network of OEC to enrich the social cognitive theory.

Table 2. Theories utilized in EC research

Dimension	Theory	Authors
NEC	Cultural dimensions theory	Swierczek and Jatusripatak (1994); Swierczek and Quang (2004); Autio *et al.* (2013); Thampi *et al.* (2015); Stephan and Pathak (2016); Thampi *et al.* (2018), Samuel *et al.* (2021)
	Institutional theory	Stephan and Uhlaner (2010); Aidis *et al*. (2012); Ruël *et al.* (2012); Stephan *et al.* (2015); Capelleras *et al.* (2019)
	Action theory of entrepreneurship	Autio *et al*. (2013)
	Social capital theory	Spigel (2013)
	Eclectic theory of entrepreneurship	Thai and Turkina (2014)
	Personality-based approach	Obschonka (2017)
	Theory of entrepreneurial talent allocation	Opper and Andersson (2019)
	Organizational imprinting theory	Sipola (2021)
	Human capital theory	Samuel *et al.* (2021)
OEC	Institutional theory of organizations	Sancho *et al.* (2021); Sim *et al.* (2021)
	Social cognitive theory	Cui (2021); Mukhtar *et al.* (2021)
	Opportunity-based view theory	Dimitratos *et al* (2016)
	Dynamic capabilities view theory	Buccieri *et al.* (2020)
	Organizational learning theory	Buccieri *et al.* (2021)
	Knowledge-based view theory	Buccieri *et al.* (2021)
	Resource-based view theory	Okoi *et al.* (2021)

Source: own study.

Frameworks and Measurements Utilized in EC Research

Due to the lack of literature review research on the EC, there is massive fragmentation in terms of frameworks and measurements that were utilized in both veins of EC in the literature. The literature reviews of EC (Hayton *et al.*, 2002; Hayton & Cacciotti, 2013) suggest that NEC is illustrated through four forms or indications of EC combining needs and motives, beliefs and behaviours, cognition, and cultural values (societal and individual levels). However, due to the dominance of Hofstede's conceptualization of NEC to characterize cultural values, the underdevelopment of other domains emerged in the EC literature, thus calling for their development (Hayton *et al.*, 2002). Hayton and Cacciotti

(2013) conclude that the next phase of the evolution of this literature has to concentrate on the creation and improvement of more precise and comprehensive theoretical frameworks. However, they only focus on the NEC and its outcomes and do not summarise or clarify the rational frameworks of both veins of EC. Supporting this view and taking those studies (Hayton *et al.*, 2002; Hayton & Cacciotti, 2013) as the foundation, we synthesised the domains of NEC, instead of only focusing on Hofstede's cultural dimensions, and classified them regarding five forms of NEC to generate an extensive framework for NEC, resolving the disintegrations in the literature. This study went beyond an extended version of those studies by synthesising the EC frameworks and measurements in both veins of EC including NEC and OEC, which was displayed in Table 3, and combining them with their causal relationships in order to integrate them into the comprehensive nomological networks of both veins of EC (Figure 2 and 3). Table 3 depicts the summarisation of the appropriate EC frameworks and their corresponding measurements which have been applied and examined in the literature.

Framework of NEC

We consulted the works of Hayton *et al.* (2002), and Hayton and Cacciotti (2013) to create a comprehensive framework of NEC, resolving the fragmentation in the application of framework NEC. This framework can also be used to enlarge the institutional theory by clarifying the crucial facets of a NEC.

Needs and motives. They are impulses which initiate and influence specific behaviours regarding appropriate rewards and they can be viewed as the desire to act or conduct a future development towards entrepreneurship. They express the aggregation of the individuals' entrepreneurial attributes in a particular region including entrepreneurial values (Davidsson, 1995; Davidsson & Wiklund, 1997), need for achievement (Beugelsdijk & Smeets, 2008), and business startup motives (Afriyie & Boohene, 2014).

Beliefs and behaviours. They are a set of assumptions, convictions, actions, and activities of individuals in relation to entrepreneurship. In NEC literature, various dimensions were examined to characterize this domain. The dimensions include entrepreneurial beliefs (Davidsson, 1995; Davidsson & Wiklund, 1997), 'effective' entrepreneurial behaviour, entrepreneurial 'way of life' (Gibb, 1999), the level of entrepreneur's participation in industry association activity (Minguzzi & Passaro, 2001), entrepreneurial orientation (Afriyie & Boohene, 2014), creative – innovative, daring to take risks, seizing business opportunities, sustainable achievement (Nguyen, 2016)

Cognition. It concerns how individuals think and act. In entrepreneurship, it reflects the knowledge structure and process which individuals employ to promote awareness and make analyses, evaluations, or decisions comprising opportunity appraisal and business formation and growth. Scholars studied this domain in EC literature by investigating the entrepreneurial mindset of the individuals (Afriyie & Boohene, 2014), their perceptions towards finding a job, entrepreneurship and unemployment (Meyer, 2014), social acceptance of entrepreneurship (Capelleras *et al.*, 2019), and perceived awareness for entrepreneurship in a region (Bischoff, 2021).

Cultural values. Because of the dominance of Hofstede's cultural dimensions in the literature, the values embedded in the culture amongst a nation for both individual and societal levels were developed and modified efficiently and took an essential role in the NEC framework (Swierczek & Jatusripatak, 1994; Swierczek & Quang, 2004; Autio *et al.*, 2013; Thampi *et al.*, 2015; Stephan & Pathak, 2016; Thampi *et al.*, 2018; Samuel *et al.*, 2021). Besides that, the overall cultural dimensions which were proposed in the work of McClelland (1961) and Bourdieu (1977, 1986, 1989, 1990) were also enforced in the literature by examining and validating the applicability and sufficiency of their framework in promoting entrepreneurship (Beugelsdijk & Smeets, 2008; Spigel, 2013). Furthermore, there is a great number of scholars in the EC literature put their effort into creating the particular set of culture values to measure NEC that stimulates the entrepreneurial behaviours of individuals, groups, and societies. Thus, NEC supports the development of new venture, turning into the sustainable entrepreneurship in a nation. Several cultural values have been identified including postmaterialism (Uhlaner & Thurik, 2007), performance-based culture, and socially-supportive culture (Stephan & Uhlaner, 2010; Thai & Turkina, 2014), entrepreneurial community (Coleman & Kariv, 2014), business discouragements, business promotion, diversity and change, focus on the local (Breazeale *et al.*, 2015; Göleç & Maksudunov, 2019), national-level postmaterialism, national-level

socially supportive cultural norms (Stephan *et al.*, 2015), normative-cognitive layer (Šebestová *et al.,* 2015), work-life balance (Leustean *et al.*, 2016), cultural inputs (Fernández-Serrano *et al.*, 2018), and venture capital-financed entrepreneurship culture (Sipola, 2021).

Social context. However, the framework of Hayton *et al.* (2002) does not encompass the other valuable facets of NEC recommended in the study of Hayton and Cacciotti (2013). The scholars proved that the societal characteristics and social context support the development of entrepreneurial activities and entrepreneur's behaviours (Kim *et al.,* 1989), thus, it can be accounted as a crucial domain of NEC. Hence, we provided evidence to add the social context to generate a comprehensive framework for NEC. The social environment of a community provides many conditions and systems to assist entrepreneurs and entrepreneurial activities, which can be found through various remarkable characteristics including freedom from corruption, market freedom, size of the government (Aidis *et al.*, 2012), community role models, community's financial support (Coleman & Kariv, 2014), political layer (Šebestová *et al.*, 2015), allowances, taxation, and private funding, institutional advantages, laws, market condition (Leustean *et al.*, 2016), entrepreneurial inputs (Fernández-Serrano *et al.*, 2018).

National EC is illustrated through five forms or indications of EC combining needs and motives, beliefs and behaviours, cognition, cultural values (societal and individual levels), and social context.

Framework of OEC

Because many of the selected EC studies in the literature were conducted on the organizational level, the EC framework was constructed mostly in the organizational context, creating the OEC vein. A predominant number of selected articles investigated the OEC as a unidimensional construct, therefore, this concept is utilized to distinguish OEC from distinct types of cultures of organizations in a common geographical territory, which fosters the entrepreneurial activities of the organizations. Moreover, OEC was analysed as a combination of the organizational characteristics comprising the shared set of behaviours, assumptions values, objectives, motivations, experiences, self-concepts, and procedures, which stimulated, promoted, and sustained the entrepreneurial actions of the enterprises forming the organizational features that fostered the entrepreneurship in a particular region (Chan, 1992; Kelemen & Hristov, 1998; Rohmetra, 1998; Boojihawon *et al.*, 2007; Dutta, 2018; Aryana *et al.*, 2017; Basargekar *et al.*, 2019; Nikolova-Alexieva & Angelova, 2020; Nguyen *et al.*, 2021). Those variables can be leveraged to enhance the institutional theory of organizations. The framework of OEC was widely utilized in the international context (Dimitratos & Plakoyiannaki, 2003; Dimitratos *et al.*, 2012; Buccieri *et al.*, 2020; Buccieri *et al.*, 2021). The six major domains of international entrepreneurial culture (IEC) can be denoted in a diversity of material and cognitive components of organizational culture including international entrepreneurial orientation, international market orientation, international motivation, international network orientation, international learning orientation, and international risk attitude.

Organizational EC is a unidimensional construct or a combination of organizational characteristics that stimulates, promotes, and sustains organizations' entrepreneurial activities.

Nomological Network of EC

The literature reviews of EC (Hayton *et al.*, 2002) only generated a framework of NEC and entrepreneurship whereas NEC acted as a moderator of the connections between contextual factors and entrepreneurial outcomes rather than a causal factor of entrepreneurial outcomes. In the same vein, Hayton and Cacciotti (2013) also promote a framework to investigate the causal relationships ranging from cultural values through individual motives, traits, and cognition to behaviours and collective measures of behavioural outcomes. Therefore, we implemented those research frameworks and filled their research gaps by offering the comprehensive network of both veins of EC which demonstrates the sufficient causal chains. We pursued the works of Korber and McNaughton (2017) and Fitz-Koch *et al.* (2017) to organize the variables that create the causal relationships of EC based on three levels of analysis combining individual, organization, and socio-economic system; which are represented in Figure 2 and 3.

Table 3. Frameworks and measurements utilized in EC research

Model	Characteristics/Components	Measurement	Authors
NEC			
Inglehart (1990)	Postmaterialism	Inglehart (1990)	Uhlaner and Thurik (2007)
Davidsson (1995)	Entrepreneurial beliefs; entrepreneurial values	Davidsson (1995); Davidsson and Wiklund (1997)	Davidsson (1995); Davidsson and Wiklund (1997)
Gibb (1999)	'Effective' entrepreneurial behaviour; entrepreneurial 'way of life'	N/A	Gibb (1999)
Swierczek and Jatusripatak (1994)	Characteristics; commercialization; decision making – entrepreneurial mode; entrepreneurial definition; innovation; motivation; operating management philosophy; proactivity	Swierczek and Jatusripatak (1994)	Swierczek and Jatusripatak (1994); Swierczek and Quang (2004)
McClelland (1961)	Need for achievement	McClelland (1961)	Beugelsdijk and Smeets (2008)
Bourdieu (1977, 1986, 1989, 1990)	Capital; field; habitus	N/A	Spigel (2013)
Minguzzi and Passaro (2001)	Age of entrepreneur; attitude to delegating of the entrepreneur; education level of the entrepreneur; father's profession; level of entrepreneur's participation in industry association activity	Minguzzi and Passaro (2001)	Minguzzi and Passaro (2001)
Hayton *et al.* (2002)	Beliefs and behaviours, cognition; cultural values; needs and motives	N/A	Hayton *et al.* (2002); Hayton and Cacciotti (2013)
McMullen *et al*. (2008)	Freedom from corruption; market freedom; the size of the government	Aidis *et al*. (2012)	Aidis *et al*. (2012)
Stephan and Uhlaner (2010)	Performance-based culture; socially-supportive culture	Thai and Turkina (2014); Stephan and Uhlaner (2010)	Stephan and Uhlaner (2010); Thai and Turkina (2014)
Autio *et al.* (2013)	Institutional collectivism; performance orientation; uncertainty avoidance	Autio *et al.* (2013)	Autio *et al.* (2013)
Afriyie and Boohene (2014)	Business startup motives; entrepreneurial mindset; entrepreneurial orientation	Afriyie and Boohene (2014)	Afriyie and Boohene (2014)
Meyer (2014)	Perceptions towards finding a job, entrepreneurship and unemployment	Meyer (2014)	Meyer (2014)
PSED II	Community role models; community's financial support; entrepreneurial community	PSED II	Coleman and Kariv (2014)
Breazeale *et al.* (2015)	Business discouragements; business promotion; diversity and change; focus on local	Breazeale *et al.* (2015)	Breazeale *et al.* (2015); Göleç and Maksudunov (2019)
Stephan *et al.* (2015)	National-level postmaterialism cultural motives; national-level socially supportive cultural norms	Stephan *et al.* (2015)	Stephan *et al.* (2015)
Thampi *et al.* (2015)	Collectivism versus individualism; indulgence versus restraint; long-term (pragmatic) orientation versus short-term (or normative) orientation; masculinity versus femininity; power distance; uncertainty avoidance	Thampi *et al.* (2015)	Thampi *et al.* (2015); Thampi *et al.* (2018)
Fritsch and Wyrwich (2012); Andersson (2012)	Normative-cognitive layer; political layer	Šebestová *et al.* (2015)	Šebestová *et al.* (2015)

Model	Characteristics/Components	Measurement	Authors
Leustean *et al.* (2016)	Allowances, taxation, and private funding; Institutional advantages; laws; market condition; work-life balance	Leustean *et al.* (2016)	Leustean *et al.* (2016)
Nguyen (2016)	Creative – innovative; daring to take risks; seizing business opportunities; sustainable achievement	Nguyen (2016)	Nguyen (2016)
Stephan and Pathak (2016)	Individualism-collectivism cultural values; uncertainty avoidance cultural values	Stephan and Pathak (2016)	Stephan and Pathak (2016)
Fernández-Serrano *et al.* (2018)	Cultural inputs; entrepreneurial inputs	Fernández-Serrano *et al.* (2018)	Fernández-Serrano *et al.* (2018)
Capelleras *et al.* (2019)	Social acceptance of entrepreneurship; the presence of entrepreneurial role models	Capelleras *et al.* (2019)	Capelleras *et al.* (2019)
Sipola (2021)	Venture capital-financed entrepreneurship culture	N/A	Sipola (2021)
Bischoff (2021)	Perceived awareness for entrepreneurship in a region	Bischoff (2021)	Bischoff (2021)
Samuel *et al.* (2021)	Celebrity endorsement; perceived gender norms; perceived social expectation	Samuel *et al.* (2021)	Samuel *et al.* (2021)
Others	EC		
OEC			
Chan (1992)	Co-operative; creative	N/A	Chan (1992)
Kelemen and Hristov (1998)	Commitment to quality; control of resources; organizational structure; strategic orientation; technological innovation	N/A	Kelemen and Hristov (1998)
Rohmetra (1998)	Development mechanisms; general climate; value base	Rohmetra (1998)	Rohmetra (1998)
Dimitratos and Plakoyiannaki (2003); Dimitratos *et al.* (2012)	International entrepreneurial orientation; international market orientation; international motivation; international network orientation; international learning orientation; international risk attitude	Dimitratos *et al.* (2012); Baimai and Mukherji (2015)	Dimitratos and Plakoyiannaki (2003); Dimitratos *et al.* (2012); Gabrielsson *et al.* (2014); Baimai and Mukherji (2015); Dimitratos *et al.* (2016); Buccieri *et al.* (2020); Buccieri *et al.* (2021)
Boojihawon *et al.* (2007)	Global vision; entrepreneurial MNC network management; entrepreneurial orientation	N/A	Boojihawon *et al.* (2007)
Osiri *et al.* (2013)	Communications that convey commitment to academic entrepreneurship; the presence of a support backbone to facilitate academic entrepreneurship	N/A	Osiri *et al.* (2013)
Bau and Wagner (2015)	Collaboration, information and innovation; leadership quality and effectiveness; product and market know-how; tasks and responsibility	Bau and Wagner (2015)	Bau and Wagner (2015); Nguyen *et al.* (2021)
Abulhanova *et al.* (2016)	Absence of really working system of mentoring and staff rotation; positive image of the hospitality industry; staff overloading; using behaviour patterns; work and train	Abulhanova *et al.* (2016)	Abulhanova *et al.* (2016)
Akuegwu and Nwi-Ue (2016)	Access to governmental/financial institutions' assistance; availability of raw materials; encouragement to work independently; exposure to occupational experience; exposure to success stories of entrepreneurs; exposure to technical	Akuegwu and Nwi-Ue (2016)	Akuegwu and Nwi-Ue (2016)

Model	Characteristics/Components	Measurement	Authors
	knowledge; knowledge of profit margin; the opportunity to display personal responsibility		
Aryana *et al.* (2017)	Entrepreneurship development	Aryana *et al.* (2017)	Aryana *et al.* (2017)
Dutta (2018)	Day 1 mentality; customer centricity; human capital Focus; self-competition	N/A	Dutta (2018)
Danish *et al.* (2019)	Innovative culture	Danish *et al.* (2019)	Danish *et al.* (2019)
Oosthuizen (2006)	Appropriate awards and reinforcement; continuous and cross-functional learning; discretionary time and work; empowered/multi-disciplinary teamwork; encouragement to innovations and new ideas; entrepreneurial leadership; flat organizational structure and open communication; management support; resource availability and accessibility; sponsorship (champion); strong customer orientation; tolerance for risk, mistakes and failure; vision and strategic intent	Oosthuizen (2006)	Basargekar *et al.* (2019)
Nikolova-Alexieva and Angelova (2020)	Cohesiveness; learning and development support; opportunity-driven change; organizational enthusiasm; stakeholder alignment	Nikolova-Alexieva and Angelova (2020)	Nikolova-Alexieva and Angelova (2020)
Unidimensional construct	OEC	12 authors	Atiku *et al.* (2014); Li and Lee (2015); Leal-Rodríguez *et al.* (2017); Bergmann *et al.* (2018); Moh'd Adnan Homsi *et al.* (2020); Hassan *et al.* (2021); Cui (2021); Sancho *et al.* (2021); Lahikainen *et al.* (2021); Mukhtar *et al.* (2021); Okoi *et al.* (2021); Sim *et al.* (2021)

Source: own study.

Nomological Network of Nec

Antecedents of NEC

Socio-economic system-level antecedents. Ruël *et al.* (2012) determined that both informal institutions and formal institutions in the entrepreneurial ecosystem can facilitate or hinder the development of EC in biotech clusters in which social networks, role models, and funding have high influences, while country orientation towards entrepreneurship, entrepreneurial education, economic enablers, specific legislation, supporting facilities, and technology transfer processes displays medium effects. Afriyie and Boohene (2014) concluded that if entrepreneurship education was made obligatory and learned by all students regardless of the field of study, it would positively cultivate and develop their EC, which means that they would become career generators instead of career seekers, thus ultimately reducing the unemployment rate. In detail, the formation of EC was positively influenced by entrepreneurial teaching methods, socialization process, and legal and regulatory framework because the EC could not be maintained by a restricted number of people but had to be all-inclusive so that individuals, organizations, family, society, and government all perform their particular functions to facilitate entrepreneurship (Mwaura *et al.*, 2015). Moreover, Stuetzer *et al.* (2016) found that the existence of large-scale industries in British areas

in the nineteenth century had a negative influence on entrepreneurship culture. The formation of a supportive and helpful EC within the tribe is a positive result of the cultural dimension of a community, perceived value, and kinship system (Rahman *et al.*, 2019).

Outcomes of NEC

Individual-level outcomes. The entrepreneurial entry by individuals, which is identified as the event in which an individual becomes an entrepreneur, is a positive result of freedom from corruption and market freedom (Aidis *et al.*, 2012) and performance orientation practices (Autio *et al.*, 2013), but is a negative consequence of the size of the state sector (Aidis *et al.*, 2012) and institutional collectivism and uncertainty avoidance practices (Autio *et al.*, 2013). Furthermore, the entrepreneurial post-entry growth aspirations, which are the pursuit of growth of an individual after becoming an entrepreneur, are the positive outcomes of institutional collectivism practices (Autio *et al.*, 2013). Coleman and Kariv (2014) demonstrated that the community's EC positively impacts entrepreneurial self-efficacy. Moreover, NEC also has a positive effect on the likelihood of individuals engaging in social entrepreneurship (Stephan *et al.*, 2015) and the likelihood of an individual being an entrepreneur-individual entrepreneurship (Stephan & Pathak, 2016). Samuel *et al.* (2021) concluded that the NEC includes perceived gender norms, celebrity endorsement, and perceived social expectation positively influences the career readiness of the youths, especially the students towards entrepreneurial ventures.

Organizational outcomes. The community's EC also delivered mixed effects on the expected performance of new firms led by women and men (Coleman & Kariv, 2014) and the entrepreneurial performance of micro, small, and medium enterprises (MSMEs) (Thampi *et al.*, 2018).

Socio-economic system-outcomes. Both entrepreneurial values and beliefs embraced by the NEC positively influence regional new firm formation rates across a broad number of regions (Davidsson, 1995; Davidsson & Wiklund, 1997). These findings were supported by the conclusions illustrating that total entrepreneurial activity (new business formation rates) and national entrepreneurship rate are the positive consequences of postmaterialism (Uhlaner & Thurik, 2007) and socially-supportive culture (Stephan & Uhlaner, 2010). Then, Thai and Turkina (2014) enlarged those statements by concluding that the high quality of NEC leads to a high national rate of formal and informal entrepreneurship. Moreover, nations obtain higher opportunity existence for entrepreneurship as a positive result of having performance-based culture (Stephan & Uhlaner, 2010). More innovative regions with a culture that can be described as entrepreneurial tend to obtain higher economic growth rates (Beugelsdijk, 2007; Prasetyo, 2019), which thus leads to extraordinary regional economic performance (Stuetzer *et al.*, 2018), and ultimately turns into a regional economic posture (Chabani, 2021). Furthermore, the provinces with a high degree of EC in which entrepreneurship is encouraged to receive a high level of foreign investment (Majocchi & Presutti, 2009). Moreover, the local and regional EC was proved to have a mixed impact on the adaptability of entrepreneurial activities to changing institutional arrangements and related payoff structures (Breazeale *et al.*, 2015; Opper & Andersson, 2019). Fritsch and Wyrwich (2018) uncovered a positive impact of EC, which was represented in the degrees of historical self-employment, on the rate of new business formation in innovative industries. Moreover, Bischoff (2021) suggests that the EC, which is expressed through the level of entrepreneurial awareness in a territory, positively influences the perceived strength of the sustainable entrepreneurial ecosystem.

Mediators of NEC

Socio-economic system-level mediators. Stephan and Uhlaner (2010) state that environmental framework conditions combine 'government policies and regulation, quality of research and development activity, physical infrastructure and other formal support' for new enterprises and play a mediating role in the impact of NEC on the opportunity level in a nation. Moreover, they also found that supply-side variables which support potential entrepreneurs in a community play a mediating role in the relationship between NEC and entrepreneurship rate. The cultural values of a nation affect entrepreneurship indirectly, through global leadership elements including charismatic and self-protective culturally-endorsed implicit leadership theories (Stephan & Pathak, 2016). The country's competition was found to be a significant and positive mediator in the relationships between EC in entrepreneurial and MSMEs sectors

and regional economic growth (Prasetyo, 2019). Besides that, the indirect effects of cultural dimension, perceived values, and kinship system on EC were expressed through the positive function of an informal cultural-based entrepreneurial learning which was embedded in the Minangkabau community (Rahman *et al.*, 2019). Furthermore, entrepreneurial education amongst the higher learning institutions in Nigeria indicated a positive mediating impact on the connections between EC and career readiness among the youth regarding entrepreneurial ventures (Samuel *et al.*, 2021).

Moderators of NEC

Individual-level moderators. Coleman and Kariv (2014) proved that gender acted as a moderator of the connections between a community's EC, as recognized by women and men, and entrepreneurial self-efficacy and expected business performance.

Despite the confirmed diverse causal relationships of NEC, the nomological network of NEC neglects some crucial variables which can be investigated further. In the entrepreneurship literature, NEC was acknowledged as a crucial domain of the entrepreneurial ecosystem by numerous critical studies (Isenberg, 2010; Stam, 2015; Global Entrepreneurship Monitor, 2018). Moreover, NEC is entrenched in the entrepreneurial ecosystem and it is defined as the composition of all social characteristics of a community and the subjective conditions correlated to the behaviours by which individuals interact with others (Isenberg, 2010). The nomological network of the entrepreneurial ecosystem, which can be found in the work of Thai *et al.* (2023), reveals several promising hypotheses for the NEC that have not been exposed in the EC literature. For instance, Thai *et al.* (2023) suggest that the positive determinants of the entrepreneurial ecosystem embracing the NEC are the coherence of entrepreneurial activities, strategies of an entrepreneurial ecosystem, information technologies and Internet, formal institutions, physical infrastructure and amenities; while its positive outcomes include productive entrepreneurship, economic resilience, entrepreneurship innovation, productive activities, regional performance, and social entrepreneurship. Those causal chains can be exploited to generate and investigate the potential hypotheses, which enlarge the nomological network of NEC.

We propose that future studies adopt a broader scope to seek, hypothesize, investigate, and approve the relevant and appropriate variables which illustrate the causal relationships of NEC embedded in entrepreneurial ecosystem literature to broaden and accomplish a more comprehensive nomological network of NEC.

Nomological network of OEC

Antecedents of OEC

Individual-level antecedents. Danish *et al.* (2019) found a positive influence of the employees' self-efficacy, openness to change, and creativity on entrepreneurship in information technology firms. Sim *et al.* (2021) confirmed the positive effects of students' perceptions of concept development support and students' perceptions of business development support on the EC of universities.

Organizational-level antecedents. Aryana *et al.* (2017) confirmed that employee empowerment in the organization includes a sense of competence (self-efficacy), a sense of having the right of choice (independence), a sense of effectiveness, a sense of meaning, and a sense of trust in other employees positively influence the development of an EC in a university. In the educational context, Hassan *et al.* (2021) supported that finding by concluding that enhancing and stimulating empowerment among students positively influence the EC in private higher education institutions. The EC of universities was also positively influenced by the degree of institutionalization of entrepreneurship at universities and the share of students who participated in a compulsory entrepreneurship-related course (Bergmann *et al.*, 2018). Furthermore, Moh'd Adnan Homsi *et al.* (2020) proved that the entrepreneurial marketing of the firm consisting of customer focus, opportunity-driven, innovation, risk management, and proactiveness positively impacts the organizational culture by cultivating entrepreneurial thinking, attitude and passion.

Outcomes of OEC

Individual-level outcomes. The employees' perception related to the OEC was explained as the facilitators of their perception related to the potential success of their organizations (Basargekar *et al.*, 2019). Moreover, EC in a university positively enhances the students' entrepreneurial intention, because it encourages students to learn and develop to become broad-minded to accept novel knowledge which stimulates entrepreneurial behaviours (Mukhtar *et al.*, 2021; Sim *et al.*, 2021). Although the non-significant direct effects emerged, Nguyen *et al.* (2021) detected an indirect effect of entrepreneurship on employees' innovative work behaviour through psychological empowerment.

Organizational outcomes. Buccieri *et al.* (2021) supported the positive impact of IEC on the performance of new international ventures, because it included entrenched routines generating an extensive pursuit of new international opportunities. The negative side was approved by Okoi *et al.* (2021) by confirming the negative impact of EC on the profitability of SMEs in Calabar Metropolis. The firm's EC positively impacted human resource development policy, inspiring entrepreneurial mindset and creativity among the enterprises in the Nigerian banking sector (Atiku *et al.*, 2014). In addition, their sustainable competitive advantage could be improved by transferring and controlling entrepreneurial orientations through efficient learning and development programs (Atiku & Fields, 2016). Leal-Rodríguez *et al.* (2017) suggested that promoting an EC is a positive driver of business innovation outcomes, causing a high level of organizational innovativeness, because the enterprise creates a dynamic and entrepreneurial climate whereas people are willing to take risks to transform their novel ideas into new products or services. Mukhtar *et al.* (2021) confirmed a positive impact of EC on entrepreneurial education in organizations, especially in universities, because it promotes social legitimization and supports a climate which encourages teaching and learning entrepreneurship.

Mediators of OEC

Individual-level mediators. Mukhtar *et al.* (2021) claim that the EC, which is presented within a university, stimulates students' entrepreneurial mindset, which thus strongly stimulates their entrepreneurial intention.

Organizational-level mediators. The effects of IEC on a firm's international performance were positively mediated by the firm's entrepreneurial strategy and entrepreneurial implementation (Baimai & Mukherji, 2015); or by the firm's ambidextrous innovation (Buccieri *et al.*, 2020); or by the organization's dynamic marketing capabilities (Buccieri *et al.*, 2020; Buccieri *et al.*, 2021). Moreover, Atiku, and Fields (2016) found that human resource development programs positively mediate the relationship between EC and sustainable competitive advantage in the Nigerian banking industry. Nguyen *et al.* (2021) approved a full and positive mediating role of psychological empowerment in the association between EC and employees' innovative work behaviour.

Moderators of OEC

Organizational-level moderators. Leal-Rodríguez *et al.* (2017) verified that the family nature of an enterprise promotes or enhances the relationships between EC and business innovation outcomes.

Socio-economic system-level moderators. Buccieri *et al.* (2020) suggested that an IEC has a larger influence on expanding ambidextrous innovation when environmental dynamism is demonstrated. Later, Buccieri *et al.* (2021) found that the benefits of IEC on dynamic capabilities and international business performance are strengthened when performing in turbulent markets.

In the nomological network of OEC, the causal relationships of the environmental factors (*e.g.*, OEC and other organizational characteristics), cognitive factors (*e.g.*, entrepreneurial mindset, employees' perception related to the potential success of the organization, perceptions of business development support, perceptions of concept development support, openness to change, and self-efficacy); and behaviours factors (*e.g.*, entrepreneurial intention, innovative work behaviour, and employees' creative behaviours) have been confirmed. Nevertheless, those causal relationships were not utilized to enrich the social cognitive theory. Thus, we propose the following.

It is fruitful to utilize the nomological network of OEC, especially the causal relationships between OEC and its individual-level antecedents and outcomes to enhance the social cognitive theory.

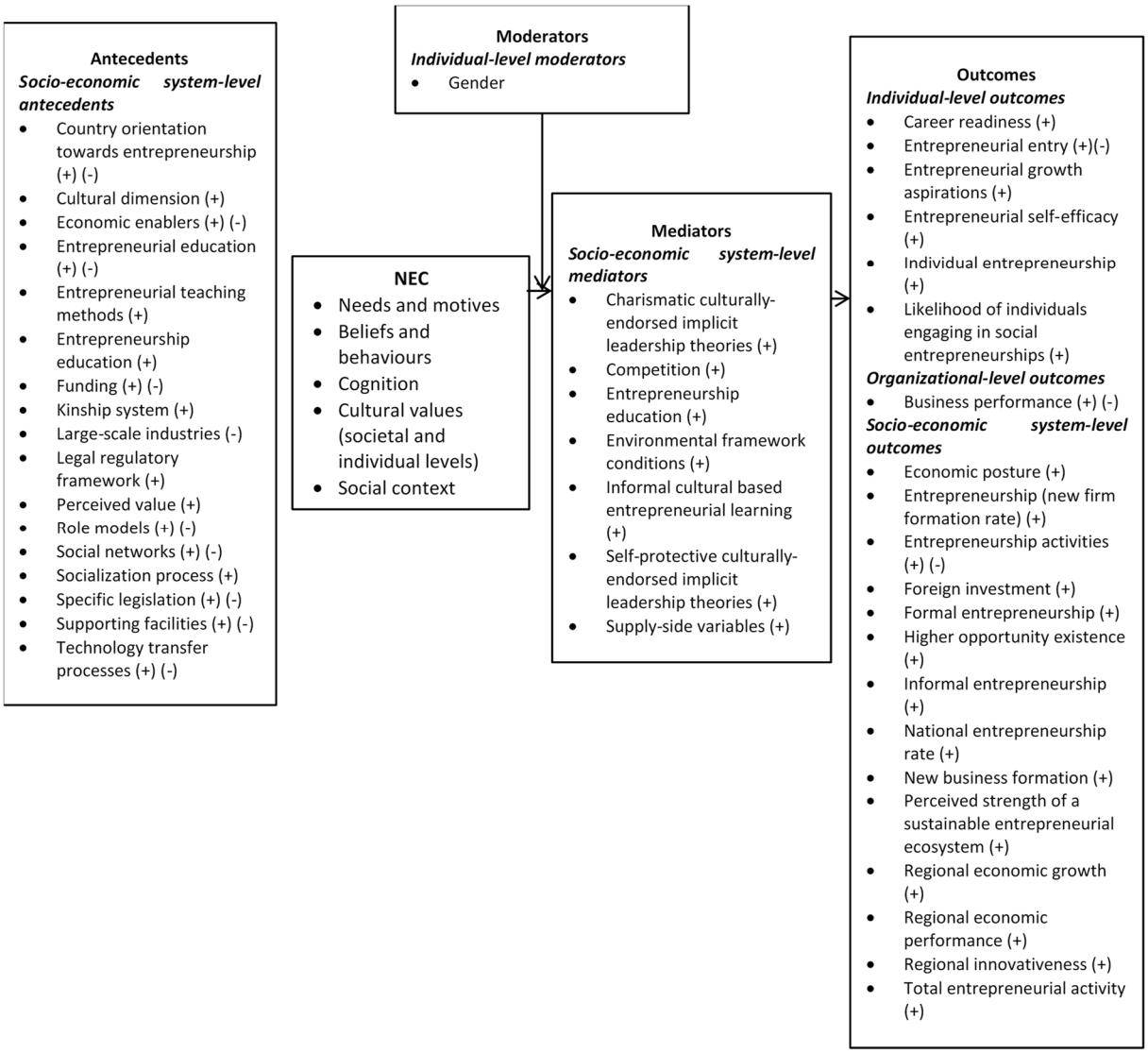

Figure 2. The nomological network of NEC
Source: own elaboration.

Areas for Future Research

The huge body of EC literature testifies to scholars' efforts to expand knowledge of this research area. Nevertheless, the research gaps remain in need of further research to achieve a comprehensive understanding of the field. Through consulting the research findings, we determined the promising research areas for forthcoming research.

Spreading research context. The EC studies were conducted only in 26 specific nations and the publication pool of this study included a high proportion of studies that evaluated and compared the culture between at least two nations. However, there are 195 countries in the world (United Nations, 2022). Therefore, entrepreneurship has been acknowledged as an essential factor in explaining national economic development, and thus has been developed and promoted among an exclusive range of individuals, organizations, and nations (McMullan *et al.*, 1986) combining influential education and support for entrepreneurs and entrepreneurship around the world (Global Entrepreneurship Institute, 2022), providing opportunities for future research in other nations, especially the least developed and developing countries. Moreover, there was the dominance of performing EC research within the

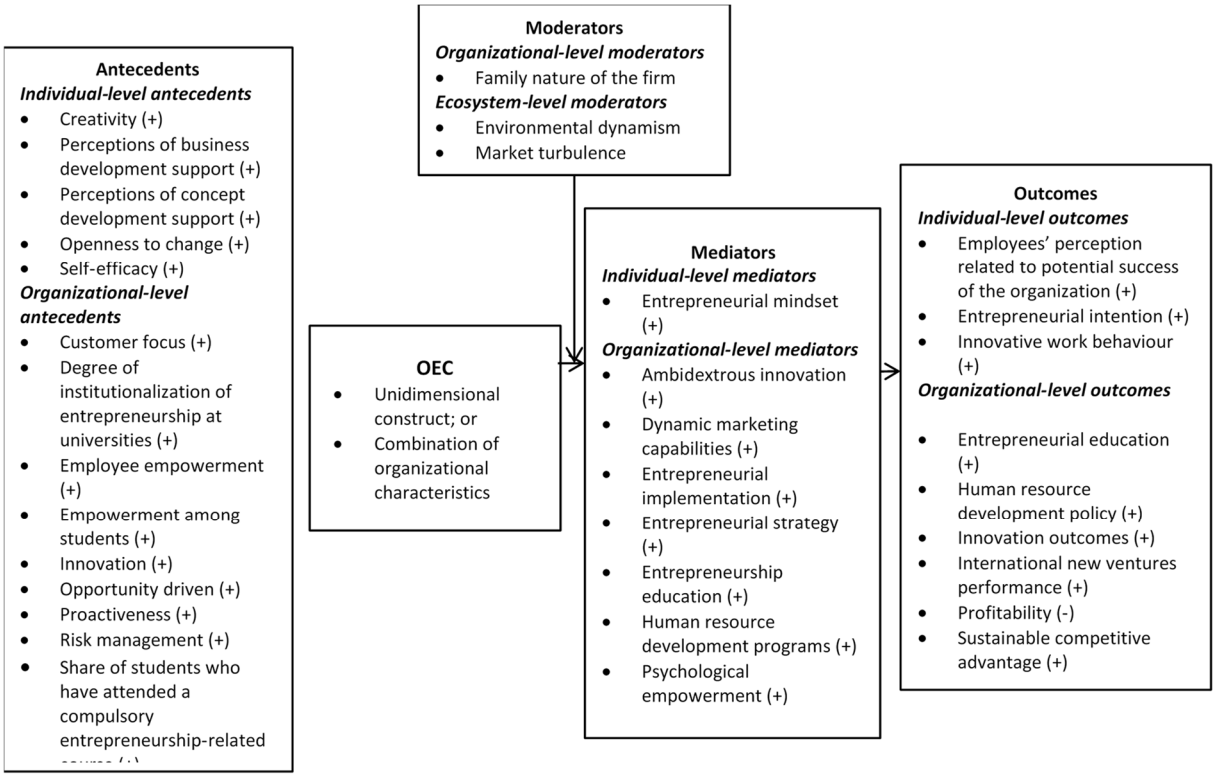

Figure 3. The nomological network of OEC
Source: own elaboration.

multi-industry sector and educational context, neglecting other crucial industries of entrepreneurship. Because of the feature of multidisciplinary embedded in entrepreneurship and EC, we suggest that the upcoming research be conducted in a sector which contributes essentially to entrepreneurship like travel, hospitality, media, energy, security, and real estate sectors (Zenbusiness, 2022).

Enhancing research design. The findings of this research expose that the quantitative research took the highest preeminent proportion among the selected studies, which aimed to investigate and confirm the proposed theories and hypotheses, combined with the over-reliance on the cross-sectional analysis causing the biases in the outcomes (Podsakoff *et al.*, 2003) because there is typically no proof of a temporal relationship between disclosure and finding (Solem, 2015). Hence, we recommend that future research utilize either qualitative or mixed methods associated with the longitudinal approach to examining and evaluating the EC in depth, thus providing the evolution of a culture that supports entrepreneurship within specific contexts.

Enriching theories of EC. Cultural dimensions theory and institutional theory were the most frequently adopted theories in the NEC articles; while the institutional theory of organizations and social cognitive theory dominate the OEC studies. However, those theories have not been well-developed in EC literature. Thus, we recommend that future research employ our findings, especially the frameworks of EC and their causal relationships to enrich those theories.

Developing frameworks and measurements of EC. This research depicted the enormous fragmentation in the application of frameworks and measurement of EC in both veins of EC in the literature, providing the research concern and promising issues for forthcoming studies. By consulting the synthesis of EC dimensions in our tables and figures, researchers can obtain the necessary information, and formulate and investigate the comprehensive frameworks and measurements which can be applied predominantly in both veins of EC, as well as validate the utilization of various appropriate theories in the literature. We also offer holistic frameworks for both veins of EC that can be applied and further evaluated.

Utilizing and strengthening the nomological network of EC. Because of the dominance of the quantitative approach in EC literature, researchers examined and confirmed varied causal relationships of

EC in diverse contexts. Nevertheless, those causal relationships neglected various variables which can be further examined. Since EC is an essential domain of the entrepreneurial ecosystem (Isenberg, 2010; Stam, 2015; Global Entrepreneurship Monitor, 2018). Therefore, we recommend that future studies should adopt a broader scope to seek, hypothesize, examine, and confirm the appropriate variables which demonstrate the causal relationships of NEC embedded in entrepreneurial ecosystem literature to expand and achieve a more comprehensive nomological network of NEC. Moreover, the application of the nomological network of OEC to expand social cognitive theory is highly desirable.

CONCLUSIONS

In this research, we performed an SLR regarding the EC literature, which aimed to summarise and synthesise the findings of pertinent extant research in order to expand knowledge in this research field by using the technique of Garrard (2004). We propose four essential outcomes as the results of integrating the information that has been investigated and approved in the literature. Firstly, there is an extreme developing tendency in the number of EC articles that started rapidly in 2012. The quantitative method is the most frequently utilized approach in diverse industries and nations. Thus, the research purposes of EC research evolved from theory building to theory validation. Secondly, there is enormous fragmentation in the utilization of frameworks, theories, and measurement of EC in two veins of EC in the literature. However, cultural dimensions theory and institutional theory are exhibited as the most frequently utilized theories in the NEC articles; while the institutional theory of organizations and social cognitive theory dominate the OEC studies. Despite the fact that distinct dimensions of EC have been examined in the literature, we offered the holistic framework of NEC which is the combination of five forms or indications including needs and motives, beliefs and behaviours, cognition, cultural values (societal and individual levels), and social context; while OEC is a unidimensional construct or a combination of the organizational characteristics that stimulates, promotes, and sustains the entrepreneurial activities of the organizations. Thirdly, this research generated a nomological network that recapitulates and displays the causal relationships of both veins of EC, which can be employed and expanded to enrich institutional theory and social cognitive theory. Finally, regarding the findings, we outline the promising research areas for future EC research in terms of research context, research design, theory, framework, measurement, and nomological network of NEC and OEC that may significantly contribute to the literature.

The findings of this research provide meaningful implications for both theory and practice. Concerning the theoretical context, this research integrated and demonstrated the most recent and exclusive trends, frameworks, theories, and measurements of both veins of EC and their causal relationships, proposing the research guideline for further studies. Thus, by offering the evolutionary trend of EC articles, this study provided evidence for selecting a suitable methodology through which future research can be conducted to create novel knowledge to develop the EC field. Furthermore, this study fulfils the research gaps of Malecki's study (2018) by providing a comprehensive view of the EC field which integrates the remarkable theories, frameworks, and measurements of EC. Besides that, it offers the holistic frameworks of NEC and OEC, thus resolving the problems of disintegration and disjointedness encountered in the literature. Those frameworks can be leveraged to enlarge the institutional theory by identifying the essential dimensions that shape and construct the EC in which human behaviours are conducted to indicate the institutional context stimulating entrepreneurship. Moreover, this research gave a reliable basis for adjusting and creating thorough frameworks and measurements of EC of both veins of EC in future studies regarding the research context, which was revealed in the summary of the EC models. Finally, this study went beyond the requests of Hayton *et al.* (2002) and Hayton and Cacciotti (2013) by generating two nomological networks displaying the causal relationships of NEC and OEC that were investigated and approved in the literature, thus assisting other scholars in determining the vital issues and formulating the appropriate variables for generating the future research in EC literature. In particular, the exploitation of the nomological network of OEC and the

causal chains between OEC and its individual-level antecedents and outcomes is highly likely to enhance the social cognitive theory which displays the interrelations between environmental elements, personal elements, and behaviour elements.

In a practical context, two nomological networks of EC also contribute to the positive perceptions, awareness, and acknowledgement of the importance of developing and sustaining an appropriate EC amongst individuals, organizations, and nations. Regarding NEC, the practitioners, governors, policymakers, and other stakeholders should concentrate on building an efficient NEC, because of its positive impacts on the entrepreneurship of a nation including the perceptions of the individuals towards becoming an entrepreneur, the new firm establishment rate and performance, entrepreneurial activities, which is likely to turn into positive national performance and growth. Besides that, they may elaborate on how to construct an effective NEC by acting as role models to encourage the citizens to follow entrepreneurial behaviours, creating an appropriate entrepreneurial education system which provides suitable skills and knowledge to the community, providing funding that supports the entrepreneurial actions, modifying the legal regulatory framework and legislation to stimulate the entrepreneurial attitudes, improving technology system, and applying other methods which are displayed in our nomological network of NEC. Regarding OEC, in an educational context, the principals in higher educational institutions can propose to create entrepreneurship departments, hold entrepreneurship competitions, and encourage sharing entrepreneurship knowledge. Meanwhile, teachers can empower their students in courses in order to constitute the EC throughout the institution that stimulates the students' intentions to become an entrepreneur. In a business context, due to its effect on the employees' performance, leading to organizational performance, profitability, and sustainable competitive advantage, managers and entrepreneurs may also focus on building the informal contexts of the organization. In doing so, they can develop entrepreneurial cognition and behaviours among the employees and organization, comprising creativity, innovation, openness to change, self-efficacy, proactiveness, and risk management.

However, this study was limited in terms of language as the articles in the publication pool included only studies in English. This limitation can be resolved in future research by seeking and analysing the articles which were written in other languages.

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The interplay of dynamic capabilities and innovation output in family and non-family companies: The moderating effect of environmental dynamism

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ABSTRACT

Objective: In the article, we aim to test the relationship between dynamic capabilities (DCs) and innovation output as moderated by environmental dynamism and establish if there are significant differences between family and non-family firms in this regard.

Research Design & Methods: To test three research hypotheses we employed quantitative research methodology. Our results are based on the data from 211 family and 211 non-family companies from the Polish post-transition economy. Results were analyzed using multigroup structural equation modelling.

Findings: Results indicate that DCs can be justifiably perceived in two dimensions (sensing and seizing; reconfiguring) and these dimensions influence the innovation output in both family and non-family businesses, however, this impact varies. The environmental dynamism does not significantly moderate the basic relationship, but it influences the level of innovation output in non-family businesses. Models estimated for family and non-family businesses are significantly different, which proves that subtle differences between these two groups of companies exist.

Implications & Recommendations: In the article, we enrich the theory of innovation in family firms and show how subtle differences create a different portrait of relationships between DCs and innovation in these types of companies.

Contribution & Value Added: To our knowledge, it is the first study to show how family businesses are different from their non-family counterparts with respect to relationships between DCs and innovation output as measured by the number of new products and solutions.

Article type: research article

Keywords: dynamic capabilities; environmental dynamism; innovation output; family business; structural equation modelling

JEL codes: O30

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INTRODUCTION

The external environment, its dynamism, hostility, and unpredictability force organizations to change (Stieglitz, Knudsen, & Becker, 2016). As the failures of numerous companies show (Blackberry, Nokia, to mention just a few), the inability to change results in a slow decline or rapid collapse. Organizations have numerous ways to adapt to the environment and one of them is innovation. Innovation – defined in terms of new products, services, or new organizational solutions and processes (Oslo Manual, 2018) – can be achieved in organizational settings through numerous means. Most organizations seek to create a proper mindset and conditions in which innovation may occur (Ringberg, Reihlen, & Ryden, 2019). Numerous studies emphasize the role of dynamic capabilities (DCs) in driving desired outcomes – new and

valuable products, services, or processes that help to adapt to the ever-changing environment. Teece, Pisano, and Shuen (1997) argue that the DCs focus on the organization's abilities to create new resources and renew or reconfigure its resource base in the face of a rapidly changing environment; it helps to explain organizational behaviours in uncertain times. Moreover, although Borch and Madsen (2007) clearly show the links between DCs and innovative strategies, the proofs for the direct effect of DCs on firm innovation and innovation output in particular – introduced new products, services, or processes – are scarce in the literature. Even less is known about the influence of the DCs on innovation in different organizational settings and different types of companies (Weerawardena & Mavondo, 2011).

To fill in this empirical gap, we decided to compare the influence of DCs on innovation output in two diverse groups of organizations: family businesses (FBs) and non-family businesses (NFBs). The distinctiveness of FBs from NFBs is indicated in the literature. The differences reside, among other things, in specific FBs features, such as familiness, increased family involvement, on average, the lower level of professionalization, or creating and appropriating socioemotional wealth as a particular goal of the operation. It all leads to a different approach to innovation and differential organizational processes and may also lead to a different approach to DCs as compared with the NFBs, although evidence for it is ambiguous (Kraus, Pohjola, & Koponen, 2012). The understanding of differences between FBs and NFBs in terms of the differences in the approach to the utilization of dynamic capabilities for innovation is important for several reasons. Firstly, FBs are often characterized by unique features such as a long-term orientation and a focus on tradition and legacy (Akram, Gosh, & Sharma, 2022), which may impact their ability to develop and deploy DCs effectively. Understanding how dynamic capabilities influence innovation in FBs and NFBs can provide insights into how FBs can leverage their unique strengths and overcome potential barriers to innovation. Secondly, FBs may have to balance the needs of the family and the business, navigate family dynamics, and manage succession planning, all of which can impact their ability to develop and effectively deploy DCs (Perlines, Ariza-Montes, & Araya-Castillo, 2020). Thirdly, innovation is a key driver of economic growth and FBs are important contributors to the global economy. By examining the differences in the influence of DCs on firm innovation in these two types of companies, researchers and practitioners can better understand the factors that influence innovation in these firms, and how they can be encouraged to develop and deploy DCs more effectively (Camisón-Zornoza *et al.*, 2020). Overall, in our opinion, the search for differences in the influence of DCs on firm innovation in FBs and NFBs has important implications for both theory and practice and can inform strategies for improving innovation in these firms.

Summarizing, (1) there is a significant convergence of views on the importance of innovation for the survival and development of the company (Ortiz-Villajos & Sotoca, 2018); (2) DCs are seen as a trigger of innovation (Warner & Wäger, 2019). However, few studies focus on answering the question: do DCs translate directly into the company's innovation, as measured by the innovation output? Even fewer studies explain that relationship in a more precisely defined organizational context – the context of family and non-family firms (De Massis *et al.,* 2016). Thus, the article will answer three questions. Are DCs related to innovation output? What role does environmental dynamism (changeability) play in this relationship? Moreover, is the relationship between DCs and innovation output different in family and non-family firms? Therefore, the article will test the relationship between DCs and innovation output as moderated by environmental dynamism and establish if there are significant differences between family and non-family firms.

We hope to contribute to the knowledge of the determinants of innovation in family and non-family firms based on data flowing from 211 family and 211 non-family firms, considering their similarities in size as measured by the number of employees. These data were gathered between August and November 2021 from owners or managers of Polish companies. We are convinced that such data allow us to test the relationship between DCs and innovation output and check to what extent FB and NFB are different. Our study fills in empirical gaps in current literature by explicitly presenting the link between DCs and innovation, exhibiting the role of environmental dynamism in this relationship, and showing how this relationship looks in family and non-family firms (Akram, Ghosh, & Sharma, 2022; Calabro *et al.*, 2019). In our study, we seek to contribute to the knowledge of DCs and innovation by

exhibiting the influence of latent organizational DCs on innovation output as moderated by the dynamism of the organizations' environment. We also seek to enrich the knowledge in the field of FBs by showing how the specificity of FBs alters the influence of DCs on innovation output.

To achieve the goal of our paper, we begin by conducting a literature review and developing hypotheses based on the findings. We then proceed with describing our methodology and presenting the results of our empirical research. In the following section, we discuss these results and compare them with previous studies. Finally, we present the theoretical and practical implications of our findings, outline future research directions, and acknowledge the limitations of our research approach.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Dynamic Capabilities as Drivers of Innovation and Change in an Organization

Management scholars explain the innovativeness of organizations using diverse approaches (Ardi *et al.*, 2020; Singh *et al.*, 2020). Some scholars argue for the role of organizational culture in innovation (Büschgens *et al.*, 2013), some emphasize the notion of organizational ambidexterity (Andriopoulos & Lewis, 2009), and others seek sources of innovation in individual creativity (Amabile, 1988; Perry-Smith & Mannucci, 2017). One of the most critical research streams – the resource-based view (RBV) – explains an organization's innovativeness by emphasizing the role of resources in driving organizational-level outcomes (Barney *et al.*, 2001). As some argue (Eisenhardt & Martin, 2000; Lin & Wu, 2014; Wang & Ahmed, 2007), building on, and enhancing the resource-based view, DCs seek the sources of organizational performance, including innovations, in firms' specific competencies, allowing for swift movement in a dynamic environment (Laaksonen & Peltoniemi, 2018).

Teece *et al.* (1997) initially coined the notion of DCs to gain consequent interest in the management field. The original definition of DCs (Teece *et al.*, 1997), explains it as 'the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments,' or 'the organization's ability to achieve new and innovative forms of a competitive advantage given path dependencies and market positions.' Despite the notion of the DCs for diverse organizational outcomes, proven by different scholars in different settings, the debate is still roaming in the literature regarding the very essence of this phenomenon (Ambrosini & Bowman, 2009; Breznik & Hisrich, 2014; Kurtmollaiev *et al.*, 2022). The original definition, coined by Teece *et al.* (1997) focuses on four types of DCs: (1) reconfiguration and transformation or the reconfiguration-transforming and recombining of assets and resources; (2) leverage – replicating a process or system operating in one business unit into another; (3) learning – experimenting and reflecting on failures and successes; and (4) assets and resources, resulting in a new resource configuration.

Eisenhardt and Martin (2000) also played an important role in creating the concept of the company and integrating, reconfiguring, acquiring, and releasing resources in order to adjust the company to market changes, and even to trigger them ('the processes to integrate, reconfigure, gain and release resources – to match and even create market change'). DCs are organizational and strategic routines through which companies create new resource configurations during the emergence, merger, division, development, and disappearance of markets.

Moreover, Eisenhardt and Martin (2000) emphasize that the importance of DCs lies in the appropriate configuration of resources and not only in the resources themselves. Competitive advantage is achieved because one uses these resources faster and better than competitors. In the following years, Teece (2007) and other researchers made some changes to the concept of DCs, trying to clarify certain assumptions, as there were criticisms of the concept. However, publications by Teece, Pisano, and Shuen (1997) and Eisenhardt and Martin (2000) are still considered key in strengthening the position of the DCs concept in strategic management (Di Stefano *et al.*, 2014; Peteraf *et al.*, 2013), even though many researchers contrast them. In this instance, Yeow, Soh, and Hansen (2018) express the opinion that in recent years these two, to some extent opposing approaches to DCs, have been subject to integration. The differences that previously raised concern were, among other things, whether DCs are

idiosyncratic or shared by organizations and whether they provide a sustainable competitive advantage. It is believed that DCs exist in different forms but also share common characteristics; in detail, they can be idiosyncratic (Di Stefano *et al.*, 2014; Peteraf *et al.*, 2013).

Many researchers interested in the DCs research perspective believe it is rooted in the resource-based view (RBV). According to numerous scholars, DCs constitute not only a specific continuation of RBV but also its extension (Ambrosini & Bowman, 2009; Barney & Clark, 2007; Breznik & Hisrich, 2014; Helfat & Peteraf, 2003). Nonetheless, in a dynamic environment characterized by a high level of variability, frequency, and depth of changes, the DCs of enterprises operating in these difficult conditions acquire a special meaning. Summarizing, management literature emphasizes the relationship between DCs and innovation and it can be argued that this relationship is significant in highly dynamic environments (Slater *et al.*, 2014).

From the analysis of individual DCs dimensions, it can be concluded that their relationship with implementing innovations is highly probable. The DCs concept's originators (Eisenhardt & Martin, 2000; Teece, 2007; Teece *et al.*, 1997) emphasize a close relationship between DCs and innovative behaviour and the creation of new products or services. Lessard, Teece, and Leih (2016) believe that DCs specifically include asset orchestration and provide the ability to combine selected technologies, people, and other resources into new products and processes. Moreover, DCs reflect the company's ability to create and modify its material and non-material resources deliberately and thus facilitate the introduction of changes and renewal of implemented processes. It further stimulates innovation to adapt to market or, more broadly, environmental changes (Eisenhardt & Martin, 2000). Strategic management research indicates that innovation and capabilities are essential elements of DCs (Strønen *et al.*, 2017).

Furthermore, DCs enable the repetitive and reliable performance of activities aimed at planned strategic change instead of ad hoc solutions to problems resulting from turbulence in the environment (Schilke *et al.*, 2018). Thus, DCs are not spontaneous reactions to changes in the environment to solve an identified ad hoc problem-solving event or a spontaneous reaction. Instead, DCs are becoming prominent and observed as routines, which entails their repeatability and intentionality (Ambrosini & Bowman, 2009). They also include routines related to innovation management. In this way, DCs will become the primary source of sustainable competitive advantages and economic efficiency (Camisón & Monfort-Mir, 2012), among other things, by creating innovation as an effect of innovative capacity. Thus, we hypothesize:

H1: Dynamic abilities are positively related to the level of innovation output.

Dynamic capabilities enable companies to change (Winter, 2003; Teece *et al.*, 1997) in response to shifts in their environment. In fact, DCs facilitate sensing and seizing of new business opportunities located in the companies' environment, and as a result, new products or services can be introduced (Laaksonen & Peltoniemi, 2018). Research in this vein helped to establish the role of environmental characteristics in the relationship between DCs and performance (Nedzinskas *et al.*, 2013), competitive advantage (Jurksiene & Pundziene, 2016) or financial performance (Girod & Whittington, 2017). Considering the critical role of new products or services in driving the competitive advantage of companies (Chatzoglou & Chatzoudes, 2018), the lack of evidence for the influence of environment's characteristics on the relationship between DCs and introduced innovations (innovation output) brings a question of the role environment plays in this respect.

Digging deeper into the nature of the relationship between DCs and the innovation performance of companies, it is worth noting that the creators of this concept (Teece, 2007; Teece *et al.*, 1997), as well as other researchers, indicate the notion of DCs interaction with the competitive and changeable environment of contemporary organizations. Miller and Friesen (1984) indicate environmental dynamism as one of the key environmental characteristics. Environment complexity, changeability, depth, and pace of changes require an entrepreneurial approach from the management of companies, *i.e.*, a focus on looking for opportunities in the environment, flexibility, responsiveness, and learning ability (Teece, 2014). These conditions are met by the DCs concept, as it allows it to adapt to environmental changes. However, some researchers indicate that despite the commonly perceived variability in the current conditions in which enterprises operate, their environment may differ: from a 'fast speed' environment to a quasi-

stable environment. Therefore, it seems rational to ask whether a company needs DCs in all environmental conditions or to adapt to rapidly changing environments (Suddaby *et al.*, 2020). Some researchers, especially the creators of the DCs concept, note that the construct refers to the adaptation of companies to the conditions of rapid environmental changes, usually initiated by technological innovations (Teece, 2007; Teece *et al.*, 1997). In turn, Eisenhardt and Martin (2000) stated that the opposite is true, *i.e.*, dynamic abilities may enable the adaptation of a company in a relatively stable environment but do not help adapt to high-speed changes. However, most researchers agree that DCs in a dynamic environment is the most useful organizational response (Breznik & Hisrich, 2014), while the environment is a source of opportunities that can be exploited with new products or services.

According to Ringov (2017), the codified DCs may lose their importance as the environment's dynamism increases. However, the importance of codified DCs largely depends on the exposure to changes' dynamics and the asset base's complexity. According to Ringov (2017), what is needed is a more nuanced situational approach to this relationship, which considers the complex interaction between environmental and internal factors of the company. Thus, in Ringov's opinion, it seems necessary to abandon simple determinism. In this vein, Schilke (2014) empirically confirmed that the strongest positive influence of DCs on competitive advantage exists in average environment dynamism. This relationship may be weaker at lower levels of the environment's dynamism as then fewer opportunities are available to the company. On the other hand, when environmental changes are highly dynamic, too frequent or unpredictable, appropriate use of DCs and implementation of changes might become problematic. Schilke *et al.* (2018) emphasize that the environment's dynamism may be a critical condition for the degree to which DCs can affect organizational results. Summarizing, DCs may be valuable for competing in both stable and dynamic environments, but the strength of the influence of DCs on performance measures might vary.

Literature analyses on the role of the environment bring evidence for the moderating role of this variable in the relationships between DCs and organizational-level outcomes. Girod and Whittington (2017) show that environmental dynamism positively moderates the relationship between reconfiguration and economic performance. In their research, reconfiguration enables the prompt reaction to new opportunities created in the environment through offering of modified or new products allowing better response to clients' needs. Similarly, Singh *et al.* (2019) position environmental dynamism as a moderating variable in the relationship between DCs and firm responsiveness. Moreover, Huang and Ichikohji (2022) argue for and test the moderating effect of environmental dynamism in the relationship between DCs and business model innovation (see also Wiemann *et al.*, 2020). Considering all the above mentioned we believe there is a strong confirmation for the proposition of positioning the environmental dynamism as a moderator in the relationship between DCs and innovation output. Thus, we hypothesise.

H2: The environment's dynamism plays a moderating role in shaping the relationship between DCs and innovation.

Towards a better understanding of the relationship between DCs and innovation in FBs and NFBs

The specificity of FBs is of interest to many researchers (De Massis *et al.*, 2021; Neubaum & Payne, 2021), but there is no single definition of FBs. Although some claim FBs themselves are not uniform category (Brune *et al.*, 2019; Kosmidou & Ahuja, 2019; Stanley *et al.*, 2019), research confirms numerous differences between FBs and NFBs (Chrisman *et al.*, 2009; Gedajlovic *et al.*, 2012; Short *et al.*, 2009). The specificity of FBs relates to, among others, the notion of socioemotional wealth importance (Minichilli *et al.*, 2014), succession problems (Kets de Vries, 1993; Ucbasaran *et al.*, 2013), familiness (Basco, 2015; Habbershon & Williams, 1999; Pearson *et al.*, 2008), the role of family in managing the enterprise (Gedajlovic *et al.*, 2012; Getz & Carlsen, 2000; Greenhaus & Beutell, 1985) and corporate governance mechanisms, which are unique to FBs (Schulze *et al.*, 2001; Thomsen & Pedersen, 2000; Zellweger *et al.*, 2012). In the database, there were also studies related to social capital structure (Sanchez-Famoso *et al.*, 2014), entrepreneurship and entrepreneurial orientation (Salvato & Melin, 2008), innovation (De Massis *et al.*, 2013) or agency theory (Le Breton-Miller & Miller, 2006), which signifies that there might also be significant differences in these instances. Thus, there are numerous arguments for clearly distinguishing FBs from their non-family counterparts.

Following previous studies, we defined FB as a company of any legal form, which is owned in whole or a decisive part (minimum 30% of shares in the case of listed companies) by the family (one or more) and at least one family member manages or co-manages the company to keep the company in the hands of the family on a lasting basis. The operational definitions of FBs used by researchers in other countries are similar, as they take into account one or more of the criteria mentioned above (Waterwall & Alipour, 2021). Some researchers consider an additional or exclusive criterion, which is the perception of the company as a family by its representatives (Brinkerink, 2018).

To gain a deeper understanding of the differences between FBs and NFBs with respect to DCs and innovation, we decided to conduct a literature study on the publications listed in the Scopus and Web of Science databases. For this purpose, we searched for three terms: 'innovat*' (innovation, innovativeness), 'family business' and 'dynamic capabilities' in titles, abstracts and keywords of indexed articles. We located 134 articles relating jointly to these three issues in Web of Science database (fields of business or management or economics) and just 38 documents in the Scopus database (in the areas of business, management and accounting, economics and econometrics and finance). The search was carried out on 5 March 2023. It allowed us to identify articles explicitly, simultaneously referring to key constructs.

Then we downloaded the metadata (containing data identifying the article, keywords from articles, abstracts and a full bibliography) of these articles (we exported it to separate files). The prepared files were further imported to the VOSviewer program, free software that assesses coexistence relationships. The program performed a keyword analysis and created a map based on biographical data. There were 767 unique keywords in the articles, so we decided to limit their number to the most common ones. The minimum number of word occurrences was set at 15, which resulted in the selection of 18 keywords. The phrases 'family business' and 'family firms,' were coded as 'family business,' also 'firm performance' and 'performance' were coded as 'performance,' before the analysis, for better clarity of results. The co-occurrence of keywords is presented in Figure 1.

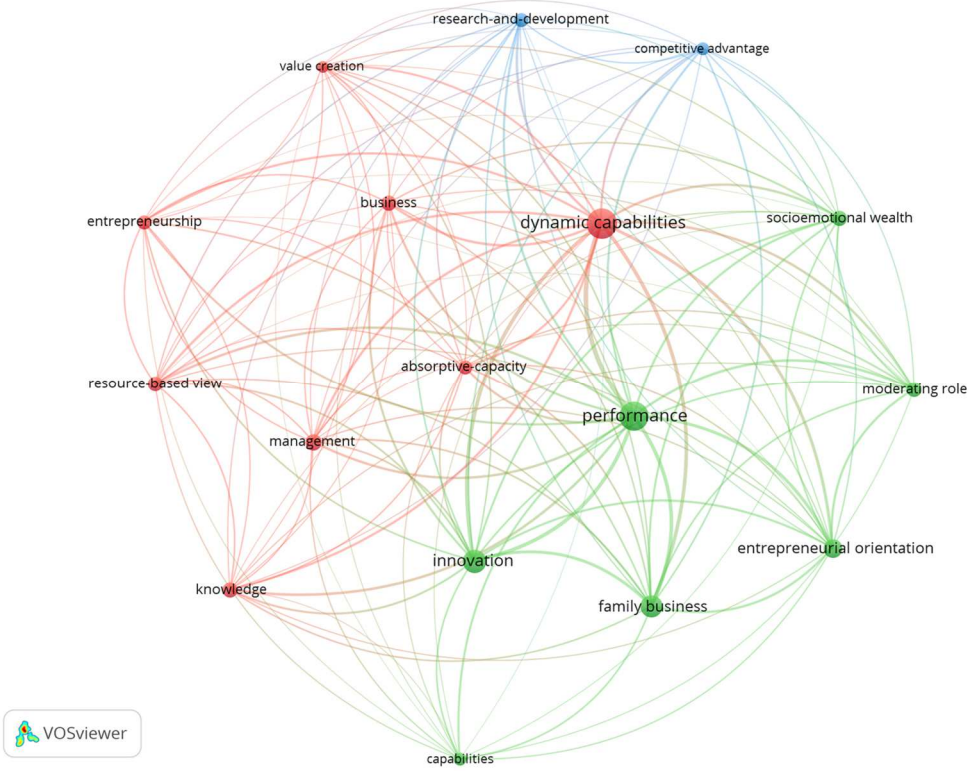

Figure 1. Co-occurrence of keywords in articles referring to a family business, innovation, and dynamic capabilities

Source: own elaboration based on database search and analysis conducted on 5 March 2023.

Analysis of keywords clearly showed that research on DCs and innovation in FBs was mainly carried out using the resource-based view (Alonso, Kok, & O'Shea, 2018); frequently, performance or competitive advantage were dependent variables (Camison-Zornoza *et al.*, 2020); studies also referred to entrepreneurial orientation or entrepreneurship (Hernandez-Perlines *et al.*, 2022), research and development (Broekaert, Andries, & Debackere, 2016), value creation (Gunavan & Keontjoro, 2023) and absorptive capacity (Mennens *et al.*, 2018). However, they also investigated management and knowledge (Sanchez-Sellero, 2014). The main construct strongly related to the specificity of the FBs is socioemotional wealth, which according to Fang *et al.* (2018), jointly with governance structures, generation of family control, and resource availability influence the internationalization of companies. According to the study, FBs differ significantly from NFBs in this regard. In a similar vein, Hernandez-Perlines, Ariza-Montes and Araya-Castillo (2020) argue that in FBs socioemotional wealth strongly influences the entrepreneurial orientation and performance of this group of companies. Similarly, De Massis *et al.* (2018) show how German FBs achieve innovation through a specific set of capabilities related, among others, to niche focus, self-financing, long-run mindset, and community embeddedness, which are perceived as unique characteristics of this group of companies. Summarizing, socioemotional wealth importance clearly distinguishes FBs from NFBs in terms of its influence on innovation.

We further analysed articles searching for empirical studies related to relationships between DCs and innovation in FBs. Using a systematic literature review of 147 journal articles, Akram, Ghosh, and Sharma (2022) clearly indicate the need (as a future research avenue) for studying DCs and innovation output in FBs arguing for its distinctiveness from the NFBs. Based on 261 cases from Taiwan, Chen and Huan (2022) suggest that market knowledge influences product innovation and this relationship is mediated by operational financial effectiveness, knowledge governance, and modularity in FBs. Further, De Massis *et al.* (2016) argue for the creation of a new product innovation strategy for FBs (called innovation through tradition) while it allows for the identification of capabilities enabling for interiorization and reinterpretation of past knowledge in these types of organizations. In sum, researchers call for studies on relationships between DCs and innovation output in FBs justifying these types of studies with specific characteristics of FBs.

The above short review of studies relating to the differences between FBs and NFBs confirms that the specificity of FBs affects several aspects of their functioning. It includes innovation, which remains in complex relationships with the strategic behaviour of these entities with their entrepreneurial orientation (Hernández-Linares & López-Fernández, 2020; Lumpkin *et al.*, 2010), and ultimately with the DCs. The uniqueness of FBs is reflected in strategic management (Barros *et al.*, 2016). Their characteristics may influence the formation and use of DCs by them. However, comparative research on these issues confirms the apparent specificity of DCs in FBs, as it shows that FBs adapt to changes in the environment mainly through innovation (Duarte Alonso *et al.*, 2018). Moreover, DCs are manifested in most of the respondent's FBs through 'organizational heritage,' home-grown capabilities, VRIN attributes, open culture, signature processes, and idiosyncratic/tacit knowledge (Duarte Alonso *et al.*, 2018). Additionally, DCs research in FBs (Camisón-Zornoza *et al.*, 2020; Chirico & Nordqvist, 2010; Jones *et al.*, 2013) clearly shows the impact of different aspects of family involvement in business on the DCs. It has been empirically proven that DCs in FBs are influenced by ownership, management, and governance (corporate and family) (Camisón-Zornoza *et al.*, 2020).

To summarize, we believe that there is a solid theoretical rationale for studying relationships between DCs and innovation in FBs. In fact, relationships between DCs and innovation in FBs might be different than in NFBs, which by itself justifies comparative studies to delve deeper into the similarities and differences. These differences result mainly from the notion of socioemotional wealth, but also from different strategic approaches, the role of family and government mechanisms, particular goals and sets of values, social capital, or risk-taking propensities. On this basis, we hypothesise:

H3: Relationships between dynamic abilities and the level of innovation are different in family and non-family companies.

RESEARCH METHODOLOGY

Sample Selection

To test the interplay between DCs, innovation output, and environmental dynamism in FBs and NFBs, we designed and carried out empirical research based on a quantitative methodology. Considering the nature of the relationship between DCs and innovation output and the knowledge gathered in the respective fields, we opted for a survey. Further, to be able to compare FBs and NFBs, we decided to gather data from two groups of companies that would be similar, at least considering their size. A similar approach was suggested by Amman and Jaussaud (2012). The external market research company employed to gather the data managed to reach 211 FBs and 211 NFBs, which created pairs with respect to their size. The data were gathered between August and November 2021. The sampling frame was a database of a research company; it is composed of 10 009 contacts to company representatives from Poland. Approximately 60% of the contacts in the database were from the FBs. However, no data about the family status of a company was available during the initial stage. In the second stage, randomly selected companies were contacted by e-mail if they opted to participate in a survey. If the answer was positive, the interviewer contacted the company representative and asked if the company is a family or non-family one and about the number of full-time employees. The respondents were either owners or managers having profound knowledge of the company. The market research company contacted selected companies so that the number of FBs and NFBs was equal in three groups of organizations: micro and small, medium, and large. The effective response rate after removing incomplete answers equalled about 21.1% (the company contacted over 2000 companies by e-mail with a request to participate in a survey). Overall, one in five companies from the database was contacted.

Although we asked for an entirely random sample, the study's design made it impossible to finish the study as a fully randomly selected one. Finally, in the sample, there were 145 micro and small (less than 50 employees), 61 medium-sized (50-249 employees), and five large (employing more than 250 employees) FBs. The composition of the sample of NFBs was the same. The average age of the FBs equalled more than 19 years (sd=13.78), and for NFBs it was nearly 17 years (sd=11.06). Family companies were, on average, smaller than their non-family counterparts, which results from the inclusion of large non-family companies in the sample (mean = 40 vs 127 employees; with the standard deviation of 73 and 603, respectively for FBs and NFBs).

Within the family firms, 155 of them were managed by the first owner, and only 56 were passed to the second generation of owners. Owners of FBs were also actively engaged in the company. In 125 FBs, one or two members of the founding company were active. In the remaining 86 FBs, three or more family members were engaged. In 186 FBs, one founding family member was on the board, and in 25 cases, there were two or more owners. Moreover, 196 family companies were owned by at least 50% of the founding family, and in 15 FBs founding family owned less than 50% of the shares.

Measures

We measured innovation output according to the Oslo Manual (2018). We asked for the number of new products, new services, and innovations in business processes (production and service, distribution and logistics, marketing and sales, information and communication with the environment, management and administration, and product development). Next, to establish the innovation output, we decided to sum up the answers. Considering the large dispersion of data, these were further standardized using the log10 function (to minimize the influence of outliers and extreme cases on the calculation).

We measured DCs using the framework and questionnaire proposed by Wilden *et al.* (2013). The scale was previously extensively cited and used in different research scenarios and is considered reliable, with studies showing its high internal consistency and test-retest reliability (Kump *et al*., 2019). The questionnaire was composed of 12 questions evaluated on the 1-7 Likert-type scale with a small modification. Instead of asking 'How often have you carried out the following activities?' with referral to reconfiguring construct, we asked respondents about their focus on the implementation of new kinds of management methods, the introduction of new or substantially changed marketing methods or strategy, substantial

renewal of business processes and new or substantially changed ways of achieving targets and objectives. In this way, we obtained information about the strategic focus rather than real-life changes. We did it to mitigate the measurement of DCs in a similar manner to our main dependent variable – innovation output. Cronbachs' alpha for the scale was 0.7849. This framework suggests the existence of three dimensions of DCs, namely sensing, seizing, and reconfiguring, four items each. However, when checking for Cronbachs' alphas for the dimensions sensing accounted for only 0.5533, which is significantly below the accepted cut-off line of 0.7. For sensing, we decided to test alpha if an item was deleted. It occurred that deleting the very first item related to people's participation in professional association activities improved the scale significantly to the level of 0.67, which is still below the cut-off line. Thus, we decided to run a confirmatory factor analysis in Mplus 8.0 and the estimation fit results: RMSEA = 0.087, CFI of 0.923, TLI = 0.901, and SRMR = 0.092 suggested a poor to weak fit for the structural model. Thus, we decided to use exploratory factor analysis (EFA) in STATA to check for the suggestions of the internal structure of DCs in the sample. The results of the EFA analysis (KMO=0.861; Bartlett test of sphericity: Chi-square = 2180.586; df=66; p-value=0.000) are presented in Table 1.

Table 1. Exploratory factor analysis of dynamic capabilities

Variable	Factor 1 – Sensing and Seizing	Factor 2 – Reconfiguring	Mean	SD	Uniqueness
3. We observe best practices in our sector	**0.793**	0.017	5.445	1.444	0.371
6. We adopt best practices in our sector	**0.790**	-0.127	5.524	1.407	0.360
5. We invest in finding solutions for our customers	**0.763**	0.043	5.495	1.347	0.416
8. We change our practices when customer feedback gives us a reason to change	**0.712**	-0.137	5.524	1.253	0.474
4. We gather economic information on our operations and operational environment	**0.638**	0.244	5.085	1.539	0.533
2. We establish processes to identify target market segments, changing customer needs and customer innovation	**0.602**	0.203	4.898	1.602	0.597
7. We respond to defects pointed out by employees	**0.583**	0.108	5.225	1.444	0.649
11. Substantial renewal of business processes	-0.006	**0.893**	3.322	1.625	0.203
12. New or substantially changed ways of achieving our targets and objectives	0.062	**0.882**	3.597	1.67	0.218
10. New or substantially changed marketing method or strategy	0.071	**0.858**	3.443	1.6	0.258
9. Implementation of new kinds of management methods	-0.086	**0.851**	3.32	1.671	0.268
1. People participate in professional association activities	0.017	0.521	3.313	2.072	0.729
Cronbach's alpha	0.825	0.9075	-	-	-

Note: Significant loadings are highlighted.
Source: own elaboration of empirical research.

Thus, EFA results suggest a two-factor structure instead of the three-factor proposed by Wilden *et al.* (2013). Both factors have relatively high values of Cronbach's alphas' which signifies satisfying reliability and internal consistency. The first question, on participation in professional association activities, does not load significantly to any of the factors. However, with a grain of salt, based on EFA, it could be attributed to the reconfiguration but we find no theoretical justification for such an inclusion. Thus, we decided to drop this item off the scale for further calculations. This may be explained by considering the low average participation of employees in professional associations in smaller companies in Poland in comparison to, for example, adopting best practices. However, this would require additional study, which is beyond the scope of our research. Confirmatory factor analysis for 11 items and two constructs (1. Sensing and seizing, composed of seven items; 2. Reconfiguring, composed of four items) showed acceptable levels of fit, with RMSEA = 0.070, CFI = 0.958, TLI = 0.944 and SRMR = 0.059. Thus, for further analyses, we included the structure as suggested by the results of factor analyses and not following suggestions by Wilden *et al.* (2013).

To measure the environment's dynamism, we decided to use the scale suggested by Sutcliffe (Sutcliffe, 1994), composed of four items measured on a 7-point Likert scale. Cronbach's alpha was slightly below 0.7 (0.6567). However, removing items would not significantly improve the scale's reliability. Considering our sample size and intended statistical analyses methods, we decided to code dynamism, as a moderator, and as a dummy variable (although we could potentially treat it as a continuous latent variable, this would significantly increase the complexity of the already complicated model and increased significantly the number of estimated parameters in a SEM model leading to estimation problems). Thus, for further analyses, we decided to treat this variable as a moderator and transform it into a dummy variable. For this purpose, we (1) calculated the mean values for every company (created meta-variables), (2) calculated the mean value for the whole environmental dynamism, (3) if the meta-variable was below the mean, we coded it as 1; if the meta-variable was above mean, we coded it as 2. Thus, we identified low and high levels of dynamism for further calculations.

We divided our sample into two sub-samples, namely FBs and NFBs. To assign the companies appropriately, we asked a single question scaled 1 – a family firm, and 2 – non-family firms. If the company declared to be of a family status, we asked for additional parameters regarding the number of active members of the family in a firm, the number of family members on a board, and shares owned by a single family member (generation of the family). This further tested if the company could be considered a family one.

We decided to include the age and size of a company as a control variable. Respondents were asked to provide information on the number of years the company being in the market (age of the company) and the average number of employees (as a measure of the company's size). Both variables were standardized using the decimal logarithm function (to minimize the influence of outliers and extreme cases on the calculation).

RESULTS AND DISCUSSION

In our analyses, we first calculated Pearson correlation. Table 2 summarizes the analyses in the whole sample (a), as well as in family (b) and non-family firms (c). The Table 2 also provides descriptive statistics for variables.

Table 2. Pairwise correlations and descriptive statistics

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Innovation output (log10)	1.000	–	–	–	–	–
(2) Sensing and seizing	0.263*	1.000	–	–	–	–
(3) Reconfiguring	0.398*	0.088	1.000	–	–	–
(4) Dynamism (meta-variable)	0.146*	0.201*	0.196*	1.000	–	–
(5) Size (log10)	0.351*	-0.111*	0.336*	0.015	1.000	–
(6) Age (log10)	0.052	-0.107*	0.041	-0.124*	0.455*	1.000
Mean	42	5.310	5.442	4.306	84	18
Standard deviation	137	1.000	1.03	1.117	431	12

Note: *In the case of a number of innovations, age, and size, we provided average and standard deviation of real numbers, not calculated logarithms. Correlations reflect standardized values. *P < 0.05.
Source: own elaboration of empirical research.

To prepare a correlation Table, in the case of DCs and environmental dynamism, we calculated metavariables as means of questionnaire items following factor analysis results.

The values of individual meta-variables indicated that the surveyed companies had dynamic capabilities more significant than the middle level of the scale in the area of perceiving and capturing values (average = 5.31, standard deviation = 1.00). However, in their assessment, they perform worse dealing with the reconfiguration of resources (average = 3.421; std = 1.453). In this case, the responses were relatively highly dispersed, which indicates that this issue differentiates enterprises in the sample most strongly among all three dimensions of DCs. On average, companies implemented 42 new solutions in the analysed three-year period, and the standard deviation, in this case, was vast and amounted to

over 137, which indicates the abnormal distribution and the great importance of large enterprises in the sample, which can generate statistically more innovations than in the case of smaller economic entities. The maximum number of developed solutions – innovations was 2 260. Moreover, 85% of the surveyed companies indicated that in the three years, they developed less than 50 new solutions that, according to the definition of Oslo, can be treated as innovations. The dynamics of the environment were assessed at the level of the middle of the scale (4.306) with a moderate standard deviation (1.117). The average number of employees converted into full-time jobs was almost 84, with a high standard deviation of 431. This indicates a significant role of very large economic entities in the studied sample. The average lifetime was just over 18 years, with a relatively significant standard deviation of over 12 years. The oldest of the surveyed enterprises was 102 years old, and the youngest was two years.

To better understand the nature of the studied dependencies – taking into account the differences between family and non-family enterprises – in the following part, structural equations were modelled using the multigroup analysis technique, with the grouping variable, in this case, being the family nature or the non-family nature of the enterprise. Table 2 shows the estimation results of the three models.

Table 3. Results of a structural equation modelling

Variable	Model 1. The model with control variables and DV only			Model 2. Relationships between dynamic capabilities and the number of innovations		
	(overall) (restricted)	(family) (unrestricted)	(non-family) (unrestricted)	(overall) (restricted)	(family) (unrestricted)	(non-family) (unrestricted)
CHI2	58.213	58.213		282.318	260.497	
DF	4	4		166	156	
RMSEA	0.000	0.000		0.058	0.056	
CFI	1.000	1.000		0.949	0.954	
TLI	1.000	1.000		0.945	0.947	
Akaike Information Criteria (AIC)	760.794	764.346		15667.543	15665.722	
SRMR	0.015	0.000		0.094	0.083	
Innovation output (r2)	**0.150 (0.037; 0.000)**	**0.119 (0.042; 0.004)**	**0.139 (0.044; 0.002)**	**0.301 (0.043; 0.000)**	**0.329 (0.056; 0.000)**	**0.269 (0.054; 0.000)**
Constant	**0.359 (0.035; 0.000)**	**0.881 (0.042; 0.000)**	**1.512 (0.268; 0.000)**	**1.504 (0.205; 0.000)**	**1.516 (0.275; 0.000)**	**1.239 (0.286; 0.000)**
Size (logarithm)	**0.360 (0.047; 0.000)**	**0.381 (0.067; 0.000)**	**0.413 (0.070; 0.000)**	**0.280 (0.048; 0.000)**	**0.218 (0.070; 0.002)**	**0.374 (0.074; 0.000)**
Age (logarithm)	**-0.264 (0.108; 0.014)**	**-0.155 (0.071; 0.029)**	-0.096 (0.075; 0.196)	-0.068 (0.049; 0.163)	-0.091 (0.065; 0.158)	-0.027 (0.071; 0.709)
Sensing and seizing	N/A	N/A	N/A	**0.310 (0.050; 0.000)**	**0.319 (0.060; 0.000)**	**0.286 (0.070; 0.000)**
Reconfiguring	N/A	N/A	N/A	**0.298 (0.048; 0.000)**	**0.359 (0.064; 0.000)**	**0.249 (0.067; 0.000)**

Note: Statistically significant relationships are highlighted (bold); in brackets, standard errors and p-values are provided.
Source: own elaboration based on empirical research.

The control model explains circa 15% of the variability of innovation output, which signifies that both size and age of an organization play a role in explaining the innovativeness of a company. In the case of family business age negatively influencing its innovation output, it can be noticed that older FBs are, on average, less innovative than their younger counterparts. At the same time, age is not a significant factor in non-family business settings. The company's size is an essential predictor of innovativeness in both FBs and NFBs. Differences between these two models are subtle, except for the above-mentioned relationship. The second model revealed that sensing, seizing, and reconfiguring are essential in explaining the innovation output. There were no significant differences between family and non-FBs in this instance. It also showed that size remains an important determinant of innovation

output, positively influencing its levels, no matter the type of business. Age, on the other hand, becomes insignificant in both cases. This shows that studied FBs and NFBs were similar in relationships between DCs and innovation output. In sum, Table 3 analyses reveal no significant differences between family and NFBs in the sample. In estimated models, DCs with the size and age of the company explain roughly 30% of the variability of innovation output. Both models were estimated with acceptable levels of fit indicators – with RMSEA below the 0.06 cutoff line and CFI and TLI reaching levels approaching 0.95, which shows that theoretical models fit relatively well with the ones resulting from data. Calculating restricted and unrestricted models' parameters allowed for comparing both models using the right-tailed chi-square distribution function in Excel. The difference of chi-square of 21.821 with the difference of 10 degrees of freedom results in a 0.01 p-value, which signifies that the two models were significantly different in statistical terms. Thus, although path coefficients were similarly significant, there were differences between family and NFBs strong enough to justify the claim of the difference between FBs and NFBs in this regard. As seen from the determination coefficient, DCs are a more important predictor of innovation output in FBs than in NFBs.

To test the influence of environmental dynamism on the relationship between DCs and innovation output, separate models were calculated for FBs and NFBs. In this case, due to the latent variable moderation by the environmental dynamism, multigroup analysis was not possible in the Mplus program. Figures 2 and 3 present estimated models reporting relationships between DCs dimensions (sensing and seizing, and reconfiguring) and innovation output in the context of environmental dynamism. Comparing the two models reveals that they are similar at first sight. In both models, sensing, seizing, and reconfiguring are significantly related to innovation output. In both models, environmental dynamism is not a significant moderator of relationships between DCs and innovation output. In both models, firm size is a valid predictor of innovation output, and age, as a control variable, does not play an important role. The difference lies in the influence of environmental dynamism. In FBs, environmental dynamism was not a significant predictor of innovation output (-0.056; 0.063; 0.374), while in NFBs, it was (0.185; 0.093; 0.049). Furthermore, although significant, parameters had diverse levels indicating different explanation power. It was revealed in the determination coefficient. In FBs, DCs with size, age, and environmental dynamism explained 33.6% of the variation of innovation output. For FBs, the influence of studied constructs on the dependent variable was lower and accounted for 27.8% of the variability.

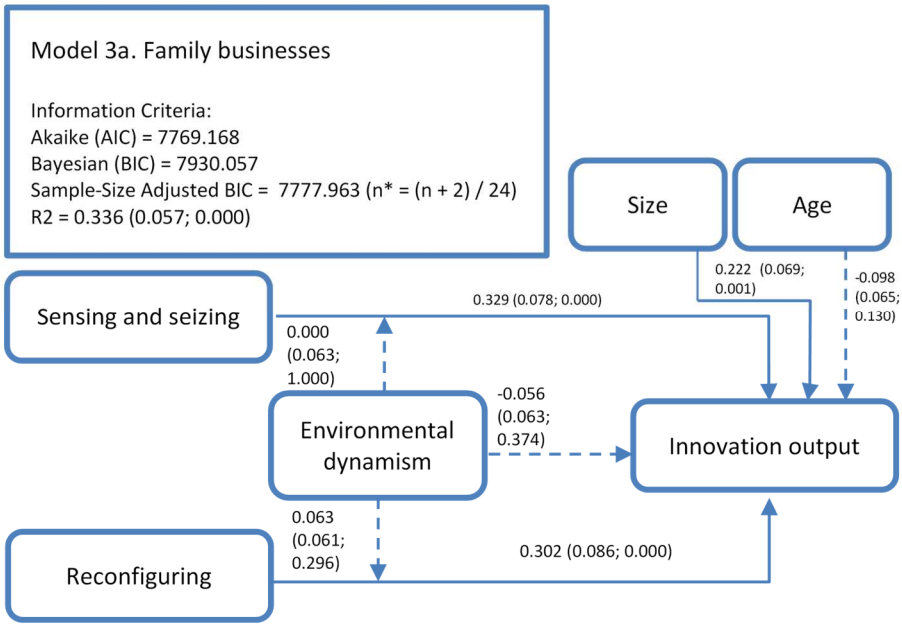

Figure 2. Relationships between dynamic capabilities and innovation output mediated by environmental dynamism in family businesses

Source: own elaboration of empirical research.

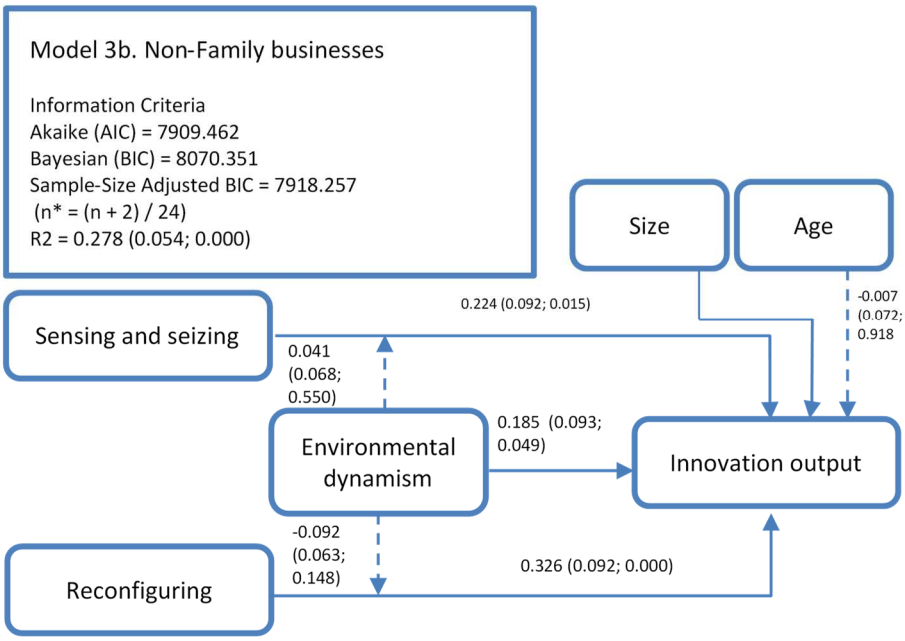

Figure 3. Relationships between dynamic capabilities and innovation output mediated by environmental dynamism in non-family businesses
Source: own elaboration of empirical research.

In the following part, we will discuss these relationships in more detail, searching for explanations, and trying to make implications for theory, practice, and future research directions.

Discussion

Research results revealed that DCs were positively related to the level of innovation output both in family and NFBs. This confirmed our first research hypothesis (H1). It also confirmed other studies that reported relationships between DCs and innovation in companies (Zheng, Zhang, & Du, 2011). Moreover, it proved the claim that FBs are significantly different in this respect in comparison to NFBs. In this case, one might expect more substantial differences in the innovation performance of DCs (*i.e.* diverse signs of coefficients or non-significance of relations in one case and significance in the latter). However, the direct comparison of restricted and unrestricted models (model 2) with right-tailed chi-square distribution revealed that differences were significant enough to claim that FBs are essentially different from NFBs.

Both identified dimensions of DCs played an important role in explaining the variability of innovation output in studied organizations. However, in FBs (Figure 2) settings, sensing and seizing coefficient (0.329; 0.078; 0.000) is slightly higher than the reconfiguring coefficient (0.302; 0.086; 0.000), which signifies these processes might play a slightly more important role for innovation output. It is the opposite in NFBs (Figure 3), where the reconfiguring coefficient is higher (0.326; 0.092; 0.000) than the sensing and seizing coefficient (0.224; 0.092; 0.015).

When explaining these differences, we should take into account that FBs in the sample were, on average, smaller than their non-family counterparts (mean 40 employees in FBs vs. 73 employees in NFBs). As proven, larger organizations usually have more financial resources and reserves (resource and financial slack) to implement innovations (Parida & Örtqvist, 2015), and thus proper reconfiguration of resources on hand may lead to more innovations. On the other hand, in statistically smaller FBs, the role of original ideas, which are direct responses to sensed opportunities, combined with appropriately crafted seizing activities, result in more innovations. It might signify a larger role of improvisation and utilization of resources currently on hand in FBs than in the case of NFBs. This is, however, a claim that needs empirical confirmation and could serve as a potentially interesting implication of the study fuelling future research.

Delving deeper into the role of environmental dynamism, our study revealed that it does not play an important role as supposed in hypothesis H2. It did not serve as a moderator of the main relationship in our study. Neither in FBs nor in NFBs did environmental dynamism significantly alter the influence of DCs on innovation output. It is contrary to other research results proving that the nature of the organizational environment acts as a moderator and influences the relationships in organizational settings (Rosenbusch *et al.*, 2013). However, in this instance, it should be noticed that the perception of the level of environmental dynamism directly influenced the number of innovations in NFBs (0.185; 0.093; 0.049), while it was non-significant in FBs (-0.056; 0.063; 0.374). It means that, on average, NFBs are more dependent on environmental jolts and tend to respond to a perceived increase in environmental dynamism with more innovations than their family counterparts. It might be explained by the fact that studied NFBs were significantly larger in terms of the number of employees (as indicated above) and thus had more resources to respond to increased environmental dynamism promptly. Combining these results with reported (Amann & Jaussaud, 2012) better adaptability and responses to FBs' external, unpredicted events (and organizational resilience) may signify that FBs are more restrictive towards investments in new solutions as a response to everyday environment changes than NFBs. It also suggests that FBs accumulate on average more financial and resource slack to be used in extreme situations. At the same time, these companies are reluctant to invest their resources daily, responding to natural environmental changes (Dreux, 1990). However, this assumption would require more in-depth study based on qualitative results and more profound information on the choices of FBs and NFBs.

CONCLUSIONS

We conclude that DCs are perceived as an important driver of performance and innovation in both FBs (Cassia, De Massis, & Pizzurno, 2012; Diéguez-Soto, Manzaneque, & Rojo-Ramírez, 2016, Fuetsch & Suess-Reyes, 2017) and in NFBs alike (De Massis *et al.*, 2015; Ferreira, Coelho, & Moutinho, 2020). Willing to contribute to the knowledge of dynamic capabilities, innovation, and functioning of FBs, we show how DCs lead to innovation irresectable of environmental dynamism. In light of our study, in FBs, sensing, seizing, and reconfiguring the existing resource base serve as a trigger for innovation. In NFBs, the role of sensing and seizing is slightly lower, although still statistically significant. Our study clearly supports the claim that FBs are statistically significantly different from their NFBs counterparts (Amann & Jaussaud, 2012), which serves as a trigger for further, in-depth analyses in the field. The different influence of DCs on innovation output in FBs as compared with NFBs may be well explained by the very specificity of these companies (Chirico & Nordqvist, 2010). This may be attributed to the fact that FBs develop different organizational climate for innovation because of the very specific 'organizational heritage,' open culture, idiosyncratic and tacit knowledge, or home-grown capabilities (Duarte Alonso *et al.*, 2018). Moreover, family involvement in business may to some extent influence the focus of FBs' key decision-makers on the effective deployment of DCs (Camisón-Zornoza *et al.*, 2020). However, further in-depth studies are necessary to confirm it.

Implications For Organizational Practice

On the practical side, our study confirmed the value and notion of DCs in both FBs and NFBs. Our research results proved that FBs should focus slightly more on sensing and seizing opportunities for improving innovation output, while NFBs should put more focus on the reconfiguration of resources, which might bring out a higher number of innovations than in the case of focus on sensing and seizing. For FBs, it is a clear indication that the focus on observing best practices in the sector, adopting best practices, investing in finding solutions for customers, changing practices when customer feedback provides a reason to do so, gathering economic information on operations and operational environment, establishing processes to identify target market segments, and modifying customer needs and responding to defect pointed out by employees should become an everyday practice (Wilden & Gudergan, 2015). Capabilities related to the substantial renewal of processes, changing ways of achieving targets, altering marketing methods and strategies, or implementing new management methods should also be considered as a source of innovations (Brines, Shepherd, & Woods, 2013; Werner,

Schroder, & Chlosta, 2018). However, these are less important in FBs than they are in NFBs. On the other hand, NFBs should pay significantly more attention to reconfiguration processes and slightly lesser to sensing and seizing capabilities.

Our study confirms that environmental dynamism does not play an important role in moderating the effect of DCs dimensions on innovation output. Thus, no matter the environment, both in the case of. FBs and NFBs, investments in the development of DCs should pay back in the form of innovation output (Uhlaner *et al.*, 2013). However, in NFBs, organizational growth in terms of the size of an organization should lead to increased innovation output, as proven by our research, and congruent with Pittino, Visitin and Mazzurana (2017) claims. For FBs, on the other hand, significant growth in the number of employees does not necessarily lead to increased innovation performance, which is against previous findings (Ding, Fu, & Yang, 2022). For NFBs, imitation of successful practices taken by their FBs' competitors may not lead to expected outcomes. This may be explained by the socioemotional wealth importance (Gomez-Mejia *et al.*, 2007; 2014), the influence of the family in FBs, which is not observed in NFBs (Duran, 2016; Kellermanns *et al.,* 2012), or founder influence (Arzubiaga *et al.*, 2018; Jaskiewicz *et al.*, 2017), which are uncharacteristic for this group of companies.

Future Research Directions and Limitations

The analysis of identified articles related to DCs and innovation led to a surprising observation. Among identified 134 articles, only one by Wang (2016) deals with environmental dynamism. Wang argues that environmental dynamism triggers DCs to appear with the moderating role of trust in this relationship. Although there is a rationale for such an approach and DCs were specified with referral to absorptive, adaptive, and innovative capabilities, Wang does not provide an alternative model structure. Innovative capabilities are closely related to innovation output in the research design.

The differences between FBs and NFBs are subtle but observable in the data. Focusing more on the distinctive characteristics of FBs might bring more evidence on how and why innovation performance is achieved in this type of company. However, our research results support the third hypothesis (H3). Although the differences are small, they are significant enough to justify the claim that the influence of DCs on innovation output is different in FBs and NFBs. We believe that including other variables more related to the specificity of FBs, would strengthen this argument. Of special interest are socioemotional wealth (Filser *et al.*, 2018; Fitz-Koch & Nordqvist, 2017; Li & Daspit, 2016) and the importance of these specific values for the functioning of FBs. Moreover, a different, more tradition-based strategic approach of FBs should be considered in this instance (Mariussen *et al.*, 1997). We are convinced that the interplay and interaction of family members with non-family members of FBs might also play an essential role in explaining the influence of DCs on innovation output (Memili *et al.*, 2015).

We also suppose that subtle differences between FBs and NFBs result from similar roots in studied organizations. On average, studied organizations were similar in terms of age, which signifies they were created at a similar time – in most cases, after the economic transformation of the 1990s. As a result, both types of companies had access to the same knowledge, were influenced by similar factors, and underwent similar environmental disturbances. Most likely, also the experience of managers and owners is similar. Frequently, owners and managers are firmly entrenched in the way of thinking characteristic of the socialist period (pre-1990). It might be especially evident in the case of FBs' owners. In most cases, these companies were before succession, which means they are effectively governed by the very first generation of managers, educated prior to economic transition. These organizational actors, very influential in everyday life and making decisions reflecting the company's future, were educated and gathered their experiences in different conditions, which is uncharacteristic for the market economy. Thus, the influence of socialist imprinting on the functioning of FBs would also make sense in future research (Kriauciunas & Kale, 2006).

We are convinced that future research should intensely focus on explaining the processes and thus should be based more on comparisons of qualitative data. Exploring the relationships, our study brings a few arguments on how DCs are transformed into new solutions. Getting deeper information on the processes behind it would greatly benefit our knowledge. This suggests case studies and more

grounded-theory-based research designs appropriate for gathering more evidence on these relationships (Qingliang *et al.*, 2021). Furthermore, studies reporting more than single source information, including triangulation, would help better understand the very nature of relationships in the model.

Our study is limited in terms of not including mediating variables and we believe it would better explain how DCs are transformed into new products and solutions. Previous studies suggested the role of organizational creativity (Bharadwaj & Menon, 2000), organizational culture (Büschgens, Bausch, & Balkin, 2013), and resource availability (Classen *et al.*, 2012). Knowledge management would also play an important role in this relationship (Cheung, 2016). We predict that including these variables in the model would further explain the innovation performance to a greater extent. Moreover, including slack resources, primarily financial, might help to show and explain the differences in the levels of innovativeness in studied organizations (Ruggiero & Cupertino, 2018). However, this was beyond the scope of the study and required further empirical proof.

Regarding the measurement choices, the scale for assessing the DCs referred strongly to innovation performance, especially concerning the reconfiguration items (Wilden *et al.*, 2013). This may raise a question about measuring the same issues as dependent and independent variables. Firstly, our study differs from the approach taken by Wilden *et al*. (2013), while the original study linked DCs to overall organizational performance and we focused on its influence on the innovation output explicitly. Secondly, Lichtenthaler and Muethel (2012) indicate differences between innovation capabilities and innovation output. The same issue is emphasized by Broekaert, Andries, and Debackere (2016), who test the influence of organizational flexibility, perceived through the lenses of DC theory on product and service innovation output. Similarly, Mennens *et al.* (2018) distinguish between absorptive capacity and innovation performance. In the article, we confronted declarative statements for capabilities which may lead to innovation with the number of innovations introduced within recent years. With respect to the alternative specification of dynamic capabilities in our study as compared to the investigation of Wilden *et al.* (2013), we believe that the composition and perception of the internal structure of the construct may slightly vary depending on diverse organizational settings. Literature offers different approaches to the internal structure of the researched constructs. While sensing and seizing opportunities created a joint dimension, reconfiguration remained unchanged. We believe it simply reflects the perceived internal structure better than blindly applying theoretical (albeit well-tested and validated) constructs in our analysis (Ruscio & Roche, 2012).

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Conflict of Interest

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Women and business: Empirical study on economic constraints, legal conditions, and social support influencing women entrepreneurs in Malaysia and Poland

Beata Ślusarczyk, Sedigheh Moghavvemi, Shehnaz Tehseen

ABSTRACT

Objective: The study aimed to develop and validate three factors, i.e. economic constraints, legal conditions, and social support that influence women entrepreneurs' managerial skills.

Research Design & Methods: A conceptual model was developed based on the literature review, and the data collected from 120 women entrepreneurs in Poland was utilised to construct the scale. The items were generated after validity, reliability, and exploratory factor analysis were conducted with SPSS software. The final developed scale was validated among 140 women entrepreneurs in Malaysia and the data was analysed through structural equation modelling (Amos).

Findings: The results show that economic constraints, legal conditions, and social support are the main factors that influence the managerial skills of women entrepreneurs. Further analysis shows that economic constraints, legal conditions, and social support, vary across countries and influence women entrepreneurs' businesses. Women entrepreneurs in Poland consider assertiveness, risk-taking, responsibility, patience, and diligence as essential features of entrepreneurs, while women entrepreneurs in Malaysia believe patience, independence, self-confidence, responsibility, courage, and the ability to work with people are the most important features.

Implications & Recommendations: This study identified the main factors that impact women entrepreneurs and highlights that the factors could have a significant effect on their managerial skills, which can provide knowledge for industry players and government officials who want to ease the start-up process and prevent failures.

Contribution & Value Added: This study advances knowledge about the various factors influencing women's businesses in emerging countries like Malaysia and developed countries like Poland. It also makes a practical contribution by helping to develop policies that can encourage entrepreneurship among women.

Article type: research article
Keywords: Women; entrepreneurship; socio-economic factors; legal conditions; Poland; Malaysia
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INTRODUCTION

Entrepreneurship stands as a vehicle to improve quality of life and sustain a healthy economy and environment. The importance of female entrepreneurship for economic development is widely recognized. The growth in the proportion of women entrepreneurs in developing countries has drawn the attention of both academic and developmental agencies to this untapped source of entrepreneurial talent (Ilie *et al.,* 2021; Solesvik *et al.,* 2019). Creating change through female entrepreneurship is seen as a liberating and transformative act (Jennings *et al.,* 2016). However, the lack of prominent, successful women business owners contributes to the general lack of visibility of women entrepreneurs and usually, it is assumed that successful business owners are all men (Solesvik *et al.,* 2019). This may be

due to the gender stereotype belief that women have less tendency to evaluate business opportunities, and thus their involvement in business is lower compared to men (Gupta *et al.,* 2014). This is because many of the studies conducted focused on male entrepreneurs and saw gender as irrelevant (Moreira *et al.,* 2019). While most studies on entrepreneurship focused on men in the past, with more and more women venturing out on their own, corporate leaders have made it a priority to learn about women's entrepreneurship (Moreira *et al.,* 2019; Kelley, 2017).

Although women are discriminated against their male counterparts, female entrepreneurs economically perform equally well as male entrepreneurs (Robb & Watson, 2012). Feminist social theorists recognise that men and women are not identical in every way and that women may take actions that are not always as effective as those taken by men (Welsh *et al.,* 2014). Research on entrepreneurship rarely considers the fact that female entrepreneurs in both developed and developing countries face different challenges when it comes to accessing resources (or 'inputs'). The fact is that many female entrepreneurs in developing countries do not have equal access to resources and must work with what they can get their hands on (Iakovleva *et al.,* 2013).

Women's economic participation in the private sector is much lower than that of men, because in many developing countries, like Malaysia, women have a hard time getting money to start a business. Most female business owners in developing countries struggle to find cheap sources of funding. Afza and Amir Rashid (2009) state that the performance of women company owners is strongly influenced by external factors such as political, financial, and social difficulties. Saleem (2017) posited that environmental factors, government regulations, and political difficulties in developing economies all played a role in whether or not women business owners were successful. Moreover, internal elements are not the only ones that contribute to an organization's success or failure; external issues such as political, economic, and environmental difficulties are crucial. Women-led small and medium-sized enterprises (SMEs) cannot keep up with the competition or deal with political, economic, or social difficulties on their own if they do not invest in R&D (Radzi *et al.,* 2017). According to research by Lindvert *et al.* (2017), political and economic instability is linked to the failure of female entrepreneurs. Since factors like the economy and politics are often beyond a company's control, it is fair to say that these factors have a major impact on the firm's performance and growth (Radzi *et al.,* 2017).

Understanding the impact of economic constraints, legal conditions, and entrepreneurs' networks or social support on the managerial abilities of women entrepreneurs in countries at different levels of development is crucial for a variety of reasons. Firstly, the rapid global expansion of women-owned enterprises has refocused attention on the significance of women entrepreneurs for the development of economies (Welsh *et al.,* 2021). Secondly, researchers have pushed for a more comprehensive knowledge of the unique and valuable strategic resources in the field of female entrepreneurship; thus, the social network is one of the crucial components of unique capital, *i.e.*, social capital (Welsh *et al.,* 2021). Thirdly, social capital, economic, political, and legal factors influence human capital, *i.e.*, entrepreneurs' managerial skills (Hernández-Carrión *et al.,* 2017). Political and legal conditions existing in a given country are very important for the development of small and medium-sized enterprises. Elements shaping the political and legal framework of entrepreneurship can stimulate or inhibit entrepreneurial attitudes in individuals. Therefore, the existing conditions may create favourable conditions for the development of entrepreneurship and create barriers to its functioning. The stability of a given country's political, legal, and economic situation is undoubtedly an important factor to consider in the process of starting and running an entrepreneurial activity, regardless of the size of a functioning enterprise. Furthermore, it is necessary to examine whether or not the competitive growth of nations plays a role in understanding the impact of these elements on women's managerial skills.

According to the Global Entrepreneurship Monitor 2020-2021 (GEM) Global Report, there is evidence that the proportion of women founding or running a new business in 2020 has decreased much more dramatically than that of men, maybe because women have been more burdened with homeschooling and housework since the pandemic. Italy, Poland, and India have the lowest rates of young female entrepreneurs. The GEM study indicates that men continue to be more likely to establish new enterprises than women. If one group in society is not launching businesses at the same rate as other groups, this will impede job creation, innovation, income production, the provision of new products

and services, and all of the other positive effects that new enterprises have on the economy and society. The women business owners provide for their families, create jobs, and promote their own and other women's rights. They act as models and have the authority to make decisions (Jha & Alam, 2021). Thus, it is essential to investigate the factors leading to the growth of women's businesses. When compared to men, women face greater difficulty when launching a company. There are monetary, legal, and cultural roadblocks. The global trend towards higher female representation in the public and private sectors is represented by a 13% increase in the number of female entrepreneurs in 2017, and this trend has maintained since then (Jha & Alam, 2021).

Considering the contribution of female entrepreneurs to the economy and society, it is important to look at the external factors that influence their businesses. Women entrepreneurs' subpar achievement is a worry for both developed and developing countries. Extensive literature deals with the topic of women in business in various contexts (*e.g*., Yadav & Unni, 2016); as well as female immigrant entrepreneurs (Chreim *et al.,* 2018); however, limited studies deal with the impact of external environmental factors including economic constraints, legal conditions, and social support on women's entrepreneurship. Although it has been acknowledged that economic factors negatively impact women entrepreneurs, existential studies revealed inconsistencies regarding this fact. For instance, according to the findings of Brownson (2021), in the Akwa-Ibom State of Nigeria, economic variables were not the roadblocks for women business owners. Instead, the data show that women business owners in Akwa-Ibom State experience positive economic factors, suggesting that the study's context is crucial. Likewise, another study by Kamaruddin *et al.* (2018) found that socio-cultural factors in Malaysian society are the primary inspiration for women company owners. Likewise, the majority of studies on female entrepreneurs have been conducted in developed nations; however, there is a dearth of data on women business owners in emerging economies where regulations are lax and systems are inefficient (Kimosop *et al.,* 2016). Still, less is known about the effects of political and social upheaval on business in developing countries (Welsh *et al.,* 2018).

Thus, the purpose of this study was to identify key macro-environmental factors affecting the decision to do business by women from developed countries like Poland and developing countries like Malaysia. Therefore, this article seeks to find the answer to the main question. (1) What is the effect of external environmental factors, including economic, political, legal, and socio-cultural conditions on women entrepreneurs' managerial skills related to running a business?

This study advances knowledge about the various factors influencing women's businesses in emerging countries like Malaysia and developed countries like Poland by filling the gaps mentioned above. It also makes a practical contribution by helping to develop policies that can encourage entrepreneurship among women.

The structure of the article is as follows. In the next section, we will discuss the contexts that have contributed to the growth of entrepreneurship in two different countries, *i.e.*, Malaysia and Poland. Following that, we will present an analysis of the study's theoretical background. The methodology of the research will be presented in the next section. The next part will be an analysis of the findings. Finally, the article will end with the discussion and conclusions.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Langevang *et al.* (2015) say that political, economic, social, and cultural factors all play a role in how and why women start businesses and how they can do so. These contexts also shape women's motivations and attitudes towards entrepreneurship (Martinelli, 2004). To a greater or lesser extent, the economic, political, cultural, and social environments of women entrepreneurs' home nations shape their businesses and their lives (Langevang *et al.,* 2018; Welsh *et al.,* 2016). Women business owners are both a part of and shaped by the unique cultural and economic environments of the developing or developed nations in which they operate (Ojong *et al*., 2021). Afza and Amir Rashid (2009) note that in practically every industry, political, financial, and social factors have a disproportionately large impact on the success of women entrepreneurs. Moreover, Saleem (2017) hypothesised that the climate, government regulations, and political issues in emerging economies had a substantial impact on the

success of women entrepreneurs. External elements, which include political, economic, and environmental conditions, are also crucial to businesses' performances.

Literature about female entrepreneurship in most developing countries talks about the complicated environment in which women entrepreneurs work and shows that their place in this political, institutional, social, and cultural setting causes problems. This embeddedness affects women entrepreneurs' control over resources, which affects their tactics. Entrepreneurs' markets depend on economic, legal, social, cultural, and technological factors that are outside of their control. These factors have different effects on businesses in different countries.

Impact of Economic Constraints on Managerial Skills

The economic environment exercises the most direct and immediate influence on entrepreneurship. When there is a conducive or supportive economic environment for businesses, more enterprises are established, and the existing ones also flourish. On the other hand, when the economic environment is not supportive, businesses suffer and eventually liquidate or collapse. Economic factors are the major key factors influencing the entrepreneurial behaviour and operation of small and medium enterprises (SMEs) across Chennai, Tamil Nadu State, India (Khan, 2014). The economic factor ranked the highest among all other factors, and an efficient economic environment has a strong impact on entrepreneurship activity (Olowa & Olowa, 2015). This evidence shows that economic policies such as taxation, interest rates, inflation rate, and the exchange rate affect the frequency at which people start up new ventures and develop them over time.

The study among small and medium entrepreneurs in Poland claims that the level of income tax rate used in Poland is too high and less competitive compared to taxes in, *e.g*., Cyprus, Estonia, Ireland, Lithuania, or Latvia (Dziadkiewicz & Całus, 2011). Taxation on general principles is the basic form of taxing economic activity in Poland. If no other form is selected, a natural person conducting business activity pays income tax at the rates of 12% and 32% on the surplus of income over PLN 120 000. If the flat tax option is chosen, the rate is 19% (Kubala, 2022). The high tax rate coupled with the high interest rate makes it difficult for entrepreneurs to get access to seed money for their start-ups. High tax rates affect the taxable income of individuals; it reduces their purchasing power and results in fewer entrepreneurial activities.

In their study regarding Poland, Dziadkiewicz and Całus (2011) argue that a continuous high level of unemployment and a low employment rate in the country create barriers to the development of SMEs. Despite widespread agreement that women in many developing countries face significant barriers when attempting to secure financing for their businesses, the rate at which women are investing in the private sector is in stark contrast to that of men. Many countries in the developing world have a dire need for women to have simple access to startup capital (Khan *et al.,* 2021). Similarly, simplified access to loans for women entrepreneurs has a positive effect (Shkodra *et al.,* 2021).

Economic factors include how well women business owners know about funding opportunities, how willing they are to apply for loans, how well they know how to start a business, and how the banks respond to their loan requests (Jha *et al.,* 2018). Inadequate capital or credit or financial institutions' credit schemes are only two examples of the many obstacles women business owners face (Halkias *et al.,* 2011). When a woman starts her own business or tries to grow it, she is more likely to run into money problems at every turn. These budgetary limits affect how well the company does overall (Khaleque, 2018). Researchers who have looked at the issue of women company owners' access to external funding have concluded that national economic policies are significant factors (Shaw *et al.,* 2012). Women business owners face greater credit limitations than their male counterparts (Khaleque, 2018). One of the most important variables affecting the success of women business owners is access to financial resources (Dinc & Budic, 2016). Research conducted through in-depth interviews with Indian businesswomen found that without substantial collateral or the help of male family members, women entrepreneurs had a hard time securing loans from financial institutions (Thakad, 2016). Thus, based on the above relevant studies, it has been observed that economic limitations can have a substantial impact on women entrepreneurs' managerial abilities. Economic limitations like limited capital or a lack of capital have an impact on women's managerial skills. For instance, women entrepreneurs

frequently struggle to secure capital for their firms. This can restrict their ability to invest in resources, such as technology and training, that can aid in the development of their managerial abilities. Likewise, due to insufficient capital, access to networks and resources may be restricted for women entrepreneurs, preventing them from acquiring the managerial skills necessary for success. For instance, women may lack access to mentors, business networks, or educational programmes that can aid in skill development. As a result, the following hypothesis was developed in this regard:

H1: Economic constraints have a negative impact on managerial skills among women entrepreneurs.

Impact of Legal Conditions on Managerial Skills

Women business owners have complained about the lack of favourable legal policies on their side when it comes to support for their businesses, which contributes to the uncertainty that stunts their business growth (Guma, 2015). Moreover, policies meant to promote women business owners are rarely put into practice, even when they exist (Akanji, 2016). In their early stages, women-owned businesses are especially sensitive to economic stagnation (Welsh *et al.,* 2016) and the stage of economic development in which a given country is currently operating (Guma, 2015). As pointed out in several articles, the institutional and legal settings in a number of developing countries are not friendly to female entrepreneurs (Singh *et al.,* 2010). There is a favourable correlation between supportive government policies and the success of businesses, making the design and execution of such policies crucial to women's entrepreneurship (Sequeira, Gibbs, & Juma, 2016). Women company owners now have access to more chances than ever before because of the plethora of online networking tools at their disposal (Steel, 2017). Women business owners may now engage directly with social groups, connect with and gain from their peers, and communicate with customers to both introduce and sell products; the rise of digital tools has facilitated such activities (Crittenden *et al.,* 2019).

Legal conditions may impede female business owners' managerial capacity. There are some ways in which favourable legal conditions can affect their abilities. Firstly, some countries have policies that are not discriminatory towards female company owners, which allows them to start and expand their businesses with ease. For example, they may be able to obtain credit in their own name or bind themselves to contracts. This allows them to equip themselves with the essential management skills required to run a thriving business. Secondly, they have proper legal protection that allows them to afford legal representation or alternative dispute resolution mechanisms in the event of a dispute with a supplier, customer, or business partner. Thirdly, regulations that are both transparent and unbiased against women make it easy for female entrepreneurs to launch and grow their businesses. Lastly, due to access to the justice system, women entrepreneurs can assert their legal rights and resolve conflicts. Thus, we assume a positive impact of legal conditions on managerial skills and hypothesise:

H2: Legal conditions have a positive impact on the managerial skills of women entrepreneurs.

Impact of Social Support on Managerial Skills

These contexts refer to the influence of attitudes and culture towards women in business (Jha & Alam, 2021). Socio-cultural influence refers to the powers that interactional relationships among individuals have on attitudes, behaviours, and dispositions (Linan *et al*., 2011). Relationships often reflect beliefs, values, attitudes, dispositions, and ways of life, all of which develop as the result of social, religious, educational, and ethnic moulding (Jha & Alam, 2021). As a result, women are often more likely to appreciate safe employment instead of personal development possibilities which is more valuable for men (Samoliuk *et al.,* 2022). An untypical example is the higher share of women in managerial staff in the family farming businesses for some types of business activity (Vasylieva & James, 2020). Socio-cultural environments in developing countries often do not support or encourage women's participation in economic activities. Women entrepreneurs can be subject to backlash from family and society for taking up entrepreneurial activity (Khaleque, 2018). From a socio-cultural viewpoint, societal influence is considered to have a broad effect on the creation of entrepreneurs (Pradeepika, 2017); social surroundings and norms have a particularly important influence on the

stage of entrepreneurial attitudes formation during education (Barrientos-Báez *et al.,* 2022). Chatwani (2015) explains that gender socialisation processes and gender roles within families and society are instilled throughout childhood and reinforced in adulthood through social interactions and norms. Several prominent studies concluded that social support for entrepreneurship influences the orientation of women entrepreneurs (Jyoti *et al.,* 2011; Jha & Alam, 2021). Evidence from developing countries suggests that socio-cultural hindrances including local customs, social obligations, patriarchal culture, low motivation, a lack of interest in entrepreneurial activities, and high rates of crime can result in lower levels of women's entrepreneurship (Rashid & Ratten, 2020).

Because patriarchal attitudes influence women who enter business, some women face opposition from their spouses (Mordi *et al.,* 2010). Women are supposed to stay home and raise their children (Kalafatoglu & Mendoza, 2017), hence, some women entrepreneurs conduct their enterprises from home, which limits their access to clients (Otoo *et al.,* 2011). Women entrepreneurs often face negative perceptions and rejection from their families, particularly their spouses. (McClelland *et al.,* 2005). Men are seen as the breadwinners in some developing countries. Hence, women who run businesses are seen as undermining their husbands' power (Kapinga & Montero, 2017).

Social support improves women entrepreneurs' management skills. For instance, mentorship and networking help women entrepreneurs build management abilities. Women entrepreneurs can learn from mentors and network with other business owners. Likewise, emotional support is also essential for women entrepreneurs. Women entrepreneurs often feel overwhelmed. Family, friends, and other business owners can help them overcome these challenges and maintain their motivation. Thus, based on the above literature, we hypothesise (Figure 1):

H3: There is a positive impact of social support on the managerial skills of women entrepreneurs.

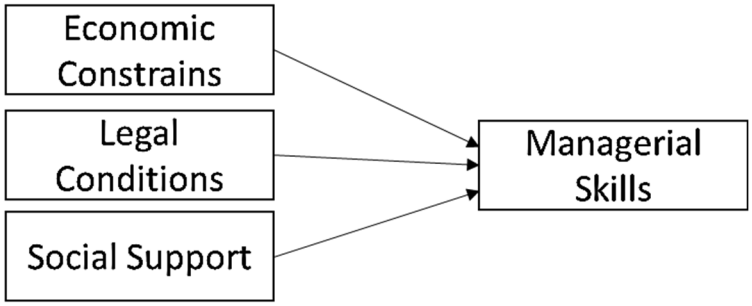

Figure 1. Conceptual framework
Source: own elaboration.

RESEARCH METHODOLOGY

Item Generation

A comprehensive literature review was conducted to identify economic, legal, socio-economic, and technological factors that impact women entrepreneurs. The items for each construct were extracted from the previous research. The empirical research was carried out in several stages. The first stage concerned the preparation of the assumptions for the research procedure. The next two stages consisted of conducting a pilot study based on a previously prepared research tool, enabling verification of the proper construction of the questionnaire. After making the necessary corrections resulting from the previous stages, the final version of the questionnaire was prepared. Items were categorised under economic conditions (12 items), political and legal conditions (14 items), socio-cultural conditions (14 items), professional and technical facilities (4 items), and business activities (16 items). The first stage of data collection was conducted among women entrepreneurs in Poland. The survey instrument was designed based on a five-point Likert scale (1=strongly disagree to 5=strongly agree). The questionnaire design consisted of three parts. The first part was related to the characteristics of the business, such as its scope, sector, legal form, year of activity, and the

reason for starting it. The second section of the questionnaire was related to economic, socio-cultural, political, and legal support and technical facilities and business activities. Finally, the third section was related to predispositions and demographic factors such as age and education.

Sampling Procedures

In the first part of the study, women business owners in Poland were investigated. Their main job was to run a business that was registered as a business activity. The research group included women from various socioeconomic backgrounds, some of whom were already running their own businesses and others who were in the process of starting them. Furthermore, the study also covered a group of women with the status of 'employees.' The request to complete the questionnaire was delivered to the respondents in two ways: in person and by e-mail. Information about female entrepreneurs selected for the study came from the following sources:

- authors' contacts;
- contact information from official websites of women's business management organizations;
- articles and industry reports with authors' contact details.

During the first round of data collection, a questionnaire was distributed among Polish female entrepreneurs. The data shows that around 66% of them had led their current business for more than three years, while 59% of them were full-time employees before they started their own business, and around 24% of them resigned because of the lack of professional development opportunities in their previous job and started their own business while having worked for more than 10 years (25%). Most of them (86%) were small businesses with fewer than 10 employees, and the majority (29%) were in the trade sector. Lack of professional development opportunities (24%) was the main reason for starting their own business (23%), followed by low salary (23%). In total, 34% of them were between 36 and 45 years old and used their own money (74% of them) to start a business; 74% had higher education, with a majority in social science (29%); 67% were married; and 37% had less than two children. The most critical features of entrepreneurs from their point of view were assertiveness (43%), the ability to take risks (28.3%), responsibility (26%), patience (24%), diligence (22.5%), the ability to make decisions (21%), creativity, and innovativeness (18%).

The data were checked for the missing value and internal consistency of initial items (Cronbach alpha (α)), and the results showed that for each construct, a higher Cronbach alpha would be attained if items were removed; therefore, some items were dropped to increase the reliability (three – eight items from each dimension were dropped). Subsequently, the removal of the items was confirmed by factor analysis (the items with low factor loading or overlap were dropped). The reliability for all the variables was greater than 0.7 except for business management, which was near the threshold. The results of the exploratory factors analysis showed that the items loaded in the economic constraint with six items, the legal constraint with four items, social support with four items, and managerial skills with three items (Table 1), which accounted for 50% of the total variance. All the items' loading factors were greater than 0.5. The extraction method was principal component analysis with the varimax-rotated component matrix.

The data was tested for normality and the results of the skewness and kurtosis showed that the data was normally distributed. The mean and standard deviation of each variable measured were calculated, and the results showed that social support factors had the highest mean (mean = 4.37). This highlighted the importance of social support for the success of women entrepreneurs (Table 2).

The questionnaire was finalised to collect data from women entrepreneurs in Malaysia to test the conceptual model.

Table 1. Exploratory factor analysis

Constructs (Poland)	EFA	Factor loading	Cronbach α
Economic constraints	KMO=0.747		0.769
The amount of taxes adversely affects the decisions to set up a business by women.	Sig: 000	0.770	
High non-pay labour costs represent one of the barriers to conducting own business.		0.876	
High non-pay labour costs affect the desire to limit employment for people running their own business.		0.786	
The conditions imposed by banks in granting credit to small businesses impede to start my own business.		0.681	
Limited financial support from the government makes it difficult for women to set up their own business.		0.711	
The high cost of managerial skill training constitutes a barrier when deciding to start business.		0.693	
Legal conditions	KMO=0.710		0.818
The lack of clarity in the tax regulations increases the risk of doing business.	Sig: 000	0.846	
Complicated tax laws make it difficult for entrepreneurs to conduct business activity.		0.891	
Frequent changes in the tax laws make it difficult for entrepreneurs to conduct their own business.		0.846	
Running own business involves the risk of failure.		0.616	
Social support	KMO=0.567		0.848
Running a business requires a personal commitment and a significant contribution in the form of free time.	Sig: 000	0.771	
The support received from my partner is a motivating factor in conducting business.		0.827	
The support received from my family is a motivating factor in conducting business.		0.532	
When I decided to start my own business, I was guided to achieve higher profits.		0.678	
Managerial skills	KMO=0.574		0.636
The entrepreneur taking a risk is an integral part of business management.	Sig: 000	0.667	
The entrepreneur determines the strategy of the company for its development.		0.848	
The entrepreneur should be focused on achieving a competitive advantage.		0.742	

Source: own study.

Table 2. The list of estimated models

Constructs	Poland			
	Mean	SD	Skewness	Kurtosis
Economic constraints	4.09	0.86	-0.904	0.129
Social support	4.37	0.87	-0.883	0.256
Legal	4.08	0.80	-1.593	2.070
Managerial skills	4.01	0.57	-1.410	3.907

Source: own study.

Sampling Procedures in Malaysia

The questionnaire was designed for the survey among women entrepreneurs in Malaysia. Similar to the questionnaire distributed in Poland, the questionnaire consisted of three parts. The first and last sections of the questionnaire were the same as those distributed in Poland. The second section of the

questionnaire was based on the results of the scale development. Furthermore, we added a few questions with high factor loading, which were dropped from the Poland data set, for additional testing and comparison with the data for Poland. To validate the scale, we developed and distributed the questionnaire among women entrepreneurs in Malaysia. We selected three big cities in Malaysia based on population and level of development: Kuala Lumpur, Penang, and Johor. The researcher identified the entrepreneurs from the list of companies in each city based on purposive sampling, and further clarification was conducted during data collection to select the correct respondents. The hard copy of the questionnaire was distributed personally by the researcher. The data showed that 53% of the respondents were in the business for more than three years, 65% of them were managing a business with less than 10 employees, while before they started their business, they were full-time employees (57%), and 25% of them were working between one to three years. In total, 37% left their previous job and started their own business because of a lack of promotion and professional development opportunities. Meanwhile, 43% of them were running businesses related to financial intermediation and production (making something for consumption, such as goods and services). In the sample, 49% of the women entrepreneurs were the only owners, and 53% founded their businesses entirely from scratch and used their resources (64%). More than 56% were above 36, while more significant percentages (30%) were more than 45 years old. Among the surveyed, 55% had higher education, most in art (26%) and social science (25%). Finally, 75% were married, and 33% had between two and four children.

According to Malaysian women entrepreneurs, the most important features of entrepreneurs were patience (46%), independence (32%), self-confidence (31%), responsibility (27.5%), courage (18%), and the ability to work with people (17.9%). The comparison of the views of women entrepreneurs in Poland and Malaysia (Table 4) shows that women in those countries have different perceptions of the most important features of entrepreneurs (assertiveness, risk-taking, responsibility, patience, diligence, the ability to make decisions, creativity, and innovation were the main factors for women entrepreneurs in Poland).

RESULTS AND DISCUSSION

The data from Malaysian women entrepreneurs was tested for normality, and the results showed that the data were distributed normally. The mean comparison results showed that social support factors had the highest mean (mean = 4.04), while managerial skills had the lowest mean (mean = 3.09) among women entrepreneurs in Malaysia (Table 3). This highlighted the importance of social support for the success of women entrepreneurs in Malaysia.

Table 3. Descriptive analysis

Constructs	Malaysia			
	Mean	SD	Skewness	Kurtosis
Economic constraints	3.40	0.935	-0.435	0.477
Social Support	4.04	0.470	-0.343	0.597
Legal Conditions	3.71	0.770	-0.806	-0.563
Managerial skills	3.09	0.590	-0.667	1.050

Source: own study.

The reliability test results showed that the Cronbach alpha (α) was higher than 0.7 for all the variables except social support and managerial skills. The confirmatory factor analysis was conducted through structural equation modelling (Amos). The results showed that all the items had acceptable factor loading (more than 0.7), and the composite reliability for all the variables was higher than 0.7. However, social support and managerial skills had low composite reliability. The results of the average variance extracted followed the same pattern and were higher than the acceptable value of 0.5, while the value for social support was on the borderline. The square root of the average variance extracted was higher than the correlation between the variables (Table 4). These results confirmed the convergent and discriminant validity of the variables.

The results of the fit indices of confirmatory factor analysis (measurement model) showed that the values of CFI = 0.906, TLI = 0.877, GFI = 0.879, and RMSEA = 0.068 were in the acceptable range and revealed that the data fit to the model very well (Table 5).

Table 4. Correlation, composite reliability, average variance extracted

Constructs (Malaysia)	CR	AVE	1	2	3	4	5
Economic constraints	0.763	0.723	**0.850**	–	–	–	–
Legal Conditions	0.792	0.736	0.482**	**0.857**	–	–	–
Social support	0.483	0.487	0.168*	0.142	**0.697**	–	–
Managerial skills	0.594	0.472	0.071	0.353**	0.254**	0.183*	**0.687**

Source: own study.

Table 5. Fit indices for the measurement model

CMIN	χ^2/df	TLI	CFI	RMSEA	GFI	IFI
170.375	1.63	0.877	0.906	0.068	0.879	0.910

Source: own study.

The results showed that legal conditions (β= 0.555, P = 0.004), social support (β= 0.494, P = 0.04), and economic constraints (β= 0.413, P = 0.04) significantly affect managerial skills. Economic constraints have a negative influence on managerial skills. Economic constraints, legal conditions, and social support predicted 42% of the variance in managerial skills. The result of the structural model showed that the fit indices CMIN = 119.159, χ^2/df =1.72, CFI = 0.892, GFI = 0.890, AGFI = 0.832, IFI = 0.897, and RMSEA = 0.07, were within acceptable levels (Hair *et al*., 2009).

Table 6. Results of the structural model

Relationship		β	C.R.	S.E.	P
H1	Economic constraints ⟶ Managerial skills	-0.413	-1.965	0.106	0.04
H2	Legal Conditions ⟶ Managerial skills	0.555	2.88	0.098	0.004
H3	Social support ⟶ Managerial skills	0.494	1.99	0.240	0.04

**p< 0.01; ***p< 0.001

Source: own study.

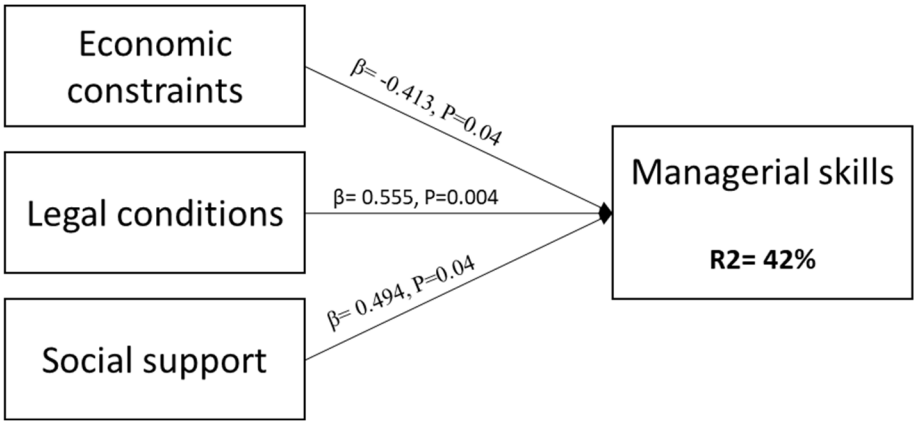

Figure 2. Research model

Source: own elaboration.

The outcomes of the study supported the first hypothesis that economic constraints would diminish management competence. The findings revealed that economic constraints, such as the lack of access to financial resources, restricted market prospects, and inadequate support services, present significant challenges for women company owners attempting to operate their companies successfully. This result is consistent with previous research that identified economic constraints as a significant

barrier to female entrepreneurs' success (Dinc & Budic, 2016; Khan, 2014). The results showed that in both Poland and Malaysia, adjustments to the law significantly improved female business owners' managerial skills – supporting the second hypothesis – which is supported by previous research in diverse contexts (Sequeira, Gibbs, & Juma, 2016; Akanji, 2016). Finally, social support networks considerably enhance female business owners' managerial skills. This result is consistent with findings from research undertaken in other nations (Jyoti *et al.*, 2011; Jha & Alam, 2021).

The comparison of the data from Poland and Malaysia showed that the legal, economic, and social factors are different and have different impacts on women. Malaysia is a diverse country with a mix of Malay, Indian, and Chinese groups as majorities, among other groups, which creates opportunities for women entrepreneurs to tap into business and serve a diverse customer base. Family values are strong, and Islamic influence impacts women entrepreneurs as they are subject to Islamic laws and regulations. For example, the Islamic fashion industry creates a lot of opportunities for women entrepreneurs in Malaysia. Malaysian culture has a strong entrepreneurial spirit and a growing number of women are starting businesses, some of them very successful and some operating small businesses. The community is supportive and the government is providing some financial help for small businesses.

Apostol's (2022) research findings indicated that the United Kingdom and Poland have higher women's early-stage entrepreneurial activity rates, encompassing women who aspire to start a business and those who have just initiated or currently oversee one. From the other perspective, women in Poland are in a different environment, which impacts their decision to start a business. The finding of this study, supported by the previous studies by González and Kobylińska (2022), reported that Poland's unemployment rate was 2.9% in December 2021 and early-stage entrepreneurship accounted for 2% of the total. The authors note that the scarcity of jobs is a significant motivator for individuals to start their own businesses, particularly for women in Poland who view entrepreneurship as a means of achieving economic wealth. Many women-owned businesses in Poland are small, with five or fewer employees, or even operated by a single person. Limited access to funding, coupled with women's tendency to prioritise the stability of their businesses' overgrowth and expansion, presents challenges for female entrepreneurs in Poland. However, income levels in Poland are more evenly distributed, suggesting that economic background may not be as decisive a factor for women seeking to start their own businesses.

The authors found that in Poland, middle-aged women with education beyond high school are more likely to start their own businesses. This is consistent with the finding from Georgieva (2022), according to which significant statistical variations exist among female entrepreneurs concerning their age, level, and category of education. Women in Poland perceive greater opportunities and an easier path to starting a business. However, fear of failure is more prevalent among women due to the prevailing social attitudes towards entrepreneurship and the stereotypical gender roles that perpetuate these attitudes. Concerns about how their family members will react to their decision to start a business and the potential impact on household duties may also discourage women in Poland.

CONCLUSIONS

This study aimed to develop a scale to measure the economic, political, legal, socio-cultural, technical, and professional facilities that impact women entrepreneurs' ability to start and manage their businesses. The items were generated from the existing literature and validated by academic experts in many stages. The questionnaire was developed, the data was collected from women entrepreneurs in Poland, and reliability tests, exploratory factor analysis, and correlation tests were run to develop the scale. To validate the scale and test the conceptual model, the data collected from women entrepreneurs in Malaysia and the model were run through confirmatory factor analysis. The relationship proposed was tested via a structural model. The results showed a significant relationship between economic constraints, legal conditions, and social support towards managerial skills. This research has provided further insight into how economic limitations, legal circumstances, and social assistance affect female entrepreneurs' managerial skills in nations with varying levels of progress.

Although the literature on the subject abounds with research on female entrepreneurship, each subsequent publication provides new conclusions. This is also the case with this study, the aim of

which was to develop and validate three factors, namely economic constraints, legal conditions, and social support that influence women entrepreneurs' managerial skills. The research was conducted using primary data collected in two countries that differed in the level of economic development and the social and legal conditions of society and economy. The contribution of the conducted research to the theory of women's entrepreneurship is even more important and interesting, hence, other researchers can conduct comparative research and develop it with new elements, thus contributing to the expansion of knowledge.

To increase the share of women among entrepreneurs conducting business activity, it is necessary to take further actions in the area of state policy, change the beliefs present in society regarding the perception of women, and disseminate information on running a business. Activities aimed at reducing barriers to entrepreneurship and programmes whose implementation may aid in the removal of prevalent stereotypes about men and women are extremely important from women's perspective. Actions promoting an equal approach to the roles played by women and men in society, as well as in family and professional life, are important.

Despite its importance for various implications, this study has a few limitations when it comes to interpreting findings. Firstly, the study results cannot be generalised to other developed and developing countries because they are limited to the sample countries, *i.e.*, Poland and Malaysia, analysed in this study. Thus, future researchers should investigate similar studies across different countries to see the impact of variables on the managerial skills of women entrepreneurs in different contexts. Secondly, other external environmental factors, namely political factors and technological factors, were not studied in the present study; therefore, future researchers should study these two factors in relation to women entrepreneurs' business success.

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Conflict of Interest

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When does entrepreneurial bricolage mediate the effect of entrepreneurial orientation on new product development? The role of environmental dynamism as moderator

Dede Kurnia, Hari Mulyadi, Heny Hendrayati, Zarina Denan

ABSTRACT

Objective: The objective of the article is to investigate the environmental dynamism (ED) conditions for entrepreneurial bricolage (EB) to function as the mediator between entrepreneurial orientation (EO) and new product development (NPD).

Research Design & Methods: This research was conducted using the cross-sectional method surveying 258 entrepreneurs in West Java, while the mediation role of the variables was analysed through macro PROCESS for SPSS developed by Andrew F. Hayes (Hayes, 2018).

Findings: The results showed that the influence of entrepreneurial bricolage is weak as a direct or mediating variable when the environmental dynamism is high or strong but has a strong mediating effect when the environmental conditions are stable.

Implications & Recommendations: To add to the body of knowledge on entrepreneurship, this research investigated the role of environmental dynamism in the direct and mediating relationship between entrepreneurial bricolage and new product development.

Contribution & Value Added: The investigation of entrepreneurial bricolage at varying levels of environmental dynamism is expected to make a substantial contribution to the entrepreneurship literature.

Article type: research article

Keywords: entrepreneurial orientation; entrepreneurial bricolage; environmental dynamism; new product development; conditional analysis process

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INTRODUCTION

New product development is a concrete and important effort to keep an advantage over competitors (Sheng *et al*., 2013; Wu *et al*., 2017; Zhao *et al*., 2022). However, entrepreneurs often fail to thrive due to limited resources (Davidsson *et al*., 2017). Some of the factors associated with these resources include a highly competitive market, operating in an environment with poor resources, and being personally attracted to opportunities considered unfavourable by investors. Fackler *et al*. (2013) reported that micro, small, and medium-sized enterprises (MSMEs) mostly experience difficulty in obtaining strategic resources. Yu *et al*. (2019) noted that this was more challenging for business owners in emerging nations, particularly during the current Covid-19 pandemic (Kuckertz *et al*., 2020). Moreover, the data published by the Ministry of Cooperatives and MSMEs in 2021 showed that Indonesia, being a

developing country, has 64.2 million MSMEs. Therefore, it is important to study the new product development (NPD) performance of MSMEs during the Covid-19 pandemic and consider the existence of a hyper-competitive environment with limited resources.

Liu and Wang (2022) have recently found entrepreneurial orientation (EO) to be the main motivation for entrepreneurs to pursue innovative goals such as NPD. In the meantime, several earlier studies emphasise the impact of EO on performance (Rezaei & Ortt, 2018) while none was reported on its effect on new product development (Yi *et al*., 2021). Ferreras-Méndes *et al*. (2021) state that EO is necessary to ensure successful new product development but not sufficient. This is because companies do not usually develop new products when they only have high entrepreneurial orientation without enough resources (Patel *et al*., 2015).

Ferreras-méndes *et al*. (2021) further explained that EO and the creation of innovative products highly depend on the company's internal capabilities such as *absorptive capacity* (Patel *et al*., 2015), organizational learning (Bouncken *et al*., 2014), and *organizational change* (Wales, 2016). Entrepreneurial bricolage, one of the internal skills, was found to have received less focus despite serving as a dependable method of addressing the issue of high uncertainty and difficulty in locating unique resources (Baker & Nelson, 2005).

As An *et al*. (2018) explain, the concept behind bricolage was developed by a French anthropologist called Lévi Strauss as a concept theoretically recommended to remain productive using available resources in times of crisis. It was further adapted by Baker and Nelson (2005) to define entrepreneurial practice as an attempt to engage in production activities by reusing and re-combining available resources (Desa, 2012). Several studies also confirmed the possibility of using entrepreneurial bricolage in new product development (Cunha *et al*., 2014; Senyard *et al*., 2015; Tasavori *et al*., 2018; Wu *et al*., 2007).

It has been noted that in the last five years, research on EB in the context of entrepreneurship has been dominated by the social-entrepreneur landscape as exemplified by Kwong *et al*. (2017); Tasavori *et al*. (2018); Janssen *et al*. (2018); Langevang and Namatovu (2019); Servantie and Rispal (2018); Malsch and Guieu (2019). Meanwhile, research on EB and its contribution to the company's ability to develop new products is yet to be firmly established because there have been very few studies conducted, thereby, making the research an endless topic for discussion (Bechky & Okhuysen, 2017).

The result of some previous studies showed that only four articles tested empirically the effect of EB on NPD. They are An *et al*. (2018), Sivathanu and Pillai (2020), Wu *et al*. (2017), and Yu *et al*. (2019). Meanwhile, Kwong *et al*. (2019) and Santos *et al*. (2020) showed the concept as a capability needed by companies in times of crisis, especially during the Covid-19 pandemic. Therefore, to bridge this gap, this research conducted an empirical evaluation of the impact of EO and EB on NPD by including ED in the framework as a moderating factor.

Importantly, placing ED as a moderating variable in one framework has not been conducted previously. Wu *et al*. (2017) considered technological turbulence, meanwhile, during the Covid-19 pandemic, changes occur in all aspects and not only in the technological aspects. It was also discovered that the majority of recent research places it as an independent variable, thereby showing a direct negative effect (Kim *et al*., 2020; Seo *et al*., 2020). The research objectives are to close the gaps in knowledge by offering convincing findings about how EO and EB affect MSMEs' capacity to NPD using the ED landscape.

This investigation focuses on 1) developing a conceptual framework based on the relationship between OE and EB in NPD, 2) ascertaining the beneficial effects of including ED as a mediator in the suggested conceptual model, and 3) firmly establishing the effect of EO and EB on NPD. Academically, this article contributes to fairly complex research on EO, EB, and NPD by incorporating an important construct that has not been fully explored, namely environmental dynamism.

The following sections will present the theoretical background, development of hypotheses, methodology, finding, discussion, conclusion, theoretical implication, practical implication, limitations and future research.

LITERATURE REVIEW

Entrepreneurial Orientation and New Product Development

In short, NPD is the utilisation of a company's resources and capacity to produce or enhance new or extant products (Cooper, 2003), which is performed after making predictions on the situation and conditions in the market (Liu & Wang, 2022). This means that new product development is company's effort to change the demand information from potential consumers. Even though new product development is required to maintain business sustainability, it is still practically associated with the risk of failure.

According to Wang *et al*. (2021), the success of NPD is crucial to company's survival, because it correlates with the company's success. Therefore, companies need the right strategy to anticipate failures when developing a new product. Karami *et al*. (2020) explain that entrepreneurial orientation, being the most established construct in the management and entrepreneurship literature, is useful for making strategic decisions. Moreover, Mu *et al*. (2017) found that the contribution of EO to the success of NPD has become a concern for managers in every company in the last few decades.

Moreno-Moya and Munuera-Aleman (2016) argue that EO allows for recognizing opportunities and threats in their environment, assisting in NPD in response to those opportunities. This belief is supported by the results from Donbesuur *et al*. (2020) that EO is a crucial and strategic element for NPD's success, which affects the company's success. Several previous research has also shown that EO is very important for the sustainability and creation of company's economic stability (Głodowska *et al*., 2019; Oghazi & Hultman, 2017).

Covin and Wales (2019) define EO as a company's strategy concerning decision-making and processes of generating new market entries. This practically increases company's awareness in relation to opportunities, which indicates the ability of those with a strong EO to invest in the skill development necessary to perpetually examine and monitor the environment for new opportunities. According to Lumpkin and Dess (1996), EO consists of five dimensions which include risk-taking, innovation, proactiveness, autonomy, and competitive aggressiveness. Meanwhile, Anwar *et al*. (2021) discovered that several studies in developing countries focus on three of these dimensions. Miller and Friesen (1978) were the first to include in their research innovation, risk-taking, and proactiveness as the elements believed to be the determinants of business success and the development of new products (Anwar *et al*., 2021; Ma *et al*., 2017).

Adam and Alarifi (2021) showed that a company's ability to innovate promotes the creation of new products and improves performance. Of course, these are important to maintaining a competitive position in the market (Anwar *et al*., 2021). This practically means that innovation ability which encourages the development of new products needs to be balanced with the courage to face risks (Brettel *et al*., 2014). This shows that entrepreneurs need the courage to take risks to achieve high-performance levels (Anwar *et al*., 2021). Moreover, proactiveness during the process of NPD significantly influences the search for the appropriate product to be developed. This is in line with the opinion of Gao *et al*. (2018) that it is very beneficial for companies to be proactive when scanning the environment for potentially profitable activities. This means the three dimensions of EO are important for the development of new products and values. This led us to the subsequent hypothesis:

H1: The development of new products is positively impacted by entrepreneurial orientation.

Entrepreneurial Orientation, Entrepreneurial Bricolage, New Product Development

In the entrepreneurship setting, bricolage has contributed to the birth of new insights in the process of implementing ideas (An *et al.*, 2018). According to Baker and Nelson (2005), this concept is the utilization of the available resources within the organization – including human and non-human resources – by successful entrepreneurs to solve challenges or execute new opportunities. In fact, the entrepreneurial literature states that entrepreneurial bricolage serves as the strategy of choice in the process of pursuing innovation and developing the company during a crisis or when resources are limited for various reasons (Phillimore *et al*., 2019; Senyard *et al*., 2015; Smith & Blundel, 2014).

This simply means that companies with good entrepreneurial bricolage perceive crises or scarcity of resources as opportunities to be creative (Cunha *et al*., 2014). This is mainly because the concept of bricolage was developed based on the assumption that limited resources can provide unexpected resources when utilized based on the bricoleur perspective (Lévi-Strauss, 1984). This point of view emphasizes three main principles, which include immediate action, the combination of resources for new purposes, and the application of resources at hand (An *et al*., 2018; Baker & Nelson, 2005).

Vanevenhoven *et al*. (2011) generally divide EB into two types which include internal and external bricolage. External bricolage refers to activities intended to expand the pool of potential resources available to business owners in their external surroundings, including social connections, tangible assets, and useful assets, while internal bricolage refers to the entrepreneur's internal resources, such as life experience, prior knowledge, education, and possible certification to use, improvise, or employ in operation and management processes. Thus, external bricolage refers to external resources (Nor-Aishah *et al*., 2020).

Notably, amid high uncertainty, rapid change, and difficult access to production resources, entrepreneurial bricolage is determined by entrepreneurial orientation because it reflects the strategic position of a company even during the process of exploring different actions. Ma and Yang (2021) defined bricolage in relation to the actions of companies and it was observed by Salunke *et al*. (2013) to be mainly driven by entrepreneurial orientation, thereby, allowing companies to maintain sensitivity to new opportunities and take risks (Ma & Yang, 2021; Zhenduo, 2015). Several studies showed that EO is the main driver of EB (Hooi *et al*., 2016; Mohammadi, 2021; Salunke *et al*., 2013). This is because EO makes companies always sensitive to new opportunities and risk-taking as a dimension of EO (Ma & Yang, 2021; Zhenduo, 2015). Some studies also suggested that entrepreneurs tend to run their businesses in environments with limited resources (Salunke *et al*., 2013; Sirmon *et al*., 2007). This condition makes entrepreneurs dependent on EO competencies to NPD or services with bricolage efforts or combining the available resources (Gundry *et al*., 2011). According to Zhenduo (2015), entrepreneurial orientation increases sensitivity to new opportunities through entrepreneurial bricolage activities. This resulted in the formulation of the subsequent hypothesis.

H2: Entrepreneurial orientation has a positive influence on entrepreneurial bricolage.

Several theoretical arguments showed that entrepreneurial bricolage triggers new product development. Firstly, it manifests a quick reaction to market demand (Guo *et al*., 2018) as well as trial and error efforts to modify a product (Xiang *et al*., 2020). Secondly, bricolage promotes new product development at a low price, because it uses the resources available (Su *et al*., 2020; Yu *et al*., 2019). Theoretical arguments regarding the entrepreneurial influence of bricolage on new product development are supported by Wang *et al*. (2021), Yu and Wang (2021), and Sivathanu and Pillai (2020). This observation resulted in the following hypothesis:

H3: The development of new products is positively impacted by entrepreneurial bricolage.

Mediating Role of Entrepreneurial Bricolage

Ferreras-Méndes *et al*. (2021) confirmed that for an NPD to be effective, EO is a required but not sufficient condition. This means a company also needs to pay attention to other factors such as internal capabilities and adequate resources to minimize failure while developing new products. In reality, Lumpkin and Dess (2001) claimed that ED plays a significant role in the connection between EO and NPD at the early stages of the concept's development.

Based on these reasons, several previous research has tried to add factors related to the company's internal capabilities as a mediating mechanism to increase the influence of EO on NPD. These internal factors included absorptive capacity (Patel *et al*., 2015), organizational learning (Bouncken *et al*., 2014), organizational change (Wales, 2016), and business model innovation (Ferreras-Méndes *et al*., 2021). Moreover, from these proposed internal factors, those that have been proven to increase the influence of entrepreneurial orientation on new product development have not been explored amid uncertainty and difficulty in accessing production resources.

This study aimed to propose entrepreneurial bricolage as an antecedent that mediates the effect of EO on NPD. It was motivated by the fact that companies with limited resources, entrepreneurial

orientation, and the ability to recognize opportunities must have entrepreneurial bricolage. This means that companies could create value through entrepreneurial bricolage by utilizing their resources effectively (Baker & Nelson, 2005; Senyard *et al*., 2015). Furthermore, companies could develop new products to meet existing opportunities by applying EB principles (Simba *et al*., 2020).

Entrepreneurial orientation is the initial phase in stimulating the development of new ideas. This means entrepreneurial orientation complements entrepreneurial bricolage, which focuses on new product development through immediate action using the available resources. Entrepreneurial bricolage is an internal mechanism needed to realize a company's entrepreneurial orientation. In line with this, the following hypothesis was proposed:

H4: Entrepreneurial bricolage mediates the effect of entrepreneurial orientation on new product development.

Environmental Dynamism as a Moderator

Environmental dynamism is the regularity with which environmental variables change, including technology, market demand, suppliers, customer preferences, and competitors (Ma & Yang, 2021; Seo *et al*., 2020; Wijbenga & van Witteloostuijn, 2007), as well as frequent rapid change and a high degree of ambiguity (Jahanshahi & Brem, 2020). According to contingency theory, environmental dynamism encourages companies to exhibit behaviours, processes, abilities, and management styles that adapt to various opportunities in their environment (Scott & Davis, 2007). This indicates that contingency is a crucial consideration when selecting the most suitable business strategy (Tajeddini & Mueller, 2018).

The increasingly dynamic customer preferences for consuming a product are impacted by the high level of ED, which leads to shorter product cycles, therefore, companies need to introduce new products more frequently (Atuahene-Gima *et al*., 2006) or modify them continuously (Zhao *et al*., 2014). Furthermore, environmental dynamism also affects the unstable supply of production factors, because it puts the company in a dilemma of having to introduce new products and at the same time need to overcome the scarcity of production factors. Based on these conditions, it is understood that environmental dynamism stimulates EB to overcome the instability of resource supply (Ma & Yang, 2021) by continuously integrating the available resources creatively, to develop new products. Therefore, the following hypothesis is put forth:

H5: The relationship between entrepreneurial bricolage and new product development is moderated by entrepreneurial dynamism.

Taking into account the previously mentioned arguments, the current one builds on two postulates, according to which entrepreneurial bricolage is a mediator of EO and NPD and ED strengthens the positive impact of EB on NPD. This means that when the occurrence of ED is high, the mediating effect of EB becomes stronger than the influence that EO has on NPD. Thus, we hypothesise as follows:

H6: Environmental dynamism is necessary for the indirect impact of entrepreneurial orientation on new product development through entrepreneurial bricolage. The stronger the indirect relationship between entrepreneurial orientation and new product development, the greater the environmental dynamism.

Figure 1 depicts the conceptual model of the connection between the suggested variables, which include EO, EB, ED, and NPD.

RESEARCH METHODOLOGY

Data Collection and Sample Size

The population consisted of owners of MSMEs in the food and beverage sector in the province of West Java, Indonesia. The survey location was selected based on data from the Central Statistics Agency in 2020 which shows this province has the largest number of food and beverage MSMEs. A non-probability sampling technique was used to obtain 258 MSME owners with less than five years in business

that were willing to respond to the survey, and the information was gathered cross-sectionally through an online-based survey conducted from December 2021 to March 2022.

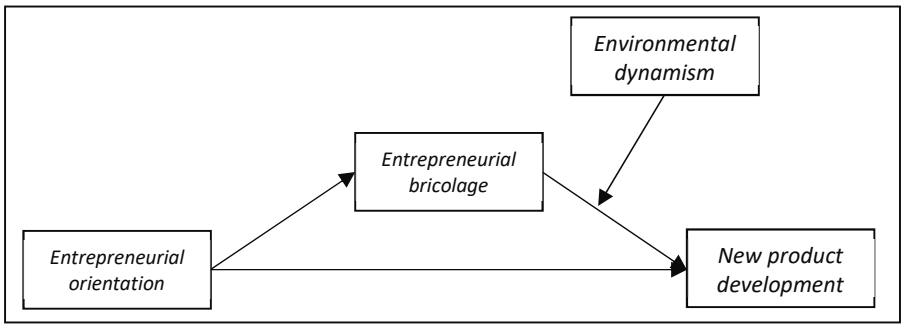

Figure 1. Conceptual model
Source: own elaboration.

Measures

Variables were measured using an instrument designed with a numerical scale of 1 to 7 points in line with the recommendation of Nunnally and Bernstein (1994) according to which the scale tends to produce interval data when using the anchoring technique. This measurement instrument was adapted from several previous research provided necessary modifications such as adaptation of the instrument used by Anwar *et al*. (2021) which consists of dimensions of innovation, risk-taking, and proactiveness for EO. Meanwhile, EB was measured using an instrument developed by Davidsson *et al*. (2017) and the other instrument developed by Yapu Zhao *et al*. (2022) was adapted to measure NPD. The environmental dynamics were measured using an instrument developed by Seo *et al*. (2020) and the results of this analysis show that all measurement instruments have good construct validity with standardized regression weights > 0.5.

Data Analysis

The measurement model test procedure used for data analysis was SEM-AMOS after which micro-PROCESS was applied to conduct conditional process analysis. This conditional process analysis is a relatively new term introduced by Hayes (2012, 2018) and further described by Hayes and Rockwood (2020) as a methodological approach that combines mediation and moderation to examine and evaluate theories about how different mechanisms vary depending on the environment or the individual. Meanwhile, Preacher and Hayes (2004) introduce a bootstrap method to perform this analysis before it was later recommended by Zhao *et al*. (2010) and widely applied in different research fields based on Yang *et al*. (2019).

Confirmatory factor analysis (CFA) with the multi-factor method and the AMOS were used to perform the measurement model test. It showed that $\chi 2 = 705.387$, df = 293, RMSEA = 0.07, CFA = 0.8, and TLI = 0.8. According to Hair *et al*. (2018), a RMSEA score lower than 0.08 indicates that the model fits the data and meets the criteria of goodness of fit (GOF). The CR, AVE, descriptive statistics, and correlations between variables are presented in Table 1.

RESULTS AND DISCUSSION

Test of Mediation Hypotheses

The proposed hypotheses used the transmittal and segmentation approach such that hypotheses 1, 2, and 3 were tested through the segmentation approach and hypotheses 4, 5, and 6 – through the transmittal approach. The transmittal hypothesis focuses on a single statement that the mediator (M) mediates the relationship between X and Y without exploring the hypothesis that links X to M and M to Y (Memon *et al*., 2018).

Table 1. CR, AVE, descriptive statistics, and correlation between variables

Variable	CR	AVE	M	SD	EO	EB	NPD	ED
EO	0.89	0.51	36.18	8.24	1	–	–	–
EB	0.88	0.62	38.08	6.73	0.524**	1	–	–
NPD	0.89	0.58	32.48	6.85	0.548**	0.728**	1	–
ED	0.83	0.50	23.64	5.57	0.638**	0.540**	0.675**	1

Note: N = 258. *p < 0.05, **p < 0.01
Source: own study.

The outcomes of the Macro PROCESS study are displayed in Table 2. It was discovered that the direct effect of EO on NPD had a p-value of 0.000 (< 0.05). This indicates that the hypothesis (H_1) was verified. This was supported by the range between the lower-level confidence interval (LLCI) and the upper-level confidence interval (ULCI) attaining its maximum value between 0.112 and 0.270. This is in line with the recommendation of Hayes (2018) that the proposed hypothesis should not be rejected when the LLCI and ULCI values are not below 0.

Table 2. Mediation analysis results

Model	Effect	SE	P	t	95% CI
Direct					
EO → NPD	0.191	0.040	0.000	4.760	0.112 to 0.270
Indirect (mediation)					
EO→EB	0.428	0.043	0.000	9.841	0.342 to 0.514
EB→NPD	0.618	0.049	0.000	12.558	0.521 to 0.714
EO→EB→NPD	0.264	0.039			0.193 to 0.345

Source: own elaboration of macro PROCESS model 4 output.

The second hypothesis (H_2) on the advantageous impact of EO on EB was tested and also accepted as indicated by the coefficient of the p-value of 0.000 (<0.05) was in line with a1 and LLCI with ULCI reaching between 0.342 and 0.514. Moreover, the third hypothesis (H_3) concerning the connection between EB and NPD was in line with b1 and showed positive results due to the p-value of 0.000 (<0.05) as well as the LLCI with ULCI values in the range between 0.521 and 0.714.

The mediation hypothesis was tested in line with the developments by Baron and Kenny (1986) on the application of four conditions to determine mediating effects. In the first condition, the predictor variable was seen to have a direct impact on the mediator, whereas, in the second condition, the mediator variable greatly impacted the dependent. Thirdly, the coefficient of the mediator had to be significant while the fourth required the independent variable's coefficient – insignificant.

The outcomes of the mediation study are shown in Table 2. An indirect impact of EO was discovered on NPD via EB as indicated by an effect of 0.264 with SE = 0.039, LLCI = 0.193, and ULCI = 0.345, and this means that the fourth hypothesis (H_4) was also accepted, thus supporting Hooi *et al*. (2016), Mohammadi (2021), and Salunke *et al*. (2013). Moreover, it was discovered that EB had a partial mediating role in the direct and significant relationship between EO as an independent variable and NPD as a dependent variable. This is also in line with the rules stated by Baron and Kenny (1986) that the direct influence of the independent variable on the dependent variable constitutes partial mediation, thus supporting Ma and Yang (2021).

Test of Moderated Mediation

Based on several guidelines from prior research, the 14 macro PROCESS model was used to assess the moderating-mediating impact of the proposed variables. These conditions include the existence of 1) a significant indirect effect, 2) a significant interaction between mediators, and 3) a moderator to predict the criterion and the independent variable that has a conditional indirect effect. These

were based on different criteria related to the mediators at high and low moderating levels (Guarana & Hernandez, 2015; Srivastava & Agrawal, 2020).

The results of the analysis conducted using the moderation-mediation model validated the fifth non-directional hypothesis (H_5) by showing that ED moderated the relationship between EB and NPD. However, ED had a negative moderating effect of -0.017 on the relationship between EB and NPD with a p-value of 0.017, LLCI of -0.030, and ULCI of -0.003. These results indicated that the tendency of EB to affect NPD becomes weak when the ED is high. This is in line with the rule by Holland *et al*. (2017) that the impact of variable X on Y becomes weak when the moderator is high in terms of a negative moderating effect. Thus, the fifth hypothesis (H_5) was accepted.

The post hoc probing effect presented in Figure 2 shows that the slope of the regression line for the NPD over EB gets steeper as the ED value increases. This further validates that there was a weakening effect caused by an increase in ED. The analysis also showed that the R^2 Change value of 0.008 indicated that 0.8% of the change in the relationship between EB and NPD was caused by the moderating effect of ED.

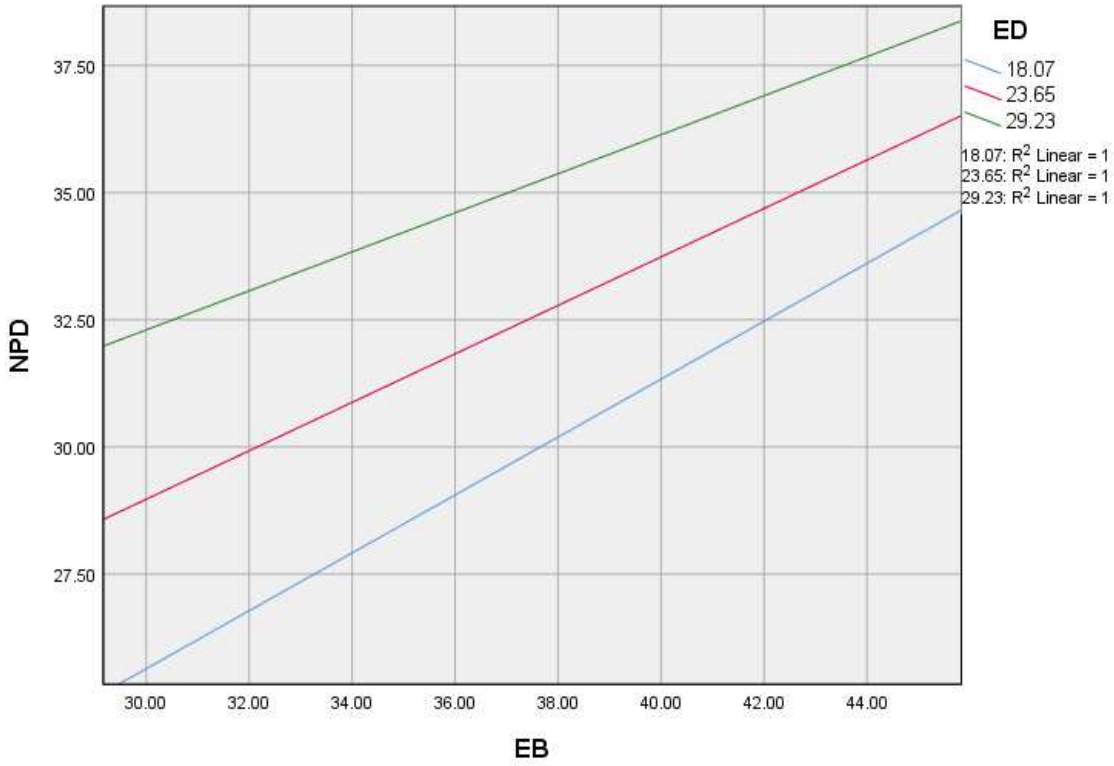

Figure 2. The moderating role of ED on the EB-NPD relationship
Source: own elaboration.

The macro PROCESS classifies environmental dynamism into three levels of conditions to prove the moderating-mediation conditional effect and these include low, moderate, and high levels as indicated in Table 3.

Table 3. Moderated mediation results for new product development

Value moderator	*Conditional indirect effect*	SE	95% CI
18.068 (-SD)	0.244	0.040	0.169 to 0.326
23.647 (M)	0.204	0.032	0.145 to 0.271
29.227 (+SD)	0.164	0.034	0.103 to 0.237

Source: own elaboration of macro PROCESS model 14 output.

Table 3 shows that effect of EO on NPD mediated by EB was strongest when ED was at a weak level (-SD; indirect effect = 0.244). Meanwhile, the indirect effect of EO on NPD got weaker when ED was

strengthened (+SD; indirect effect = 0.164). This analysis showed that the sixth hypothesis (H_6) constructed directionally was not accepted because a high environmental dynamism led to a weaker indirect relationship between the variables. Figure 3 showed the conditional direct and indirect effects.

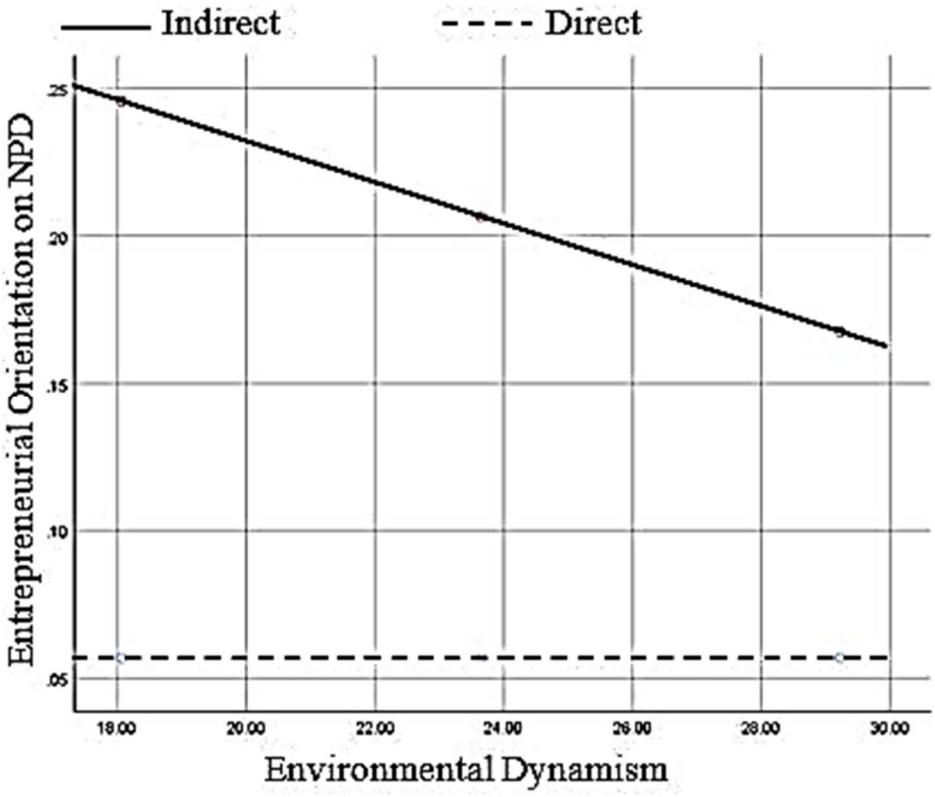

Figure 3. The conditional direct and indirect effect
Source: own elaboration.

The visualization results in Figure 3 show that the slope of the line indicates the level at which the indirect impact of EO on NPD is influenced by the strength of ED. Meanwhile, the direct effect was found to be constant at a value of 0.191 based on the coefficients in the conditional process model, because it is independent of the moderator variable. Noteworthy, the slope of the line for the indirect effect in Figure 2 is ab3 = 0.428(0.870) = 0.372. This resonates with the magnitude of the indirect impact of EO on NPD was influenced by ED through EB.

Discussion

This research examined the in-depth and direct effect of EO on NPD and the mediating influence of EB on the indirect effect. Previous studies showed that companies need to pursue an EO to achieve superior performance (Ferreras-Méndes *et al*., 2021; Tajeddini & Mueller, 2018). This is because an EO configures certain abilities to recognize threats and opportunities to NPD (Moreno-moya & Munuera-Aleman, 2016). However, some showed that EO needs to be supported by other variables in the mediating role to produce a more comprehensive explanation in terms of company performance and NPD (Ma & Yang, 2021). In this case, other variables should be involved to obtain a comprehensive model to achieve optimal new product development (Amankwah-Amoah *et al*., 2019).

It has also been previously reported that new product development is an important strategic process for company's success (Bouncken *et al*., 2020). Moreover, Wang *et al*. (2021) interpreted the perspective of the resource-based theory in relation to the need of a company to have strategic resources capable of increasing innovation in order to achieve superior NPD. However, some businesses, especially new ones, often experience difficulties in accessing strategic resources. This is why Ma and Yang (2021) suggested recognising how other factors act as mediators to increase EO's influence.

The study revealed that the effect of EO on NPD provides a larger coefficient when mediated by EB. These findings supported Ma and Yang (2021) that EO triggers EB, which enhances NPD. The results provided a new perspective in examining the relationship between EO and NPD, previously studied based on competence, entrepreneurial networks, and opportunity creation (Anwar *et al*., 2021a; Su *et al*., 2015). Meanwhile, the direct effect had a smaller coefficient which implicitly indicates that the ability to recognize threats and opportunities in a company's environment is not practically sufficient to develop new products as a response to existing opportunities (Moreno-Moya & Munuera-Aleman, 2016).

The higher coefficient recorded for the impact of EO on NPD after the involvement of EB as a mediator variable also validated the findings of previous research. For example, Ferreras-Mendes *et al*. (2021) and Lumpkin and Dess (2001) showed that a company also needs to pay attention to other factors such as internal capabilities and adequate resources to minimize failure when developing a new product. This is relevant to the description of Simba *et al*. (2020) that companies need NPD to meet opportunities by applying the principles of EB.

The conducted model conditional process analysis showed that the mediating effect of EB on the relationship between EO and NPD is highly dependent on the level of environmental dynamism. This simply means that the underlying effect of EO on NPD becomes weak when the ED is high. It also shows that the EB can only mediate the impact of EO on NPD when ED is at a low level or even in a stable environment. This is in line with the findings of Wang *et al*. (2021) that EB is optimal when the organization's structure consists of individuals from different backgrounds providing diverse knowledge.

The findings showed that ED mediates the effect of EB on NPD. These results contradict Ma and Yang (2021) that EB is the main antecedent in improving business performance in various environmental conditions. However, Ma and Yang (2021) used respondents with over five years of experience in managerial and business backgrounds, so they were more adept at surviving in various situations and conditions.

According to the sixth hypothesis test, in a rapidly changing and unpredictable environment, entrepreneurs must have internal capabilities that are more sophisticated than EB. This indirectly rejected the findings of Phillimore *et al*. (2019) and Smith and Blundel (2014) that EB is an alternative strategy to keep innovating during a crisis.

CONCLUSIONS

Several earlier studies used mediating factors like opportunity creation to analyse the relationship between EO and firm success (Anwar *et al*., 2021a), customers' satisfaction (Cuevas-Vargas *et al*., 2019), and functional performance (Rezaei & Ortt, 2018). However, studies involving internal capabilities as recommended by Ferreras-Méndes *et al*. (2021) are still limited. This means that studies on the effect of internal capabilities such as EB in the relationship between EO and NPD need to be improved.

This research demonstrated that EB is stimulated by EO (Hooi *et al*., 2016; Mohammadi, 2021) to influence NPD (Guo *et al*., 2018; Xiang *et al*., 2020). The relationship between EB and NPD is also influenced by high or low ED. This means that EB is a mediating variable moderated by ED in the relationship between EO and NPD. The results indicated that EO and bricolage support NPD. Therefore, entrepreneurs with adequate EO and bricolage achieve higher NPD.

The mediation effect analysis showed that EO and bricolage could become important aspects of NPD. The results showed that high ED weakens the influence of EB on NPD. This implies that when ED is high, entrepreneurs should focus more on EO because EB is usually weak. However, stable or low ED is important in the NPD process. The moderating effect of ED on the relationship between EB and NPD has been rarely studied. Therefore, it is quite difficult to find relevant literature that confirms this finding.

Theoretical Implications

This study adds a number of significant ideas to the literature on entrepreneurship. Firstly, it is consistent with Fisher's (2012) recommendation for more comprehensive research on entrepreneurial bricolage. The results showed that EB increases the influence of EO on NPD performance, especially to

assist new businesses in overcoming resource constraints as suggested by An *et al*. (2019); Busch and Barkema (2020); Su *et al*. (2020) and also for companies as a whole (Walheiser *et al*., 2019).

Secondly, the findings also established several environmental dynamism conditions in the connection between entrepreneurial bricolage and new product development. It confirms that entrepreneurial bricolage only improves the new product development performance in an environment with a low or even stable level of environmental dynamism. This novel discovery and understanding stem from the bricolage study in the context of entrepreneurship, wherein entrepreneurial bricolage serves as a tactic to be used in times of resource scarcity (Hota *et al*., 2019; Musona *et al*., 2020; Phillimore *et al*., 2019; Smith & Blundel, 2014) yet cannot overcome environmental dynamism.

Practical Implications

The results provided practical and managerial insights into the activities performed by entrepreneurial actors. Firstly, entrepreneurs could rely on EO and bricolage to trigger new product development. Secondly, high ED weakens the mediating role of EB, meaning that entrepreneurs should focus more on EO when ED is high. This would increase the company's sensitivity to opportunities, indicating that a strong EO supports competency development to identify new opportunities. Conversely, stable or low ED are important aspects to rely on in the NPD process. The moderating effect of ED on the relationship between EB and NPD is currently rarely studied. Therefore, it is quite difficult to find relevant literature that confirms this finding.

Limitations and Future Research

There are several limitations to this research. Firstly, the respondents were only entrepreneurs in West Java Province selected using a sampling method without a probability technique. This has statistical limitations in relation to the generalization of the results to a wider population. For example, the research on entrepreneurial orientation, entrepreneurial bricolage, and environmental dynamism has only been conducted in developed countries such as Italy, the United States of America, and China up to the present moment but their findings cannot be applied to developing countries. This study recommends further research to explore entrepreneurial bricolage using two culturally and demographically different populations to provide specific insights as a contribution to the development of entrepreneurial bricolage literature in general. These results are anticipated to stimulate additional investigation using a conditional process analysis methodology to look at additional factors enhancing the impact of entrepreneurial bricolage on new product development.

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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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Channel preferences and attitudes of domestic buyers in purchase decision processes of high-value electronic devices

Krisztina Taralik, Tamás Kozák, Zsolt Molnár

ABSTRACT

Objective: The objective of the article is to examine how respondents' technological readiness (as an individual factor besides demographic characteristics) influences channel preference (in-store, online big- and small-screen at different stages of the purchasing decision process for high-value electronic devices (products).

Research Design & Methods: The research encompassed data collected by a quantitative online survey of 415 respondents in Hungary. To identify homogenous groups in the sample, we used cluster analysis based on factors we determined among the technology-readiness variables.

Findings: We identified the technological readiness index 2.0 (TRI) segments in our sample and our findings confirmed that the perceived technological readiness has a significant influence on customers' channel choice.

Implications & Recommendations: Customer experience (CX) is far more than satisfaction with the product; it is influenced by the total purchasing decision process starting at the need recognition and ending at the post-purchasing stage. The difficulties and uncertainties in any stage of the decision-making process result in anxiety and reduce the CX. The uncertainty can arise from factors related to the product, individual, or channel.

Contribution & Value Added: Although the sample is not representative, it provides insight into how Hungarian respondents can be segmented based on technological readiness and how this affects their channel preferences during the customer journey through purchase decisions regarding electronic devices.

Article type: research article

Keywords: technological readiness; omnichannel; customer experience; pattern of channel usage; perceived control over the purchasing process; TRI

JEL codes: M31

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INTRODUCTION

Because of the wide range of products and services offering similar attributes, the limited amount of time, information and money, and the customers' desire to choose the best possible alternatives, the purchasing process requires a certain degree of physical and mental effort.

Consumers' perceived value of the purchasing experience is far more than the satisfaction with the product. It is influenced by the total purchasing decision process starting at the need recognition and ending at the post-purchasing stage. The difficulties and uncertainties in any stage of the decision-making process result in anxiety and reduce the customer experience (CX). Therefore, the natural aim of buyers is to reduce uncertainty and increase decision confidence.

The lower level of uncertainty – associated with the purchase – results in greater perceived control over the process, which provides a higher degree of confidence in purchasing decisions for customers (Schul & Mayo, 2003). Satisfaction with the decision-making process leads to consumption satisfaction and positively influences post-choice behaviour (Heitmann *et al.,* 2007).

The retail market is getting more and more competitive and saturated, so retailers are forced to constantly look for new customers. Knowing where to attract customers from and what are the characteristics of the target groups is essential. Based on this information, retailers can develop and implement strategies and activities, while determining touch points that best suit the needs of their customers' preferences. In this research, the data was used to define segments based on the technological readiness of Hungarian buyers. The segmentation method described in this research can be used to create a predictive model that identifies likely characteristics of attractive consumers.

Our research objective was to examine the channel choice of customers at different stages of the purchasing journey for high-value electronic devices on a non-representative sample of Hungarian customers. Although several statistical analyses deal with channel usage in Hungary, we did not come across any research that examined the relationship between technological readiness and the purchasing habits of the product category included in our study. That is why we thought it would be exciting and meaningful to investigate this area.

The purpose of this study was to examine how the respondents' technological readiness influenced the use of channels in the purchasing decision process of high-value electronic devices.

The following research questions were determined:

RQ1: What homogeneous groups can be identified in our sample based on technological readiness? Do the segments identified by Parasuraman and Colby (2015) based on the technological readiness index 2.0 (TRI) appear in our sample?

RQ2: Do the preferred channels at different stages of the technical product purchase process show a closer correlation with each other? (If someone prefers a given channel at a particular stage in the buying process, will they be more likely to prefer that channel later in the process?)

RQ3: Can we identify different patterns in channel preference of different segments based on TRI 2.0?

RQ4: What clusters can we identify based on channel preference?

RQ5: Can we find relationships between TRI segments and channel preference clusters?

This article will first examine the role of control in the shopping experience and the shopping patterns developed in practice based on a literature review. This will be followed by an overview of the methodology and the results of the primary analyses based on the formulated research objectives, based on which the researchers' conclusions will be presented.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Control Over the Purchasing Decision Process

The shift of power from retailers to consumers affects the equation, the sides of which are the perceived friction and the reward of shopping (Hammond, 2017). All internet-based innovation happens when retailers reduce purchase friction and increase shopping rewards. On the one side, the selection of friction variables might comprise travel distance, and the time needed to complete a shopping transaction; on the other side, reward factors could be *i.e.* price advantage, service quality, and thrill of speciality. One of the most important golden rules in channel choice to customers is for it to be easy to spend money.

Several research studies examined the customers' channel choice across the different stages of the decision process in relation to the different segments of buyers. There is a wide range of considered variables in this area. For instance, scholars examined the buyers' group channel choice based on the motivation of channel usage (Frasquet *et al*., 2015), and the attitude of buyers (Rodríguez-Torrico *et al*., 2017). Research also covers different product categories (Konuş *et al*., 2008) and examines channel choice based on sociodemographic variables, order hours, product categories, and communication strategies applied by the seller (Park & Lee, 2017).

The uncertainty associated with the purchasing decision can arise from factors related to the product, individual, or channel (Santos & Martins Gonçalves, 2019).

An important product-related factor is involvement (Frasquet *et al*., 2015). The higher the involvement, the more extensive the information needed (Puccinelli *et al*., 2009). For highly involved consumers, it is very important to choose the best option according to their shopping needs, and thus, they perceive a higher level of uncertainty in the purchase. In this study, we examined the purchasing decision process of valuable electronic devices that represents a big part of the buyers' budget which thus increases the level of involvement.

The individual factors are very complex. Determined by factors of the person's black box such as demographic attributes, motivation, perception, attitude, self-concept, and so on. In this study, besides the demographic characteristics, we examined how respondents' technological readiness influences channel choice during the purchasing process of expensive technical equipment.

Besides the involvement and internal factors, the CX is influenced by situational variables connected to the channel. Both offline and online channels have advantages and disadvantages in relation to the aim of decreasing decision uncertainty.

Table 1. Pros and cons of offline and online channels

Category	In-store	Online
Pros	Provides interactions with the products and other people (*e.g*., salesperson or other customers). The personal experience with a product; the ability to touch merchandise decrease the uncertainty of choice (Peck & Childers, 2003).	Besides the large amount of available information, it provides decision assistance tools to search, compare, and evaluate alternatives.
Cons	Provides only limited alternatives compared to the online channels.	Because of the limited cognitive capacity of consumers, great amounts of information can overload consumers' minds and result in confusion and anxiety (Walsh & Mitchell, 2010). The lack of interaction with products and other people may increase the level of uncertainty (Peck & Childers, 2003).

Source: own study.

Perceived security is an important factor in the perceived shopping experience (Davis & Venkatesh, 1996), while perceived security is influenced by technological readiness (Hallikainen *et al*., 2019; Parasuraman & Colby, 2015). Davis and Venkatesh (1996) created the technology acceptance model (TAM), which assesses and predicts user acceptance of emerging IT and captures extrinsic motivation by the perceived usefulness (PU – the extent to which an individual thinks that the use of a particular system enhances his/her own performance) and the perceived ease of use (PEU – the degree to which the individual needs mental and physical effort to use the system) (Keszey & Zsukk, 2017). Many findings prove that the components of the TAM model (PU and PEU) have a direct effect on customers' intention to use online channels (Oyman *et al*., 2022; Hansen *et al*., 2018; Hyun *et al*., 2022).

Parasuraman and Colby (2015) developed the technological readiness index (TRI 2.0) to measure customers' attitudes toward technology use. The TRI 2.0 includes four dimensions:

- Optimism – a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency.
- Innovativeness – a tendency to be a technology pioneer and thought leader.
- Discomfort – a perceived lack of control over technology and a feeling of being overwhelmed by it.
- Insecurity – distrust of technology, stemming from scepticism about its ability to work properly and concerns about its potentially harmful consequences.

The omnichannel service allows the customers to switch between online and offline channels during the navigation across various stages of the decision process, which enhances the customer shopping convenience. Based on their needs, the customer can choose the channel combination that best meets their expectations, which results in different channel usage patterns. An example may be the showrooming behaviour when consumers inspect a product at a seller's physical store before buying the same

product in a different seller's online store (Balakrishnan *et al*., 2014; Gensler *et al*., 2017; Mehra *et al*., 2013; Verhoef *et al*., 2015). Pseudo-showrooming used by Gu and Tayi (2016) refers to the consumer behaviour of inspecting a product at a seller's physical store before buying a related but different product in the same seller's online store. Webrooming behaviour means the practice of researching items online, and then buying them in store (Flavián *et al*., 2016; Santos & Martins Gonçalves, 2019).

These prior empirical results allowed us to assume the following research hypotheses:

H1: The groups identified by Parasuraman and Colby (2015) based on TRI 2.0 will also appear in our sample.

H2: Due to the importance of personal interaction, insistence on using the same channel occurs primarily among those who prefer to shop offline.

H3: The different TRI 2.0-based customer segments show different channel use patterns during their purchasing process.

RESEARCH METHODOLOGY

Data Collection

An online survey was conducted with convenience sampling. The Google form was shared on Facebook and among the students of two Hungarian universities (Budapest Business School (BBS) and. Hungarian University of Agriculture and Life Sciences (MATE)). The questionnaire was available between 10 February and 29 March 2022. During this period, 415 responses were collected.

Measurement

The questionnaire included measurement of the channel preferences of respondents. This part of the questionnaire measured the usage frequency of different channels (offline and online) in different stages (information search – evaluation of alternatives – purchase – payment – product return – post-purchase service (*e.g*., advice) – review/opinion share). The examined channels were in-store (offline) channels; small – (mobile) and big-screen (tablet, PC) online channels of high-value electronic device purchasing decision process.

The next topic of the questionnaire examined the technological readiness (TR) of respondents measured by the TRI 2.0 (Table 2) developed by Parasuraman and Colby (2015).

Table 2. Dimensions and statements of TRI 2.0

Optimism	OPT1. New technologies contribute to a better quality of life. OPT2. Technology gives me more freedom of mobility. OPT3. Technology gives people more control over their daily lives. OPT4. Technology makes me more productive in my personal life.
Innovativeness	INN1. Other people come to me for advice on new technologies. INN2. In general, I am among the first in my circle of colleagues and friends to acquire new technology when it appears. INN3. I can usually figure out new high-tech products and services without help from others. INN4. I keep up with the latest technological developments in my areas of interest.
Discomfort	DIS1. When I get technical support from a provider of a high-tech product or a service, I sometimes feel as if I am being taken advantage of by someone who knows more than I do. DIS2. Technical support lines are not helpful because they don't explain things in terms I understand. DIS3. Sometimes, I think that technology systems are not designed for use by ordinary people. DIS4. There is no such thing as a manual for a high-tech product or a service that's written in plain language.
Insecurity	INS1. People are too dependent on technology to do things for them. INS2. Too much technology distracts people to a point that is harmful. INS3. Technology lowers the quality of relationships by reducing personal interaction. INS4. I do not feel confident doing business with a place that can only be reached online

Source: these questions comprise the technology readiness index 2.0, which is copyrighted by A. Parasuraman and Rockbridge Associates, Inc., 2014. This scale may be duplicated only with written permission from the authors.

We measured the statement of TR and the channel usage frequency on a 5-point Likert scale. In TR measurement scale 1 means 'I totally disagree' while 5 means 'totally agree,' while in channel usage frequency measurement 1 means 'I never use it' while 5 means 'I always use it.'

The last part of the questionnaire included demographic questions, *e.g.* about gender, age group, education level, residence, and perceived income level.

Considerations of Product Category Choice

We selected high-value electronic devices for various reasons:

- GlobalData (2021) predicts that by 2025 online sales penetration in the electronics product category will reach nearly 50% (49.6%), the highest rate among product categories.
- The valuable electronic devices represent big parts in the buyers' budget which increases the involvement level. For highly involved consumers, it is very important to choose the best option according to their shopping needs, and thus perceive a higher level of uncertainty in the purchase.

Data Analysis

SPSS 28.0 was used for data analysis. Besides descriptive statistics (frequency, mean, std. deviation), we examined the association between nominal variables by the Chí-squared test between variables measured on the Likert scale by variance analysis.

To reduce the distorting effect of close correlation among TRI and channel usage variables, factor analysis was conducted and followed by K-means cluster classification of the sample. Based on channel usage factors, we classified our respondents with the K-means cluster method. The channel usage pattern of different TRI segments was compared by variance analysis and the relationships between TRI segments and channel usage segments were examined by Chí-squared test.

Sample Composition

Our survey was filled by 415 respondents. Two third (60.5%) of our respondents were women and students from two Hungarian universities represented a large part of the sample (BBS and MATE), which is also reflected in the sample distribution of respondents by age group and place of residence. The perceived income level of most of our respondents was at least average, only 9.4 % of respondents perceived their income level as lower than average.

Table 3. Demographic distribution of the sample

Gender n (%)	**Male**				**Female**		
	161 (39.5)				**251 (60.5)**		
Age group n (%)	18 or younger	19-24	25-30 t	31-40	41-50	51-60	60 or older
	1 (0.2)	233 (56.1)	34 (8.2)	34 (8.2)	74 (17.8)	29 (7.0)	10 (2.4)
Education level n (%)	Completed 8 classes	Qualification	Graduation	Post-graduation certificate	BA/BSc certificate	MA/MSc certificate	PhD/DLA
	1 (0.2)	8 (1.9)	220 (53.0)	57 (13.7)	70 (16.9)	46 (11.1)	13 (3.1)
Region n (%)	Western Transdanubia	Central Transdanubia	Southern Transdanubia	Pest	Southern Great Plain	Northern Hungary	Northern Great Plain
	14 (3.4)	16 (3.9)	19 (4.6)	228 (54.9) on which Budapest 140	21 (5.1)	101 (24.3)	16 (3.9)

Income level n (%)	Well below average	Below average	Average	Above average	Well above average
	7 (1.7)	32 (7.7)	227 (54.7)	133 (32.0)	16 (3.9)

Source: own study.

RESULTS AND DISCUSSION

The Technology Readiness index 2.0 in the Sample (RQ1.)

The lower level of uncertainty – associated with the purchase – results in greater perceived control over the process, which provides a higher degree of confidence in purchasing decisions for customers (Schul & Mayo, 2003). The online channel usage is influenced by the buyer's attitude toward the technology and through it, the attitude toward online channels. For this reason, we examined how respondents perceived their own technological readiness.

We measured respondents' attitudes toward the technology on a five-point Likert-scale according to the TRI 2.0 by Parasuraman and Colby (2015) (Table 2). To examine how well our survey results fit the factors of the TRI 2.0 model, firstly, we performed a factor analysis on 16 questions on technological readiness.

As previously mentioned, two of the dimensions are motivators (optimism and innovativeness) and two are inhibitor themes (insecurity and discomfort). Therefore, firstly, we reverse-coded the insecurity and discomfort dimensions by subtracting from 6 (Marked by: Rev in Table 4).

Based on the results of Kaiser-Meyer-Olkin (KMO) test for sampling adequacy (0.783) and Bartlett's sphericity test (Sig. 0.000) our sample was appropriate for the factor analysis.

Our factor analysis of the 16 technological readiness variables showed four components. The eight statements belonging to motivator variables formed two factors, the innovativeness and the optimism factors including the 4-4 statements according to Parasuraman and Colby TRI 2.0 measurement method. The eight inhibitor statements also formed two factors, discomfort and insecurity. Here, we found a slight difference in the case of the fourth variable of insecurity ('I do not feel confident doing business with a place that can only be reached online'). Although both the inhibitor factors sit on variables, the correlation is greater in the case of the discomfort factor (Table 4).

Table 4. Rotated component matrix of technological readiness questions

Component	Discomfort	Innovativeness	Insecurity	Optimism
RevDIS2	0.791	0.080	0.119	-0.020
RevDIS4	0.785	0.146	0.089	0.060
RevDIS3	0.774	0.074	0.134	0.024
RevDIS1	0.656	-0.311	-0.025	0.086
RevINS4	0.456	0.117	0.304	-0.066
INN4	0.165	0.798	0.008	0.168
INN3	0.276	0.789	-0.052	0.046
INN1	-0.028	0.788	0.000	0.078
INN2	-0.200	0.721	0.156	0.178
RevINS2	0.174	0.063	0.817	0.126
RevINS3	0.103	0.087	0.793	0.043
RevINS1	0.127	-0.108	0.730	0.094
OPT1	0.168	0.144	-0.019	0.788
OPT2	0.257	0.146	-0.015	0.733
OPT3	-0.205	0.022	0.121	0.673
OPT4	-0.143	0.162	0.355	0.593

Source: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations.

Because we examined a unique group of people – buyers of electronic devices selected with convenience sampling methods – we decided to retain all the measurement items in the analysis according to the original technology readiness index 2.0 despite this slight difference we have found.

Parasuraman and Colby (2001) developed a segmentation scheme (TRI 1.0), which they later improved and developed as the TRI 2.0 scheme (Table 2), and they defined five categories of respondents based on their pattern of beliefs about technology:

- Sceptics – tend to have a detached view of technology, with less extreme positive and negative beliefs.
- Explorers – tend to have a high degree of motivation and a low degree of resistance.
- Avoiders – tend to have a high degree of resistance and a low degree of motivation.
- Pioneers – tend to hold both strong positive and negative views about technology.
- Hesitators – stand out due to their low degree of innovativeness (Parasuraman & Colby, 2015).

This classification was created using a proprietary algorithm, therefore, we sent our SPSS dataset to Rockbridge, to classify our dataset.

Sample Composition Based on TRI Segments

Comparing the TRI segment composition in our sample with the US norm 2021 provided by Rockbridge (Figure 1), the biggest differences (more than 10%) are in the sceptic and avoider segments. We have more sceptics but fewer avoiders, which could be due to the age of the respondents, because the younger generation (under 30) was overrepresented (more than 60%) in our sample.

The majority of our respondents (Table 5) were sceptics (44.6%). The TRI means are in the second half among the five segments; they are in the fourth place in optimism, discomfort, and insecurity dimensions, and third in innovativeness.

The number of explorers and hesitators was the same, they both represent 17.8% of the sample.

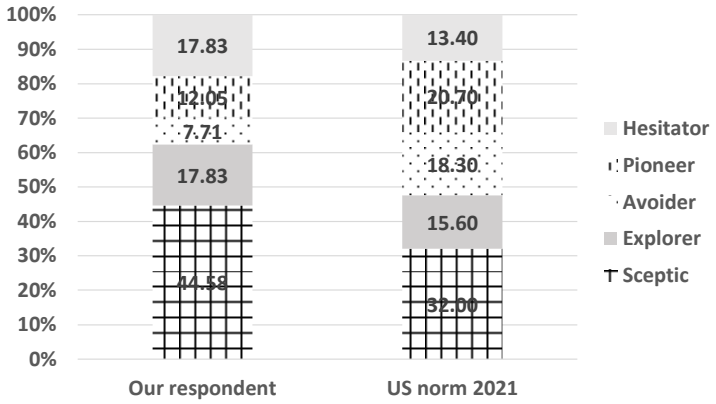

Figure 1. The proportion of the TRI segments in our sample compared to the 2021 norm in the USA
Source: own elaboration based on information from Rockbridge and our survey.

Table 5. The TRI segment composition and means of TRI dimensions in different segments in our sample

Segments (n)	%	Means (Rank)				
		Optimism	Innovativeness	Discomfort	Insecurity	TRI
Sceptic (185)	44.6	3.46 (4)	3.12 (3)	2.28 (4)	3.57 (4)	3.18
Explorer (74)	17.8	4.28 (1)	3.90 (2)	1.81(5)	2.78(5)	3.90
Hesitator (74)	17.8	3.89 (3)	1.98 (5)	2.77 (3)	3.78 (3)	2.83
Pioneer (50)	12.0	4.10 (2)	3.98 (1)	3.48 (1)	4.14 (1)	3.12
Avoider (32)	7.7	2.74 (5)	2.01 (4)	2.93 (2)	4.15 (2)	2.42
Total (415)	100.0	3.70	3.07	2.48	3.58	3.18

Source: own elaboration based on our survey.

Explorers showed a high degree of motivation (first and second place in the ranking of motivator dimensions), and a low degree of resistance (last in both inhibitor dimensions).

Hesitators stood out due to their low degree of innovativeness (they were last in ranking), while in other dimensions (both motivator and inhibitor) they were in the middle.

The percentage of pioneers was 12%. They held both strong positive and negative views about technology.

The percentage of avoiders was the lowest (7.7%). They tended to have a high degree of resistance (second place in ranking) and a low degree of motivation (fourth and fifth place in ranking)

These technological readiness profiles are in line with the results of Parasuraman and Colby (2015).

Evaluating the total TRI scores – where the lowest possible is 1.0 and the highest is 5.0, and a higher score indicates higher techno-readiness – we can examine the distribution of segments among low, medium, and high TR score levels (Table 6.)

Table 6. Distribution of TRI segments among the TR tiers

TRI segment	TR tier n (% within the segment)			Total
	low (1 – 2.75)	middle (>2.75 – <3.25)	high (3.25 – 5)	
Sceptic	18 (9.7%)	83 (44.9%)	84 (45.4%)	185
Explorer	0 (0%)	0 (0%)	74 (100%)	74
Avoider	30 (93.8%)	2 (6.3%)	0 (0%)	32
Pioneer	6 (12.0%)	26 (52.0%)	18 (36%)	50
Hesitator	37 (50%)	29 (39.2 %)	8 (10.8%)	74
Total	91 (21.9%)	140 (33.7%)	184 (44.3%)	415

Source: own elaboration.

The TR tier composition of TRI segments based on total TRI scores confirmed the profiles of the segments. All explorers belonged to the highest TR tier, but none of the avoiders fell in the highest tier. Most of the hesitators showed at most the middle tier of TR, while the majority of sceptics and pioneers showed the middle or high tier of IT.

In the total sample, most of our respondents (44.3%) belonged to the high TR tier, more than one-third to the middle tier, and about one-fifth (21.9%) to the low tier.

Factor analysis of channel preference variables (RQ2.)

The stages of purchasing decision process are the need recognition – information search – evaluation of alternatives – purchase – post-purchase. In our survey, we examined channel usage in the case of information search – evaluation of alternatives – purchase – payment – aftersales service – return goods – review. We examined the frequency of use of channels – in-store, online big screen and small screen (mobile) – at these stages.

The respondent could evaluate the statements on channel preference at the different stages of purchasing decision on Likert scale (1 – I never use it, 2 – I use it rarely, 3 – sometimes I use it, 4 – I use it frequently, 5 – I always use it).

To reduce the number of variables, we conducted a factor analysis on the 21-channel usage variables (7 stages x 3 channels). The KMO value was 0.73 and the significance level of Bartlett's sphericity test was 0.000, which confirmed that our sample was appropriate for the factor analysis.

The factor analysis reduced the 21 variables to six factors and it could hold 70.88% of the information.

Six stages of the in-store purchasing process (except the review) belonged to a single factor. Five stages of the big screen online shopping process also showed a separate item (except the review and return). In the case of small screen (mobile) usage the pre- and post-purchase steps belong to the same factors. Interestingly, mobile purchases and payments belong to a separate factor. The fifth and sixth factors include the online (both small and big screen) review and return activities in order. Table 7 shows the variable composition of factors in the rotated component matrix and their labels based on variables.

Relationship Between TRI Segments and Channel Preference Factors (RQ3.)

We examined the relationship between the TRI segments and the six-channel usage factors. The variance analysis showed a significant relationship in the case of the in-store process factor (sign. 0.003), Small screen pre- and post-purchase steps (0.05), and the review online factor (sign 0.01). Interestingly, the online big screen usage did not show a statistical relationship with TRI segments.

Although only half of the six factors showed significant relationships with the TRI segment, the box-plot diagram (which shows the distribution of the factors around the factor centres by TRI clusters) revealed interesting tendencies (Figure 2).

Table 7. Rotated component matrix of channel usage variables

Category		Component					
		In-store process	Big screen process	Small screen usage pre – and post-purchase	Purchase and pay-ment on mobile	Review online	Return online
Evaluation	In-store	0.838	-0.028	-0.114	0.027	0.011	-0.003
Information search	In-store	0.836	-0.038	-0.069	-0.021	-0.015	-0.008
Post-purchase service	In-store	0.783	-0.114	-0.035	0.008	0.049	-0.027
Purchase	In-store	0.693	-0.049	0.121	-0.361	-0.109	-0.131
Payment	In-store	0.608	-0.013	0.169	-0.404	-0.051	-0.205
Return	In-store	0.518	0.006	0.199	-0.158	0.015	-0.381
Evaluation	Big screen	-0.005	0.903	0.076	0.014	0.017	-0.055
Information search	Big screen	0.033	0.901	0.062	-0.024	-0.006	-0.036
Post-purchase service	Big screen	-0.158	0.691	0.152	-0.146	0.102	0.341
Purchase	Big screen	-0.170	0.619	-0.030	0.562	0.082	0.091
Payment	Big screen	-0.196	0.563	-0.065	0.531	0.126	0.214
Evaluation	Mobile	0.016	0.085	0.856	0.172	0.002	-0.053
Information search	Mobile	0.004	0.089	0.850	0.120	0.009	-0.037
Post-purchase service	Mobile	-0.022	-0.010	0.770	-0.019	0.056	0.277
Review	Offline	0.159	0.134	0.336	-0.268	0.139	-0.035
Purchase	Mobile	-0.094	-0.049	0.469	0.690	0.116	0.146
Payment	Mobile	-0.129	-0.025	0.460	0.642	0.132	0.250
Review	Big screen	-0.021	0.165	-0.058	0.055	0.928	0.087
Review	Mobile	-0.004	-0.038	0.206	0.114	0.922	0.069
Return	Big screen	-0.152	0.322	-0.028	0.137	0.116	0.800
Return	Mobile	-0.095	-0.113	0.371	0.280	0.080	0.753

Notes: Extraction method: Principal component analysis. Rotation method: Varimax with Kaiser Normalization. a. Rotation converged in six iterations.
Source: own study.

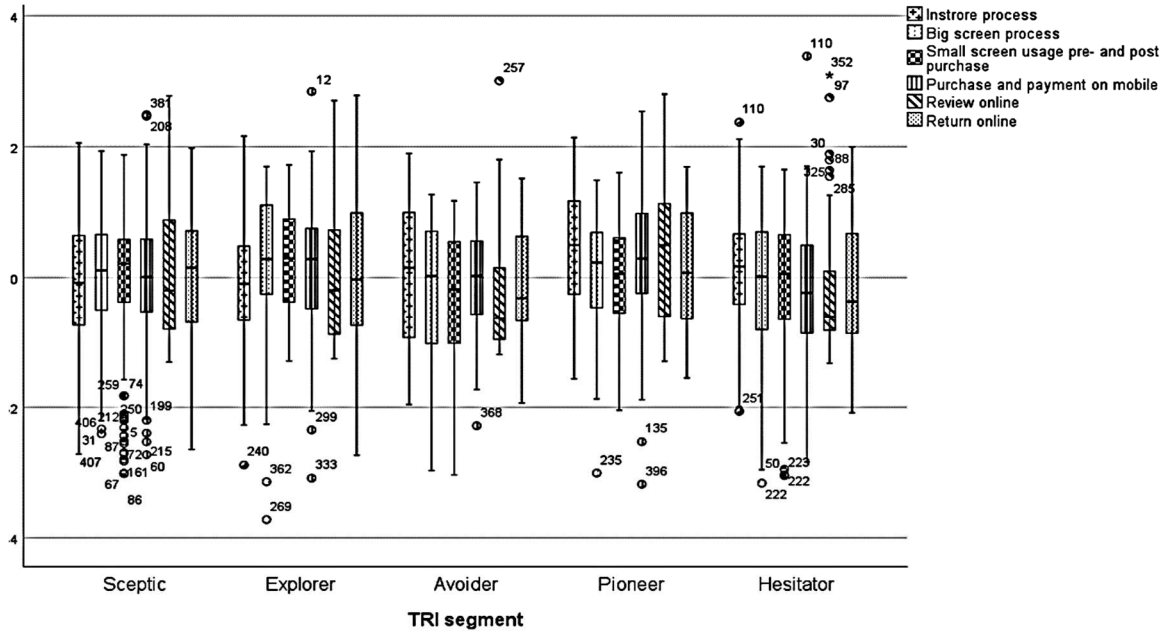

Figure 2. Boxplot diagram of channel preference factors of TRI segments
Source: own elaboration.

Pioneers showed strong positive and negative views in TRI dimensions. According to this, all the factor centres of pioneers are higher than the factor centres of the total sample, and especially high in the in-store process and review online factors.

Explorers, who showed a high degree of motivation and low degree of resistance in TRI dimensions, on boxplot diagram show higher level factor centre values than the total sample at online channel usage (both big and small screen process – besides the mobile pre- and post-purchase steps in purchase and payment).

Hesitators, who stand out due to their low degree of innovativeness but were in the middle in other TRI dimensions, on boxplot diagram show at most equal or less factor centre value compared to the whole sample, but at the in-store process. It means that the hesitators prefer the in-store process during the whole purchasing decision process instead of online channels in comparison with other TRI segments.

Avoiders showed a high degree of resistance and a low degree of motivation in TRI dimensions. The factor centres of this segment show a very similar pattern to the hesitators, with lower levels of mobile pre- and post-purchase factor centres.

Sceptics showed less extreme positive and negative beliefs. On the boxplot diagram, the factor centres slightly differ from the factor centres of the total sample. This segment prefers the online channels rather than the in-store process compared to the whole sample.

The conclusion of the pattern of factor centres by TRI segments is that the perceived TR affected channel usage during the purchasing decision process. Moreover, the channel preferences were in accordance with the TRI dimensions of segments.

Clusters Based on Channel Preference Factors (RQ4.)

Based on the channel usage preference factors, we classified our 415 respondents by K-means cluster analysis from two-cluster to eight-cluster solution.

The distribution of samples among the clusters is relatively balanced in each of these solutions. From these cluster solutions the four, six, seven, and eight-cluster classifications showed significant (less than 0.001 sig. level) in each channel factor. Examining these classifications, the four-cluster solution proved to be the best to interpret, therefore, we examined this cluster solution further.

Based on the factor centres deviation of the first cluster, its representatives prefer the in-store and big-screen channels compared to the whole sample. While they prefer less mobile devices at the beginning of the purchasing decision process, they are willing to purchase, pay and return on online mobile channels, but they rarely review their experience either online or offline (offline review in the third factor) – small-screen avoiders.

The second cluster uses less in-store channels and more both big and small-screen online channels. Mobile usage is rather important in the first stages of purchasing decision process, the purchase and payment on mobile are similar to or slightly under the whole samples factor centre, and they rarely use the online channels at the post-purchase stage (return and review) – online buyers.

The third cluster is characterized by the low frequency of online big-screen channel usage. They use offline channels and online mobile channels similarly to the whole sample (mobile online channel slightly more frequently) – in-motion buyers.

The fourth cluster's in-store purchasing is completely in line with the whole sample. The online channel usage (both big and small screen) is slightly over the sample's factor centres. Online reviewing is an outstanding habit of this group – opinion-sharing balanced channel users.

Interestingly, we did not find an 'offline segment' among our respondent segments, which is reported in many multi-channel segmentation research (Neslin, 2022). The presence of the offline segment was also reported in research that also covered the purchase of electronic goods (Valentini *et al*., 2020; Herhausen *et al*., 2019) The fact that we could not identify the typical in-store customer among our respondents – in addition to the bias resulting from convenient sampling – may also result from the fact that the pandemic strongly pushed customers towards online channels.

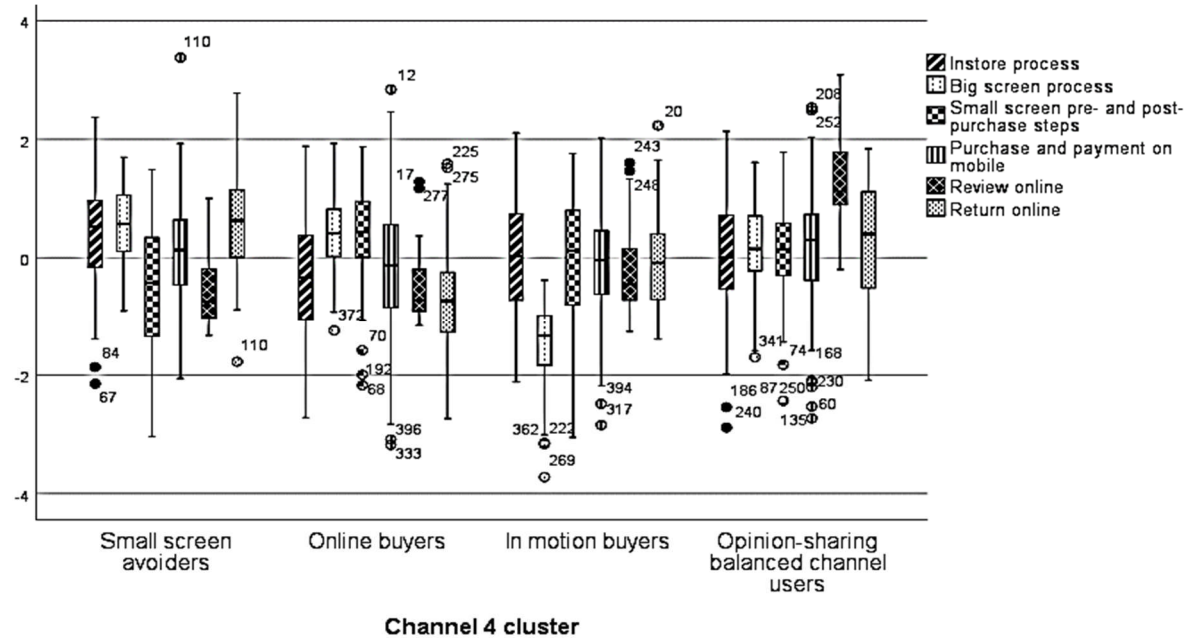

Figure 3. The boxplot of channel preference factors for the four clusters
Source: own elaboration.

Demographic Distribution of Respondents Among Channel Usage Clusters

Examination of the demographic distribution of clusters – based on gender, age group, residence region of the country, education level, and perceived income level – showed significant differences in the case of age groups only (Table 8).

Table 8. Age composition of channel usage clusters

Age group	Channel clusters n (% within the age group)				Total
	Small-screen avoiders	Online buyers	In motion buyers	Opinion-sharing balanced channel users	
Between 19-24	48 (20.6)	80 (34.3)	47 (20.2)	58 (24.9)	233 (100)
Between 25-30	8 (23.5)	7 (20.6)	9 (26.5)	10 (29.4)	34 (100)
Between 31-40	4 (11.8)	7 (20.6)	9 (26.5)	14 (41.2)	34 (100)
Between 41-50	28 (37.8)	14 (18.9)	14 (18.9)	18 (24.3)	74 (100)
Between 51-60	12 (41.4)	4 (13.8)	6 (20.7)	7 (24.1)	29 (100)
Over 60	4 (40.0)	0 (0.0)	2 (20.0)	4 (40.0)	10 (100)
Total	104 (25.1)	112 (27.1)	87 (21.0)	111 (26.8)	414* (100)

Note: *Only one respondent was under 18 years of age, therefore, we considered this respondent as missing value.
Source: own study.

The proportion of the youngest group (19-24) was the highest in the online buyer group. More than one-third (34.3%) of the youngest respondent belonged to this cluster. The proportion of 25-30 and 31-40-years respondents was identically 20.6% in this cluster, while the proportion of the elder generation decreased with age.

While the proportion of the age groups of 25-30 and 31-40 years was the same in online buyer and in-motion buyer clusters, the 25-30 years age group distribution was more balanced among the four-channel usage cluster. The 31-40 years age group proportion was the highest (41.2%) in the opinion-sharing and balanced channel user cluster and the lowest in the small-screen avoider group (11.8%) comparing the proportions of other age groups in these clusters.

The older age groups (over 41 years) represented a remarkably higher proportion in small-screen avoider group (37.8, 41.1, and 40%).

Although a big ratio of the oldest group (40-40%) belongs to small-screen avoider and opinion-sharing balanced buyer clusters, because of the very low number of respondents in this age group, no conclusions were drawn in this regard.

There was no significant relationship between the other examined demographic characteristics and the channel clusters. An interesting trend emerged in gender distribution. While the women's distribution was balanced among the clusters (about one-fourth of women in each cluster), the distribution of men was less balanced, because one-third of men (30.5%) belonged to opinion-sharing balanced channel users and only 15.9% to the in-motion buyer group.

The Relationship Between TRI Segments and Channel Clusters (RQ5.)

Does the TR have a significant effect on the channel usage? To discover it, we conducted Chi-squared tests between the TRI segments and the channel usage segments showed significant (sig. level is 0.049) relationship. Table 9 shows the distribution of TRI 2.0 segments among the channel usage clusters. The TRI was considered an explanatory variable because technological readiness influences the channel's perceived usefulness and its ease of use.

The sceptics' distribution among the channel usage clusters was relatively balanced. This TRI segment did not show outstanding participation in any channel usage cluster. This result was in accordance with the TRI segment description: tend to have a detached view of technology, with less extreme positive and negative beliefs.

The proportion of explorers (a high degree of motivation and a low degree of resistance) was much lower in the 'in-motion buyers' group than in the other channel usage groups.

More than one-third of avoiders (who have a high degree of resistance and low degree of motivation) were in the 'small-screen avoider' cluster.

Table 9. Distribution of TRI segments among the channel usage clusters

Channel usage clusters	TRI segment n (% within TRI segment)					Total
	Sceptic	Explorer	Avoider	Pioneer	Hesitator	
Small-screen avoiders	44 (23.8)	20 (27.0)	11 (34.4)	10 (20.0)	19 (25.7)	104 (25.1)
Online buyers	50 (27.0)	21 (28.4)	8 (25.0)	9 (18.0)	25 (33.8)	113 (27.2)
In motion buyers	39(21.1)	12 (16.2)	9 (28.1)	8 (16.0)	19 (25.7)	87 (21.0)
Op. sharing balanced channel users	52 (28.1)	21 (28.4)	4 (12.5)	23 (46.0)	11 (14.9)	111 (26.7)
Total	185 (100.0)	74 (100.0)	32 (100.0)	50 (100.0)	74 (100.0)	415 (100.0)

Source: own study.

Pioneers (holding both strong positive and negative views about technology) were highly represented in the opinion-sharing balanced channel user group, while only the lowest proportion (14.9%) of hesitators (they show a low degree of innovativeness) belonged to this channel usage group.

RESULTS AND DISCUSSION

In accordance with the research objectives, the research found the following.

RQ1. The study aimed to examine how respondents' technological readiness influences channel use preference at different stages of the purchasing decision process for high-value electronic devices. We first sought to identify homogeneous groups based on the TRI 2.0 of Parasuraman and Colby (2015). We identified the same TRI segments (sceptics, explorers, avoiders, pioneers, and hesitaters) with the same characteristics described in the study of Parasuraman and Colby (2015). Thus, the H1 hypothesis was confirmed.

RQ2. Factor analysis was performed to examine the relationship among channel usage variables. We could reduce the number of 21 variables to six items, where six stages from the examined seven of the in-store purchasing process belonged to a single factor. Five stages of the big screen online shopping process also showed a separate item (except the review and return). On the other hand, the stages of mobile online shopping were more divided among the factors. Based on this,

the preference for using offline channels correlated at almost every stage of the customer journey, while in the case of online channels – especially on the mobile channel – the channel usage of successive stages did not show such a close correlation. Therefore, we could neither confirm nor reject the H2 hypothesis.

RQ3. Do the TRI segments show different channel usage patterns? Three of the six-channel usage factors showed significant relationships with the TRI segment. The pattern of factor centres of different TRI segments confirmed that the perceived TR affects the channel usage during purchasing decision process, and the channel preferences were in accordance with the TRI dimensions of segments. *This result confirmed the H3 hypothesis.*

RQ4. Cluster analysis of channel usage factors resulted in different cluster number solutions. Based on the interpretability, the four-cluster solution was chosen, including small-screen avoider, online buyer, in-motion buyer, and opinion-sharing balanced channel user groups. These groups based on different patterns of channel usage factors showed significantly different age group composition. Unsurprisingly, while a high proportion of younger respondents belonged to online buyers, a bigger proportion of the elder generation belonged to the small-screen avoider cluster.

RQ5. Hypothesis H3 was examined in another approach when we searched for relationship between TRI segments and channel preference clusters. Our findings showed a relationship at the 5% significance level, which *confirmed the H3 hypothesis.* This means that, in line with the findings of Hallikainen *et al*. (2019), the technological readiness of the customer has a significant impact on channel preference.

CONCLUSIONS

Consumers' perceived value of the purchasing experience is influenced by the total purchasing decision process starting at the need recognition and ending at the post-purchasing stage. The difficulties and uncertainties in any stage of the decision-making process result in anxiety and deteriorate the customer experience. The uncertainty can arise from factors related to the product, individual, or channel (Santos & Martins Gonçalves, 2019). In this study, all the three factors were considered. The expensive, more complex products like the high-value electronic device, increase customer's involvement. The higher the involvement, the more frustrating the decision-making process is. Regarding individual factor – besides the demographic characteristics – we considered the technological readiness of our respondents. The uncertainty associated with the channel was examined by comparing three channels (in-store, online large and small screen) at different stages of the customer journey.

Our sample showed the TRI 2.0 segment distribution – although our sampling method was not representative, this is the first research (we did not encounter any articles of this kind) which examined a Hungarian sample based on this measurement method. Our findings confirmed that perceived technological readiness influences customers' channel choice.

Managerial Implication

In our sample, we could not identify a typical in-store customer group based on channel usage preferences during the customer journey, which contrasts with the results of several pre-pandemic studies (Valentini *et al.*, 2020; Herhausen *et al.*, 2019). Although no reliable conclusion can be drawn from this due to the non-representative sampling method of our study and the different geographical and cultural background of the mentioned papers, according to our assumptions, the pandemic may play a decisive role in this difference. Pandemic-related safety concerns have strongly driven shoppers to use contactless online channels (including those who otherwise strongly adhere to brick-and-mortar stores, and even for products where physical touch can be important) (Arun *et al*., 2020; Kannan & Kulkarni, 2021; Zielke *et al*., 2023), which findings support our assumption.

Successful marketing is about reaching a customer with an interesting offer when he or she is primed to accept it, thus, knowing what might interest the customer is half the battle to making the sale and this is where customer analytics comes in. In terms of technological readiness, customer analytics has evolved from analysing and reporting customer behaviour to segmenting customers based

on their responsiveness to improve buying predictions and actually 'manipulate' customer behaviour with target-specific promotional offers and marketing campaigns. One of the conclusions based on this research is that retailers need a complex view of the customer in real-time that will enable their marketers to deliver personalized experiences whenever the customer is primed to receive them.

Firstly, our results confirmed that there is a significant relationship between technological readiness and channel usage preferences, which is consistent with findings that have shown the effect of technology acceptance on customers' intention to use online channels.

On the other hand, our sample showed significant differences in channel preference according to the age groups. More than one-third of the youngest (19-24 years) respondents frequently use both big and small-screen online channels, which means that electronics retailers can successfully reach them on different online channels. Respondents between the ages of 25 and 40 are more likely to be reached on offline and mobile online channels, and those over 41 are more likely to be reached on offline and large-screen channels and also less likely to be reached on small-screen channels.

Limitations and Further Research

A limitation of this study is the non-probability (convenience) sampling method, as the 19-24 age group (university students) and respondents from central and northern parts of Hungary were overrepresented. To confirm our above proposals, a large-sample representative study would be needed in the future.

This study focused on the purchasing of high-value electronic devices. In the future, it would be interesting to evaluate and compare the free-riding omnichannel behavioural segments of customers during the customer journey regarding other product categories.

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Does human resource performance contribute to the success of the university entrepreneurial project?

Jorge Armando López-Lemus

ABSTRACT

Objective: This article aims to verify the influence exerted by the performance of human resources on university entrepreneurship.

Research Design & Methods: The methodology used in the research was cross-sectional, observational, and explanatory. Regarding the sample used, 434 university entrepreneurial leaders from the state of Guanajuato, Mexico were considered. A structural equation model (SEM) was designed for the hypothesis test. According to the goodness and fit indices of the model, they turned out to be satisfactory.

Findings: I confirmed that the management of human resources positively influenced the performance of HR. Similarly, the HR performance positively influenced the management and success of the entrepreneurial project and finally, the management of the project positively influenced the success of the university entrepreneurial project.

Implications & Recommendations: The practical implications and recommendations focus on university entrepreneurs of SMEs, who must consider the entrepreneurial processes of business entities and the necessary human resources, which impact the new firm as well as the positioning of their venture, considering human resources as the main factor for the development and growth of entrepreneurship. Therefore, the management of human resources plays a very important role in the development of the entrepreneurial project, and in the same way, represents a management tool focused on the people involved in the development of the entrepreneurial project.

Contribution & Value Added: This study highlights the management and performance of human resources and the success of the business project previously studied specifically in the university enterprise in Mexico. The results obtained contribute to the literature by shedding light on the process of human resource management in entrepreneurship.

Article type: research article

Keywords: human resource management; management project; entrepreneurship; new firms; university entrepreneurship; entrepreneurial project

JEL codes: M12, M13, M51

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INTRODUCTION

For progress, development, growth, and economic prosperity within a country, the role played by the business sector is important, as are the government organizations (Bucardo, Saavedra, & Camarena, 2015). According to the data of the 2020 economic census of the National Institute of Statistics and Geography (INEGI), of the 4.9 million registered economic units, the micro, small, and medium enterprises (MSMEs) represent 99.8% of these (INEGI, 2023) and also generate 72% of employees in Mexico (Senate of the Republic, 2023). As mentioned above, enterprises represent the main trigger and engine

of the region's economic and social development. In the same way, the enterprise represents an alternative that favours technological, economic, and social development (Amorós, 2011; Lopez & Alvarez, 2018; Astebro, Bazzazian, & Bazzazian, 2012) both at the regional level of the nation.

In a study carried out by INEGI, it was reported that in 2020, economic censuses found 4.9 million microenterprises and SMEs in Mexico, of which 79.2% survived, and 20.8% of these closed their doors permanently. That is, they died (INEGI, 2023). According to the Failure Institute, one of the main factors that induce enterprises' failure is the lack of correct management of human resources, where specifically of 100%, 29% of this is due to the lack of development of personnel, 21% is related to compensation problems, 20% to the lack of adequate selection, 16% to theft by staff, and finally, 14% to staff turnover (The Failure Institute, 2023).

Various investigations carried out in the literature mention that an enterprise can survive when it makes good and adequate use of its resources, among which researchers include human resources (Acs, 2010; Wang, Tsai, Lin, Enkhbuyant, & Cai, 2019; Alvarez, 2020), one of the main factors that promote sustainability, performance, and economic profitability of the MSMEs that are developed in the region.

Currently, universities play an extremely important role in the business sector. According to various studies, university students' entrepreneurship endeavours tend to have a higher percentage of success than those carried out by individuals with a lower education level, so universities are an incubator for university entrepreneurship (Davey, Hannon, & Penaluna, 2016; Guven & Yildirim, 2022) and represent an area of opportunity for the generation and development of new business initiatives that may contribute to the economic development of the region.

In this sense, it is extremely important to focus efforts on the performance of human resources, which allows companies – and the business sector that continually undertakes new products and services – to achieve objectives and thus high performance (Scapolan, Montanari, Bonesso, Gerli, & Mizzau, 2017), allowing one to position themselves and stay in a highly competitive market.

This study aimed to verify the influence exerted by the performance of human resources on university entrepreneurship. Based on this, it intended to generate strategies that could contribute to the management of projects carried out in university environments and the development and progress of new business initiatives. The originality of this study stands out because it investigates both university entrepreneurship in Mexico through the study of management and the influence of human resource performance on the success of the entrepreneurial project. To do this, a structural equation model was designed to measure the causal effects of the variables analysed.

The article is structured as follows. Firstly, we will present a review of the literature and the development of the hypotheses raised in the study. Subsequently, we will outline the methodology used in this study and describe the statistical techniques and the development of the SEM model. Next, the direct and indirect effects of the exogenous variables on the endogenous ones corresponding to a proposed hypothetical model will be described and analysed. Then, results and discussion will be presented. Finally, in the conclusions, we will analyse each of the findings and compare them with the results of other studies.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Baumol (1968) defines the entrepreneur as a person who manages the resources available to generate and do business, visualizes the possibility of innovating products and services, obtains new sources necessary to manage and potentiate the organization, plans to open new markets, and of course, seeks the design and administration of a new organization (Bucardo, Saavedra, & Camarena, 2015). Entrepreneurship allows new knowledge to be identified and explored, which in turn generates entrepreneurial opportunities.

According to Qian and Acs (2013), 'the entrepreneur acts as an agent of change, to the extent that he can start a business motivated by the possibility of exploring, exploiting and making profitable a new knowledge, a technological innovation or a new product' (Sánchez, Garcia, & Mendoza, 2015, p. 2).

According to the model proposed by Mehlum, Moene, and Torvik (2003), the countries that have a high level of economic income, development, and employment, as well as those that acquire high levels of growth rates in the short, medium, and the long term are characterized by promoting and

generating a greater number of enterprises (Aeeni, Motavaseli, Sakhdari, & Mobini, 2018) in any business field, hence the government sectors and educational entities focus on potentiating the management of entrepreneurship through its plans and programs alluding to the fact that many universities have opted to create incubators to generate and develop entrepreneurship.

Various investigations affirm that university entrepreneurship occurs through the influence of internal and external factors, where the business and market sector is related to universities to promote an entrepreneurial education among students, thus bringing with it an opportunity to opt for a business vocation and make it more probable that the emerging ventures will be successful (Karra, Phillips, & Tracey, 2008; The Failure Institute, 2023).

More and more business institutions are focusing on entrepreneurship (Wach, 2014) because it is relevant to the region's economic and social attractiveness. Therefore, a university entrepreneur is also the one who decides to pursue a professional career that allows him to generate and do business because he dedicates efforts, resources, and time to training, obtaining knowledge, skills, and competencies that will help him achieve the success (Borrayo, Valdez, & Delgado, 2019) regardless of the chosen career path. Likewise, it is necessary to consider that entrepreneurship is interested in analysing factors that promote the economic growth of countries, (Galindo-Martín, Méndez-Picazo, & Castaño-Martínez, 2016), with HR being one of the strategies used to achieve business objectives such as entrepreneurship.

Universities are the origin of a big part of the research and innovation carried out in entrepreneurship, as well as the generation of businesses. It is also the field of training new talents and the identification of business opportunity areas. In this sense, universities are within the entrepreneurial environment and contribute through their students to the process of generating business ideas, empowering them with the ability to develop their business skills, to later shape and use them to generate success within the entrepreneurial project, either by creating some type of company that offers products/services or forging the idea of being self-employed entrepreneurs. Thus, universities serve as an incubator for the generation of this type of undertaking called university entrepreneurship (Davey, Hannon, & Penaluna, 2016; Guven & Yildirim, 2022; Tunio, Chaudhry, Shaikh, Jariko, & Brahmi, 2021) that can respond to the needs of an emerging market.

Tunio, Chaudhry, Shaikh, Jariko, and Brahmi (2021) point out that in recent years, employment opportunities in some countries have been scarce, so entrepreneurship helps society to reach financial independence. For entrepreneurs to prosper, key elements are required, and university education is recognized as a key element for the success of an entrepreneurial project (European Commission, 2013; Isenberg, 2014; Spigel, 2017). In their report for the National Council for Graduate Entrepreneurship (NCGE) of the United Kingdom, Gibb and Haskins (2014) mention that university entrepreneurship defines those universities that provide opportunities, practices, and suitable environments to motivate and help their university students and graduates to undertake (Williams, Knight, Rutter, & Mathias, 2022).

Universities are the reservoirs of knowledge and skills in a society that seeks positive change through the exchange of knowledge and the development of human resources oriented towards competence and performance generation. University entrepreneurship uses the potential of each of its students to analyse and develop economic, political, and social opportunities within the environment (Ahmed, Chandranb, Klobas, Liñánde, & Kokkalis, 2020). The university entrepreneur combines his academic knowledge with that of an entrepreneur, to create self-employment opportunities and thus generate income and profit (Abreu, Demirel, Grinevich, & Karataş-Özkan, 2016; Astebro, Bazzazian, & Bazzazian, 2012).

Entrepreneurship contributes to competitiveness, economic growth, and job creation in a country, because business actions such as starting or establishing a company are considered a means for generating self-employment and income. In university entrepreneurship, an entrepreneurial attitude based on social needs in terms of business development and job creation is sought (Dehter, 2001; Formichella, 2004). The social and cultural dimensions play a role in entrepreneurship. Hofstede (2001) mentions that culture explains human behaviour which, according to different investigations, is an ideal behaviour of the human memory of an enterprise, this will be a factor positively influential in entrepreneurship because it will promote proactive attitudes and behaviour that allow generating knowledge to create and reinvent businesses necessary for your ventures (Vargas, 2022).

The key element of a developed or developing entrepreneurial country is its financial system, so it is important to know how it is managed and what is the level of the financial education of its population. The teaching of financial education at universities is very relevant for the future preparation of students, because university students need it now and will need it in the future to perform better in their professions and while pursuing any goal. For example, various investigations carried out to affirm that the Millennial generation, meaning people born between 1981-2000 (Vargas, 2022) is a generation focused on entrepreneurship, whose financial education can help them enjoy a better life quality and improve their entrepreneurial success probability (Vargas & Higuera, 2022).

The performance of the human resource can be defined as 'the extent to which the individual can meet the established objectives of quality, cost, and time' (Hoegl & Gemuenden, 2001, p. 438). For the performance of the human resource to be of quality, six key elements are required. These include communication, coordination, the balance of member contribution, mutual support, effort, and cohesion coverage (Lindsjørn, Sjøberg, Dingsøyr, Bergersen, & Dybå, 2016).

In recent years, the success of a venture such as a university venture has taken on great relevance, because the success of a venture occurs as the business objectives specified in strategic planning are achieved. This is revealed by indicators (KPI) related to the management and performance of human resources measured through their efficiency and effectiveness (Salas-Arbeláez, García, & Murillo, 2017; Zhang & Zhu, 2012).

Various studies in the literature suggest that the performance of human resources has a positive influence on the success of an enterprise (Capelleras, Domi, & Belletti, 2021). In this sense, the performance of human resources turns out to be one of the main strategies that allow business units, as well as entrepreneurship promoted in universities, to achieve success. That is, the enterprise manages to position itself in a highly competitive market.

Kim, Dibrell, Kraft, and Marshall (2021) and Pocztowski (2008) define human resources management (HRM) as a strategy to support employees or work teams in their capacities, which they seek to potentiate, hoping that they will achieve the expected results. It is a strategy that seeks to achieve business or entrepreneurial objectives by enhancing the capabilities of the work team (Badzińska, 2016; Gawlik & Jacobsen, 2016). Tam, Da Costa, Oliveira, and Varajão (2020) state that the capacity of the work team represents one of the main strategies to manage HR due to knowledge management as well as the conditions necessary to complete tasks. Likewise, Misra, Kumar, and Kumar (2009) indicate that a highly trained and managed work team allows activities to be carried out in a timely and functional manner, because it seeks to meet customer satisfaction by achieving success. On the other hand, Chow and Cao (2008) state that the motivation and commitment of the personnel under adaptability management and constant training make the enterprise more likely to succeed in a given project.

Likewise, the employees or people who are closely linked to the development, creation, and support of the university entrepreneurial project are considered the most important human resource since they will generate prosperity (Omotoye, Abdulazeez, & Olusesi, 2022; Rachwał, Kurek, & Boguś, 2016) for the new business initiative. That is why the capacity of the team (Tam, Da Costa, Oliveira, & Varajão, 2020), in this sense, of the human resource, plays an important role in the development of the entrepreneurial project.

One of the challenges facing entrepreneurship is related to the performance of human resources with efficiency and effectiveness, that is, towards maximum performance. The personnel of a company is a key element for any type of adaptation that arises in the organization based on the established objectives. Therefore, when suitable and committed human capital is achieved, the organization gets added value and a competitive advantage (Montoya & Boyero, 2015) that guarantees the success of the business unit or university entrepreneurship in the business sector. Based on the above, we hypothesised the following:

H1: Human resource management is positively and significantly related to human resource performance.

Organizations have realized that to survive in a market in a globalized environment, it is necessary to quickly adapt to the changes that arise and thus, the human resource within organizations plays a

very important role in the adaptation process. Therefore, it turns out to be one of the main concerns of managers to maintain good levels of efficiency and effectiveness in the work performance of their workers (Lin, Wang, Chen, & Chen, 2019; Luthans, Luthans, & Luthans, 2004; Soares, Teixeira, & Verwaal, 2018; Volberda, Van, Verwaal, & Stienstra, 2012; Luthans, Luthans, & Luthans, 2004)

The performance of human resources should not be the sole responsibility of the organization or the employee himself, rather, it should be a union between the two to achieve the stated objective (Lee & Young, 2017; McDonald & Hite, 2016; McElroy & Weng, 2016). The aim should be to generate synergy between human resources and senior management to achieve more-than-expected results and thereby achieve and guarantee success in the university entrepreneurial project.

To achieve the success of a university entrepreneurial project, important factors that will affect the achievement of the objective must be taken into consideration, among which is the performance of human resources. According to He, Song, Yang, and Chen (2021), the concept of performance can be defined as the point at which the human resource achieves the stated objectives and in turn, the result obtained meets the organization's mission. Human resource performance is the extent to which employees achieve results to the expected standard (Zulfadil, Hendriani, & Machasin, 2020). However, Lin, Wang, Chen, and Chen (2019) define the performance of human resources as using the capabilities of each member of the organization to mobilize motivation and resources, and taking actions necessary to succeed (Rico *et al*., 2021).

Sharp and Robinson (2010) describe how the performance of human resources enables collaboration, coordination, and communication within an entrepreneurial project. Various studies in the literature show the relationships between various aspects of job quality based on the performance of human resources through the efficiency and effectiveness of human resources. In this sense, the present study focused on the factors described by Hoegl and Gemuenden (2001), which mention that the performance of human resources focuses on two main factors: (1) effectiveness and (2) efficiency, in which effectiveness refers to the point at which the human resource meets expectations regarding the quality of work (Bergersen, Hannay, Sjøberg, Dybå, & Karahasanovi, 2011). In this sense, human resources can achieve the objectives established through strategic planning through functionality, solidity, and reliability, which leads to the high performance of tasks and thereby position the business initiative through entrepreneurship (Lindsjørn, Sjøberg, Dingsøyr, Bergersen, & Dybå, 2016) managed through university institutions.

Efficiency refers to the point at which human resources meet all expectations regarding quality, time, and cost, as well as comply with the program established to achieve the objectives considering the adequate use of the budget assigned to university entrepreneurship. In this sense, the efficiency of human resources makes it possible to relate the resources with respect to the objectives set in order to achieve competitiveness through university entrepreneurship and thereby position the university in the market. Based on the above, we hypothesised the following:

H2: The performance of human resources is positively and significantly related to the management of the university entrepreneurship project.

If human resources are not well-trained, organizations tend to lose the ability to compete in the national and international market, which brings with it a decrease in the success of the proposed project (Tomaka, 2001). Executive directors and managers and business schools that promote entrepreneurship must implement strategies and practices toward human resources so that they can create and retain a workforce with the capacity to generate performance, which will increase the success probability of the entrepreneurial project. Furthermore, organizations that implement more inputs for human resources tend to be more likely to have resource management practices with higher levels of performance, considering business management practices through an ideal human resource can add value to a venture with a competitive advantage (Barney & Wright, 1998; Ferguson & Reio, 2010).

The environmental changes of globalization and the influence of the economic crisis put pressure on companies and university educational institutions to improve business competitiveness and thereby guarantee success through entrepreneurship. For this reason, it is of interest to study the determinants of business performance through human resources. Likewise, changes in business practices

offer greater flexibility to the labour market and encourage the development of incentives to be able to attract and maintain a high-performance human resource and thereby become a more competitive and successful company. Milliman, Von Glinow, and Nathan (1991) define the concept of flexibility within an enterprise as the ability of human resources to manage the organization so that they adapt more easily and effectively to changes in the national and international markets (Madero & Barboza, 2015) and represents one of the main factors that contribute to the success of the entrepreneurial project. Based on the above, we hypothesised the following:

H3: The performance of human resources is positively and significantly related to the success of the entrepreneurial project.

Likewise, Wheelwright and Clark (1992) and Grant (1996) argue that two of the most important contributions to success in entrepreneurship are the practices of human resource management and the knowledge absorption capacity of the human resource project within the enterprise. Human resource management practices are significantly related to the success of the entrepreneurial project. Human resource management practices help the organization to prepare for potential future projects, assigning a suitable human resource to participate in them, and change management so that they can be coupled to the long-term strategy (Popaitoon & Siengthai, 2013). In this sense, the enhancement of the performance of human resources through efficiency and effectiveness plays a fundamental role in the development of the university entrepreneurship project and factors that allow the success of the entrepreneurial project. Thus, we hypothesised the following:

H4: The management of the university entrepreneurship project is positively and significantly related to the success of the entrepreneurial project.

Figure 1 shows the hypothetical model with specified hypotheses of the present study.

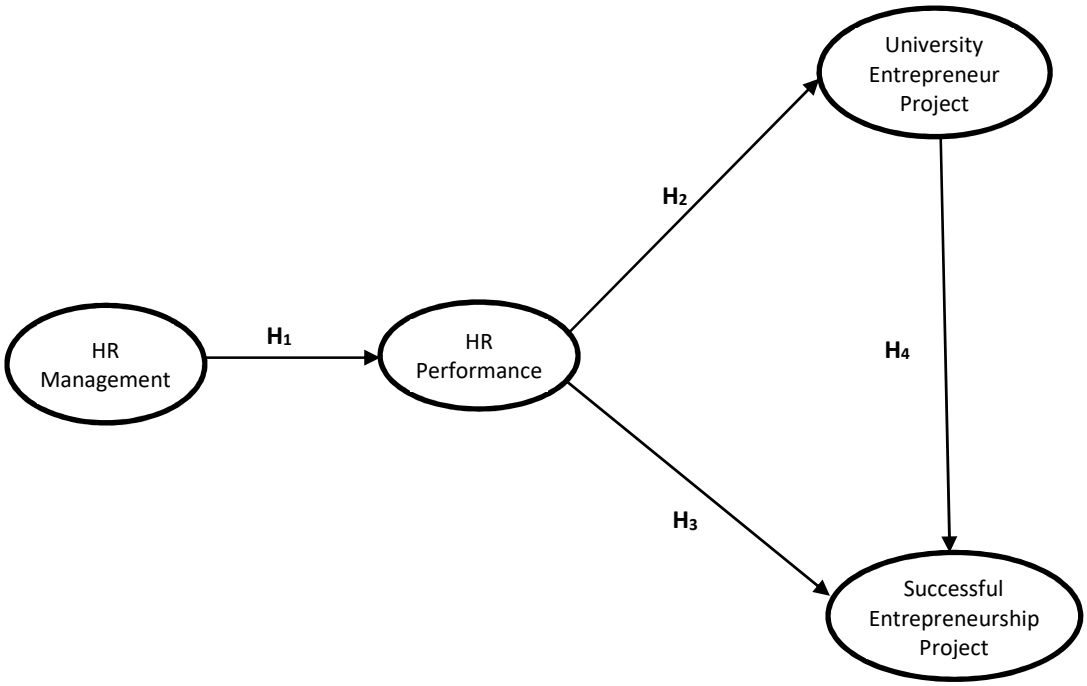

Figure 1. Theorized hypothetical model
Source: own elaboration.

RESEARCH METHODOLOGY

The type of sampling applied in the research was intentionally non-probabilistic, because it was intended to obtain the largest number of participants in the study. Regarding the inclusion criteria, they were young university entrepreneurial leaders who had a business and had at least one year of experience in the management of the entrepreneurial initiative, one year of seniority in positioning the

business in the market, and the leader had at least five dependents. Likewise, leaders with a venture whose ideas have been incubated through a university were considered. To obtain the data, an internet page was created which the participants entered to fill the questionnaires, thus providing the necessary information to statistically analyse information.

In this way, it was possible to obtain a sample of 434 entrepreneurs from public and private universities in the state of Guanajuato. Mexico. Of these, 59.4% (n=258) were women while 40.6% (n=176) were men. Regarding the age of the participants, 12.9% (n=56) were under 20 years old, 63.6% (n=276) were between 21 and 30 years old, 13.1% (n =57) – 31 and 40 years old, 10.3% (n=45) – older than 40 years. Regarding the sector of business initiatives, 42.6% (n=185) were from commerce, 48.2% (n=209) – services, and 9.2% (n=40) – the industrial sector.

For the analysis of the data obtained, the statistical software SPSS v.21 was used, for the verification of the hypotheses – SEM model designed using Amos v.21, and to calculate the force effect size and statistical power – software G * Power v.3.1.9.4.

The correlation of the analysed variables was analysed in the same way. In this way, it was shown that there is a positive and significant relationship (Bonett & Wright, 2000; Pearson, 1929; Pearson, 1931) between the latent variables: human resource management, human resource performance, university entrepreneurship project, and the success of the project. The entrepreneurial project was measured through the Pearson correlation coefficient as shown in Table 1.

Table 1. Descriptive statistics

Variables	Mean	Standard Deviation	Variance	1	2	3	4
Human resource management	5.64	1.10	1.21	1.00	–	–	–
Human resource performance	6.14	0.86	0.74	0.15**	1.00	–	–
Management of the university entrepreneurial project	6.07	1.02	1.05	0.10*	0.68**	1.00	–
Successful entrepreneurship project	6.05	0.94	0.90	0.15**	0.67**	0.80**	1.00

Note: * p<0.05; ** p < 0.001.
Source: own study.

Likewise, to improve the internal consistency of the test, the effect size of the statistical force (f^2) and the statistical power (1-β) of the correlations were calculated. For this, the F-test analysis was performed under the multiple linear regression statistical test based on the coefficient of absolute determination (ΔR^2) or squared effect size (ρ^2) considering the type of analysis: post-hoc computed achieved power (Cohen, 1988; Faul, Erdfelder, Buchner, & Lang, 2009; Hair, Hult, Ringle, & Sarstedt, 2017) (Table 3).

According to the criteria of the values corresponding to the size of the statistical force effect (f^2), Cohen (1988), Faul, Erdfelder, Buchner, and Lang (2009), as well as Hair, Hult, Ringle, and Sarstedt, (2017), consider value less than 0.02 a small force, greater than 0.02 but less than 0.35 with a reference of 0.15 as a medium force, while the value equal to or greater than 0.35 as a strong statistical force. On the other hand, Cohen (1988) considers the statistical power (1-β) criteria greater than 0.70 as adequate, greater than 0.80, to be acceptable, and greater than 0.90, to be excellent (Cohen, 1988; Faul, Erdfelder, Buchner, & Lang, 2009).

The constructs were investigated through questionnaires developed in a way that allowed a group of experts to measure them. In the same way, for the construction of some items, the main ideas were taken from the studies carried out by Lindsjørn, Sjøberg, Dingsøyr, Bergersen, and Dybå (2016), Stankovic, Nikolic, Djordjevic, and Cao (2013), Tam, Da Costa, Oliveira, and Varajão (2020), Zhang, Sun, Yang, and Wang (2018). These instruments use a 7-point Likert scale in which 1 represents 'totally disagree' and 7 'totally agree.' To measure the internal consistency of the instrument, Cronbach's alpha (α), McDonald's omega (Ω), as well as the Dillon-Goldstein composite reliability (ρc) were used. For the validity of the instruments, the structural equation model (SEM) was designed under the bootstrapping technique, and the maximum likelihood method (ML) using resampling of 1000 bootstraps through the construct validation is the most important (Hair, Hult, Ringle, & Sarstedt, 2017; Jöreskog & Sörbom, 1981; López-Lemus, De la Garza, Atlatenco, & López-Lemus, 2021). Likewise, the convergent

validity was verified through the standardized factor loadings (λ) of the same observable variables that were greater than 0.40 (Hair, Hult, Ringle, & Sarstedt, 2017; Jöreskog & Sörbom, 1981).

Human Resource Management

The human resource management instrument is made up of five manifest variables (Tam, Da Costa, Oliveira, & Varajão, 2020). According to the results of the analysis of the internal consistency of the instrument measured through reliability (α=0.90; Ω=0.90; ρc=0.90), they turned out to be satisfactory (Cronbach, 1951; Dillon & Goldstein, 1984; Hair, Hult, Ringle, & Sarstedt, 2017; Hayes & Coutts, 2020; McDonald, 1999). Regarding the validity of the human resource management instrument, a CFA was developed through an SEM model. For SEM validation, the Chi-square test was considered (χ^2=15.66 / *df*= 3; *p<0.001*) along with the partial adjustment indices of an absolute nature: the goodness of fit index (GFI=0.98), and adjusted goodness of fit index (AGFI=0.92). In the same way, the incremental fit indices were considered: comparative fit index (CFI=0.98), Tucker-Lewis index (TLI=0.96), normalized fit index (NFI=0.98), and incremental fit index (IFI=0.98). Finally, the parsimonious fit indices were considered: root mean square error approximation index (RMSEA=0.09), root mean square residual (RMR=0.02), and standardized mean square residual (SRMR=0.01). Therefore, all the goodness and fit indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996). See Table 2.

Human Resource Performance

The human resource performance instrument is made up of 10 manifest variables that the efficacy factor measures, while the efficiency factor uses five manifest variables (Lindsjørn, Sjøberg, Dingsøyr, Bergersen, & Dybå, 2016). According to the results obtained from the reliability analysis of the instrument, both the efficacy dimension (α=0.91; Ω=0.91; ρc=0.92) and the efficiency dimension (α=0.85; Ω=0.85; ρc=0.86), as well as the internal consistency of the entire instrument (7=0.93; 7=0.94; ρc=0.9), turned out to be satisfactory (Cronbach, 1951; Dillon & Goldstein, 1984; Hair, Hult, Ringle, & Sarstedt, 2017; Hayes & Coutts, 2020; McDonald & Hite, 2016; McDonald, 1999). Regarding the validity of the human resource performance instrument, a CFA was developed through an SEM model. For SEM validation, the Chi-square test was considered (χ^2=289.71 / *df*= 89; *p<0.001*) along with the absolute partial adjustment indices (GFI=0.91; AGFI=0.90), the incremental adjustment indices (CFI=0.94; TLI=0.93; NFI=0.92; IFI=0.94) and the adjustment indices of parsimonious character (RMSEA=0.07; RMR=0.05; SRMR=0.04). Therefore, all the goodness and fit indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996). See Table 3.

Human Resource Performance

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Management of the University Entrepreneurial Project

This instrument is made up of four manifest variables (Stankovic, Nikolic, Djordjevic, & Cao, 2013). According to the results obtained from the analysis of the internal consistency of the instrument (α=0.90; Ω=0.90; ρc=0.90), they turned out to be satisfactory (Cronbach, 1951; Dillon & Goldstein, 1984; Hair, Hult, Ringle, & Sarstedt, 2017; Hayes & Coutts, 2020; McDonald, 1999). Regarding the validity of the management of the university entrepreneurial project instrument, a CFA was developed through an SEM model. For SEM validation, the Chi-square test was considered (χ^2=1.29 / *df*= 2; *p<0.001*), along with the absolute partial adjustment indices (GFI=0.99; AGFI=0.99), the incremental adjustment indices (CFI=1.00; TLI=1.00; NFI=0.99; IFI=1.00), and the adjustment indices of parsimonious character (RMSEA=0.01; RMR=0.07; SRMR=0.05). Therefore, all the goodness and adjustment indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996). See Table 4.

Successful Entrepreneurship Project

This instrument considers four manifest variables (Zhang, Sun, Yang, & Wang, 2018). According to the results obtained from the analysis of the internal consistency of the instrument (α=0.87; Ω=0.86; ρc=0.87), they turned out to be satisfactory (Cronbach, 1951; Dillon & Goldstein, 1984; Hair, Hult, Ringle, & Sarstedt, 2017; Hayes & Coutts, 2020; INEGI 2023; McDonald, 1999). Regarding the validity of the successful entrepreneurship project instrument, a CFA was developed through an SEM model. For SEM validation, the Chi-square test was considered (χ^2=6.19 / *df*= 3; *p<0.001*) along with the absolute partial adjustment indices (GFI=1.00; AGFI=1.00), the incremental adjustment indices (CFI=1.00; TLI=1.00; NFI=1.00; IFI=1.00), and the adjustment indices of parsimonious character (RMSEA=0.01; RMR=0.01; SRMR=0.02). Therefore, all the goodness and adjustment indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996). See Table 5.

Table 2. Human resource management

Variable: Human resource management									**Factorial load**	**Reliability**		
HRM1. The human resource has high technical competence and experience									0.79**	0.90	0.90	0.9
HRM2. Human resources are highly motivated and committed to the success of the entrepreneurial project.									0.82**			
HRM3. Adequate technical training is provided to human resources to manage the processes of the entrepreneurial project									0.85**			
HRM4. The human resource knows the principles and management processes of the entrepreneurial project.									0.67**			
HRM5. Human resource management has a flexible and/or adaptive style towards the development of the entrepreneurial project									0.69**			
χ^2	***df***	**CFI**	**TLI**	**GFI**	**AGFI**	**NFI**	**IFI**	**RMSEA**	**SRMR**	**α**	**Ω**	ρc
15.66	3	0.980	0.960	0.980	0.920	0.980	0.980	0.09	0.01	0.90	0.90	0.90

Note: ** p<0.001.

Source: own elaboration based on Tam, Da Costa, Oliveira, and Varajão (2020).

Table 3. Human resource performance

Variable: Human resource effectiveness (EFCIA)	Factorial load	Reliability		
RE_EF1 Following the results, teamwork can be considered a success	0.702**	0.91	0.91	0.92
RE_EF2 All customer demands are satisfied.	0.716**			
RE_EF3 From the opinion of the company, the objectives of the team are achieved	0.796**			
RE_EF4 The image of the company grows according to the performance of the work team	0.747**			
RE_EF5 The result of teamwork is of high quality	0.819**			
RE_EF6 The client is satisfied with the quality of the result of teamwork.	0.792**			
RE_EF7 The work team is satisfied with the results achieved	0.782**			
RE_EF8 The product produced on the computer requires a few modifications.	0.598**			
RE_EF9 The product/service is stable in its operation	0.765**			
RE_EF10 The product/service developed proves to be complete and functional	0.551**			
Variable: Human resource efficiency (EFCA)				
RE_EC1 The organization is satisfied with the work carried out by the work team	0.824**	0.85	0.85	0.86
ER_EC2 In general, the team works profitably	0.798**			
RE_EC3 In general, the team works efficiently	0.837**			
RE_EC4 The team is on schedule	0.602**			
RE_EC5 The equipment is within budget	0.607**			

χ^2	*df*	CFI	TLI	GFI	AGFI	NFI	IFI	RMSEA	SRMR	α	Ω	ρc
289.71	89	0.94	0.93	0.91	0.9	0.92	0.94	0.07	0.04	0.93	0.94	0.94

Note: ** p<0.001.

Source: own elaboration of Lindsjørn *et al*., 2016..

Table 4. Management of the university entrepreneurial project

Variable: Management of the university entrepreneurial project	Factorial load	Reliability		
UEP1. The university entrepreneurship project was successful in terms of quality	0.80**	0.90	0.90	0.90
UEP2. The university entrepreneurship project was successful in terms of scope and project requirements met	0.89**			
UEP3. The university entrepreneurship project was successful in terms of timeliness in project completion	0.79**			
UEP4. The university entrepreneurship project was successful in terms of costs and efforts under budget or within estimates	0.80**			

χ^2	*df*	CFI	TLI	GFI	AGFI	NFI	IFI	RMSEA	SRMR	α	Ω	ρc
1.29	2	1.000	1.000	0.990	0.990	0.990	1.000	0.01	0.05	0.90	0.90	0.90

Note: ** p<0.001

Source: own elaboration of Stankovic *et al*., 2013.

Table 5. Successful entrepreneurship project

Variable: Successful entrepreneurship project	Factorial load	Reliability		
The project was accomplished:		0.87	0.86	0.87
SEP1. On-time	0.82**			
SEP2. Within budget	0.85**			
SEP3. According to specifications	0.69**			

χ^2	*df*	CFI	TLI	GFI	AGFI	NFI	IFI	RMSEA	SRMR	α	Ω	ρc
6.19	3	1.000	1.000	1.000	1.000	1.000	1.000	0.01	0.02	0.87	0.86	0.87

Note: ** p<0.001.

Source: own elaboration of Zhang *et al*., 2018.

RESULTS AND DISCUSSION

To evaluate the hypothetical structural equation model (SEM) under the bootstrapping technique and the maximum likelihood (ML), the robustness method (Satorra & Bentler, 1994) considered a resampling of 1000 bootstraps. To evaluate the hypothetical SEM model, the Chi-Square test was considered (χ^2=197.74 / *df*= 73; χ^2/*df*=2.70; *p<0.001*) along with the partial adjustment indices of an absolute nature: the goodness of fit index (GFI=0.94), and adjusted goodness of fit index (AGFI=0.91). Likewise, the incremental fit indices of the SEM model were analysed: comparative fit index (CFI=0.97), Tucker-Lewis index (TLI=0.96), normalized fit index (NFI=0.95), and incremental fit index (IFI=0.97). Likewise, the variances of the factors of which it was possible to verify that there was no collinearity between the exogenous and endogenous variables as well as the mediating variables were analysed.

Finally, the parsimonious fit indices were considered: root mean square error approximation index (RMSEA=0.06), root mean square residual (RMR=0.03), and standardized mean square residual (SRMR=0.03). Therefore, all the goodness and fit indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Hair, Hult, Ringle, & Sarstedt, 2017; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996; Tucker & Lewis, 1973), see Figure 2.

According to the analysis of the structural loads (β) of the theoretical and hypothetical SEM model (Figure 2), the hypotheses established for the present investigation were evaluated. In this sense, to evaluate hypothesis H_1, I analysed the structural load corresponding to the path via HR Management → HR Performance (β_1). According to the structural load, there was sufficient statistical evidence to affirm that human resource management is positively and significantly related (β_1=0.18; p<0.001) to human resource performance, which is 3.24% (ΔR^2= 0.032) of the total variance explained by the SEM model.

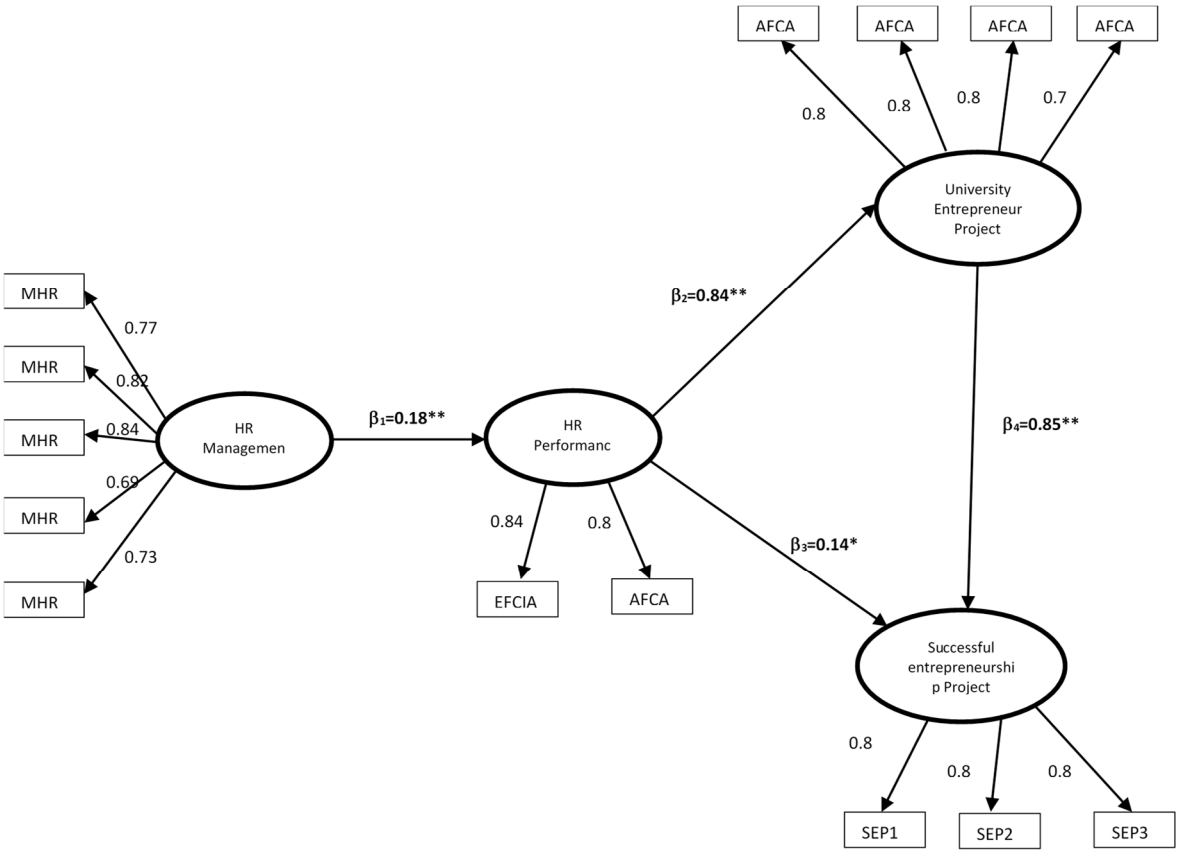

Figure 2. Standardized structural loads of the SEM model

Notes: ** *p*<0.001. * *p*<0.05

Source: own elaboration based on investment results.

Following the recommendations of Mayr, Erdfelder, Buchner, and Faul (2007), we proceeded to calculate the force (f^2) and statistical power (1- β) of the structural load (β_1) of the SEM model. The calculation of the statistical strength was determined using the F-test: multiple linear regression through a Post hoc test considering the coefficient of absolute determination (ΔR^2=0.0324) (Mayr, Erdfelder, Buchner, & Faul, 2007). Based on the result, a moderate statistical force (f^2=0.033; *p<0.001*) was obtained (Cohen, 1988) (Hair, Hult, Ringle, & Sarstedt, 2017). Subsequently, the statistical power was calculated considering the reliability level of the structural load (β_1=0.18; α=0.01), the calculated statistical force (f^2=0.033) as well as the size of the sample used in the study (N=434). under a predictor. According to the results obtained, the F-critical value (F_{432} = 6.69) and the non-centrality parameter (λ = 14.53) the statistical power (1 – β = 0.90; p<0.001) of the structural load (β_1) was excellent (Faul, Erdfelder, Buchner, & Lang, 2009). According to the analysis carried out through the structural load β_1 of the SEM model, hypothesis H_1 was accepted.

To evaluate hypothesis H_2, I analysed the structural load corresponding to the path via HR performance → university entrepreneurial project (β_2). According to the corresponding structural load, there was sufficient evidence to affirm that the performance of human resources was positively and significantly related (β_2=0.84; p<0.001) with the management of the university entrepreneurship project, which represents 70.5% (ΔR^2= 0.705) of the total variance explained by the SEM model.

In the same way, the strength and statistical power of the structural load (β2) of the SEM model were calculated. To calculate the statistical force, we considered the coefficient of absolute determination (ΔR^2=0.705) (Mayr, Erdfelder, Buchner, & Faul, 2007). Based on the result, a strong statistical force (f^2=3.10; *p<0.001*) was obtained (Cohen, 1988; Hair, Hult, Ringle, & Sarstedt, 2017). Subsequently, the statistical power was calculated considering the reliability level of the structural load (β_2=0.84; α=0.01), the calculated statistical force (f^2=3.10), as well as the size of the sample used in the study (N=434) under a predictor. According to the results obtained, the F-critical value (F_{432} = 6.69) and the non-centrality parameter (λ = 1344.69) the statistical power (1 – β = 1; p<0.001) of the structural load (β_2) was excellent (Faul, Erdfelder, Buchner, & Lang, 2009). Based on the analysis of the structural load β_2 of the SEM model, hypothesis H_2 was accepted.

To evaluate hypothesis H_3, I analysed the structural load corresponding to the path via HR performance → successful entrepreneurship project (β_3). According to the corresponding structural load, there was sufficient evidence to affirm that the performance of human resources was positively and significantly related (β_3=0.14; p<0.05) to the success of the entrepreneurial project, representing 1.96% (ΔR^2= 0.019) of the total explained variance.

Subsequently, the strength and statistical power of the structural load (β3) of the SEM model were calculated. To calculate the statistical force, we considered the coefficient of absolute determination (ΔR^2=0.019) (Mayr, Erdfelder, Buchner, & Faul, 2007). Based on the result, a moderate statistical force (f^2=0.02; *p<0.001*) was obtained (Cohen, 1988; Hair, Hult, Ringle, & Sarstedt, 2017). Subsequently, we calculated the statistical power considering the reliability level of the structural load (β3=0.14; α=0.05), the calculated statistical force (f^2=0.02), and the size of the sample used in the study (N=434) under a predictor. According to the results, the F-critical value (F_{432} = 6.69) and the non-centrality parameter (λ = 8.68), the statistical power (1 – β = 0.64; p<0.05) of the structural load (β_3) was adequate (Faul, Erdfelder, Buchner, & Lang, 2009). Based on the analysis of the structural load β_3 of the SEM model, hypothesis H_3 was accepted.

Finally, to evaluate hypothesis H_4, I analysed the structural load corresponding to the path via the university entrepreneurial project → successful entrepreneurship project (β_4). According to the corresponding structural load, there was sufficient evidence to affirm that the performance of human resources was positively and significantly related (β_3=0.85; p<0.001) to the success of the entrepreneurial project, representing 72.2% (ΔR^2= 0.722) of the total explained variance.

Consequently, the strength and statistical power of the SEM model's structural load (β4) were calculated. To calculate the statistical force, I considered the coefficient of absolute determination (ΔR^2=0.722) (Mayr, Erdfelder, Buchner, & Faul, 2007). Based on the result, a strong statistical force (f^2=2.60; *p<0.001*) was obtained (Cohen, 1988; Hair, Hult, Ringle, & Sarstedt, 2017). Subsequently,

we calculated the statistical power considering the reliability level of the structural load (β_3=0.85; α=0.01), the calculated statistical force (f^2=2.60) and the size of the sample used in the study (N=434) under a predictor. According to the results, the F-critical value (F_{432} = 6.69) and the non-centrality parameter (λ = 1127.15), the statistical power (1 – β = 1; p<0.01) of the structural load (β_4) was adequate (Faul, Erdfelder, Buchner, & Lang, 2009). Based on the analysis of the structural load β_4 of the SEM model, hypothesis H_4 was accepted.

The findings obtained in this study are important and relevant because they are similar to the results obtained in the studies carried out by Lindsjørn, Sjøberg, Dingsøyr, Bergersen, and Dybå (2016) as well as those obtained by Tam, Da Costa, Oliveira, and Varajão (2020).

CONCLUSIONS

One of the main findings obtained in the study was to identify one of the main factors that induce the performance of human resources is mainly focused on providing them with the adequate and necessary training to promote in them high technical and professional competence. Knowing each one of the management principles as well as the processes of the entrepreneurial project is extremely relevant because motivation and commitment project and potentiate in HR. Moreover, it generates a flexible and adaptive culture for developing and achieving the success of the project that is being undertaken, thus generating in them a performance of human resources based on their efficiency and effectiveness.

On the other hand, the performance of human resources is a factor that influences the university entrepreneurship project, as well as the success of the entrepreneurial project. That is, the performance of the human resource framed by its efficiency and effectiveness promotes that the HR is specifically focused on achieving results established in the entrepreneurial project and that HR is high quality thus able to achieve its objectives by satisfying the needs of the client highlighting in them a proactive image in the performance of the work team, respecting at all times the budget, time, schedules that allude to promoting each of the activities scheduled in the project (Lindsjørn, Sjøberg, Dingsøyr, Bergersen, & Dybå, 2016; Stankovic, Nikolic, Djordjevic, & Cao, 2013; Tam, Da Costa, Oliveira, & Varajão, 2020).

Given the above, it is extremely important because considering the performance of human resources in entrepreneurship because it promotes the university entrepreneurship project to achieve success in terms of meeting its objectives through the requirements established in the time established for the completion of the project entrepreneur, always achieving the necessary quality for developing the enterprise considering reaching them below budget. Likewise, the success of the entrepreneurial project is based mainly on the fact that it is carried out within the budget, consequently, that the project is established in the planned time, and finally, that it is developed according to the set specifications (Stankovic, Nikolic, Djordjevic, & Cao, 2013).

The results are extremely important for universities, because they generate important strategies to promote entrepreneurship through business schools or faculties, and for entrepreneurs, for whom the results allow to manage human resources so that the entrepreneurship project is successful. We should consider this while considering that the management of HR plays a fundamental role in developing the university entrepreneurial project, so achieving the success of the entrepreneurial project is mainly based on positioning in the market as well as the fulfilment of the objectives established through the budget, in the planned time, and by aligning at all times with the specifications of the project, thus keeping the performance quality of the human resources that participate in the specific entrepreneurial project (Stankovic, Nikolic, Djordjevic, & Cao, 2013; Tam, Da Costa, Oliveira, & Varajão, 2020; Zhang, Sun, Yang, & Wang, 2018).

The practical implications and recommendations focus on university entrepreneurs of SMEs, who must consider in their entrepreneurial processes of business entities and in entrepreneurial projects the necessary human resources that intensify the opening as the positioning of business units, which are the human resource as the main factor in the stability and continuity of practice and knowledge (Montoro-Sánchez & Ribeiro Soriano, 2011). Therefore, the management of human resources plays a very important

role in the development of the entrepreneurial project, and in the same way, it represents a management tool focused on the people who are involved in the development of the entrepreneurial project.

The study identified the relevance of human resources and its relationship with the success of university entrepreneurship. In the present study, the authors presented some significant contributions regarding human resources that have been neglected through the studies on university entrepreneurship. One of the main limitations is that only entrepreneurs who have an entrepreneurship project through the educational institution were considered. Therefore, it is suggested that the variables be analysed by university entrepreneurs and entrepreneurs who carry out a business project considering their years of experience in developing their venture in other contexts.

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Conflict of Interest

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Do academics in the boardroom create value for firms?

Taufiq Arifin, Aldy Fariz Achsanta, Irwan Trinugroho

ABSTRACT

Objective: The objective of this article is to examine the value of academics as board members. Using upper echelons theory to explain how top management's characteristics affect corporate decision-making, we particularly investigated whether academics as independent directors contribute to firm performance. More specifically, we further assessed whether this enhancing value for the firm remains in the long run. Moreover, this study also examined the monitoring role of academics as independent directors in reducing investment inefficiency.

Research Design & Methods: This study used Indonesian non-financial listed firms covering the years 2007 through 2016 as our sample. We collect both financial and non-financial data from Indonesian Stock Exchange and firms' annual reports. We eliminated firm-year observations where information is missing and left an unbalanced panel consisting of 2461 firm-year observations. To test our hypothesis empirically, we initially used OLS regression as well as GLS random effects and several robustness tests to mitigate any endogeneity concern, such as propensity score matching and Hainmueller entropy balancing. Furthermore, we used quantile regression to examine the relation effect of academic boards across the entire distribution of investment inefficiency and also to mitigate the censoring problem.

Findings: Empirically, we showed that firms with academics in board members, on average, have better firm performance. The results hold to a battery of robustness checks. The analysis also suggests that the enhancing values of academic board members remain in the long run. Interestingly, we further found that the enhancing value of academics is more pronounced in reducing high-level of investment inefficiency.

Implications & Recommendations: Corporate governance literature offers upper echelons theory to explain how the top management's characteristics affect corporate decision-making. Similar to various demographic characteristics, this study confirmed the upper echelons theory in exposing the advising and monitoring role of academic independent directors. Personal characteristics of board members predict the outcome of corporate decision-making, even in emerging countries such as Indonesia.

Contribution & Value Added: This study shed light on the important role of academics as independent board members in delivering value for firms. Examining this issue in an emerging country such as Indonesia, where the corporate governance mechanism is more likely to be a rubber stamp, helps us highlight the actual value of hiring independent academic directors. Our evidence also contributes to the literature on the channel in which academics deliver value for firms by reducing investment inefficiency at the extreme level.

Article type: research article

Keywords: academic board; upper-echelon; firm performance; investment efficiency

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INTRODUCTION

Despite the fact that the 1998 financial crisis led to negative investment and economic growth in Indonesia, the emerging literature of corporate governance literature indicates that better law enforcement may benefit the business environment. Corporate governance studies document evidence on how law enforcement and investor protection are getting better in Indonesia. Previously, Soeharto's authoritarian regime maintained control over Indonesia's political and economic aspects for 32 years.

In 1997-1998, Indonesia was facing economic collapse which led to a transition from non-democratic rule to democratic regime (Chandra & Kammen, 2002).

Indonesia's emerging democracy and decentralization era involves new fiscal and financial reformation, political divergence, accountability, and policy-making latitude (Holzhacker, Wittek, & Woltjer, 2015). This situation has increased policy performance in corporate governance by allowing corporations to develop suitable governance mechanisms to protect their stakeholders using various mechanisms, *e.g*., external and independent supervisory boards. This mechanism allows firms to enhance control and accountability. Indonesia follows a two-tier board structure; board of directors (BOD) and board of commissioners (BOC). Vigilant assurance from independent directors or commissioners is vital in mitigating the possibility of expropriation (Habib, Muhammadi, & Jiang, 2017).

Incoming board members hired from the external possess unique characteristics, knowledge, and skills. Firms may hire external and independent board members with various backgrounds, such as celebrities, former bureaucrats or politicians, government officers, sportsmen, or professors. Over the last two decades, the literature on corporate governance literature has explored the top management's role in business decisions making. Most of this empirical research relies on the upper echelons theory of Hambrick and Mason (1984) to explain how managerial background characteristics affect organizational outcomes. This issue is important for several reasons. Firstly, top executives play a significant role in shaping the organization's culture (Schein, 2004). Secondly, from a managerial perspective, top management characteristics can be used to predict the outcome of strategic decisions. Upper echelons theory predicts that the strategic decisions made by the top management team would at least partially reflect the individual's behavioural tendencies (Olsen & Stekelberg, 2015).

Prior studies have explored observable upper-echelon characteristics of firms' executives and the outcomes. Jalal and Prezas (2012) show that firms with outside chief executive officers (CEO) experience higher stock performance, accounting profitability, capital investment, and better growth opportunities. In particular, Francis, Hasan, and Wu (2015) show that firms with directors from academia exhibit higher performance than their counterparts. They argue that these directors play essential governance roles through their advising and monitoring functions. While the extant literature enhances our understanding of how top management characteristics can influence the various outcomes, few studies examine the implications of academics in the boardroom.

This study aims to extend Francis, Hasan, and Wu (2015) who examined the role of professors as board members. They show the governance role of professors through several channels such as innovations and reducing information asymmetry. The presence of academic independent directors can enhance the transparency of information and ultimately lower the risk of financial crashes (Jin *et al.,* 2022). However, a limited study in the literature examines the channel through which academic boards provide value for firms. Understanding the impact of professors on decisions making is essential for two reasons. Firstly, board members as top management teams are responsible for strategic decisions. Despite the competing argument that academics' expertise may not be well suited to the real business environment, outside board members such as academics provide heterogeneity as well as others such as foreign directors, banker directors, politician directors, or lawyer directors. Secondly, Indonesia is one of the largest emerging economies in the world and a typical relationship-based society that is characterized by weak investor protection and relatively high corruption which provides a unique setting to examine whether professors as representatives of higher education play both monitoring and advising functions as independent board members or just a rubber stamp. Our findings also add to the existing body of literature on how academics contribute value to firms by decreasing investment inefficiency to an extreme degree.

However, the academic board member may not be randomly assigned by firms. Therefore, we performed two additional tests for robustness. Firstly, we conducted a matching estimation based on the propensity score by employing Caliper and Gaussian kernel matching. Secondly, we used Hainmueller's entropy balancing method to mitigate potential endogeneity concerns (Hainmueller, 2012). Results from these two empirical tests consistently indicated that our results were robust to endogeneity problems.

The remainder of this article is organized as follows. In section 2, we will discuss prior literature and hypothesis development. Section 3 will contain empirical strategy. Section 4 will discuss our findings. Finally, we will conclude the analysis with limitations and suggestions for the future line of research.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

There has been an ongoing debate on corporate governance issues since the 1980s, attracting the attention of investors, shareholders, regulatory offices, and academic researchers. Corporate governance provides a framework to reassurance security through monitoring and controlling firms' operations. Globalization of the business environment has led to cultural diversity, and thus the framework of corporate governance may have limitations to be applied in various environments. Therefore, companies must apply the corporate governance framework meticulously and carefully. Corporate governance needs to follow a principle-based approach rather than a rule-based approach (OECD, 2004).

The corporate governance framework denotes the distribution of responsibilities and rights among different stakeholders in the firm, such as board members, managers, stockholders, creditors, customers, and other stakeholders, and ensures proper decision-making (Abu-Tapanjeh, 2009). The business and economic research on the association between various corporate governance mechanisms and firm decisions has been recently growing. For example, Olsen and Stekelberg (2015) examine the influence of CEO narcissism on corporate tax aggressiveness. According to their evidence, a narcissistic CEO can lead to more aggression in tax avoidance. This evidence shows that individual characteristics of the CEO as a top management can affect forms' strategic decisions.

Using US firms from 1992 to 2004, Khan and Vieito (2013) examine whether the women CEO outperform men. Their results show that the CEO's gender can significantly influence firm performance. Women CEO's risk preference plays a vital role in decision-making and thus can influence firm performance. However, other study shows that the gender diversity of top management team should enhance performance for firms seeking growth (Dwyera *et al.*, 2003).

More recent studies highlight the significance of exploring specific types of external board members. Although the evidence is mixed when examining the various board members' characteristics, the literature shows that outside board members behave differently in monitoring and advising functions. Some of the outside board members can even destroy firms' value, *e.g*., politicians who pursue their political objectives rather than firm goals. For example, Bertrand *et al.* (2018) show that politically-connected boards are more likely to use a firm's resources, *e.g*., over-employment or factory miss-location, to pursue their political objectives at the firm's costs.

Academic board members are a type of external board members with unique characteristics. According to Francis *et al.* (2015), professors possess specialized knowledge and skills in their respective research domains such as business, technology, and law. Additionally, academic directors' main areas of proficiency revolve around academic subjects. Their characteristics can add value to the board's diversity as well as board efficacy and thus enhance the quality of firm decisions. As independent experts, academic directors also provide advising contribution thanks to their knowledge and perspectives. Dou *et al.* (2022) argue that independent directors with academic backgrounds can also exercise their theoretical foundation and scientific foundation to help management develop better risk mitigation. For instance, the monitoring role of academic boards can effectively reduce stock price crash risk by improving financial reporting quality and alleviating agency problems (Jin *et al.,* 2022).

Despite their advising contribution, academic directors with strong reputations and a tradition of independent thinking are more likely to be independent and thus they are expected to perform better at monitoring functions (Francis *et al*., 2015, Chen *et al*., 2019). Considering their reputation, academic directors can also effectively mitigate corporate myopia (Dou *et al.*, 2022). Furthermore, firms become highly regarded because academic directors are more likely to earn respect from society because of their higher level of integrity and knowledge (Chen *et al*., 2019). The social and scientific network can help companies gain non-market resources such as favoured graduates or university resources (Chen *et al*., 2019). In light of these discussions, we hypothesize:

H1: Academic board members are positively associated with firm performance.

The influence of academic boards on a range of corporate decisions could potentially lead to an increase in firm value. Additionally, we propose that academic board members may have a role in major corporate decisions such as limiting overinvestment. Academic boards are valuable in providing sound management advice for investments. Their presence in firms can lead to better decision-making and improved operations, ultimately benefiting the organization. Independent directors also play a crucial role in advising and monitoring firms (Francis *et al.*, 2015). The expertise of academic boards can give firms a competitive advantage, and their professional knowledge can be utilized to improve corporate projects (Wang, 2020). Consequently, academic boards can help limit over-investment and enhance the quality of corporate initiatives. Therefore, we formulated the following hypothesis:

H2: Academic board members are negatively associated with over-investment.

RESEARCH METHODOLOGY

This study's sample included all Indonesian-listed firms between the years 2007 and 2016. Due to their characteristics, we eliminated financial firms, because they had different regulatory environments and corporate governance characteristics. The background information of board members, as well as financial data, were hand-collected from the annual reports. The reports provided financial and non-financial information such as detailed board members' personal information including professional background, degree, gender, and affiliation. If the annual reports provided limited information about their board members, we further searched the university website, or other business or personal websites to identify and verify their professional backgrounds. Our final sample comprised 2461 firm-year observations. We winsorized the variables at the 1% level in both tails to mitigate potentially biased inference caused by the outliers (Arifin *et al.*, 2020).

We tested our first hypothesis by employing the subsequent regression model:

$$Performance_{i,t} = \alpha + \beta_1 ACD_{i,t-1} + \sum_n^j \beta_2 X_{i,t} + \beta_3 \eta_{i,t} + \beta_4 \upsilon_{i,t} + \epsilon_{it}, \quad (1)$$

in which $Performance_{i,t}$ represents the two firms' performance measures for firm *i* in year *t*. $ACD_{i,t}$ represents the academic boards which are constructed following Francis *et al*. (2015). We then created a dummy and continuous variable to capture the presence of academic board members. For the dummy variable, we valued one if a firm has at least one academic board member either a management board or a supervisory board, and zero otherwise. We also used a ratio equal to the number of academic board members divided by the total number of board members for continuous variables. To examine our second hypothesis, we employed quantile regression to examine the relationship effect of academic board across the entire distribution of investment inefficiency.

X_{it} is a vector of control variables. Larger firms are more likely to perform better, thus we controlled for $SIZE_{it}$. $SIZE_{it}$ is the firm's size calculated as the natural logarithm of total assets of firm *i* in year *t*. $INTANG_{it}$ is the intangible assets for firm *i* in year *t* scaled by total assets. We also controlled for effective tax rate (ETR), leverage (LEV_{it}), growth opportunities $(GROWTH_{it})$, Altman's Z-Score $(ZSCR_{it})$, and capital expenditure $(CAPEX_{it})$. The effective tax rate was included to control whether firms use the tax aggressiveness associated with profitability. Excessive debt creates direct cost, *e.g*., interest payments and debt covenants, which reduces profitability. Thus, leveraged firms are less likely to perform better and growth opportunities affect profitability.

To address concerns regarding the endogenous determination of academic board members and potential bias in the OLS estimation due to omitted variables, we employed propensity score and entropy balancing matching analysis. Table 1 provides detailed information on all variables.

Table 1. Variable definition

Variable	Description
ROA	Return on assets calculated as earnings before tax divided by total assets.
ROE	Return on equity calculated as earnings after tax divided by total equity.
ACD_P	Proportion of academics calculated as the number of academics sitting on the boards divided by total number of board members.
ACD_D	Dummy variable that is equal to one in firm that has at least one academic board, and zero otherwise.
SIZE	Natural logarithm of total assets.
INTANG	Intangible assets divided by total assets.
ETR	Effective tax rate calculated as tax expenses divided by earnings before tax.
LEV	Leverage calculated as total debt-to-equity ratio.
GROWTH	Market value of equity divided by book value of equity.
ZSCR	Altman Z-score for emerging markets computed as Z = 3.25 + 6.56 × (current assets-current liabilities/total assets) + 3.26 × (retained earnings/total assets) + 6.72× (EBIT/total assets) + 1.05 × (book value of equity/total liabilities).
CAPEX	The ratio of capital expenditure to total assets.

Source: own study.

RESULTS AND DISCUSSION

In Table 2, we provide a summary of the descriptive statistics for both the dependent and independent variables, as well as the control variables for both the total sample and sub-sample. Within 2377 firm-years, 149 firm-years have at least one academic on their board members. Panel A of Table 2 suggests that 6% of our sample had academics on their board members. For firm-level characteristics, the results suggest that an average sample firm has ROA and ROE of 6.12% and 8.74% respectively. The average discretionary abnormal accrual was 0.0012, the average intangible asset ratio was 1.76%, and the average leverage ratio was 81.86%.

Regarding sub-sample analysis, we found that on average firms with an academic board member were more likely to have higher ROA and ROE. We also noticed that the likelihood of managing earnings was lower for firms with academic board members. Similarly, the larger firms were more likely to have academic board members. Furthermore, we found insignificant differences in terms of intangibility, tax aggressiveness, leverage, growth opportunity, bankruptcy risk, and capital expenditure ratio between firms with academic and non-academic boards.

Table 3 presents a correlation matrix between all variables. Our two measures of firm performance (ROA and ROE) were positively correlated. We also found that ACD_P and ACD_D were positively correlated with ROA and ROE. Similarly, SIZE was positively correlated with ROA and ROE, indicating that larger firms were associated with better performance. As predicted, ROA and ROE were negatively correlated with LEV.

We first explored the impact of academic board members on firm performance. Table 4 presents the results of the baseline model using ordinary least squares (OLS) regressions including industry and year fixed-effect. Standard errors were adjusted at the firm-level clustering. Column 1(2) reports the results with the ROA(ROE) as the dependent variable. The significantly positive coefficients of ACD_P suggest that academics as board members can enhance firm performance. The results held when we replaced ACD_P with ACD_D (dummy variable). We also found that academics positively and significantly affect the sales-to-employee ratio (untabulated). As a result, the statistical significance of the impact of academic boards on firm performance provided support for Hypothesis 1. The results of this study are consistent with previous research that highlights the importance of academic boards in improving the performance of firms (Francis *et al*., 2015; Jiang & Murphy, 2007; Chen *et al*., 2019).

Table 2. Descriptive statistics

Panel A. Full sample						
Variables	**N**	**Mean**	**SD**	**p25**	**Median**	**p75**
ROA	3244	0.0612	0.1026	0.0106	0.0499	0.0996
ROE	3244	0.0874	0.2515	0.0001	0.0720	0.1806
ACD_P	3440	0.0064	0.0296	0.0000	0.0000	0.0000
ACD_D	3446	0.0522	0.2225	0.0000	0.0000	0.0000
DAC	3244	0.0012	0.1762	-0.0155	0.0001	0.0419
SIZE	3244	21.1428	1.8142	19.9135	21.1762	22.3953
INTANG	3237	0.0176	0.0512	0.0001	0.0001	0.0044
ETR	3244	0.2193	0.2107	0.0001	0.2350	0.2993
LEV	3244	0.8186	1.7322	0.0678	0.4168	1.0190
GROWTH	3244	0.9063	0.3162	0.9189	0.9897	1.0531
ZSCR	3901	6.4026	7.0657	4.3335	6.1328	8.6862
CAPEX	3244	0.1530	0.2946	0.0104	0.0681	0.1725
Panel B: Sub-sample						
Variables	**Academic board**		**Non-academic board**		**Diff.**	**p-value**
	Mean	**SD**	**Mean**	**SD**		
ROA	0.123	0.1026	0.059	0.1008	0.065	0.000***
ROE	0.225	0.2515	0.080	0.2420	0.145	0.000***
DAC	-0.025	0.1762	0.007	0.1619	-0.032	0.022**
SIZE	20.553	1.8142	21.238	1.7945	-0.685	0.000***
INTANG	0.011	0.0512	0.018	0.0504	-0.007	0.106
ETR	0.223	0.2107	0.219	0.2146	0.004	0.8647
LEV	0.902	1.7322	0.806	1.6876	0.095	0.511
GROWTH	0.908	0.3162	0.927	0.2926	-0.019	0.433
ZSCR	7.228	7.0657	6.429	6.6166	0.799	0.111
CAPEX	0.152	0.2946	0.146	0.2866	0.005	0.823

Source: own study.

Table 3. Correlation matrix

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
(1) ROA	1.0000	–	–	–	–	–	–	–	–	–	–	–
(2) ROE	0.7632	1.0000	–	–	–	–	–	–	–	–	–	–
(3) ACD_P	0.1220	0.1054	1.0000	–	–	–	–	–	–	–	–	–
(4) ACD_D	0.1415	0.1346	0.9190	1.0000	–	–	–	–	–	–	–	–
(5) DAC	0.1828	0.0852	-0.0773	-0.0452	1.0000	–	–	–	–	–	–	–
(6) SIZE	0.1607	0.1362	-0.1116	-0.0875	0.2801	1.0000	–	–	–	–	–	–
(7) INTANG	-0.0157	-0.0298	-0.0447	-0.0319	0.0081	0.1775	1.0000	–	–	–	–	–
(8) ETR	0.1014	0.1345	-0.0110	0.0039	0.0174	-0.0003	0.0034	1.0000	–	–	–	–
(9) LEV	-0.1135	-0.1841	-0.0082	0.0161	0.0095	0.0689	-0.0030	-0.0125	1.0000	–	–	–
(10) GROWTH	-0.0442	-0.0107	-0.0165	-0.0163	0.0734	0.2082	0.0238	-0.0177	0.0289	1.0000	–	–
(11) ZSCR	0.1040	0.0801	0.0196	0.0183	0.0463	0.0927	0.0625	-0.0063	-0.0565	0.0131	1.0000	–
(12) CAPEX	0.1176	0.0933	-0.0198	0.0049	0.0554	0.0919	0.1124	-0.0408	0.0219	0.0121	0.0362	1.0000

Source: own study.

Among the control variables, the coefficient of LEV and INTANG was significantly negative and suggested that firms with higher leverage and more intangible assets have a lower performance. The CAPEX coefficient was significantly positive, consistent with the prediction that firms with higher investment in capital expenditure have a higher performance. The adjusted R2 ranged from 11.70% to 14.90% suggesting that a significant portion of firm performance variance has been explained. Overall, we found consistent evidence for our central hypothesis that academic board members improve performance.

Table 4. Academic boards and firm performance: OLS regressions

Variable	(1)	(2)	(3)	(4)
	ROA	**ROE**	**ROA**	**ROE**
ACD_P_t	0.516***	1.044***	–	–
	(2.937)	(3.009)	–	–
ACD_D_t	–	–	0.074***	0.166***
	–	–	(3.233)	(3.206)
DAC_t	0.097***	0.077**	0.095***	0.073**
	(4.575)	(2.050)	(4.490)	(1.968)
$SIZE_t$	0.010***	0.024***	0.010***	0.024***
	(3.828)	(4.352)	(3.815)	(4.387)
$INTANG_t$	-0.113	-0.330**	-0.116	-0.335**
	(-1.549)	(-2.006)	(-1.582)	(-2.025)
ETR_t	0.047***	0.150***	0.046***	0.147***
	(3.760)	(4.226)	(3.712)	(4.209)
LEV_t	-0.007***	-0.029***	-0.008***	-0.029***
	(-4.664)	(-3.415)	(-4.963)	(-3.612)
$GROWTH_t$	-0.023	-0.018	-0.022	-0.017
	(-1.523)	(-0.599)	(-1.494)	(-0.563)
$ZSCR_t$	0.001**	0.002*	0.001**	0.002*
	(2.263)	(1.821)	(2.274)	(1.811)
$CAPEX_t$	0.037***	0.076***	0.035***	0.073***
	(3.652)	(2.993)	(3.581)	(2.893)
Constant	-0.111**	-0.410***	-0.110**	-0.411***
	(-2.026)	(-3.621)	(-2.004)	(-3.640)
Obs.	2 461	2 461	2 463	2 463
Adj. R-squared	**0.144**	**0.117**	**0.149**	**0.125**
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Source: own elaboration. The t-statistics, reported in parentheses, are based on clustered standard errors at the firm level. *, **, and *** indicate significance at 10%, 5%, and 1% level, respectively.

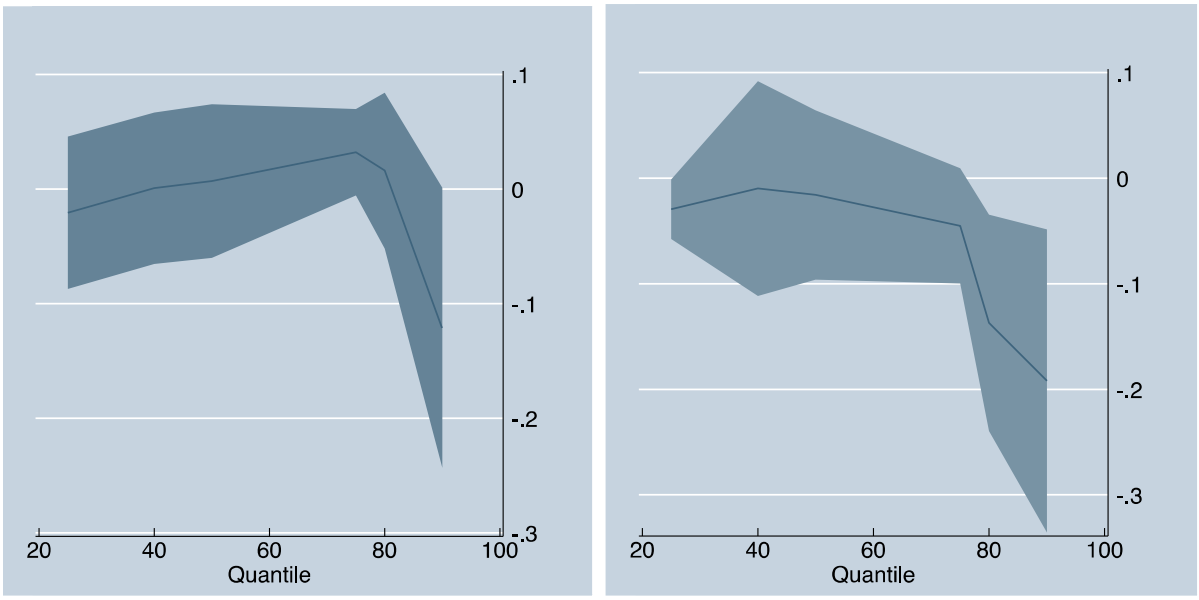
Since our main independent variables (ACD_P and ACD_D) are less likely to vary across time, therefore GLS random effects can provide a more efficient estimation than pooled OLS estimation. Table 5 reports the results of GLS random effects estimation. Consistently, Column 1(3) in Table 5 shows a significant positive influence of ACD_P (ACD_D) on ROA at 1% level. The results held when we used ROA in Column (2) and (4). These results support our first hypothesis, indicating that firms with academic board members have higher firm performance than firms with non-academic board members. (Francis *et al*., 2015; Jiang & Murphy, 2007; Chen *et al*., 2019).

As for our second hypothesis, we examined whether academics help firms in reducing investment inefficiency, using quantile regression to examine the relationship effect of academic board across the entire distribution of investment inefficiency and mitigate the censoring problem (Adelino & Dinc, 2014). We used similar control variables. Table 6 shows the regression results. We employed the investment inefficiency models of Biddle *et al.* (2009) and Ağca and Mozumdar (2008) to estimate the expected level of investment. Following Ho *et al*. (2022), we used the absolute value of the residual from both models to estimate investment inefficiency which reflects the deviation of efficient investments. Interestingly, the results consistently show that the coefficient of ACD_P is negative and significantly affects investment inefficiency conditioned at the 90th percentile. This evidence indicates a stronger negative relationship between academic boards and a decrease in investment inefficiency for the highest-level inefficiency. Our hypothesis is supported by the results, which emphasize the oversight function of academic directors in enhancing the quality of corporate decisions, *e.g.*, investment (Francis *et al*., 2015; Jiang & Murphy, 2007).

Table 5. Academic boards and firm performance: GLS random effects

Variable	(1)	(2)	(3)	(4)
	ROA	**ROE**	**ROA**	**ROE**
ACD_P_t	0.306***	0.673***	–	–
	(3.164)	(3.020)	–	–
ACD_D_t	–	–	0.044***	0.116***
	–	–	(3.469)	(4.002)
DAC_t	0.094***	0.060**	0.093***	0.059**
	(8.922)	(2.154)	(8.861)	(2.109)
$SIZE_t$	0.010***	0.022***	0.010***	0.022***
	(5.619)	(5.173)	(5.587)	(5.244)
$INTANG_t$	-0.076	-0.263**	-0.077	-0.265**
	(-1.620)	(-2.243)	(-1.634)	(-2.275)
ETR_t	0.018**	0.084***	0.018**	0.084***
	(2.196)	(3.849)	(2.165)	(3.845)
LEV_t	-0.004***	-0.025***	-0.004***	-0.026***
	(-3.768)	(-8.791)	(-3.816)	(-8.881)
$GROWTH_t$	-0.007	0.013	-0.007	0.013
	(-0.964)	(0.667)	(-0.945)	(0.676)
$ZSCR_t$	0.001	0.001	0.001	0.001
	(1.593)	(1.285)	(1.635)	(1.329)
$CAPEX_t$	0.020***	0.034**	0.020***	0.034**
	(3.320)	(2.111)	(3.305)	(2.099)
Constant	-0.139***	-0.373***	-0.136***	-0.372***
	(-3.315)	(-3.895)	(-3.264)	(-3.941)
Obs.	2 461	2 461	2 463	2 463
R-squared Overall	**0.1388**	**0.1197**	**0.1436**	**0.1284**
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Source: own study.



Panel A. Investment model of Biddle et al. (2009) Panel B. Investment model of Ağca and Mozumdar (2008)

This Figure plots the coefficients against the corresponding quantiles.

Figure 1. Quantile Regression Plot

Source: own elaboration.

Table 6. Quantile regressions

Panel A. Full sample				
Variable	**(1)**	**(2)**	**(3)**	**(3)**
	Q25	**Q50**	**Q75**	**Q90**
ACD_P $_t$	-0.021	0.001	0.032	-0.121**
	(-0.66)	(0.21)	(1.39)	(-2.06)
Control Variables	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
Obs.	2 461	2 461	2 461	2 461
Pseudo R-squared	0.005	0.003	0.002	0.014
Industry Dummy	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
Panel B. Sub-smaple				
Variable	**(1)**	**(2)**	**(3)**	**(3)**
	Q25	**Q50**	**Q75**	**Q90**
ACD_P $_t$	-0.029**	-0.016	-0.045	-0.192***
	(-2.04)	(-0.39)	(-1.63)	(-2.62)
Control Variables	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
Obs.	2 461	2 461	2 461	2 461
Pseudo R-squared	**0.012**	**0.071**	**0.059**	**0.075**
Industry Dummy	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes

Note: investment inefficiency is the residual of the following equations: $Investment_{i,t}=\alpha + \beta_1 SalesGrowth_{i,t-1}+ \epsilon_{it}$ (Biddle *et al.*, 2009) and $Investment_{i,t}=\alpha + \beta_1 TobinsQ_{i,t-1}+ \beta_2 CF_{i,t-1}+\epsilon_{it}$ (Ağca & Mozumdar, 2008). *, **, and *** indicate significance at 10%, 5%, and 1% level, respectively.
Source: own study.

Robustness Tests: Endogeneity

Endogeneity could be a problematic issue when examining the influence of board characteristics. In the context of our study, the sample selection bias issue would indicate that the board characteristics and their determinants were jointly determined. Therefore, we conducted a battery of robustness tests to address endogeneity issues. Firstly, we used propensity score matching (PSM) to match firms with academic board members with control firms to mitigate any selection bias on observed variables. In PSM, we employed two matching procedures: Caliper and Gaussian Kernel. We used specific firm characteristics for each procedure to estimate the likelihood of having academic board members. Table 7 shows that our final matched sample for PSM comprises 2209 firm-year observations. As in the full sample, we compared the means of ROA for the subsamples of firms with academic and non-academic boards. The results continued to support our previous evidence on the higher performance of firms with academics on their board members.

The observable differences across treated and control groups can be argued to explain differences in firm performance across these two groups, probably in a non-linear way. To address this point of concern, we employed entropy balancing as in Hainmueller (2012). By using this approach, it is possible to achieve equilibrium concerning the first three moments of discernible firm characteristics between the treated and control groups. After achieving this balance, the analysis can be re-evaluated using this newly aligned data structure. This method ensures that the features of treated and control groups are similar in terms of mean, standard deviation, and skewness. The result strengthens the findings of PSM's findings and supports our primary evidence that firms with academics on their board members are more likely to have a better performance.

Table 7. Propensity score matching and entropy balancing

Propensity Score Matching	**Caliper**		**Gaussian Kernel**	
Difference in ROA	0.0621*** (3.74)		0.0719*** (5.64)	
Bootstrapped 100 replications	**Caliper**		**Gaussian Kernel**	
	Coef.	**z-stat**	**Coef.**	**z-stat**
ACD_D	0.071***	5.06	0.071***	5.55
Std. Err.	0.014	–	0.013	–
Observations	2 209	–	2 209	–
Entropy Balancing	**Coef.**	**t-stat**	–	–
ACD_D	0.436***	5.71	–	–
Control variables	Yes	–	–	–
Year FE	Yes	–	–	–
Industry FE	Yes	–	–	–
Observations	2 461	–	–	–
R^2	**0.201**	–	–	–

Source: own study.

Additional Analysis: Long-term Performance

This subsection examines the long-term impact of academic board members on the firm performance of academic board members. Table 8 reports the cross-sectional OLS regressions of long-term performance. In this regression specification, the dependent variables were the long-term ROA and ROE over two-, three-, and four-year periods. We included similar firm characteristics in the regression as control variables. Both in Panel A and Panel B of Table 8, the coefficients of ACD are significantly positive in all six specifications. Consistently, the results in Panel C of Table 7 show that the firms with academic directors exhibit higher sales per employee. Overall, these findings support the evidence of Francis *et al.* (2015) showing a positive long-run market reaction following the appointment of an academic director.

CONCLUSIONS

The upper echelons theory suggests that board members' characteristics have a significant influence on strategic corporate decisions. Following this notion, this study examined whether the background of board members such as academics can alleviate firm performance. Using data on Indonesian public firms from 2007-2016, we found that firm performance significantly improves in firms that hire academic board members. Furthermore, our evidence also suggests that this effect remains in the long run. The results are robust to a battery of sensitivity tests, including when we use propensity score and entropy balancing to mitigate the endogeneity concerns. These findings are consistent with the notion that firms benefit from the particular expertise of academic board members. Academia can improve a board's diversity and enrich different problem-solving perspectives. Because the impact of academic board members may depend on the level of investment inefficiency, our further analysis focused on the impact of academics at extreme levels of investment inefficiency. We found that investment inefficiency decreases for firms with a high investment inefficiency group. Our evidence extends prior literature examining the role of board member characteristics' role in corporate decision-making.

Table 8. Academic boards and long-term performance

Panel A			
Variable	**(1)**	**(2)**	**(3)**
	ROA $_{t+2}$	**ROA $_{t+3}$**	**ROA $_{t+4}$**
ACD_P$_t$	0.580***	–	–
	(3.026)	–	–
ACD_P$_t$	–	0.583***	–
	–	(2.893)	–
ACD_P$_t$	–	–	0.606***
	–	–	(2.986)
Control Variables	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Obs.	1 913	1 651	1 387
Adj. R-squared	**0.112**	**0.116**	**0.119**
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Panel B			
Variable	**(1)**	**(2)**	**(3)**
	ROE $_{t+2}$	**ROE $_{t+3}$**	**ROE $_{t+4}$**
ACD_D$_t$	1.215***	–	–
	(3.197)	–	–
ACD_D$_t$	–	1.193***	–
	–	(2.865)	–
ACD_D$_t$	–	–	1.174***
	–	–	(2.816)
Control Variables	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Obs.	1 913	1 651	1 387
Adj. R-squared	**0.089**	**0.095**	**0.085**
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Panel C			
Variable	**(1)**	**(2)**	**(3)**
	SALEM $_{t+2}$	**SALEM $_{t+3}$**	**SALEM $_{t+4}$**
ACD_P $_t$	4.051**	–	–
	(2.21)	–	–
ACD_P $_t$	–	3.888**	–
	–	(2.02)	–
ACD_P $_t$	–	–	3.631*
	–	–	(1.95)
Control Variables	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Obs.	1 466	1 193	937
Adj. R-squared	**0.1997**	**0.1914**	**0.1620**
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Note: ROA = earnings before tax divided by total assets; ROE = earnings after tax divided by total equity; ACD_P = the proportion of academics on the boards divided by the total number of board members; SALEM = total sales divided by the total number of employees. The t-statistics, reported in parentheses, are based on clustered standard errors at the firm level. *, **, and *** indicate significance at 10%, 5%, and 1% level, respectively.

Source: own study.

Therefore, our results provide noteworthy policy implications by providing empirical evidence to both regulatory bodies and industries on how academic board members could improve firms' performance. Although firms may hire independent board members to only fulfil its obligation to the regulation, careless hiring will provide no additional value to the firms. Therefore, academic and expertise background is necessary to be considered in board member hiring. Hence, firms are encouraged to hire academics to their boardroom to bring diversity into it and to benefit from their expertise and scientifical knowledge to improve performance and firms' value in the long run. We acknowledge the limitation of our study, particularly regarding the academic reputability of the academic board. Academic board members from top universities may bring different impact compared to those from low-ranked or non-reputable universities. Hence, we suggest for future research to explore academic reputation, including the academic board's university reputation, and to dig deeper into how it may affect firms' long-term value.

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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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Being and becoming an entrepreneur: A narrative study on the development of entrepreneurial mindset in Pakistan

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ABSTRACT

Objective: The study aims to explore the journey of the development of an entrepreneurial mindset among Pakistani entrepreneurs. The continuous economic instability in the country has resulted in an unpredictable future and reduced job opportunities. Therefore, being and becoming an entrepreneur has gained great importance. The study used the self-narratives of twelve entrepreneurs.

Research Design & Methods: This qualitative exploratory study utilized interpretivism as a research paradigm. Using the grounded theory approach, this study employed content analysis to analyze qualitative data. Interviews were conducted to collect data, which was subsequently transcribed, coded, and analyzed before developing the themes.

Findings: The research revealed that entrepreneurship is a mindset, not an occupation or business. Entrepreneurs must be agile, knowledgeable, capable of learning, and have analyzing powers to take a risk. Social networking and online business make the business substantial. Furthermore, successful business stories inspire people to start their businesses.

Implications & Recommendations: The findings of this study are valuable for young people and entrepreneurs who are inclined towards starting a business rather than pursuing a job, which has become more difficult, competitive, and restrictive in terms of income opportunities and the application of innovative ideas. Moreover, government institutions and policymakers can formulate policies to increase entrepreneurial activities based on the research findings.

Contribution & Value Added: This could be one of the first studies conducted in Pakistan to identify the elements that lead to the formation of an entrepreneurial mindset, and themes obtained from the research can be utilized for the benefit of entrepreneurial development. Existing research gaps were filled by the contribution of this study. In addition, this study provides practical insights to being and becoming entrepreneurs.

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INTRODUCTION

In the ever-changing and unpredictable world, becoming entrepreneurial has been suggested as one of the best strategies to survive and even thrive (Alvarez & Barney, 2005; Kor, Mc Grath, & MacMillan, 2001). Nonetheless, it has now been solely linked to entrepreneurial actions, with no application to other situations. This study presents an alternative view on the importance and application of entrepreneurial orientation and what this might entail of entrepreneurial orientation, stating that developing this mindset, independent of professional goals, is one method to prepare individuals to become entrepreneurs.

Entrepreneurs are often defined by a few characteristics such as innovativeness, the need for achievement, locus of control, risk-taking propensity, a positive attitude, and motivation (Hameed & Irfan, 2019). Being entrepreneurial or having an entrepreneurial attitude refers to the persistent emphasis on chances to seize new opportunities and the ability to think of fresh ideas and implement them to improve situations. Whereas becoming entrepreneurial means the dynamic and ever-evolving process of developing a more entrepreneurial attitude throughout one's lifetime. An entrepreneurial mindset (EM) may enhance an individual's ability to be agile. It is critical to converting products and services into something commercial to enhance economic benefits. Because entrepreneurship offers innovative business ideas and competition, it creates job opportunities and consequently, provides chance to generate wealth. Unemployed people take advantage of new ideas to start their businesses. People with a broad range of knowledge, interests, and observational skills can quickly spot entrepreneurial opportunities and be persuaded to undertake an entrepreneurial career (Ervin Williams, n.d.). However, there is a need to make the environment of entrepreneurship resilient in times of crises such as COVID-19 (Portuguez Castro & Gómez Zermeño, 2020).

According to Jiatong *et al.* (2021), nations' growth and development may be enhanced by an entrepreneurial mindset. A person with an entrepreneurial mindset continuously seeks possibilities for new opportunities. Education, work, and personal life play a very significant role in developing an entrepreneurial mindset. Auerswald (2012) elucidates that EM can be analyzed from a developmental standpoint and it is possible to see how it develops with the subjects' specific characteristics, thereby contributing new insights to the discipline. Furthermore, Yousaf *et al.* (2015) demonstrate that initiating and implementing entrepreneurial ideas may be a subjective experience, with decisions seen as uniquely personal. Individuals analyze and comprehend comparable settings or hazards in a variety of ways. In addition, Tanveer, Haq, and Ali (2020) suggest that it is critical to shift both students' and teachers' mindsets towards entrepreneurship. Some events and seminars can be organized to broaden the mindsets of learners and policymakers.

Entrepreneurship has positive outcomes, including income creation, job creation, and the development of entrepreneurial spirit (Gaddefors & Anderson, 2017). The entrepreneurial spirit is also attributed to lowering crime rates, rising living standards, germinating entrepreneurial spirit, and instilling competition and national development (Baumol, Schilling, & Wolff, 2009; Yousafzai, 2019). Entrepreneurship is considered a key element in poverty reduction in developing countries (Soluk *et al*., 2021; Sutter *et al*., 2019). Pakistan is a developing country and has been attempting to preserve its global economic, diplomatic, and cultural presence. Therefore, entrepreneurship is very essential for Pakistan as compared to any other country.

According to the Labour Force Survey 2020-2021, Pakistan has a total labour force of 71.76 million people, with an unemployment rate of 4.51% of the labour force the percentage of entrepreneurs in the formal sector 1.4%, and in the informal sector respectively 2.6% were recorded in the financial year 2020-2021. As a result, the per capita income of Pakistan is quite low which was calculated at USD 1798 in the financial year 2021-2022 (Pakistan economic survey). In Pakistan, over 90% of startups fail each year ('Why Startups Fail in Pakistan?,' 05 July 2022). Therefore, it is essential to understand the function of an entrepreneurial mindset that can be the regulator of entrepreneurial activities (Maqboo, 2021). Research shows that there is no consensus on what an entrepreneurial mindset is or how it is developed, despite increasing interest, therefore, more research is required to be conducted to understand the phenomenon (Daspit *et al.,* 2021). Likewise, McLarty *et al*. (2022) emphasized the need for future research to understand whether one's mindset evolves, how do mindsets vary, and what facets of the entrepreneurial mindset have not been explored.

According to Aalumgir (2022), many individual, environmental, group, and venture factors affect an entrepreneurial mindset, and an undeveloped mindset can be a barrier to the development of entrepreneurs. Moreover, in a developing country such as Pakistan, several obstacles have also a significant impact on young entrepreneurs' decisions and actions, such as financial family, corruption issues, a lack of entrepreneurial education, and legal constraints (Tunio *et al*., 2021). As a result, youngsters are hesitant to pursue entrepreneurship as a career. (Stanley, 2016). By conducting this research, we can better understand this phenomenon by hearing about the experiences of entrepreneurs, including

how they became entrepreneurs, and how their mindsets developed. Therefore, this research will be critical in defining concepts for different sorts of creative potential, as well as concepts for how EM develops. The following are the primary research questions that this study hopes to answer:

RQ1: What does 'being entrepreneurial' entail for entrepreneurs, as they view and characterize it?

RQ2: How did participants in Pakistan become entrepreneurs?

The goal of this research is to add to the body of knowledge in the domain of entrepreneurship by analyzing the entrepreneurial mindset and understanding what skills must be acquired and developed by entrepreneurs over time. Moreover, we want to investigate that how an entrepreneurial mindset can be developed for being and becoming entrepreneur in Pakistan. This study will also help to understand the internal and external factors that can play significant role in this journey and hence giving a roadmap to policy makers to promote entrepreneurship in Pakistan.

LITERATURE REVIEW

The entrepreneurial mindset plays a significant role to develop entrepreneurs (Loboda *et al*., 2019). Therefore, further research is essential to explore the concept of entrepreneurship (McLarty *et al*., 2022). According to (McLarty *et al*., 2022) despite increasing interest in exploring entrepreneurs' mindsets, little is known about it. Elder (1998) elaborated growth mindset distinguishes great achievers from others. Growth-oriented individuals are innovative and hardworking who believe in excellence. Individuals with a fixed perspective view have fixed and unchangeable abilities. Entrepreneurship makes use of mindset to capture certain cognitive aspects of entrepreneurship.

Haase, Lautenschlager, and Rena (2011) undertook a cross-cultural comparison of the entrepreneurial mindset of Namibian and German university students. They intended to determine whether there was a variation in entrepreneurial inclinations among the students of both countries. They conducted cross-sectional research and administered a 23-question survey on expected career pathways. The findings indicated that Namibian students showed a greater proclivity for entrepreneurship than their German counterparts. The entrepreneurial mindset in the case of women continues to be underrepresented in many countries. This indicates that women confront significant barriers such as resources, fewer mentors, and limited credit history (Ashourizadeh *et al.*, 2014). The concept and structure of entrepreneurship remain debatable but most academics agree on its importance. The evaluation of EM is still not a substantively understood topic that lacks sufficient explanations or well-established hypotheses. If it is taught, researchers must determine why some people have EM while others do not. According to Özdemir (2015), the first wave of research into the evolution of EM occurred in the sphere of education. Education, mentorship, cultural, social, financial, and capital support are frequently cited as barriers to minority populations participating in entrepreneurial activities. Numerous studies have demonstrated that entrepreneurial education can benefit students.

An entrepreneurial mindset is a multifaceted ability that emerges from the interplay of individuals and their circumstances. This process develops gradually and is influenced by an individual's family background, exposure to opportunities, race and gender identity, personal characteristics, and meaning-creation systems. Wach and Wojciechowski (2016) attempted to comprehend the variables influencing the evolution of EM and similar concepts, such as entrepreneurial intention. These conceptions may be influenced by family background, income, culture, and gender. Nonetheless, the majority of research either examines EM within particular groups, such as a single nationality or analyzes specific entrepreneurial education programs. According to Ashourizadeh, Chavoushi, and Schøtt (2014), EM does not develop overnight but rather over time. Age, culture, and gender all influence EM, which develops the desire to be and become an entrepreneur.

Furthermore, Jemal (2020) explained that entrepreneurial mindsets such as opportunity-seeking, risk-taking, innovation, awareness in action, and proactivity were examined to determine their effect on the subjective performance of SMEs (Blumer, 1969). Over time, entrepreneurial individuals establish their meanings and experiences of becoming and being entrepreneurial. The well-known

reality phenomenon made famous by Steve Jobs demonstrates that entrepreneurs may perceive and build their reality and represent it to others.

Moreover, narrative identity theory is relevant to this study (McAdams & McLean, 2013) The narrative analysis method was used to have a better understanding of the stories, and it was inspired by the theory of interpretation as well as the narrative analysis technique (Tan *et al.*, 2009). Other theories such as Brofenbrenner's (1993) ecological models were beneficial for examining various aspects affecting participants' EM. They serve as a framework for categorizing certain interactions and influences between individuals and their environments (Wozniak, 1993).

RESEARCH METHODOLOGY

Since the work was exploratory, we employed the grounded theory approach and interpreted results with the use of content analysis (Blumer, 1969; Bryant & Charmaz, 2007). Grounded theory can capture the underlying meaning and compare the essence of various experiences, as well as how people make sense of such experiences during the data collection and analysis process. The standard content analysis approach serves as a guide for deriving meaning and identifying themes from the material.

Data was collected on the target population's self-narratives through interviews. The interpretivism philosophy was employed to establish a thorough knowledge of the phenomena, ensuring the study's validity and reliability (Creswell, 1999). The purposive sampling method was used (Patton, 2002) to recruit interviews from different backgrounds, fields, sizes of businesses, and development stages.

Interviewees were nominated by friends, relatives, and professional networks, and two of them were recruited from LinkedIn. We selected people who had at least three years of entrepreneurial experience. Twelve personal interviews with entrepreneurs were conducted. Ten participants could provide data saturation and the aim could be achieved (Sandelowski, 1995). The research was conducted inside the jurisdiction of Karachi, Pakistan's largest city. Semi-structured interviews were used to address the most often asked questions on entrepreneurial experience and personal development. Interviews were recorded and transcribed to construct a codebook to record fundamental codes and enter essential data. The interview questions were derived from the thesis by Fryr (2020), which is a large study that focuses on the entrepreneurial mindset, and which is completely consistent with the factors established in an earlier study in the literature review section. Interview transcripts were examined to develop an open codebook containing the core codes and clusters that arose from the data. At this stage, certain repetitive codes were consolidated or removed. We kept notes during the transcript coding process to capture key messages and themes that we might have missed or forgotten (Thomas & Harden, 2008).

RESULTS AND DISCUSSION

Being Entrepreneurial

This section explains the main themes and examples derived from interviews in terms of narratives of the participant being entrepreneurial. Being entrepreneurial represents a skill that must be acquired and developed over time, rather than a natural trait.

Continuous Learning and Remaining Well Informed

All participants in this study emphasized continuous learning and keeping entrepreneurs well informed. One of the interviewees responded that 'education does not matter a lot while you start your own business, you have to learn by doing, with your efforts and day-to-day business activities and operation. Taking a risk can be taught in universities but practical situation tells when to take the risk and when it should be avoided; moreover, having continuous knowledge and market information makes business operations more successful,' therefore, constant learning and having information about the market is vital. Other participants highlighted that 'it is true we can get knowledge of business activities from books, internet, observations, success stories, and academics but practical experience plays an essential role among all. Continuous learning and information on the market are essential elements to pay attention to for the success of the business. If an entrepreneur does not have learning skills but has the proper information

at the right time, he/she cannot cope with any difficult situation. For example, during Covid-19, entrepreneurs who survived were those who had learning skills and they shifted their business according to the situation that was required by, for example, digitalizing their business.'

Taking Practical Steps

The majority of the participants underlined taking practical steps in business more than anything. An interviewee stated: 'I started a job after completing studies, but I was not satisfied with doing the job then I decided to start my own consultancy business, then made lots of plans to start and did planning for it, I gathered finance and resources but despite gathering all I could not start my business because I was hesitant to take a practical step and to leave my job and high salary. I used to think what if I may not be successful and I have to face the music but one day I was disgraced in the office by my boss then I left my job and took the practical step to become an entrepreneur and I am successful. I earn a lot, spending life without job stress.'

Taking Risks and Believing in Actions

Seventy per cent of the interviewees believe in the action and taking a risk in the business. While telling his success story, a participant revealed: 'I took many risks in my entrepreneurial career. I believe that without taking risks you cannot make your business successful. When I sent my first consignment of mangoes to Saudi Arabia, I was afraid of what would happen if I failed because I invested all that I had. I did not know the other party and even complete the procedure to export mangoes but I took a risk and sent that consignment. That was a great risk for me but I became successful. Since then I have been doing this work to send fruits and vegetables to different countries and earn a lot. I conclude that without taking a risk you cannot be a good entrepreneur.'

Have a Vision and Keep Struggling

All participants underlined that vision and struggle are significant elements of entrepreneurship. Without vision and struggle, no kind of substantive results can be obtained. Three participants shared the same stories. When they started a business, they faced great trouble. At the initial level, they could not reach break-even, and many times they decided to quit but they kept struggling finally after some time they started to make progress, and finally, they became successful businessmen. One participant added that 'without a great vision you cannot do substantial work. Businesspeople without vision may not achieve nor deliver a lot.'

Connection Different Elements/Networks to Create

A great number of participants discussed connecting the existing elements to create something new. In this situation, business community people can dissect goods, issues, and solutions to devise a novel way of integrating those fundamental components and responding to existing demand. In this regard, innovation and new ways of connecting different elements are indispensable. One participant noted: 'you must join social networking, media, and the latest trends in the market to build a business and to create something new.' Some participants disclosed a similar thought: 'When I started a business, there were a lot of similar products in the market, therefore, to gain competitive advantage, I had to make unique strategies to meet the existing needs of the consumers.' In this situation, the entrepreneur can break down different components of products, problems, and solutions, to devise a novel method of integrating those fundamental components and responding to existing demand. Thus, the responses of participants imply that the definition of innovation should encompass not just the production of wholly new items, but also novel ways of linking different elements.

Disrupt to Create Some Product or Service Better

Being disruptive can also imply being inventive in terms of resolving unique difficulties and filling an unmet demand. Various participants indicated: 'Entrepreneurs use disruption to identify and address problems in novel ways. They consider disruption as a means of innovation. They continuously seek

gaps and identify shortcomings in the existing system and make strategies tools and techniques for better solutions.' One participant noted: 'you must lead to disruption to begin novelty.'

Becoming Entrepreneurial

Entrepreneurship does not happen overnight. As this study attempted to comprehend how respondents became entrepreneurs, we began to notice emerging trends.

Chance or Personal Efforts

A few participants in this study noted: 'I started their own business by my efforts and previous work experience helped me start my own business.' Three participants disclosed a similar idea: 'I had paid little personal effort to start my own business. I got business setups from my family, I only had to make some innovative steps. I did some reforms.' Some participants revealed that 'they got a chance and did personal efforts too.' One participant told us the following story: 'When I completed ACMA I started doing the job. However, after three months, I realized that I was unfit for any kind of job then I decided to establish a tax consulting company, because the economy was shifting towards digitalization and that was a great opportunity for me to grab the market. I put in a lot of effort to get clients and performed efficiently and effectively resultantly I am a successful businessman and earn an enormous amount of money.' Another interviewee stated: 'I used to teach when I was studying to meet my educational and personal expenditures when I completed MS, I started to search for jobs but I could not find any robust job, consequently, I opened a coaching centre in my home. It was a great success within a few months I got 35 admissions then my parents advise me to open a coaching centre professionally. I acquired ranted space and started a coaching centre as an entrepreneur. Subsequently, I established a school with a coaching centre. At the movement, I have 34 employees and earn a lot.'

Emerging Experience From Childhood or Adulthood

Seventy per cent of participants described that 'they were average students in their school life and they have learned the business by doing it according to them the role of education had been very little in their entrepreneurship career. They also revealed that they had been learning business activities since childhood or adulthood. They used to see their family members or relatives doing business' whereas 30% said that 'they were a top and popular student in their academic career and their entrepreneurial experience had also been associated with child or adulthood experiences.' One participant revealed: 'I became an entrepreneur accidentally, I started part-time work in a restaurant in my adulthood. Sometime after learning things, I realized that I can start my restaurant, therefore, I established my own fast food business, before that, I used to think only about getting a good job.'

Selling and Problem-Solving at an Early Age

One interviewee delineated that 'When I was studying in class 6, I put a stall in school exhibition, my mother made sandwiches and my father purchased some cold drinks for my stall, I sold both things and that was the time when I earned money the first time and I started thinking about entrepreneurship.' Another interviewee said that 'my mother used to stitch clothes for customers to meet the expenditure of my house because my father had died. When I became 16 years old, I realized to help my mother for that reason I made the first move to help my mother with stitching thereafter my uncle arranged a meeting with the owner of the boutique and we started to make his order as per demand. After some time, we took a shop for rent and started our own business. The results were amazing we started earning almost thrice and that was the point that made me a professional entrepreneur.' Some participants disclosed that 'they were not used to selling at an early age.'

Family Support And Influence

A nearly equal number of participants disclosed that had and did not have family support or was or was not influenced by family in their businesses.' One participant revealed: 'I was doing business of cloth manufacturing in partnership. We were three partners; we established a unit. During the Covid-19 crisis, one of our partners cheated on us and took all our money and resources, and ran away. After

that, we could not survive and we had to close the unit. I had lost all I had. At this crucial time, my father helped me and I started from scratch again, and now I have my unit and earn good money.' Another participant stated: 'I had a very fantastic job and a great salary but suddenly our company was closed and I became jobless. This was a very hard time for me. During this movement, my wife supported me a lot. She started to teach at school and sold all of her jewellery and gave me that cash to start my own business of baby pampers. I started real estate work besides selling pampers, and currently, I am earning more than I could earn in my previous job.' Four participants reported that 'they had no support of family members when they started the business.'

Impact of School

Most of the participants noted that 'their school did not make them select entrepreneurship as a field, they told us that they took normal education in their school, and no specific skills related to entrepreneurial mindset development were taught and no extra activities were organized that could enhance their entrepreneurial skills However, one participant shared the following experience: 'I took entrepreneurial motivation from school when I put a stall at school and sold some sandwiches and cold drinks.'

Work-Related Experience

Four study participants revealed that 'they learned from their job experiences, which led them to start their own business. Before that, they were not used to thinking about it. They got experience from doing things on the job where they also established connections. They got the idea of the complete cycle, risks, opportunities, and procedures to do business from the job.' The rest of the participants had no work experience when they started their businesses. All participants highlighted that 'there is a continuous learning process in doing own business; every day you learn new things, and have to face different situations, to cope with this you have to be well conversant about the internal and external environment.'

Motivation from Society or Stories

A few participants stated that 'they took motivation from renowned national and international businessmen, their success stories on social media inspired them a lot.' One participant said: 'I was doing a job and my income was very exiguous. Meanwhile, one of my cousins was earning too much after doing his own business consequently. I realized I have to start my own business, I made a strategy. Firstly, I started a business part-time and after some time I left my job and embarked on a full-time business. I am earning more than at my previous job but doing business is not easy as there is tough competition in the market.'

DISCUSSION

Based on the responses to this study, numerous themes have been developed. Participants emphasized that there was a need for continuous learning, remaining well-informed, and taking practical steps to be and become an entrepreneur. Cope (2003) emphasizes that an entrepreneur takes practical steps instead of wasting all time on planning that gives him success. An entrepreneur's 'learning lens' can be used to open up new paths for entrepreneurship research from a learning aspect. Likewise, Müller *et al*. (2023) conclude that taking practical action in business entrepreneurs is associated with venture success.

Interviewees revealed that taking risks is a significant element of being an entrepreneur. Ma and Tan (2012) also accentuate that an entrepreneur is a champion of innovation, and has passion, uniqueness, a creative mindset, and belief in actions. An entrepreneur takes risks and believes in actions underlined by the participants. It was elucidated that entrepreneur should be risk-taker to grow their business (Hamid, 2011; Ilevbare *et al.*, 2022).

Having a vision and keeping struggling is the strength of the entrepreneur according to interviewees of the study. In similar fashion, Kaptein (2017) relates struggle as a pivotal element for business. Moreover, participants highlighted that socialization was immensely necessary for entrepreneurs to uplift their businesses. Similarly, Durda and Ključnikov (2019) underline the importance of social media in the growth of new businesses. Participants of the study revealed that disruption was required to

create a better product or service, which is also emphasized by Trimi and Berbegal-Mirabent (2012). In the context of starting a business, few participants disclosed that they got a chance from an inherited business whereas some explained they got it through personal efforts. Lewis and Marcus (2015) argue that it might be tough to establish and maintain a new entrepreneurial identity. Besides this was the crucial question of whether entrepreneurial skills emerge child or adulthood. The majority of participants replied that there was a significant effect of their child's experience on their entrepreneurial career. As identified by Loderup *et al*. (2021), parents teach their children about business in childhood and it has great importance in their entrepreneurial career. Likewise, the majority of participants revealed that selling and problem-solving at an early age were not imparted to them, only a few shared their experiences doing this activity in their childhood. Marques and Albuquerque (2012) emphasize that applied education – which is more focused on preparing individuals for tomorrow's labour markets and more unpredictable and complex society – and new policies aimed directly at this area should be implemented. Assuming that entrepreneurship abilities can be taught and are viewed as a general mindset that can be applied to various parts of work and daily life.

On the one hand, many participants of the study revealed that they had family support and influence in their businesses. Shen, Osorio, and Settles (2017) inscribe that the perceived desirability and feasibility of starting a business are both positively connected to family support. Entrepreneurs' perceptions of economic and political support influence their perceptions of the feasibility and desirability of starting a firm. However, on the other hand, they reported that there is no impact of the school on their entrepreneurial career**.** In contrast, in developed countries, school plays an important role. Weiss and Belland (2020) shed the light on the importance of school in building the entrepreneurial mindset. The student can gain a more comprehensive knowledge of business activities through activity-based learning.

Work-related experience is also an essential element of running a business because according to entrepreneurs, doing business is a continuous learning process. Fatoki's (2014) findings showed that business students have a strong desire to set up their own companies. Some participants took up entrepreneurship without being influenced by the entrepreneurs' success stories. Mukherjee (2016) explains that entrepreneurial motivation is largely essential for the growth of entrepreneurship. Entrepreneurial drive is influenced by both external and internal environmental influences.

CONCLUSIONS

Based on our findings, it seems that entrepreneurship is a mindset, not an occupation or business. Many factors develop this mindset. We do not become an entrepreneur overnight. These skills evolve gradually. Entrepreneurs should not stop learning new ideas, and things. They must be well-informed about the internal and external environment, markets, and the core values of the business. Moreover, an entrepreneur takes practical steps and believes in taking risks to maximize profits. Entrepreneurs must be agile, knowledgeable, and be able to learn, and show considerable analytical abilities. The continuous struggle makes an entrepreneur stronger and more visionary as compared with an employed person. Entrepreneurs are more involved in social networking and online businesses. To take a competitive advantage, he/she has to take out-of-the-box decisions.

Businessmen do succession planning and prepare their children to take charge of their business when they got retired, but it is not necessary, as the person can start his/her own business through personal efforts and learning from his efforts and learnings from his previous experiences. Some parents having a business background bring their children to their business places and as a result, the child starts learning, but some people start their careers after completing education, they are a novice in the field and start learning by doing. Furthermore, problem-solving and doing business activities at an early age have an impact on entrepreneurial activities in contrast some participants of the study revealed that they did not involve in business activities in their childhood but have become successful businessmen.

Family support was proved to very crucial element for entrepreneurship. Moreover, the majority of participants repudiated the impact of school learning on their entrepreneurial skillset. However, work-related experience helps entrepreneurs. Additionally, successful business stories attract people to start businesses. The development of the business entity is the product of human efforts along with

environmental factors. These factors include context, luck, culture, timing to start a business, selection of industry, and various other influences. The skills of the entrepreneur himself/herself and the employees of the organization all play role in the fate and success or failure of their organizations.

Implications for Policymakers

Government should support by providing entrepreneurial education, creating a learning environment, and making policies that promote entrepreneurship moreover, technical and applied education should also be given priority. Relevant departments such as the higher education commission, universities, colleges, vocational training centres, and the Ministry of federal education and professional training should organize programs, exhibitions, and contests that promote entrepreneurial activities and encourages taking practical steps. In addition, concerned authorities should make the procedure simple to enrol a new business, moreover, there should be a single-window solution and digitalization should be augmented. Similarly, educationalists should promote the empowerment of entrepreneurial education and gain support from industry and government, additionally, schools should arrange some festivals and contests where students are encouraged to take practical entrepreneurial activities and make/sell products and services.

Limitations and Future Scope

There are some possible limitations to this research. A quantitative study followed by this qualitative study can help affirming the findings of this study. This may involve the development of a scale and testing it in different cultural contexts. In addition, a significant portion of this investigation was based on interviews as well as the participants' accounts of their experiences. Using this strategy, we can get insight into the participants' worldviews as well as how they give meaning to their own experiences. It does not imply that their accounts are an accurate picture of reality from an objective standpoint.

To continue the investigation of the entrepreneurial mentality, various avenues for further study have been suggested. These avenues offer a data-based framework and basis for comprehending the fundamental skills that we can learn from successful entrepreneurs and use in a wider context. Future research and development possibilities related to this subject will greatly advance our understanding of and progress in EM. Future research may construct assessments based on fundamental characteristics to capture and quantify the entrepreneurial mentality based on the main themes coming from the data. Lastly, the self-narratives of entrepreneurs were the focus of this research. Other approaches to exploring and studying this subject, such as different kinds of narrative and observational study, may bring other voices and viewpoints to this work.

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Evaluating innovation performance for financial technology within the national innovation system: A case study of the Kingdom of Bahrain

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ABSTRACT

Objective: This article aims to identify the role of ICT infrastructure and knowledge creation on innovation outcomes based on the technology innovation system (TIS) framework to stimulate innovation in financial technology (fintech) in Bahrain.

Research Design & Methods: This study employed the framework of the technology innovation system (as a subset of the national innovation system (NIS)) as a theoretical framework, with variables that were extracted from four major innovation theories. The study evaluated the fintech innovation sector in several commercial banks and government institutions in the Kingdom of Bahrain using a survey questionnaire. The data were collected from 119 respondents, and analyzed through partial least squares structural equation modelling(PLS-SEM).

Findings: The results showed that knowledge creation, ICT infrastructure, and knowledge diffusion impacted innovation outputs through knowledge impact. Moreover, knowledge creation did not affect innovation outputs directly but through knowledge creation.

Implications & Recommendations: The study would be invaluable for the financial managers of fintech industries in implementing strategies as well as for the policymakers in integrating financial technology innovations into the financial system.

Contribution & Value Added: The study uniquely explains the role of knowledge impact between knowledge creation, ICT infrastructure, knowledge diffusion, and innovation outputs.

Article type: research article

Keywords: financial technology (fintech); national innovation system (NIS); partial least squares structural equation model (PLS-SEM); technology innovation system (TIS)

JEL codes: M13, O16, C12

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INTRODUCTION

Researchers have been interested in the national innovation systems (NIS), because of their importance in promoting knowledge-based economies and their impact on economic growth and sustainable development. The NIS concept was developed to better understand and improve countries' innovation performance and competitiveness by analyzing and improving sectoral connections and information flows. Moreover, NIS emphasizes how the right initiatives, incentives, and regulations may help progress technology (Bengt-Åke Lundvall, 1992). Nelson (1993) describes the NIS concept as a group of organizations whose relationships impact the innovative performance of national systems. Raffaelli and Ann Glynn (2015) define NIS as 'institution-enshrined knowledge.' It is

a term that refers to an integrated innovation system that is all-encompassing, innovative, realistic, practical, and valuable (Al-Jayyousi, 2017).

Afterwards, the NIS concept was changed into the technology innovation system (TIS), which describes the nature and pace of technological developments. The TIS is a dynamic network of actors creating, diffusing, and applying technology in a given economy with the help of institutional infrastructure (Fabra, 2019). The central tenet of this approach is that factors affecting technological change can also be found in a larger societal framework beyond the boundaries of specific businesses and research institutes. Importantly, the current study considers TIS as a subset of NIS and uses the latter as a substitute. Building an enabling environment for NIS was a priority for many nations to harness human potential and innovative capabilities (Wang *et al*., 2019). The NIS comprises several indicators, including innovation outputs, ICT infrastructure, and knowledge creation, dissemination, and its impact. The relationships between these factors have become more critical with the growth of the knowledge economy, in which knowledge is the key element in driving innovation and economic development. The literature has identified knowledge creation and diffusion as two of the main drivers of innovation. Knowledge creation is acquiring and generating new knowledge and diffusing it within the organization (Andreeva, & Kianto, 2011). Meanwhile, ICT infrastructure enables organizations to access and share information and facilitate communication and collaboration (Cai, 2011). While considering these NIS indicators, several research questions arise, including: what is the relationship among knowledge creation, ICT infrastructure, and knowledge diffusion and how does this affect innovation outputs? To what extent does knowledge impact play a role in the relationship between knowledge creation, ICT infrastructure, and innovation outputs?

The purpose of assessing innovation outputs through the lens of the technology innovation system is to examine and evaluate how financial technology (fintech) has developed concerning knowledge and infrastructure. The suspension of daily life due to the outbreak of the Covid-19 pandemic disrupted the financial and banking system in particular. However, fintech proved that it offers ideal solutions for payments and online transactions to meet the needs of customers during disruptions and to comply with new standards for public health (Varea & González-Calvo, 2021). fintech is the use of technology to enhance the delivery of financial services. It uses specialized algorithms and software to assist businesses in better managing their operations. Fintech can range from back-end systems and consumer-oriented services such as robo-advisor, peer-to-peer (P2P) lending, and investment and crypto apps. The emerging platforms and business models in financial technology offer new perspectives and paradigms for researchers and policymakers to transform organizations (Mahmood, 2021). The interplay between fintech and economic performance is underpinned by good governance, human capital, and innovation policy to foster effective NIS (Al-Jayyousi, 2017; Al-Jayyousi *et al*., 2022).

In this context, the current research contributes to the existing literature by providing a comprehensive understanding of the factors that influence innovation outputs and the role of knowledge impact in this relationship within the non-oil sectors for sustainable development in Bahrain, a member of the Gulf Cooperation Council (GCC). In particular, this article aims to identify the role of ICT infrastructure and knowledge creation on innovation outcomes based on the TIS framework to stimulate innovation fintech in Bahrain. The context of Bahrain provides a unique perspective for understanding the relationship between knowledge creation, ICT infrastructure, knowledge diffusion, and innovation outputs. Bahrain is a small island nation in the Arab region that has made significant efforts to diversify its economy from oil and gas industries to knowledge-based industries, such as finance, ICT, and services. As a result, Bahrain has invested heavily in ICT infrastructure, innovation programs, education, and training initiatives, making it an interesting case study for examining the impact of these factors on innovation outputs. Furthermore, we utilized partial least squares structural equation modelling (PLS-SEM) through SmartPLS to investigate the relationships among the variables. The results of this research will help public and private financial sector managers identify and develop new future strategies for fintech.

The remainder of the article comprises the following sections. The following literature review and hypotheses development sections will provide a critical analysis of previous research on the topic and present testable hypotheses based on the literature review and research problem. The next section

will describe the research methodology, including the data collection and analysis procedures. The results and discussion section will present data analyzed using PLS-SEM in SmartPLS, including the interpretation of results, comparing them with previous research, and offering insights into the implications of the findings. Next, the conclusions will summarize the major findings of the study, their significance, and the contributions of the research to the existing knowledge. Finally, the last section will discuss the research limitations and outline the directions for future research.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Knowledge Creation and Innovation Outputs

Knowledge creation, referred to as knowledge generation, is widely recognized as a key construct of the innovation process (Cepeda-Carrion, 2022; Faccin *et al*., 2019; Khaksar *et al*., 2020), with close ties to innovative outputs. Andreeva and Kianto (2011, p. 1010) define knowledge creation as the 'ability to develop new and useful ideas and solutions relating to organizational activities, new products or services, technological processes, and managerial procedures. As a focal part of the innovation process (Quintane *et al*., 2011), thriving innovation ecosystems create innovative knowledge that leads to innovative outputs (Bramwell *et al*., 2012). Nonaka and Takeuchi (1995) describe the creation of knowledge as the means that flows between tacit and explicit knowledge. Knowledge creation is a complex process involving the interaction of multiple actors in the fintech innovation ecosystem and optimizing different types of tacit or explicit knowledge at different levels of knowledge (Schniederjan *et al*., 2020).

Knowledge creation has four indicators reflecting innovative activities to create the knowledge necessary for fintech and to spread as an innovation in the financial and banking field. Knowledge creation encompasses all the determinants considered to be the core of fintech industry innovations. Studies have shown that the creation of innovation and technical knowledge through knowledge diffusion has positively contributed to the economic growth of the countries (Asongu & Tchamyou, 2018).

The outputs of knowledge and technology are also very important. Many studies have indicated that the more clients and the company's employees are aware of the latest innovations as fintech innovation, the more they appear to be ready to use them efficiently (*e.g*., Chang *et al*., 2020; Wiseman, & Anderson, 2012). The more knowledge they have, the more tacit knowledge is translated into innovation (Cai, 2011).

Based on these arguments, we hypothesised:

H1: Knowledge Creation has a positive impact on Innovation Outputs.

Knowledge Creation and Knowledge Impact

Knowledge impact includes most of the reports and statistics that represent the impact of innovation activities on the NIS from the micro and macroeconomic levels. This effect can be considered an increase in labour productivity, the intensity of entry of new companies, spending on modern technology programs such as fintech, and industrial production measurement. While knowledge creation is concerned with the continuous transfer, collection and transfer of different types of knowledge as users practice, interact, and learn (Bag *et al*., 2021). Knowledge creation abilities encourage innovative thinking and competencies in complex situations (Nonaka *et al*., 2000). It enables the flow of knowledge from outside to create an internal knowledge repository or by utilizing existing knowledge in an innovative and advanced way internally (Robertson, 2020).

The shift in fintech's condition between the possession of technological knowledge and the act of knowing something comes through practice, action, and interaction, which is the driving force in creating new fintech knowledge. Furthermore, for this interaction to be highly productive for innovation in fintech, it is important to support unregulated work environments where creativity and innovation are essential in the fintech ecosystem. Moreover, research conducted by Ravichandran and Rai (2003) showed that knowledge creation has a direct and positive impact on knowledge impact by increasing the rate of innovation, optimizing fintech operations, improving organizational speed, and making better and faster decisions. Therefore, we developed the following hypothesis:

H2: Knowledge creation has a positive impact on knowledge impact.

ICT Infrastructure and Knowledge Creation

The ICT infrastructure includes three sub-variables, that is, information and communication technologies (ICTs), general infrastructure, and ecological sustainability as major components for the success and sustainability of any national innovation system (Cai, 2011). In this regard, ecological sustainability can play a role in the sustainability of the national innovation system. Ecological systems develop a relationship between innovation and social systems because some innovations can potentially lead the world in the wrong direction. Similarly, the better the infrastructure, the easier the means of communication and the environment-friendly means of transportation that would help produce and exchange ideas, services, and goods. Moreover, it will create an ideal environment for the innovation system to work more flexibly through increased productivity and efficiency, lower transaction costs, improved market access, and sustainable growth (Skoczkowski *et al*., 2020). Thus, the NIS system will have access to information and communication technology, online service by governments, and citizen participation via the Internet. Therefore, the effect of ICTs on the economy through technological and non-technological innovations in a country is influenced by the number of different applications and the development of new products, processes, and organizational models (Andrijauskiene, Dumciuviene, & Stundziene, 2021).

The ICT infrastructure creates a shared knowledge base and best practices across a fintech network in which ICT provides the strength, security, and ease of use of fintech operations (Haddad & Hornuf, 2019). The analysis of the study presents the central role of ICT that plays through the strength of interrelationships with knowledge creation in the accuracy of implementing and supporting financial technology. Furthermore, ICT tools enable knowledge creation to provide best practices by using the areas that are enabled and contribute to their knowledge. It highlights the challenge of improving ICT skills in fintech so that those in charge of fintech programs can expand their ability to transact through the ICT system and maximize its benefits comfortably. Thus, we hypothesised:

H3: ICT infrastructure has a positive impact on knowledge creation.

ICT Infrastructure and Knowledge Diffusion

Knowledge diffusion and integration include four dimensions, all related to the fintech sector in this case and with high-tech content or a key to innovation (Gomber *et al*., 2018). Knowledge diffusion includes intellectual property (IP) revenue as a percentage of total trade of fintech products and services provided, net high-tech exports as a percentage of total exports, exports of information and communication technology services as a percentage of total trade, and net outflows of foreign direct investment as a percentage of GDP.

The results of statistical analysis and data charts confirmed the significant positive impact of ICT on knowledge diffusion, specifically during the COVID-19 pandemic. It has highlighted the many unconventional benefits of ICT infrastructure, such as cloud infrastructure with its resilience and accessibility to enable a better response to digital customers and increasingly remote workforces (Saqib *et al*., 2015). This indicates the clear positive relationship between ICT infrastructures and knowledge diffusion. The existence of a new ICT infrastructure, such as the 'information cloud' is considered a model to better respond to the requirements of the growing digital customers, such as the diffusion of knowledge, which contributes to increasing efficiency and expanding the use of the fintech technology sector among customers (Wonglimpiyarat, 2017). Based on these arguments, the following hypothesis was proposed:

H4: ICT infrastructure has a positive impact on knowledge diffusion.

ICT Infrastructure and Knowledge Impact

The results of a study by Bankole and Mimbi (2017) support the dynamics and the main and sub-indicators of the Global Innovation Index, as the data show that they have positive effects and statistical significance in terms of the impact of ICT on the impact of knowledge.

Regarding the impact of ICT, the assessment results generally align with expectations and show that ICT is critical for knowledge creation and that it directly affects customers internally and positively impacts knowledge diffusion (Ode, & Ayavoo, 2020).

H5: ICT infrastructure has a positive impact on knowledge impact.

Knowledge Impact and Innovation Outputs

The research results by Chang *et al*. (2020) indicate that a reliable knowledge impact can improve productivity, increase efficiency, and reduce costs in the financial sector, leading to effective, innovative outputs. Knowledge impact places combined and integrated effects on knowledge-based innovation at micro and macro levels (Robertson, Caruana, & Ferreira, 2023). It is also confirmed that integrating ICT infrastructure with knowledge increases innovation competitiveness.

Hence, it reduces the risks of fraud in financial technology and financial transactions between users of financial technology (Romānova & Kudinska, 2016). Thus, the following hypothesis was proposed:

H6: Knowledge impact has a positive impact on innovation outputs.

Knowledge Diffusion and Innovation Outputs

The study by Braunerhjelm, Ding, and Thulin (2020) accepted the hypothesis that the diffusion of knowledge has a direct and positive impact on innovation outcomes, as knowledge creates a culture conducive to innovation and creativity in the financial technology ecosystem. On the other hand, knowledge dissemination activities profoundly impact the specific outputs of the innovation processes that create tacit knowledge. The experience of participation affects the financial technology ecosystem, and these effects play an important role in the knowledge dissemination process. Furthermore, creating sustainable competitive advantage depends upon knowledge diffusion, indicating that the latter is essential to accelerate innovation and maintain competitiveness (Tang *et al*., 2020). It is because knowledge diffusion indicates an inside-out management strategy that depends on inner capabilities to identify and respond to market fluctuations (Day, 2020). Thus, we hypothesiesed:

H7: Knowledge diffusion has a positive impact on innovation outputs.

Knowledge Diffusion and Knowledge Impact

The results of the study by Perez-Trujillo and Lacalle-Calderon (2020) show that the diffusion of knowledge looks at how to diffuse financial technology as new knowledge and its spread in society. Most of the survey and interview data showed how fintech is disseminated as new knowledge in the form of ideas, innovations, technology, products or practices, influencing users, customers and adopters to increase the ability to understand the potential of the transformed knowledge. The presence of gadgets such as smartphones and many other devices managed in the digital computing system helped diffuse knowledge quickly and impressively regarding fintech technology, so it was able to penetrate all aspects of work and daily activities, to meet the needs of daily life (Nakashima, 2018).

Furthermore, the data showed that knowledge diffusion has a direct and positive impact the diffusion of knowledge as an export product of financial technology and ICT infrastructure (Skare & Soriano, 2021), which is measured as a percentage and indicator of the non-oil income of the national economy. Moreover, the data showed that the diffusion of knowledge has a direct and positive impact on the diffusion of knowledge with its impact as the export product of fintech and ICT infrastructure (Chien, Cheng, & Kurniawati, 2020), which is measured as a percentage and an indicator of non-oil income for the national economy.

H8: Knowledge diffusion has a positive impact on knowledge impact.

Based on these arguments, we formulated a theoretical framework as depicted in Figure 1.

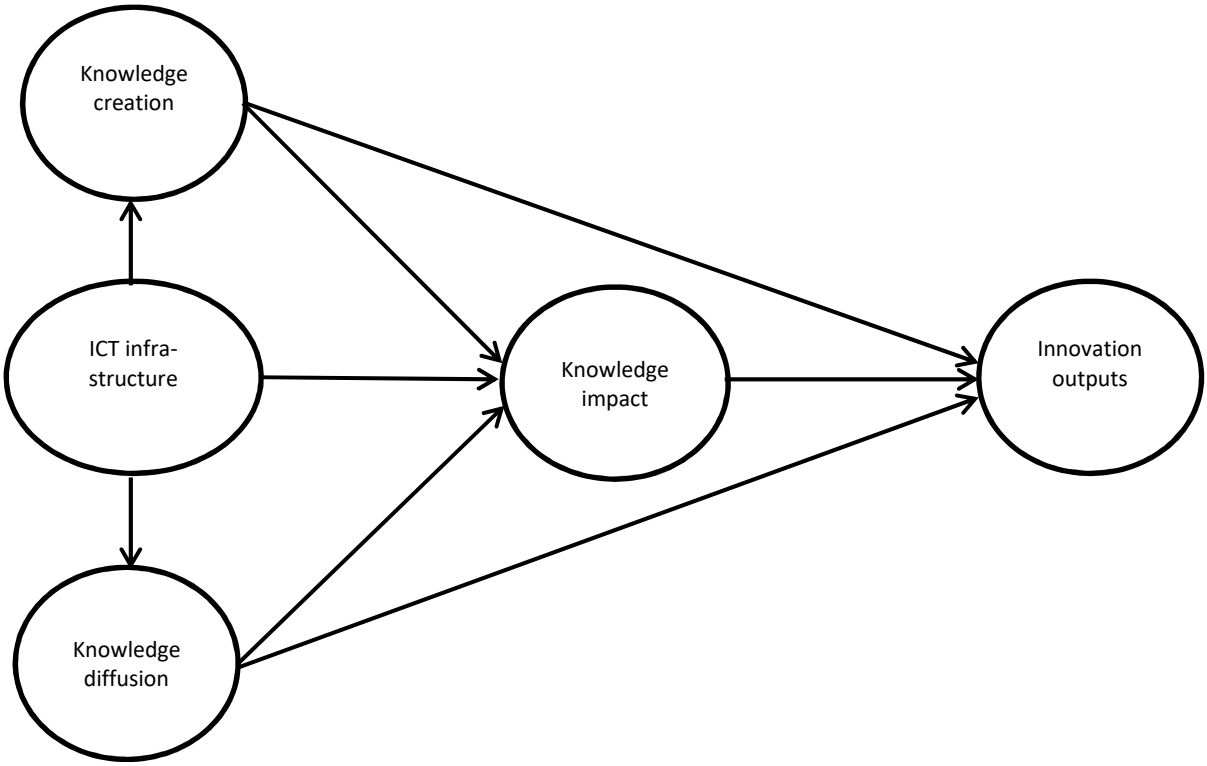

Figure 1. Theoretical framework of the study
Source: own elaboration.

RESEARCH METHODOLOGY

The study adopted the framework based on the NIS. Bahrain was selected for this study, because it is classified as a financial centre in the Middle East in terms of best practices and business environment. Regarding the digital and knowledge economy, Bahrain is the only Arab country that developed fintech legislation. Besides, the Central Bank of Bahrain has allocated a specialized financial technology unit to foster innovation. This makes the Kingdom of Bahrain a suitable candidate for the case study.

Since this research is limited to a specific time frame, a cross-sectional time horizon was used to cover the research objectives. Furthermore, non-probability-based purposive sampling was adopted and the sample members were selected based on their expertise and the nature of their relevant profession. The survey was distributed digitally through the website survey tool (Google Forms) using three digital communication mediums, namely direct email address, contact via instant messaging service (WhatsApp), and posts on social media groups (Twitter and Instagram) that include a number of experts in the field of financial services and the financial technology industry in Bahrain. The data were collected during the research period between 15 January and 15 February 2022. The target population consisted of nine categories representing the public and private sectors in Bahrain. These were the Ministry of Finance (MoF), Economic Development Board (EDB), Central Bank of Bahrain (CBB), and four leading banks providing innovative services in financial technology technologies, in addition to companies emerging in fintech applications and bank customers who use this service. A sum of 98 complete responses was retained out of 119 received. The demographics of the respondents, such as age, gender, and educational level have been shown in Table 1.

The instrument to measure the variables was adopted from the previous studies. The measures containing four items for knowledge creation were adopted from Eisenhardt and Martin (2000). The reported reliability was found to be 0.84. Similarly, knowledge impact was measured through three items adopted from Ravichandran and Rai (2003) with a reported reliability of 0.87. The four items of knowledge diffusion were adopted from Asongu and Tchamyou (2018). The reported Cronbach's alpha is 0.81. Likewise, ICT infrastructure was adopted from Cai (2020). The measure comprises 10 items

with a reliability of 0.88. Lastly, innovation outputs having six items were adopted from Wiseman and Anderson (2012), and the reported reliability is 0.79.

Table 1. Demographics of the respondents

Characteristics	Categories	Frequency	Percentage
Gender	Male	59	50
	Female	60	50
Age	20-29 years	7	6
	30-39 years	59	49
	40-50 years	32	27
	50 years and above	21	18
Education Level	Diploma	4	4
	Bachelor	25	21
	Master	40	34
	PhD	48	41
Experience	less than 5 years	18	15
	5 to 10 years	17	14
	11 to 20 years	48	41
	21 to 30 years	18	15
	Above 30 years	18	15
Position (fintech)	Start-up founders or app developers	8	16
	Heads of dept	17	14
	Software development supervisors	3	30
	CRM assistants	7	40

Source: own elaboration of collected data.

RESULTS AND DISCUSSION

The PLS-SEM measurement model was evaluated in different stages (Figure 2). Table 2 indicates that Cronbach's alpha values for all measures were above 0.7, confirming their reliability (Taber, 2018). The construct validity was evaluated through convergent and discriminant validity. The convergent validity measures how closely are the items of a construct. Table 2 also shows that AVE and indicator reliability (factor loadings) values were above 0.5, thus establishing convergent validity.

Table 2. The construct of reliability and validity

Variables	Cronbach's alpha	rho_A	Composite reliability	Average variance extracted (AVE)	Factor loading range
ICT	0.937	0.941	0.947	0.599	0.707-0.873
IO	0.873	0.878	0.902	0.571	0.737-0.840
KC	0.801	0.805	0.863	0.558	0.732-0.800
KD	0.713	0.715	0.821	0.534	0.720-0.763
KI	0.654	0.660	0.794	0.491	0.713-0.789

Source: own study.

Similarly, discriminant validity measures the extent to which a variable's items differ from other constructs. It was evaluated through a heterotrait-monotrait (HTMT) ratio of correlations. Since HTMT values in Table 3 are less than 0.9, the discriminant validity was established (Hair *et al*., 2021).

To test hypotheses with PLS-SEM, bootstrapping was performed to generate t-values to get significance for the hypotheses. Table 4 shows the path coefficients and the corresponding significance values related to each hypothesis.

The results presented in Table 4 reveal that all significant research hypotheses (H2 to H8) derived from NIS indicators were accepted except H1, which describes the direct effect of knowledge creation on innovation outputs (β=0.015, p>0.5). Hence, it signifies that knowledge creation influences innovation outputs through knowledge impact only. These hypotheses suggest that organizations

investing in knowledge creation, ICT infrastructure, and knowledge diffusion will likely experience higher innovation outputs through knowledge impact. Consistent with the present study, numerous past studies (*e.g.*, Kim *et al*., 2018; Ben-Akiva, McFadden, & Train, 2019; Haggag *et al*., 2019) demonstrated that knowledge creation, ICT infrastructure, and knowledge diffusion have a positive influence on knowledge impact and innovation outputs. For example, Asongu and Tchamyou (2018) found that knowledge creation, ICT infrastructure, and knowledge diffusion positively affected innovation outputs in the telecommunications industry in Sub-Saharan Africa.

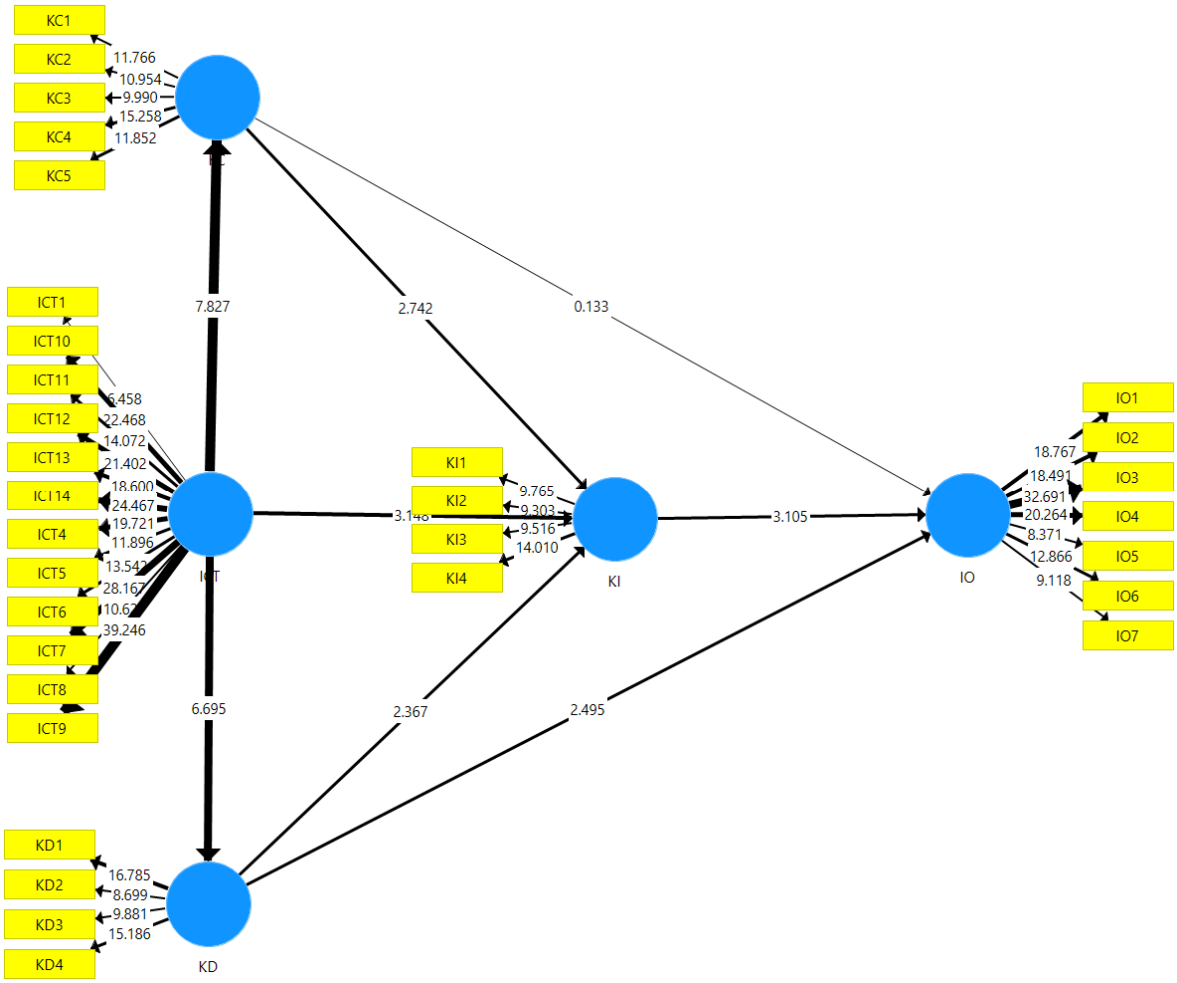

Figure 2. Research model in SmartPLS 3 software

Source: own elaboration in SmartPLS 3.

Table 3. Heterotrait-monotrait ratio (HTMT)

Variables	ICT	IO	KC	KD	KI
ICT					
IO	0.807				
KC	0.669	0.546			
KD	0.676	0.668	0.964		
KI	0.740	0.715	0.871	0.861	

Source: own elaboration.

Similarly, a study by Tuladhar *et al.* (2015) found that knowledge creation, ICT infrastructure, and knowledge diffusion positively affected innovation outputs in the manufacturing industry in Nepal. Additionally, a study by Rahman *et al.* (2019) found that knowledge creation, ICT infrastructure, and knowledge diffusion positively affected innovation outputs in the banking sector in Bangladesh. These

studies provide evidence that knowledge creation, ICT infrastructure, and knowledge diffusion positively affect innovation outputs, which is reflected in this study's findings.

Table 4. Path analysis (hypotheses testing)

Hypotheses	Relations	Coefficient	Standard deviation	T statistics	P values
H1	KC -> IO	0.015	0.112	0.133	0.894
H2	KC -> KI	0.311	0.113	2.742	0.006
H3	ICT -> KC	0.586	0.075	7.827	0.000
H4	ICT -> KD	0.569	0.085	6.695	0.000
H5	ICT -> KI	0.265	0.084	3.148	0.002
H6	KI -> IO	0.323	0.104	3.105	0.002
H7	KD -> IO	0.335	0.134	2.495	0.013
H8	KD -> KI	0.239	0.101	2.367	0.018

Source: own study.

Theoretical Implications

This study contributes to the literature by providing empirical evidence that links knowledge creation, diffusion, ICT infrastructure, innovation performance and knowledge impact. It includes the analysis of Bahrain's NIS framework and fintech ecosystem using empirical data. The national innovation system framework has shifted the emphasis from a quantity-based economy to a quality-based economy for innovation in the banking and financial sector following international standards. Moreover, the research introduces the knowledge impact between ICT infrastructure, knowledge creation, dissemination, and innovation outputs in fintech to improve the delivery of financial services.

This has enabled Bahrain to use fintech as a payment and purchase platform for various financial transactions. It also significantly impacts some customers' willingness to integrate financial technology, and Bahrain's willingness to update legislation in the national innovation system and economic vision to keep pace with digital technologies in general and the financial sector in particular. In this sense, when technological and legal limits are minimal, clients have fewer reservations about utilizing and integrating fintech into financial activities. When technological and regulatory restrictions are high, signalling that most constraints have been overcome, customers are generally willing to incorporate fintech into their daily life, resulting in economic growth and increased GDP. Additionally, when technological restrictions are high and regulatory constraints are low, customers require increased confidence and security to incorporate this technology into their daily lives. On the other hand, if technological constraints are minimal but regulatory limitations are severe, new inventions and alternative solutions will be required to promote integration.

Practical Implications

The results of this study have significant implications for managers and business leaders looking to foster innovation in their organizations. Firstly, it is clear that knowledge creation, diffusion, and ICT infrastructure are all essential factors in driving innovation performance. Managers should create an environment where knowledge is continuously developed, shared, and utilized. Additionally, they should ensure that the necessary ICT infrastructure is in place to facilitate knowledge transfer.

Furthermore, the results reveal that knowledge impact plays an important role between knowledge creation, diffusion, and ICT infrastructure in innovation performance. Therefore, managers must understand that developed and shared knowledge may be challenging to use if it has no impact. Thus, they should make sure that knowledge is meaningful, pertinent, and applicable to the business processes and goals to maximize its benefits. They should also think about creating policies that promote knowledge sharing and collaboration among staff to ensure that the information produced is effectively shared and distributed. They should take into account these findings when developing strategies to promote innovation in their organizations.

Policy Implications

Bahrain provides a unique perspective for understanding the relationships among knowledge creation, ICT infrastructure, knowledge diffusion and innovation outputs. The Kingdom of Bahrain is a small island nation in the Arabian Gulf that has diversified its economy from oil and gas industries to a knowledge-based economy, such as ICT, fintech, and services. In this regard, Bahrain has invested heavily in ICT infrastructure, innovation programs, and education and training initiatives. This makes it an interesting case study for examining the impact of the mentioned factors on innovation outputs.

Since the Kingdom of Bahrain is rapidly embracing fintech as part of Bahrain Economic Vision 2030, the government must evaluate its innovation performance and streams to ensure maximum success. This research highlighted several critical policy implications when assessing fintech in the kingdom. Firstly, the government must create a conducive environment for fintech to thrive in the Kingdom. It can involve establishing knowledge impact by encouraging knowledge creation and sharing. The government can enhance the potential for success with fintech within the Kingdom by creating a benign environment. Secondly, the government should invest in talented people to improve knowledge management and ensure fintech success. This can be accomplished through sponsoring training programs, scholarships, and other incentives to attract the biggest talents from local and global markets.

Thirdly, the government should ensure that the required ICT infrastructure is available for fintech to succeed. It can be achieved through cloud computing, artificial intelligence, blockchain technologies, and secure payment networks. Finally, the government should encourage stakeholders to collaborate to ensure that fintech is successful. It can be guaranteed by setting up industry-wide standards and regulations, as well as creating fora for the exchange of ideas. By following these research implications, the Kingdom of Bahrain can warrant the successful implementation of fintech within the national innovation system. Consequently, it will help drive innovation and develop a more robust and secure financial system.

CONCLUSIONS

This research investigated and assessed the performance of innovation in financial technology concerning ICT infrastructure and knowledge management in the Kingdom of Bahrain, a member of GCC countries. The research contributes to the literature on financial technology by assessing the performance outputs of ICT infrastructure and knowledge management within the framework of the national innovation system by providing insights into financial technology as a contemporary innovation literature for the countries of the Gulf Cooperation Council. Managers of fintech can devise strategies to enhance innovation outputs by making use of ICT infrastructure and managing the knowledge attributes. The research suggests a dire need to integrate financial technology innovations into the financial system, guided by Bahrain Economic Vision 2030. Thus, findings suggest that organizations should focus on creating a conducive environment for knowledge creation and diffusion and invest in ICT infrastructure to enhance innovation outputs.

The research results are consistent with previous studies (*e.g.*, Cai, 2011; Ravichandran & Rai, 2003; Haddad, & Hornuf, 2019). However, the present research has limitations, such as being limited to one country. Therefore, it is recommended for future research to increase the scope of the study by replicating it in other nations across regions and to undertake comparison research between different economic samples.

Despite the novelty and relevance of the research in this article, some limitations should be noted. Firstly, the study focused solely on the impact of knowledge creation, diffusion, and ICT infrastructure on innovation performance in Bahrain. While the results obtained from Bahrain could be generalized to other countries in the Gulf region, future research should include other countries and areas to understand better the impact of knowledge creation, diffusion, and ICT infrastructure on innovation performance across a wider geographical range.

Secondly, the data used were only from recent surveys and archival records. Although a variety of data sources supported the results of the study, future research should utilize additional data sources

to gain more accurate and comprehensive results. Finally, while the study was able to examine the role of knowledge impact in the context of Bahrain, it did not take into consideration the broader implications of knowledge impact in a global context. Future studies could further explore the mechanisms and processes by which knowledge impact mediates the relationship between knowledge creation and diffusion, ICT infrastructure and innovation performance. Future researchers may also survey a bigger group of people as a part of their research. In addition, cross- and in-case analyses should be considered to uncover possible exogenous states in future studies. Further studies could also investigate the influence of other factors, such as organizational culture, on this relationship.

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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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Employment risks under the conditions of the COVID-19 pandemic and their impact on changes in economic behaviour

Halyna Mishchuk, Yuriy Bilan, Viktoriia Mishchuk

ABSTRACT

Objective: The article aims to study the risks of employment under the conditions of the COVID-19 pandemic, their differences depending on the specifics of professional activity, and the assessment of the impact on the economic behaviour of the employed.

Research Design & Methods: The authors developed the classification of the employed according to the risks of the pandemic impact and considering the differences in labour functions. The research was conducted based on a sociological survey among the employed population aged 18+ with an interval of one year.

Findings: The authors' classification was constructed according to the risks of the pandemic impact, considering the specifics of professional duties, and with the division of workers into three groups: (1) 'front-line' workers; (2) employees who must be personally present at workplaces, but with a limited circle of contacts; (3) employees whose employment allows remote work. Using this approach, we found changes in the economic behaviour of employees of different risk groups.

Implications & Recommendations: The obtained results can be used by public policymakers to improve human resources management depending on employment risks and behavioural changes of employees of different professional groups.

Contribution & Value Added: The new classification allows considering the specifics of employment according to the level of risks of economic interaction during the performance of professional duties. It makes it possible to better assess the behavioural guidelines of workers with different contact frequencies under the pandemic (including possible similar situations in the future).

Article type: research article

Keywords: employment; employment risks; pandemic; economic behaviour; digital skills; motivation

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INTRODUCTION

The COVID-19 pandemic became one of the most significant challenges for humanity in the recent history of its existence and led to changes in the economic sphere and in the development of human capital. On the one hand, the sudden destruction of usual employment opportunities and communication channels and sudden stops in entire industries and types of economic activity led to large-scale risks in the field of employment and resulted in the threat of livelihood loss. Massive forced shutdowns of economic activity became obvious proof of the unprecedented impact of the pandemic on the sphere of business and work. According to the observations of Deloitte specialists from the beginning of 2020, 'in March, more than a third of humanity was in lockdown. By the end of April, 1.6 billion workers stood in immediate danger of having their livelihoods destroyed' (Deloitte, 2020, p. 2).

Such negative consequences on a global scale led to the growing relevance of research on employment risks. New economic conditions require a transformation of relations in such a way as to

restore health, economy, and society together, as emphasized in the World Health Organization's appeal to governments (World Health Organization, 2020).

At the same time, the forced transition to remote work and the rapid introduction of online services led to the development of new skills and communication channels both in business and at the household level, which caused an increase in the quality of human capital, stimulating the deployment of an innovative spiral even for those population groups that were far from mastering new technologies. Such changes, which took place during the months of the pandemic, lead to ambiguous assessments of the pandemic's impact on economic processes and require research on changes in behavioural guidelines, taking into account the impact of employment risks during the period of the pandemic 'new normal.' In this regard, we share the opinion voiced at the beginning of the global pandemic crisis: 'having a plan to deal with the unexpected, as important as it is, is not all organizations need in such an environment. Even more necessary is to make a fundamental mindset shift: from a focus on surviving to the pursuit of thriving' (Deloitte, 2021, p. 4). At the same time, the path to thriving based on the use of acquired innovative knowledge and developed methods of communication must be accompanied by the creation of a safe work environment.

In this regard, the pandemic can be perceived not only as a global threat but also as a challenge, the overcoming of which requires scientific research in the field of employment, in particular, the risks of pandemic influence on professional activity and changes in the behavioural determinants of the population of different groups of employment risks.

Despite the essential period of the pandemic and its negative consequences in the labour sphere, an important methodological gap in the investigation of employment risks is still typical for studies in the field of employment. In particular, there is no agreed classification of the employed according to the risks of the pandemic impact that would take into account the differences in labour functions. The theoretical importance of justification for the appropriate classification is obvious due to the further development of approaches to study safety in the working environment as well as differences in behavioural reactions and their changes under the influence of extreme circumstances. Despite all the negative consequences of the pandemic, it allows to develop the theoretical tools for studying new risks at work, their perception by different employees (depending on their level of risks), and relevant behavioural changes in labour and linked relations.

Therefore, we consider the study of behavioural guidelines of different groups of employees according to the degree of risk of pandemic influence to be important for the formation of a knowledge base about changes in human capital under the conditions of large-scale socio-economic crises, which will occur further. Such knowledge should serve as the basis for choosing tools for responding to similar risks in the future.

In this regard, the novelty of our research is that it justifies the new classification of employment according to the risks of professional activity under the conditions of the pandemic. This allows us to take into account the specifics of employment according to the risk level of economic interaction during the performance of professional duties, which is significantly different from the dominant approaches to the assessment of health risks by age groups. Such a classification not only fills the existing methodological gaps in studies of the risks of pandemic exposure but also makes it possible to better assess the behavioural guidelines of workers with different frequencies in contacts under the pandemic (including possible similar threats in the future).

Given the above, the purpose of our study was to investigate the risks of employment under the conditions of the pandemic, their differences depending on the specifics of professional activity, and assess the impact of changes on the economic behaviour of the employed.

To achieve this goal, we attempted to accomplish the following research tasks (RTs):

RT1: To justify the classification of the employed by the type of professional risks caused by the pandemic.

RT2: To conduct sociological monitoring of changes in the behavioural guidelines of the population of different groups by type of risks of professional activity under the conditions of the pandemic and to evaluate the identified changes.

The research aiming to accomplish these tasks was conducted using the methodology of comparative analysis (to justify the classification of employment risks under the pandemic circumstances) and a sociological survey (for research on changes in the economic behaviour of the employees of different risk groups). For the survey the employed population aged 18+ was involved with an interval of one year: December 2020 – January 2021 and December 2021 – January 2022. In these two periods, 414 and 376 people took part in the survey, respectively, which allowed forming representative samples and obtaining results suitable for further analysis.

The results obtained are an approbation of the authors' classification of the employed according to the level of professional risks of the pandemic impact, and accordingly – changes in behavioural determinants obtained during the period of global socio-economic shock. Therefore, we consider the proposed research methodology useful for other periods of similar large-scale crises, which, despite all the desire to avoid them, became an inseparable condition of human development and always have significant manifestations in the field of employment.

The remainder of the article is structured as follows. The literature review will give details regarding the theoretical background of the paper with the development of the authors' classification of employment risks used for further analysis. The materials and method section will highlight the methodological approaches used to perform data collection and analysis. The main findings of the paper will be presented in the results section. Finally, we will discuss the findings obtained in the discussion. The limitations of this research and recommendations on the practical use of the results will be presented in the conclusion.

LITERATURE REVIEW

The risks of the pandemic impact on various spheres of economic activity became the most discussed object of economic research since the beginning of the pandemic. The scale of this challenge and its demographic consequences are truly the most significant ones against the background of other similar social disasters caused by the pandemic impact over the past 50 years (Table 1).

Table 1 The number of the infected and dead from the most massive viral infections in the last 50 years of human existence

Virus	Number of the infected, people	Number of the dead, people
Ebola (1976)	33 577	13 562
H5N1 'bird flu' (1997)	861	455
SARS (2002)	8096	774
H1N1 (2009)	762 630 000	284 500
MERS (2012)	2494	858
H7N9 'bird flu' (2013)	1568	616
COVID-19*	**676 044 299**	**6 877 479**

* – retrieved from Johns Hopkins University, Coronavirus Resource Center (2023) on 6 March 2023.
Source: own study.

As you can see, the COVID-19 virus has already caused demographic losses on a global scale, which are among the largest in the last 50 years of human development. Even though at the time of writing this article, there are still fewer cases of infection than from the H1N1 virus, the death rate is already 23 times higher, despite almost three years of global efforts to overcome the pandemic. At the same time, the risk of the spread of the virus is most characteristic in the field of employment, in particular in those activities that require direct contact.

As can be seen from the trends, consequences and duration of the pandemic, the coronavirus has become one of the permanent signs of economic activity in recent years. Its influence is certainly very different across activities, which vary in the degree of contact at workplaces, both in terms of contact between the personnel and consumers. At the same time, the coronavirus provides a unique opportunity to study changes in behavioural economics under extreme conditions.

As we can see from Table 1, such challenges have become regular for humanity despite significant progress in the development of medicine.

Due to the large-scale economic impact, pandemic crises are often considered within the concept of the 'new normal' which was introduced by El-Erian (2010) during the financial crisis of 2009. During the pandemic period, it gained even more popularity in scientific circles.

The COVID-19 pandemic new normal, like the previous crisis of 2008-2009, caused economic instability in many markets, but the scale of the impact is incomparably greater. Mass sudden stops of business and the threat to the existence of entire sectors of the economy, as during the previous crisis, caused scientists to search for new ways of responding to new risks, justifying the possibility of recovery depending on enterprises' activity (Kudej *et al.,* 2021) and the effectiveness of state actions to support business under crisis conditions (Dvorský *et al.,* 2021; Kinnunen *et al.,* 2021). The most sensitive to pandemic risks were the types of activities associated with direct contact with consumers, that is, tourism and the hospitality industry in general (Esquivias *et al.,* 2021; Kostynets *et al.,* 2021; Zain *et al.,* 2022). At the same time, in some cases, it was unexpected that even understanding the weight of the consequences and the experience of other countries in overcoming them, firms did not learn from foreign policy measures, even if they relied on inputs from China or Italy (Buchheim *et al.,* 2022).

Uncertainty, even a certain confusion among business owners in the initial stages of the pandemic, was replaced by the intensification of the search for ways out of the crisis, which led to an unprecedented intensification of the development of online services and the rapid penetration of digital communication tools, especially in the B2C sphere (Kersan-Skabic, 2021; Roshchyk *et al.,* 2022; Głodowska *et al*., 2023). Along with the search for new opportunities for business development, we. Witnessed the intensification of research on the public's perception of new risks and expectations regarding the results of government measures to overcome the consequences of the pandemic (Öksüz Narinç, 2022; Popescu *et al.,* 2022). However, the authorities' activities were criticised for inefficiently addressing the worsening COVID-19 disease level (Gaman *et al.,* 2022).

Even before the end of the COVID-19 crisis, it became obvious that its protracted nature and the level of impact on economic activity are significantly different from previous global challenges. The most obvious difference between the pandemic new normal and the previous crisis periods was precisely the large-scale impact on the labour market and – through the employment sphere – on the activities of enterprises, their competitiveness, and financial results. New flexible employment opportunities, including flexible, remote work, were quickly accepted and adapted to business conditions (Le *et al.,* 2023; Raišienė *et al.,* 2021; Sunaryo *et al.,* 2022). In fact, flexible, remote work became one of the components of the employer value proposition during the crisis (Samoliuk *et al.,* 2022). The development of remote communication systems with stakeholders of various levels became a characteristic feature of the formation of business management systems, in particular, social capital management systems, internal auditing, and flexible HRM models (Azizi *et al.,* 2021; Levytska *et al.,* 2022; Mishchuk *et al.,* 2022; Oseghale *et al.,* 2022). The first shock caused by the sudden shutdown of many enterprises and subsequent COVID-19 waves had a permanent impact on business activities under the pandemic new normal: its characteristic feature was the constant monitoring of morbidity and the possibility of returning to normal employment conditions not only because of the end of the pandemic but also through the protective measures.

Therefore, apart from the rapid development of digital technologies, which undoubtedly became a powerful impetus for innovative business development, another important trend of research on the impact of the pandemic on the employment sphere was formed, namely the social focus (Korzynski *et al*., 2023; Wach *et al*., 2023). Positive changes in business strategies regarding human resources mostly included the search for new remote working opportunities in all industries, which aimed to alleviate uncertainty and improve employee psychological well-being. It allowed businesses to reinvent HRM techniques to save money and maximize efficiency without compromising their employees' life quality and well-being (Vahdat, 2021). The similar features of decent work ensuring became typical for HRM systems aimed at successful enterprise activity, particularly for firms with growing performance (Mishchuk *et al.*, 2021).

The need for further studies of the risk factors of the pandemic impact results also from confirmed increasing socioeconomic inequalities and weakening traditional mechanisms of employment protection, especially regarding low-skilled individuals and those in occupations with low working-from-home feasibility and/or from non-essential sectors, particularly tourism (Lopes & Carreira, 2021).

Thus, in the field of economic studies of employment under the conditions of increased health hazards during the pandemic, certain dominant areas of scientific interests were formed. Most of them were related to the impact of employment on the conditions and results of business activity.

Another area of research was safety at workplaces and in the process of non-economic communications. In this regard, an important area of research became the safety of the most vulnerable group of employees with regard to the risks of pandemic impact, that is, healthcare workers. Due to the virus' novelty, the perceived risk of the pandemic was very high, which shows that healthcare workers feel stressed and scared to treat COVID-19 patients (Shaikh *et al.,* 2022). Of course, the exceptional importance of healthcare employees in overcoming the pandemic drew special attention to monitoring their psychological and physical condition, working conditions, and stress levels (Bielicki *et al.,* 2020; Spoorthy *et al.,* 2020). Maintaining health and psychological comfort of employees, especially those involved in the operation of critical infrastructure facilities, is the second important area of research on the risks of pandemic impact. Its economic context is not obvious through direct links with productivity or other economic outcomes, but the study of employment risks in vital industries that determine state security in a period of crisis reflects scientists' view on the importance of certain professional groups and their varying risk levels, including in view of the possibilities of further economic development.

Notably, a unified approach to the classification of employees according to the risk groups of the pandemic impact has not been formulated before. The unity of scientists is characteristic only with regard to the selection of the riskiest spheres of activity, and accordingly, workers belonging to the so-called 'frontline workers.' The specifics of their employment, risks and, even additional principles of classification according to the level of risk exposure are sufficiently covered in the works of Blau *et al.* (2021), Jecker *et al.* (2020), Nyashanu *et al.* (2020), or Rodríguez-Rey *et al.* (2020). The concept of 'frontline workers' is widely used not only in scientific research but also, *e.g.*, in recommendations for reducing the stress of such workers as one of the active directions for improving the quality of their working life compiled by World Health Organization (World Health Organization, 2022).

Such a grouping with a division into only two groups ('frontline workers' and all others employed), of course, does not fully reflect the peculiarities of the impact of risks, which changed due to the activation of online means of work. Meanwhile, none of the most well-known classifications of the population according to the risks of pandemic influence fully considers the employment characteristics of a certain professional group. Mass media workers include *e.g*. 'frontline workers,' but there are also other groups, namely those whose employment does not involve constant mass contact, but requires personal presence at workplaces, *i.e*., the risks of their infection are higher than, *e.g*., in the case of the employees of the accounting or IT department of the same company, whose employment is possible in a completely remote format. However, so far, such features are not taken into account by any of the existing classifications.

We mention some approaches as examples to identifying employment risks under pandemic conditions (Table 2) used by government organizations of the USA, Great Britain, McKinsey, and the Ministry of Health of Ukraine. This approach is included in the consideration because empirical research was conducted on the example of Ukraine.

As you can see, these classifications have a lot in common. The main purpose of all approaches is to determine the priority of vaccination of the population. Therefore, in the Ukrainian classification, *e.g*., two ways of grouping are mixed: by the risk of infection according to the health condition (including age) and by the importance of the employment sphere for maintaining the security and vital activities of the country. Meanwhile, the Minister of Health commented that the priority groups for vaccination against COVID-19 (nine population groups) were determined based on the recommendations of Ukrainian experts and a number of international organizations. These groups are medical workers, military personnel, social workers, people living in institutions providing long-term care and support, employees of such institutions, elderly people (60+ years), employees of

critical state security structures, educational workers, persons aged 18 to 59 with concomitant diseases, and inmates (Ministry of Health of Ukraine, 2021).

Table 2. Objects of the risk analysis tangential to the sphere of economic activity

Object of analysis	**Authorship of the methodology**			
	Ministry of Health of Ukraine	McKinsey	Centers for Decease Control and Prevention (CDC), USA	UK Government
Key terms	Risks of COVID-19 infection and development; professional functions	Risks by sectors of economic activity	Groups of people with an increased risk level	Key employee
Grouping sign	Age, concomitant diseases, the content of professional activity	Criticality of functions, the possibility of providing safety at the workplace	Age, health problems	Employment in activities critical to the response to COVID-19
Risk levels and grouping of the population/types of activity	1) Critical (population of priority groups, medical workers engaged in the treatment of patients with COVID-19, military personnel participating in JFO) 2) extremely high (population by age, health status, as well as medical workers); 3) high (relevant population groups and workers who support the security and vital activities of the state); 4) increased (population with an increased risk of infection and other workers who support the security and vital activities of the State); 5) low (all others not included in priority groups)	1) Critical, highest (social services and health care, public transport, retail - food, medicine); 2) critical, adaptive (government, housing and communal services, education); 3) medium (information, finance, real estate, professional services, management, wholesale); 4) adaptive (agriculture, mining, construction, industry, administration); 5) the most threatening in terms of personal safety (rest, food and hospitality, private transportation, retail, other types)	(-)	Only the critical level is defined. Activities: – health care and social assistance; – education and childcare; – key public services (journalists, employees of the judicial system, religious and charitable institutions); – local self-government and national government; – food products and other necessary goods (including the activities of delivery services); – national security (army, police, other services); – transport and customs; – housing, communications and financial services

Note: (-) – not clearly defined, additional medical conditions are applied.
Source: CDC, 2022; GOV.UK, 2022; McKinsey, 2020; Ministry of Health of Ukraine, 2021.

The classification used in Ukraine has notable common features with the criteria for analysing the risks of pandemic impact used by McKinsey, the UK government, and the CDC (as we can see, the CDC approach is the most generalized). Furthermore, we can see that although the criteria for analysing the risks of pandemic impact are detailed to varying degrees, they actually coincide. These approaches consider to varying degrees individual characteristics, such as age, state of health, and belonging to a certain type of activity. However, in terms of economic activity, the most important feature is the performance of certain professional functions, as a result of which the risks of infection increase.

In this respect, an important omission of all the most developed classifications today is that they take into account belonging to a certain type of activity in general. As emphasized, there is a

big difference in the functions of, *e.g.*, an employee of the information department of a news service and a journalist, both in terms of the method and number of contacts, as well as in the possibilities of performing functions remotely.

Thus, aiming to resolve RT1, we consider it necessary to directly take into account indicators of risk saturation of professional activity in the analysis of factors of changes in economic behaviour. The classification of workers according to the risk of professional activity in relation to pandemic threats can therefore be simplified, which will lead to more accurate assessment results.

In this regard, it is especially important to single out employees of three groups:

1. 'frontline' workers – with critical professional risks of pandemic influence, since remote work is impossible for them;
2. employees whose employment requires personal presence at workplaces but involves limited contacts – employees with high professional risks;
3. employees whose employment allows complete or very significant social isolation if necessary – employees with moderate risks.

The first group should include employees with direct and frequent contact with a potentially dangerous environment, whose employment is impossible in a remote format (*e.g.* medical workers or police). The second group of workers should include those employees who ensure the completion of professional functions of the first group, as well as employees whose work cannot be remote but does not require contact with a constantly changing environment and is sufficiently isolated in the usual workspace (*e.g.*, construction or industry). The third group includes all employees whose employment may be remote, and therefore, the risks are significantly reduced and remain to a greater extent the responsibility of the employee.

Of course, this approach can be combined with the above groupings of professional duties. In this way, an important omission of the previous classifications is filled, *i.e.* it is possible to take into account the real risk saturation that occurs in direct contact with potential carriers of the virus and sick people.

Prior to proposing our classification of the employed according to the risks of pandemic impact, we tested it in an empirical study on the example of Ukraine.

RESEARCH METHODOLOGY

The basis of our empirical research was the proposed grouping of employees according to the level of employment risk under the conditions of the pandemic with the division into three groups, which was substantiated in the previous section.

For the gradation of age groups, the approach of labour market analysts was applied, which was obtained in particular during an interview with representatives of the recruiting agency 'Imperiya-HR,' which is among the top five recruiting agencies in Ukraine in terms of the number of vacancies according to Work.ua. Therefore, according to the results of labour market monitoring carried out by recruiters, the readiness to change the functional in professional duties today is as follows: employees under the age of 30 change the functional once every two years; 31 to 40 – once every three years; from 41 – once every four to five years. Therefore, this division was used as an additional feature of the grouping of respondents. Moreover, we selected the age group of people up to 25 years old to understand the differences in the behavioural guidelines of young people, a significant part of which are just entering the labour market.

The survey was conducted among the employed population of the Rivne Oblast (Ukraine) over the age of 18 using the Google Forms service twice with an interval of one year: in December 2020 – January 2021 and in December 2021 – January 2022.

Through the survey, we collected samples of 414 and 376 people respectively. According to the State Statistics Service of Ukraine, the size of the general population (the entire employed population of the oblast) was: 470.6 thousand people at the end of 2020 and 463.6 thousand people at the end of 2021.

To calculate the representativeness of a sample we used the Cochran formula (Cochran, 1977) with a Confidence level of 95%. The actual value of the confidence interval in the first review was

4.81% and in the second – 5.05%. Therefore, the results obtained were representative and could be used to test the hypotheses of our study.

Respondents were offered a Likert scale (Likert, 1932) for their answers, in particular, its most typical variant of a 5-level scale, in which the answers are rated from 1 point ('insignificant changes') to 5 ('maximum changes'), taking into account that the type of questions involved the evaluation of changes, and not the measurement of the current state, a mark with level '0' was additionally added, which characterized the absence of any changes.

The questions were structured according to the stages of economic relations, in which the population was involved as an employed population (production stage), as well as buyers and final consumers of products – distribution and consumption stages. Therefore, the main questions related to changes in behaviour that occurred between the beginning of quarantine and the time of taking the survey. The questions concerned:

- change of skills in the process of employment (improvement of long-distance relationships, the possibility of using new skills in the future; possibilities of finding secondary income under new conditions);
- motivational aspirations for work and personal values (motivation to keep a job; the value of free time due to saving time for travel to work; general perception of the regime of life in quarantine conditions);
- consumption and savings (change in attitudes towards spending, including the purchase of expensive things; the value of saving money on commutes and clothes).

RESULTS AND DISCUSSION

According to the estimates obtained in December 2020 – January 2021 (hereinafter referred to as Winter-2021), we can conclude that, in general, the pandemic caused an economic shock not only to economic entities but also to the population, a large part of which was forced to quickly adapt to new conditions. However, many found advantages in the situation. The generalized results of the Winter-2021 survey are presented in Table 3, in which the average level for each partial feature is determined in the cells, and the grades reflecting the reaction below the average arithmetic level of 2.5 points are marked with grey shading.

Processing the results, we found that even taking into account the fact that a significant proportion of responses to the questions of the questionnaire showed a neutral attitude (putting '0' in their reaction to life under new conditions and the power of the pandemic; from 12% to 45% of respondents to various questions of the questionnaire), none the group of respondents, formed by any feature of grouping, was completely inert to changes. At the same time, if we single out the conditional average arithmetic level of changes (2.5 points according to the evaluation scale used), then changes in behaviour in at least one of the aspects are present among respondents of different age groups. The most obvious result is the above-average value of acquired remote interaction skills and the intention to use them in the future, regardless of the change or maintenance of quarantine restrictions.

Through the analysis of the changes in behavioural guidelines at the end of the first year of pandemic restrictions through the prism of the proposed classification of workers according to the level of risks of professional activity under pandemic conditions (groups 1-3), it is possible to establish important regularities related to the number of forced contacts and the health risk. As we can see, the most valued new remote interaction skills are in group 3, which is the one with the greatest opportunities for remote work, *i.e.* these respondents have the highest intentions to use new skills in the future. Meanwhile, respondents who belong to the first and second groups of employment risks according to our classification did not feel they saved time or money (which was the expected result for these groups), but they had a lower motivation to prove themselves before the employer in order to keep the job compared to the representatives of the third group. We can consider this as a demonstration of higher confidence in stable employment, given the nature of the work, which does not allow for quickly finding a replacement, and the discrepancies in the assessments are a confirmation of the applicability of our proposed classification.

Table 3. Respondents' self-assessment of changes in economic behaviour and determining skills, max = 5.0 points (Winter 2021)

Group of respondents	A partial sign of changes in economic behaviour during the pandemic						
	Improvement of remote interaction skills	The strength of aspirations to continue using skills after quarantine	Tendency to use funds economically	The cost-saving value of remote interaction	The value of saving commute time during quarantine	The motivation to prove oneself to maintain a position	Tendency to postpone an expensive purchase until the end of the quarantine
All respondents	***3.32***	***3.49***	***2.58***	***2.51***	***2.47***	***2.28***	***2.23***
Groups of workers according to the risks of professional activity under the conditions of the pandemic							
'frontline' workers (group 1)	3.06	3.17	2.64	2.26	2.23	2.09	2.11
employees whose employment requires personal presence at workplaces but involves limited contacts (group 2)	3.05	3.13	2.61	2.45	1.95	2.29	2.58
workers whose employment allows complete or very significant social isolation (group 3)	3.74	4.02	2.51	2.79	3.06	2.43	2.09
Age groups, years							
less than 25	3.75	3.70	2.68	2.93	3.14	2.45	2.61
26-30	3.20	3.80	2.20	1.60	1.20	2.40	2.00
31-40	2.72	3.28	2.59	2.38	1.90	2.14	2.14
41 and over	2.97	3.20	2.43	1.94	1.80	2.03	1.60
Gender groups							
female	3.43	3.59	2.53	2.43	2.56	2.28	2.33
male	3.05	3.24	2.71	2.71	2.27	2.27	2.00

Note: The grey colour signifies the average arithmetic level below 2.5 points.
Source: own study.

Therefore, it can be expected that not only in the period of economic shock caused by the pandemic but also in the event of other large-scale force majeure events, employees of these two groups – despite being employed under conditions of increased professional risks and psycho-emotional stress – feel higher confidence in future employment prospects. This was the main result of the first round of the survey.

Gender differences appeared mainly due to multidirectional values in the form of saving time (more important for women) or funds related to expenses for economic activity (more important for men). Age differences in changes in economic behaviour were most evident in the fact that respondents under the age of 30 were mostly able to improve their skills of remote interaction and were the most receptive to new opportunities and the chance to improve. Somewhat higher intentions to prove themselves are characteristic of the youngest respondents, under the age of 25. Obviously, in this group, the risks of losing a job during the pandemic and finding a new one is indeed higher, which may be related to the previous employment experience of young graduates of educational institutions.

Comparing these results with the data obtained in the survey conducted at the end of the second year of the pandemic (hereinafter: Winter 2022), we saw certain behavioural changes (Table 4 and Figures 1-3).

As we can see, at the end of the second year of the pandemic, the behavioural guidelines of employees with the highest risks of pandemic influence changed significantly. The motivation for keeping a job and the tendency to use funds more rationally in terms of purchasing expensive things became

more significant. The opportunity to save time became much more valuable, which can only be connected with subjective comparisons of the conditions of employment of employees working remotely. The only motive with decreased intensity in this group was the general propensity to save, excluding the purchase of expensive items. At the same time, although the employment of these workers is not directly related to the use of remote means of work, the growth of digital interaction skills (in general, not only in work matters) was evaluated positively and with an even greater result, compared to the previous year. These changes are shown in detail in Figure 1.

Table 4. Respondents' self-assessment of changes in economic behaviour and determining skills, max = 5.0 points (Winter 2022)

Group of respondents	A partial sign of changes in economic behaviour during the pandemic						
	Improvement of remote interaction skills	The strength of aspirations to continue using skills after quarantine	Tendency to use funds economically	The cost-saving value of remote interaction	The value of saving commute time during quarantine	The motivation to prove oneself to maintain a position	Tendency to postpone an expensive purchase until the end of the quarantine
All respondents	***3.76***	***3.94***	***2.34***	***2.57***	***3.03***	***2.25***	***2.25***
Groups of workers according to the risks of professional activity under the conditions of the pandemic							
'frontline' workers (group 1)	3.60	4.00	1.50	2.60	3.10	2.90	2.60
employees whose employment requires personal presence at workplaces but involves limited contacts (group 2)	3.86	3.86	2.43	2.71	2.86	2.29	1.86
workers whose employment allows complete or very significant social isolation (group 3)	3.77	3.94	2.45	2.55	3.04	2.15	2.24
Age groups, years							
less than 25	3.80	3.92	2.36	3.20	3.40	2.68	2.04
26-30	4.20	4.20	2.20	3.20	3.60	3.80	3.00
31-40	3.86	4.29	2.43	2.14	2.67	1.62	1.76
41 and over	3.62	3.73	2.30	2.30	2.92	2.11	2.57
Gender groups							
female	3.78	3.99	2.32	2.49	2.94	2.13	2.09
male	3.68	3.79	2.42	2.84	3.37	2.68	2.84

Source: own study.

Similar results are typical of the employees of the second group (Figure 2), the answers to almost all questions are similar. Differences are evident only with regard to saving the family budget; in the second group, this tendency slightly decreased, but not as much as among the workers of the first group, who obviously had a more stable and guaranteed income even under the pandemic conditions. There are other differences in the income sphere, *e.g.*, decisions about expensive purchases were postponed less often compared to the situation in the previous year. The motivation to keep the workplace practically did not change over the year, and the value of remote interaction skills, as well as the employees of the press group, increased even more. As we can see, workers from the second group felt less confident about their income prospects. Instead, the value of free time due to the improvement of communications under the influence of pandemic restrictions increased,

which is similar to the dynamics of the first group. The same applies to the subjective assessment of the value of acquiring digital skills and their convenience for future communications.

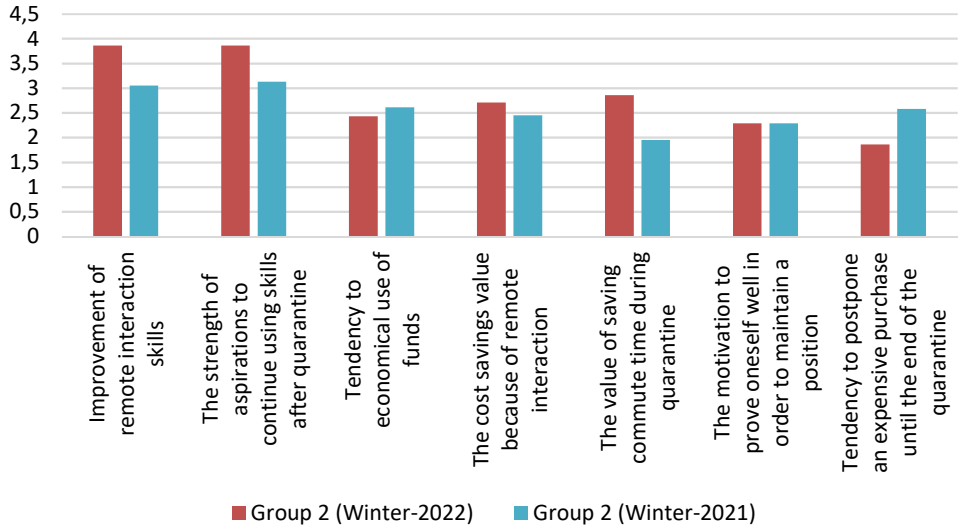

Figure 2. Changes in economic behaviour for the employees whose employment requires personal presence at workplaces but involves limited contacts during the pandemic

Source: own elaboration.

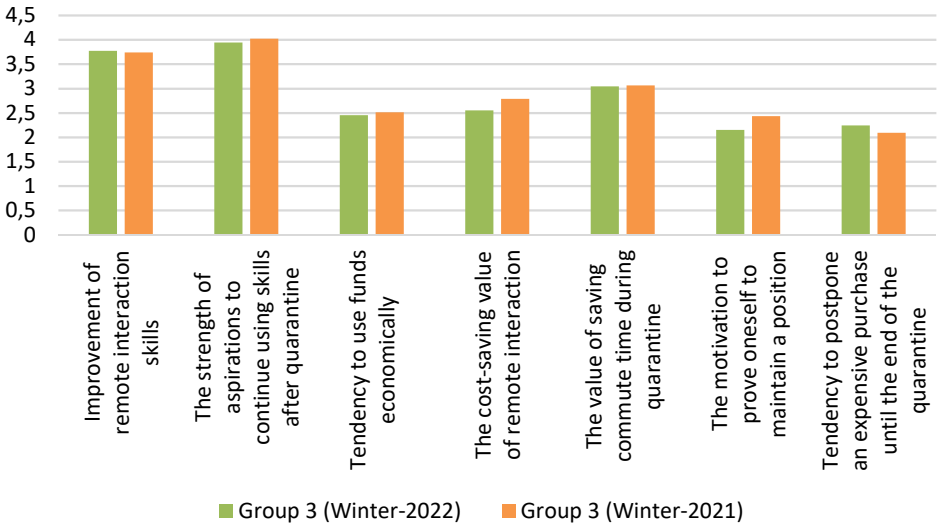

Figure 3. Changes in economic behaviour for the workers whose employment allows complete or very significant social isolation during the pandemic

Source: own elaboration.

Based on the results of our research, we can conclude that the study of determinants of economic behaviour, especially in the field of employment, needs to be supplemented with new approaches to understanding risks in the labour field. Despite its undeniably negative demographic consequences, the COVID-19 pandemic gave a chance to uniquely test the viability of existing approaches to risk assessment in professional activity, as well as changes in behavioural aspirations under the influence of these risks. It is obvious that the classic list of risks in the professional sphere under the conditions of such large-scale threats becomes less relevant than health risks caused by the way of performing professional tasks – directly at workplaces, remotely, or at workplaces, but with the possibility of sufficient

limitation of direct contacts. The pandemic caused an unprecedented rapid change in the quality of human resources. As we can see, almost all employees, to varying degrees, recognized the improvement in their remote interaction skills and confirmed their readiness to use them in the future.

Such conclusions are consistent with the works of other researchers (Le *et al.,* 2023; Raišienė *et al.,* 2021; Sunaryo *et al.,* 2022). However, at the same time, the motivation to save jobs and the resulting consequences in the form of the value of saving time and money under the conditions of economic restrictions and uncertain prospects, the tendency to save the family budget, especially in the aspect of purchasing expensive things, differ significantly in groups of employees with different levels of risks, which reflects their internal expectations of change and self-assessment of opportunities to find other sources of income under extreme conditions. At the end of the second year of the pandemic, the assessments changed significantly, especially in the first two groups. We can partially relate this to the reduction of anxiety and adaptation to new working conditions. Of course, during the two years of working under the pandemic conditions, changes in the perception of new conditions, psycho-emotional, and physical loads had to occur, especially for workers most involved in direct contacts, which was emphasized in the studies of Bielicki *et al.* (2020), Shaikh *et al.* (2022), Spoorthy *et al.* (2020). Such negative effects decreased, while the impact of pandemic restrictions allowed the development of new skills and the benefits of their use, in particular with the estimated benefits of saving time for work tasks. As for the employees of the first group, who often had appropriate additional payments for work under the conditions of increased risks, the motivation to prove oneself can be related to this aspect as well, *i.e*., the workplace became more valuable in the financial aspect.

We do not consider the obtained empirical results to be the main result of the research. In this work, we emphasize the novelty of the approach to the gradation of employees according to the level of risks in professional activity, which intensified at the end of 2019 under the influence of the coronavirus pandemic, and which may intensify again in the future as a result of other similar events as we may predict based on the dynamics of the last 50 years (Table 1).

Readiness for such events and the ability to quickly adapt and choose levers of primary influence, including protection from excessive risks of the most sensitive professional groups will determine the stability of economic systems at various levels – from individual enterprises to national-level systems.

The empirical results on behavioural responses obtained in this study are important for understanding the direction of changes and the speed of adaptation of workers of different groups. At the same time, we consider the methodological principle of grouping workers according to the level of occupational risks under the conditions of the pandemic and other possible health hazards resulting from direct contact to be valuable for use in scientific and applied purposes.

CONCLUSIONS

The pandemic became a global challenge to humanity and a huge impetus for changes in human capital-related technological and behavioural research. Under the conditions of the pandemic, organizations and countries have the opportunity to gain new knowledge about the specifics of employment and changes in the behaviour of various population groups, which is useful in introducing better ways to protect the most vulnerable employees not in terms of age, health condition, or belonging to critical infrastructure workers but by taking into account the objective employment conditions.

The second important aspect of the practical use of our proposed grouping is the possibility to use it to assess changes in the value of jobs and consequences related to employee motivation. Thus, the proposed classification not only fills the existing methodological gaps in this area but also makes it possible to better assess employment risks and behavioural guidelines of employees with different involvement in contacts under the pandemic. Therefore, our approach can be used in human resources management under similar crisis circumstances. At the entrepreneurial level, the correct identification of the risks in employment caused by employment peculiarities allows us to justify and plan actions regarding the health protection of the employees of different risks groups, improving the compensation and benefits as well as the overall motivation system considering the behavioural changes in certain groups.

However, the results regarding the behavioural changes patterns cannot be generalized to the level of the country or even other national systems. In this study, we had certain limitations in the data collection process, which was carried out by our own efforts, without the involvement of third-party organizations.

It is advisable to conduct further research in this direction using a larger survey base, as well as in the direction of finding factors that affect the quality of work life of various groups of employees, understanding the most relevant opportunities for ensuring labour safety and developing professional skills under crisis conditions.

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