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# International Entrepreneurship Review

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Krakow University of Economics
Centre for Strategic and International Entrepreneurship
Department of International Trade
ul. Rakowicka 27, 31-510 Kraków, Poland
phone +48 12 293 5929, -5376, -5307, -5381, -5327
e-mail: ier@uek.krakow.pl
www.ier.uek.krakow.pl

**Secretariat and Editorial Office**

Mrs. Anna Marcinek-Markowska
Building U, Room 300, phone +48 12 293 5929

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10.15678/IER.2026.1201.01

# Evaluating the entrepreneurial profile of Vietnam using the digital entrepreneurship ecosystem index

**Vu Thi Thuy**

**ABSTRACT**

**Objective:** This study aims to evaluate the performance of Vietnam's digital entrepreneurship ecosystem and provide policy recommendations to improve its performance.

**Research Design & Methods:** The study used the digital entrepreneurship ecosystem (DEE) index to evaluate the ecosystem performance and the penalty for the bottleneck method to provide policy suggestions. The study used data collected by a project of the University of Pécs including 115 countries for the period from 2019 to 2021.

**Findings:** The results show that although Vietnam's digital entrepreneurship ecosystem performance is better than its economic development level and has improved over time, its ecosystem is considerably unbalanced. The country has relatively strong and comprehensive legal frameworks to support access and usage of digital infrastructures and to ensure cybersecurity in the digital space. However, it has the biggest problem in granting sufficient freedom to develop digital infrastructures and advancing financial services to facilitate and accommodate digital transactions and activities.

**Implications & Recommendations:** The study suggests that strengthening the digital freedom and financial facilitation pillar would lead to the greatest improvement in Vietnam's ecosystem performance.

**Contribution & Value Added:** The study provides additional evidence for the entrepreneurship paradox and data-driven policy recommendations for policymakers to facilitate productive entrepreneurship in Vietnam.

**Article type:** research article

**Keywords:** digital entrepreneurship ecosystem; penalty for bottleneck method; Vietnam; entrepreneurship paradox; digital entrepreneurship; policy suggestions

**JEL codes:** L26, H11

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## INTRODUCTION

The relationship between entrepreneurship and economic growth is rather complicated. Although entrepreneurship can enhance economic growth by creating new employment opportunities, the increment in self-employment associated with entrepreneurship can reduce the creation of big firms, thereby slowing down economic growth. High wages associated with economic growth can provide people with resources to start a business, but they can also reduce their incentive to pursue self-employment (Acs, 2006; Liñán & Fernandez-Serrano, 2014). Digital technologies have a significant impact on economies and entrepreneurship (Paul *et al*., 2023; Acs *et al*., 2021). They not only foster innovation and shorten the entrepreneurial process (Sahut *et al*., 2021) but also transform the way entrepreneurs capture and create value (Paul *et al*., 2023; Lopes *et al*., 2025). In the digital economy, entrepreneurs or particularly platform owners, are responsible for building and sustaining the entrepreneurial ecosystem (Stam, 2015) through their own strategies and practices (Nambisan *et al*., 2019). Although various studies with different indices have indicated factors influencing entrepreneurship, the impacts of digital technologies on entrepreneurship remain underexplored (Autio *et al*., 2024).

Vietnam is not only one of the fastest-growing countries in Southeast Asia but also one of the first countries in the world to release a national digital transformation plan (Hung *et al*., 2024). The number of start-ups has increased significantly since 2014, despite the increment in costs of starting up a business (World Bank, 2024) and the lack of economic and political freedom in the country (Audretsch & Fiedler, 2022). This paradox makes Vietnam a compelling country context for studying entrepreneurship. However, the number of studies exploring digital entrepreneurship in Vietnam remains limited.

Considering the above gaps, by using the digital entrepreneurship ecosystem (DEE) index and the penalty for bottleneck method, I conducted an exploratory study to evaluate contextual factors that shape digital entrepreneurship and then provide policymakers with resource allocation recommendations to improve the performance of the digital entrepreneurship ecosystem in Vietnam. The study provides additional evidence of the entrepreneurship paradox and enhances the necessity of contextualising the understanding of entrepreneurship. It also reveals the evolution of Vietnam's digital entrepreneurship ecosystem over time and bridges the gap between academia and practitioners in fostering productive digital entrepreneurship by providing data-driven policy recommendations.

The study begins with a brief definition of concepts that are the basics for developing a digital entrepreneurship ecosystem framework. It then presents the methodology and a discussion of Vietnam's performance across the different dimensions of the ecosystem index. The study concludes with a policy simulation and some suggestions for future research.

## LITERATURE REVIEW

### Digital Ecosystem

We may define digital technologies through three distinct but related elements, *i.e.*, digital artifacts , digital platforms, and digital infrastructures (Nambisan, 2017). Digital artifacts are objects editable by changing or rearranging their items and contents and are interactive with users or other digital objects to activate expected functionality (Kallinikos *et al*., 2013), such as apps, hardware, or software (Nambisan, 2017). Digital platforms are software-based systems that provide shared service or functionality for complementary software that interoperates with them (Tiwana *et al*., 2010), such as Apple iOS (Nambisan, 2017). Digital infrastructures are 'digital technology tools and systems that provide communication, collaboration, and/or computing capabilities such as cloud computing, data analytics, online communities, social media, or 3D printing' (Nambisan, 2017, p. 1032).

The advancement of digital technologies supported by the proliferation of the internet facilitates the development of an open, complex and interdependent socio-technical environment in which multiple entities, such as individuals, organisations, software, or applications, produce heterogeneous interactions and data. Therefore, the concept of digital ecosystem emerged to address challenges provided by this phenomenon in a scalable and efficient way (Li *et al*., 2012). Different perspectives define the concept differently. In an effort to provide a comprehensive but easy to understand definition, Li *et al*. (2012) combined three perspectives (ecology, economy, and technology) and defined digital ecosystem as 'a self-organizing, scalable and sustainable system composed of heterogeneous digital entities and their interrelations focusing on interactions among entities to increase system utility, gain benefits, and promote information sharing, inner and inter cooperation and system innovation' (p. 119).

### Entrepreneurial Ecosystem

The entrepreneurial ecosystem generally refers to 'a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship' (Stam, 2015, p. 1765). The concept has emerged from the common acknowledgement that the economic benefits of entrepreneurship are conditional on contextual settings in which it occurs (Lafuente *et al*., 2022; Song, 2019). It not only treats entrepreneurship as both output and input of the ecosystem but also emphasises the leading role of entrepreneurs in creating and maintaining the healthy ecosystem (Stam, 2015). For policymakers and academia, it is a promising approach to facilitate productive entrepreneurship (Candeias & Sarkar, 2024). Various studies have indicated elements of the ecosystem and explained their connections (Lafuente *et al*., 2022). However, the role of digital technologies in the ecosystem has received

only limited attention (Song, 2019). Moreover, although actors of one entrepreneurial ecosystem can get resources from another ecosystem, current literature has largely ignored the interaction between different ecosystems (Leendertse *et al*., 2025).

### Digital Entrepreneurial Ecosystem

Integrating digital ecosystem and entrepreneurial ecosystem literature, scholars conceptualise the digital entrepreneurship ecosystem in different ways. Du *et al*. (2018, p. 1159) defined digital entrepreneurship ecosystem as 'the combination of social, political, economic and cultural elements within a region that supports the development and growth of innovative start-ups pursuing new venture opportunities presented by digital technologies.' Elia *et al*. (2020) consider it as a collective intelligence system or a self-organising community of interdependent entrepreneurial agents that can capture technology-driven opportunities by leveraging the existing digital technologies to facilitate actions and interactions throughout entrepreneurial processes. Although these definitions include the effect of digital technologies on entrepreneurship or consider the role of entrepreneurs in the ecosystem, they do not explicitly capture the role of users in the digital community. Sussan and Acs (2017) addressed this shortcoming and defined digital entrepreneurship ecosystem as 'the matching of digital customers (users and agents) on platforms in digital space through the creative use of digital ecosystem governance and business ecosystem management to create a matchmaker value and social utility by reducing transactions cost' (p. 63).

## RESEARCH METHODOLOGY

### Sample Data

The University of Pécs collected the data for 115 countries from 2019 to 2021. This study got permission to use it for analysis, so there are no ethical concerns.

### Country Background

#### Development Level

Vietnam's economy has significantly transformed from one of the poorest countries to a low-middle-income country since its economic reform in 1986 (World Bank, 2024). Between 2015 and 2021, Vietnam's annual GDP growth rate was consistently and significantly higher than the average of the world and the income group. However, due to the moderation of domestic demands and challenging external markets, the rate dropped sharply from 8% in 2022 to 5% in 2023 (World Bank, 2024). Vietnam has also experienced a considerably low unemployment rate (around 1.2% to 2.4%) compared to high-income countries (around 4.5% to 6.6%) since 2015. Although the country has slow changes in its human capital (increasing from 0.66 in 2010 to 0.69 in 2020), it is still considered to be better than other low-middle-income countries on average (World Bank, 2020). With a population of 100 352 192, a literacy rate of 96% among adults aged 15 years and over, and a GDP per capita (current US dollar) of 4 282.09 as of 2023, the country remains in the top three most innovative countries in its income group since 2019 (GII, 2024).

#### Digitalization Level

Vietnam has good initial conditions for digitalisation. In terms of general infrastructure, 100% of the population has access to electricity, and 80% has access to the internet (World Bank, 2024), with international bandwidth ranked 10th in the Network Readiness Index (NRI) 2022. In terms of institutions, Vietnam has relatively comprehensive legal frameworks that cover electronic transactions, consumer protection, privacy and data protection, and cybercrime (NRI, 2022; EGDI, 2022). Despite these favourable initial conditions, the digital transformation level in the economy is still low. Only 2.2% of 1000 surveyed companies reported successful applications of digital tools for automation and data analytics (Ministry of Planning and Investment, 2022). The number of bank account owners among adults remained unchanged during the period from 2014 to 2017 (World Bank, 2019a). Vietnam is also experiencing a high digital divide between the rich and poor, between rural and urban, and among genders (NRI, 2024). Digital skill level falls below the world median with an average annual growth rate of 2.43% from 2017 to 2019 (World Bank, 2019b). While tele-

communication networks and service providers report unwillingness to acquire and upgrade their assets (NRI, 2022), businesses express low interest in investing in AI systems (NRI, 2024).

**Digital Entrepreneurship**

Despite the prevalence of the gig economy and strong government promotion to invest in emerging technologies (NRI, 2024), the digital entrepreneurship level in Vietnam remains low. The country belonged to the laggard group in the Asian index for digital entrepreneurship system 2021 (Autio *et al*., 2021). Digitally enabled service trade in Vietnam is among the lowest in the Southeast Asia region (World Bank, 2019a). Only 30% of small and medium-sized enterprises deploy digital technologies to manage their internal processes (World Bank, 2019a). Particularly, a very limited number of firms have their own website (NRI, 2024). Moreover, only 20% of the market share of data centres and clouds is locally owned (VCCI, 2022). Key fintech segments, including payment and lending, are still in a nascent stage (World Bank, 2019a).

This low digital entrepreneurship level, to some extent, can be influenced by a high necessity entrepreneurship level, a low risk acceptance attitude, low start-up skills and a high corruption level in the country. Benzing *et al*. (2015) indicated that the three most important reasons for some Vietnamese people to start a business are 'to create a job for myself,' 'to be my own boss,' and 'to increase my income.' They selected entrepreneurship as a career because jobs are often obtained through personal connections, political influence, and money. On the scale of 0-1, the scores of risk acceptance and start-up skills measured by GEI (2019) for Vietnam are just 0.076 and 0.25.

**Digital Entrepreneurship Ecosystem Index Structure**

Szerb *et al*. (2022) developed the index based on Sussan and Acs (2017) and Song (2019), consisting of four sub-indices: digital user citizenship (DUC), digital technology infrastructure (DTI), digital multi-sided platform (DMSP), and digital technology entrepreneurship (DTE). DUC includes both consumers (demand-side users), such as Uber drivers or smartphone users, and producers (supply-side users) that provide goods or services on the platform, such as Airbnb hosts or advertisers (Acs *et al*., 2021). This sub-index measures the ability of users to participate in digital society and the existence of legal frameworks and social norms that facilitate their access and usage of digital infrastructures (Sussan & Acs, 2017). DTI, including technological and institutional components, measures the degree to which digital infrastructures ensure security, freedom and openness of digital transactions and activities (Song, 2019). DMSPs are demand-side-driven digital intermediaries that enable, organise, and orchestrate social and economic activities and interactions between users and agents (Song, 2019). This sub-index captures the externality of digital platforms on users and agents, and conditions that facilitate financial transactions on platforms. Finally, DTE refers to 'all agents that contribute to experimentation, entrepreneurial innovation, and value creation on platforms' (Song, 2019, p. 577). This sub-index reflects capabilities to use technologies, identify technology-driven opportunities and apply external knowledge or emerging technologies to create value or new business models. Each sub-index has three pillars, of which each is measured through two variables. Pillars are the most important constituents of the index (Acs *et al*., 2019b) (see Annexe 1 for details of pillars and variables).

**Penalty for the Bottleneck Method**

The theory of the weakest link and the theory of constraints inform the penalty for bottleneck (PfB) method. These two theories imply that the performance of any dynamic (eco)system configured by independent components and feedback loops can improve only when the weakest link or bottleneck is strengthened (Acs *et al*., 2014). The study used this method to suggest areas for government intervention because, unlike traditional index methods, it allows for interaction and partial replacement between components of the (eco)system, thereby portraying a more realistic picture of systematic phenomena (Acs *et al*., 2014). For policy simulation, this method assumes the same costs needed for the performance improvement of each component and the same interaction strength between any two components. This method identifies the bottleneck or the lowest score component of the ecosystem and then increases its value to the second lowest component by the function (1)

(Acs *et al*., 2014). The penalty process for the low score components continues until the ecosystem reaches a balanced configuration or expected performance level.

$$\mathrm{h}_{(i),j} = \min y_{(i),j} + (1 - e^{-(y_{(i),j})-\min y_{(i),j}}) \quad (1)$$

in which $h_{(i),j}$ is the modified, post-penalty value of index component *j* in country *i*, $y_{(i),j}$ is the normalised value of index component *j* in country *i,* and min (y) is the lowest value of $y_{(i),j}$ for country i. (i = 1, 2, . . ., n = the number of countries, j = 1, 2, . . ., m = the number of index components).

### Statistical Coherency and Robustness Check

Correlations between pillars ranged from 0.57 to 0.93, while correlations between pillars, sub-indices and overall index were greater than 0.7. This demonstrates the high reliability of the index structure. Moreover, the original DEE index scores performed similarly to the scores produced by three different weighting methods (arithmetic mean, geometric mean, and a combination of arithmetic and geometric mean). This suggests that the original DEE index scores can be free of distortions (see Supplementary material for details).

## RESULTS AND DISCUSSION

This section will provide a basic analysis of the digital entrepreneurship ecosystem of Vietnam in comparison with other countries in the index and particularly with Thailand and Cambodia for more comprehensive insights. I selected Thailand and Cambodia for their high similarity to Vietnam in terms of demographics, culture, politics, infrastructure, and geography, as assessed by objectivelist.com.

### Vietnam's DEE Rank and Sub-index Analysis

With a DEE score of 27 in 2021, Vietnam is ranked at 80 out of 115 countries, which is 24 places higher than Cambodia but 19 places lower than Thailand (see Annexe 2 for DEE scores and ranks of all countries). The DEE Index score lying above the trend line of the scatter plot (Figure 1) suggests that the digital entrepreneurship ecosystem performance of Vietnam is better than its development level.

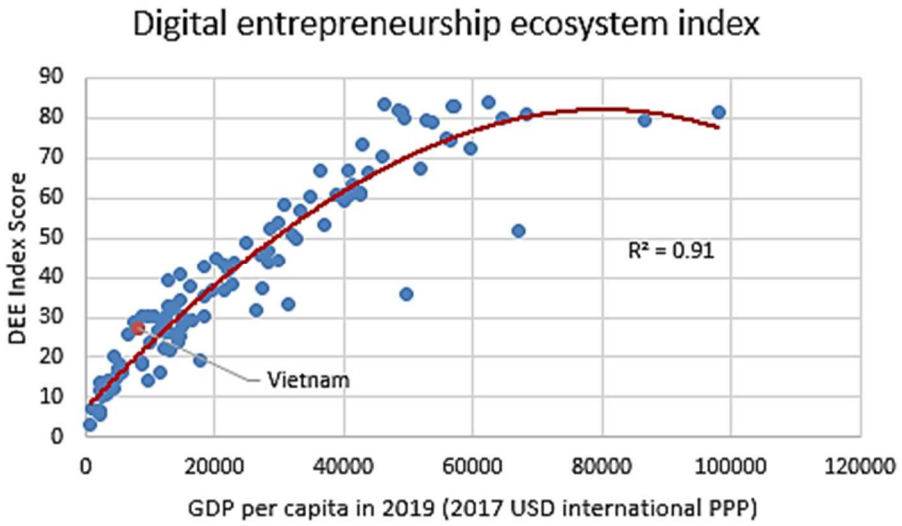


**Figure 1. Connection between the DEE index score and GDP per capita**
Source: own elaboration.

Among the four sub-indices of Vietnam, DTI had the lowest score (24.65), while DUC had the highest score (30.34). Similar to Figure 1, Figure 2 indicates that three sub-indices (DUC, DMSP, and DTE) performed slightly above the development level, while DTI performance was just in line with the development level.

Vietnam's DEE performance gradually improved between 2019 and 2021 (Figure 3). This improvement seems to be driven most by DUC and least by DTE. Despite being the lowest sub-index

in 2019, the DUC score increased significantly by 13.2 points to become the highest subindex in 2021. In contrast, the DTE score went up by only 1.8 points, making it the second lowest sub-index in 2021 from the strongest sub-index in 2019. Significant changes in the DUC score reflect greater ability of the population to participate in digital society, which can result from strong government promotion and greater coverage of the internet in Vietnam (World Bank, 2019a). In contrast, low improvements in the DTE score indicated slow changes in the capabilities of agents to capture and exploit digital technologies to facilitate entrepreneurial processes and outcomes. We may attribute this to low digital and start-up skills (GEI, 2019) as well as an IT professional shortage in Vietnam. The annual report by the Ministry of Planning and Investment (2022) shows that the IT department of 43.7% of the surveyed enterprises has less than 3 personnel.

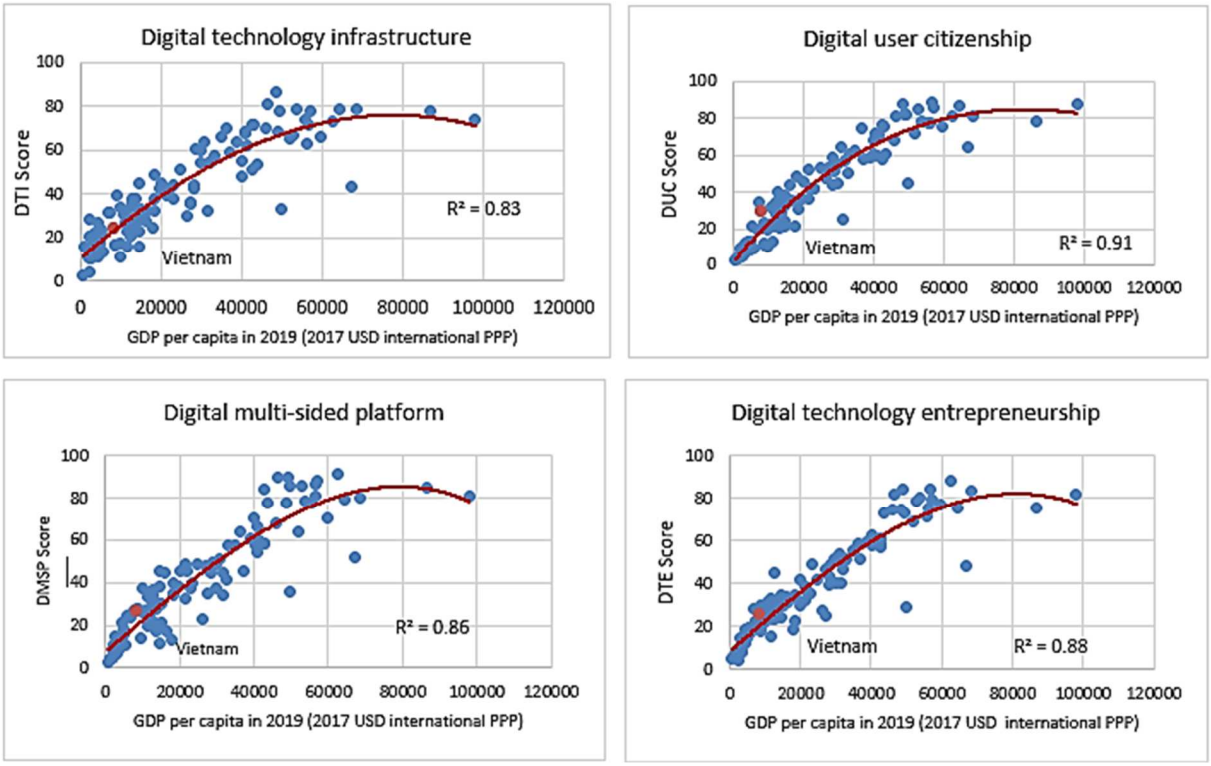


**Figure 2. Connection between the score of each sub-index and GDP per capita**
Source: own elaboration.

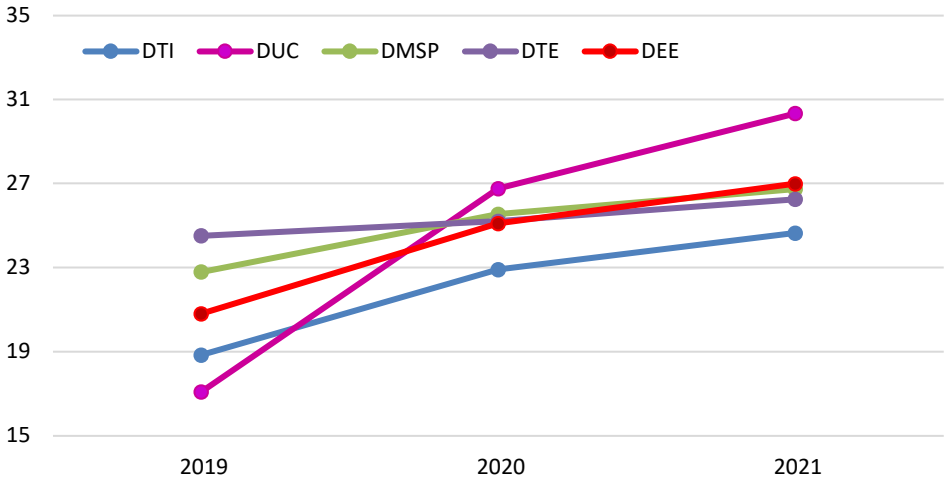


**Figure 3. Score of DEE and sub-index of Vietnam from 2019 to 2021**
Source: own elaboration.

### Pillar Analysis

Figure 4 shows that the ecosystem in Vietnam is considerably unbalanced, with a significant disparity between pillars. The strongest pillar differed from the weakest one by 38.2 points, whereas the difference between the two weakest pillars reached nine points. Compared to the bottom one-third countries, Vietnam performs worse in digital access, digital freedom, digital literacy, digital rights, financial facilitation and digital technology usage pillars and better in digital protection, digital openness, networking, matchmaking, digital adoption and digital absorption pillars.

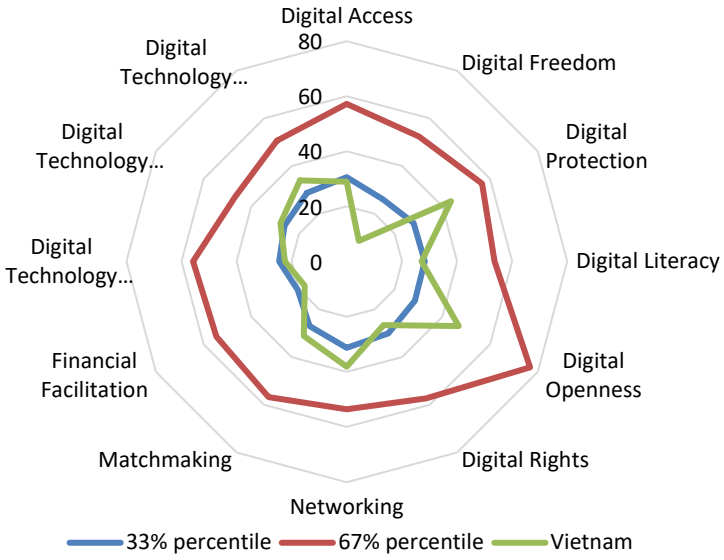


**Figure 4. Pillar scores of Vietnam in 2021**
Source: own elaboration.

Compared to two neighbouring countries (Figure 5), Vietnam's ecosystem performs better and more balanced than Cambodia, but worse and less balanced than Thailand. Vietnam significantly outperforms Cambodia in all pillars (with an average of 17 points difference) except the digital freedom pillar, where the two countries get the same performance. However, the country is relatively less developed than Thailand in the majority of pillars, except for the digital protection and digital openness pillars.

#### Digital freedom

With a score of only 8.7, digital freedom is the weakest pillar of Vietnam's digital entrepreneurship ecosystem. This score indicates that the government and other institutions in Vietnam do not provide enough freedom for digital infrastructure development. From a technical aspect, it seems to be difficult for small and medium-sized enterprises to compete in the growing ICT industry in Vietnam. The software market is dominated by foreign companies from the U.S, Germany, or China, whereas three state-owned companies (Viettel, Vinaphone and Mobifone) dominate the broadband or mobile service market (International Trade Administration, 2022). The country also scores low in the dimension of permitting and promoting private sector development in NRI 2022. From a digital content aspect, there is strong internet censorship in Vietnam. According to freedomhouse.org, it is difficult for people to express their personal views on political issues or other sensitive topics. The authority pressures social media platforms and technology companies to remove content that they consider harmful, wrongful, and illegal. For example, in 2020, the authority blocked 3 400 overseas-hosted websites that 'published toxic and harmful information' (Freedom House, 2021). In the first six months of 2022, authorities requested Facebook to remove and block more than 1 374 posts, while Google had to remove 5 363 videos on YouTube (Hung Quan, 2022). The same digital freedom issue pertains to Cambodia and Thailand. However, Thailand offers more business freedom in ICT industry than Vietnam and Cambodia (Mordor Intelligence, 2023).

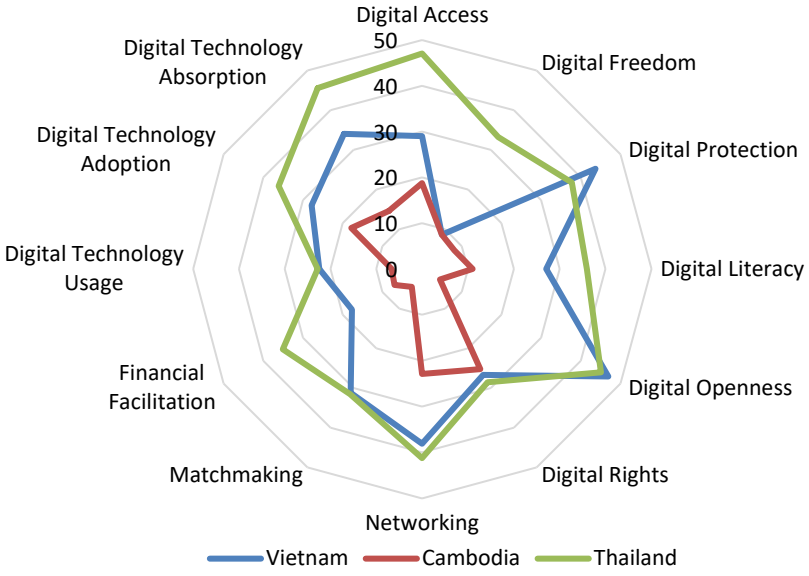


**Figure 5. The pillar scores of Vietnam, Thailand, and Cambodia in 2021**
Source: own elaboration.

### Digital protection

Public announcements and strong pressures on blocking and removing false, harmful, or illegal content in the digital space somewhat reflect the existence of strong legal frameworks that ensure security for online transactions and activities in Vietnam. This explains why digital protection with a score of 43.7 is the second strongest pillar in Vietnam's ecosystem. From an institutional aspect, Vietnam has three major laws covering the digital sphere, *i.e.*, Law on Cyber Information Security (2015), Cybersecurity Law (2018), and Law on e-transactions (2001). The country also has a dedicated unit under the Economic Police Department to deal with cybercrime. From a digital technology aspect, the total number of secure internet servers per million of the population in Vietnam increased by 19.59% to 3 128 in 2020 from 2019, which is almost double that of Thailand and far ahead of Cambodia (World Bank, 2024). The government even requested state organisations to utilise at least 10% of their total IT expenditure on improving cybersecurity solutions and initiatives (International Trade Administration, 2022). Therefore, it is no surprise that Vietnam ranked 25$^{th}$, 19 places higher than Thailand and 108 places higher than Cambodia in the Global Cybersecurity Index 2020 (ITU, 2020).

### Digital access

Vietnam scores slightly below the bottom 33% of countries in the DEE index. Thailand performs better than Vietnam with an 18-point difference, and Vietnam outperforms Cambodia by 10.2 points. This low pillar score can represent an institutional constraint between protection and freedom to reach and use digital infrastructures in Vietnam, and may result from its culture and underdeveloped digital infrastructures. Gender based stereotypes and concern about online safety may prevent women from accessing and participating in the digital society in Vietnam, making it among the few countries with gender parity on internet access (UNICEF, 2023). Compared to Thailand, Vietnam and Cambodia have poorer connectivity infrastructure. As of 2018, around 58% of the Thai population is covered by a 3G network, while it is only 41% for Vietnam and 40% for Cambodia (World Bank, 2019a). Moreover, while Thailand belonged to the top 5 countries in the Speedtest Global Index November 2023 for fixed broadband download, Vietnam ranked far below at the 46th position.

### Digital literacy

With a score of 27.1, the digital literacy of Vietnam is slightly lower than the bottom one-third of countries in the index, but remarkably above that of Cambodia. Despite the government's promotion and

participation in digital transformation (EGDI, 2022) as well as commitment to closing the digital skill gaps, which is stronger than in Thailand and Cambodia (DSGI, 2021), the ability to use digital technologies in Vietnam remains low, as mentioned previously. Low digital literacy can contribute to and be influenced by the low digital access level. A lower chance of accessing and participating in digital society may prevent women from enhancing their digital skills. Vietnam is among the few countries with gender parity in digital skills (UNICEF, 2023).

**Digital Openness**

This is the strongest pillar of Vietnam's DEE index. The country even slightly outperforms Thailand in this dimension. This result comes with a bit of surprise, as Vietnam has a lower rate of internet access among its population (74.21%) than Thailand (85.3%) (World Bank, 2024) and only a slightly higher percentage of households with a computer at home (27.1%) than Thailand (25.8%) in 2021 (World Bank, 2023). Apart from better availability of technical and legal institutions related to cybersecurity, the provision of both mobile broadband and fixed-line broadband at much cheaper prices can be a factor that boosts Vietnam's digital openness level to be higher than that of Thailand (World Bank, 2019a).

**Digital Rights**

With a score of 26.7, Vietnam's performance in digital rights is moderately below Thailand and the bottom 33% of countries. This reflects that although Vietnamese citizens have the right to access and use the internet and digital technologies, and the government provides various legal frameworks to protect their privacy in digital space (which ranks high at other indices such as EGDI), the effectiveness of these frameworks is debatable. While Thailand ranks at 75$^{th}$ out of 131, Vietnam ranks 46 places lower in terms of perceived privacy protection by law content in NRI 2022. This low perceived effectiveness of legal frameworks can partly result from their ambiguity on violations related to intellectual property rights on the internet and from their failure to cover some important aspects, such as copyright during the delivery stage (Nguyen, 2022).

**Networking**

This pillar reflects the extent to which users can capture the externality effect of digital platforms. Vietnam's performance in this pillar is better than that of the bottom one-third of countries, but slightly worse than Thailand. For example, social media becomes an attractive platform for supply-side users to conduct business activities in both Thailand and Vietnam, as both nations are among those with the highest social media usage rate in the world (37% for Vietnam and 56% for Thailand). 74% of supply-side users in Thailand and 73% in Vietnam utilised social media and messaging platforms for commercial purposes such as customer communication or advertising campaigns (World Bank, 2019a).

**Matchmaking**

Having almost the same score for this pillar indicates that the effectiveness of using digital platforms to connect buyers and sellers at low costs is nearly equal in Vietnam and Thailand. For example, the digital advertising market is growing rapidly in both countries (projected 11% for Vietnam and 9.8% for Thailand in 2023). The number of apps downloaded is estimated to reach 2 743 million for Thailand and 3 031 million for Vietnam. Shopping is a segment that brings the highest average revenue per downloaded app for both countries as of 2023 (Statista, 2023a). Real-time records from Similarweb show that as of February 2025, local developers develop 33% of top mobile apps in Vietnam, whereas the figure is 20% for Thailand (Similarweb, 2025). Both nations perform better than the bottom one-third of countries and leave Cambodia far behind in this pillar.

**Financial Facilitation**

Vietnam's digital financial infrastructure and service that facilitates matchmaking between financial providers and users or other transactions in digital platforms is the second weakest pillar of Vietnam's ecosystem and far less developed than Thailand. From the user side, Vietnam is considered one of Asia's most cash-reliant nations (Acclime, 2023a). In Vietnam, people pay for 90% of internet purchases

by cash as of 2017, and digital payment accounts for only 22% of total payments as of 2018, while these figures are 48% and 62% in Thailand, respectively (World Bank, 2019a). We may attribute the low level of digital payments in Vietnam to a low number of people owning bank accounts or equivalents and a low level of customer trust. As of 2022, only 56.27% of the Vietnamese population has an account at a financial institution or mobile money service, while the figure is 95.58% for Thailand (World Bank, 2024). From the agent side, Vietnam suffers from a shortage of skilled human resources in fintech. People who are knowledgeable about finance and banking lack information technology and foreign language skills. Key fintech segments, such as the peer-to-peer lending market, are still new in Vietnam, and specific governance rules for these segments are not available yet. In contrast, digital finance services are growing fast in Thailand. The Thai government strongly promotes financial innovation and investment in the electric banking and fintech sector while enhancing infrastructure to accommodate those advancements (Acclime, 2023b).

**Digital Technology Usage**

The pillar score reflects that entrepreneurial agents in Vietnam and Thailand have almost the same level of basic digital capabilities. Both countries perform significantly better than Cambodia, but slightly below the bottom one-third of countries, despite their strength in international internet bandwidth. The low digital capabilities level can result from a lack of formal training provided by firms in these three countries (ranked at the bottom 33% of countries in GII 2022), while explaining a low level of digital transformation commonly found in Southeast Asian countries by the World Bank (2019a). Technicians and associate professionals also constitute only a small portion of the workforce in the three countries (ranked in the group of the bottom 40 countries in NRI 2021).

**Digital Technology Adoption**

Although the level of digital technology usage is almost the same in Vietnam and Thailand, Thai agents are actually better at exploiting benefits or opportunities provided by digital technologies to build new business models or new products/services than their Vietnamese counterparts. Compared to Thailand, Vietnamese firms rely more on software purchases or licenses from outsiders than on their own internal software development (GII, 2022). According to the World Bank (2019a), 10% of surveyed firms in Vietnam used technologies licensed from foreign companies, while it was only 5% for Thailand. After COVID-19, in 2021, service for network infrastructure, servers, and storage bounced back more quickly in Thailand, while Vietnam displayed the opposite trend (Statista, 2023b).

**Digital Technology Absorption**

With a score of 34.1, Vietnam's digital technology absorption (level of knowledge spillover when exploring or experimenting with emerging digital technologies) is higher than the bottom 33% of countries but significantly lower than Thailand. From the agent side, a higher influx of outside technologies and services provides Thai firms a better chance to be exposed to new technologies. Thailand's ICT service import accounts for 0.4 % of total trade, which is 0.3 % higher than that of Vietnam. Moreover, a high number of research talents in business in Thailand (60.8%), which is almost triple that of Vietnam, allows Thai firms to learn from imported services much more readily than in Vietnam (GII, 2022). Apart from a low number of research talents in business, collaboration between the university and industry in R&D is not strong enough to support knowledge spillover in Vietnam. From a digital technology aspect, while local firms dominate the data centre market in Thailand, the opposite is true for Vietnam (Mordor Intelligence, 2023).

## Policy Simulation

Without losing any generality, the study runs policy simulations for a scenario of increasing the DEE index score by 10% for Vietnam by using the PfB method. Table 1 suggests that a total of 14 additional units of resources are needed to improve the DEE index score by 10%. Of which, 86% should be allocated to improve institutional frameworks so that citizens can have greater freedom in contributing to the development of digital infrastructures, and 14% should serve to improve digital

financial infrastructures and services to encourage and facilitate more transactions and activities in the digital space. Because the difference between the strongest and the lowest pillar, as well as the difference between the two weakest pillars, is large, it is not surprising that these two bottlenecks consume all of the country's additional effort and resources.

**Table 1. Policy simulation**

| Pillar | Original pillar score | Required increase in pillar (unit/population) | Percentage of total new effort |
|---|---|---|---|
| Digital access | 29.0 | 0 | 0% |
| **Digital freedom** | **8.70** | **12** | **86%** |
| Digital protection | 43.7 | 0 | 0% |
| Digital literacy | 27.1 | 0 | 0% |
| Digital openness | 46.8 | 0 | 0% |
| Digital rights | 26.7 | 0 | 0% |
| Networking | 38.1 | 0 | 0% |
| Matchmaking | 31.2 | 0 | 0% |
| **Financial facilitation** | **17.7** | **2** | **14%** |
| Digital technology usage | 22.4 | 0 | 0% |
| Digital technology adoption | 27.9 | 0 | 0% |
| Digital technology absorption | 34.1 | 0 | 0% |
| **Sum of additional resources (unit/population)** | – | **14** | – |

Source: own study.

## CONCLUSIONS

By using the DEE index to evaluate the performance of Vietnam's digital entrepreneurship ecosystem. The study found that although Vietnam's digital entrepreneurship ecosystem performs better than its economic development level, it is highly unbalanced. On the one hand, the country has an impressive performance in promoting individuals and firms to participate in digital society, as well as providing strong and comprehensive legal frameworks to ensure their security and privacy in digital space. On the other hand, it almost fails to ensure sufficient freedom for digital infrastructure development and adequate investment in digital financial services and infrastructures. While we may attribute the lack of digital freedom to strong internet censorship together with the dominance of some major local companies in the mobile and fixed broadband sector, we may explain the underdevelopment of digital finance by the Vietnamese strong culture of cash reliance, a lack of specific governance frameworks, and a shortage of skilled human resources with IT skills in the fintech sector. Overall, although national digital conditions for entrepreneurship gradually improve over time, they are still considered unfavourable. By using the PfB method, the study suggests that country-level governors or policymakers should consider resource allocation for strengthening digital freedom and digital financial services and infrastructures to be a priority if they want to accomplish the greatest improvement in their digital entrepreneurship ecosystem.

The study enriches the current literature on entrepreneurship and enhances the necessity of a contextualised understanding of entrepreneurship by providing additional evidence of a digital entrepreneurship paradox in Vietnam. The study also expands the literature on digital entrepreneurship in Vietnam by revealing an additional perspective for its development potential and the evolution of its national conditions. Practically, the study demonstrates to policymakers and governors how resource allocation for specific bottlenecks can improve their overall national digital entrepreneurship ecosystem. Consequently, they can make more informed decisions to foster digital entrepreneurship, which narrows the gap between academia and practitioners. The findings also remind policymakers and governors of the need to adopt a holistic approach when formulating policy interventions toward productive entrepreneurship. They should not only consider the interconnection, complementarity, and tensions between components of the digital entrepreneurship ecosystem but also involve academia and other social actors in the policy formulation process.

The study has some limitations. Firstly, although the study offers a country-level picture of the digital entrepreneurship ecosystem, it does not explore regional variations within countries. Secondly, although the study considers the interaction between pillars within the ecosystem, it does not consider variations in the strength of these interactions. Thirdly, although the current index reflects multidimensions of the digital entrepreneurship ecosystem, it may suffer a redundancy problem due to very high correlations between sub-indices and the overall index. Therefore, future research can provide a better picture of the digital entrepreneurship ecosystem in Vietnam by using regional-level data and selecting new indicators. Future research can also offer better policy recommendations by involving governors and social actors, exploring low-performance pillars further, or using more sophisticated statistical methods that allow for various interactions between pillars and other contextual constraints.

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## Appendix:

**Annex 1**. **Digital entrepreneurship ecosystem structure**

| Digital entrepreneurship ecosystem index | | | |
|---|---|---|---|
| Sub-indices | Pillars | Variables (entrepreneurship/ digital) | Variable description |
| Digital technology infrastructure | Digital access | Institutions | ICT and e-commerce regulation |
| | | Digital technology | Population use of G2-G5 networks and radio frequency coverage |
| | Digital freedom | Institutions | Business, world press, and general freedom |
| | | Digital technology | ICT competition, mobile tariffs, and handset prices |
| | Digital protection | Institutions | Measuring laws and regulations on cybercrime and cybersecurity |
| | | Digital technology | Secure Internet servers per million population, net infection ratio |
| Digital user citizenship | Digital literacy | Institutions | Human capital, the promotion of e-participation |
| | | Users | Digital skills among the population |
| | Digital openness | Institutions | The existence of technical institutions, frameworks, policy coordination institutions, and strategies dealing with cybersecurity |
| | | Users | Percentage of households with a computer and internet access |
| | Digital rights | Institutions | Regulatory quality, personal rights, fundamental rights and property rights |
| | | Users | Percentage of individuals using the internet, |
| Digital multi-sided platform | Networking | Agents | Number of professional developers |
| | | Users | Social media use |
| | Matchmaking | Agents | Mobile apps developed per person, number of apps in the national language |
| | | Users | Accessibility of the top-ranked apps |
| | Financial facilitation | Agents | Risk attitudes, the number of financial technology businesses |
| | | Users | The usage of digital financial solutions, including credit cards, mobile phones, the internet, and digital payment |
| Digital technology entrepreneurship | Digital technology usage | Agents | Technicians and associate professionals, intermediate education, and firms with a website |
| | | Digital technology | Availability of electricity, internet bandwidth, |
| | Digital technology adoption | Agents | Professionals and advanced education, adoption of emerging technology |
| | | Digital technology | Generic top-level domains |
| | Digital technology absorption | Agents | Managers and research talent at business, innovative startups |
| | | Digital technology | Computer software spending, data centres |

Source: Szerb *et al*., 2022.

**Annex 2**. **Digital entrepreneurship ecosystem index, country ranking 2021**

| Rank | Country | DEE_2021 | Rank | Country | DEE_2021 | Rank | Country | DEE_2021 |
|---|---|---|---|---|---|---|---|---|
| 1 | United States | **83.8** | 40 | Chile | **48.6** | 78 | Bosnia and Herzegovina | **27.7** |
| 2 | United Kingdom | **83.5** | 41 | Malaysia | **46.7** | 79 | Iran | **27.3** |
| 3 | Netherlands | **83.0** | 42 | Russia | **45.8** | 80 | Vietnam | **27.0** |
| 4 | Denmark | **82.9** | 43 | Costa Rica | **44.6** | 81 | Ecuador | **26.8** |
| 5 | Finland | **81.9** | 44 | Romania | **44.4** | 82 | Paraguay | **26.3** |
| 6 | Canada | **81.4** | 45 | Turkey | **44.0** | 83 | India | **25.9** |
| 7 | Singapore | **81.3** | 46 | Bulgaria | **43.9** | 84 | Armenia | **25.8** |
| 8 | Switzerland | **80.9** | 47 | Uruguay | **43.4** | 85 | Lebanon | **25.0** |
| 9 | Norway | **80.1** | 48 | Serbia | **42.8** | 86 | Jordan | **23.8** |
| 10 | Australia | **79.7** | 49 | Argentina | **41.8** | 87 | Azerbaijan | **23.6** |
| 11 | Sweden | **79.2** | 50 | Brazil | **40.6** | 88 | Mongolia | **22.0** |
| 12 | Ireland | **79.2** | 51 | Qatar | **40.4** | 89 | Sri Lanka | **21.6** |
| 13 | Germany | **79.1** | 52 | Saudi Arabia | **40.3** | 90 | Kenya | **20.0** |
| 14 | Austria | **75.1** | 53 | Ukraine | **39.5** | 91 | Botswana | **19.3** |
| 15 | Iceland | **74.3** | 54 | Mauritius | **38.3** | 92 | El Salvador | **18.8** |
| 16 | New Zealand | **73.2** | 55 | China | **37.6** | 93 | Kyrgyzstan | **18.3** |
| 17 | Hong Kong | **72.6** | 56 | Bahrain | **37.6** | 94 | Guatemala | **18.3** |
| 18 | Luxembourg | **71.6** | 57 | Oman | **37.5** | 95 | Nigeria | **17.1** |
| 19 | France | **70.4** | 58 | Montenegro | **37.0** | 96 | Honduras | **16.2** |
| 20 | Belgium | **67.5** | 59 | Mexico | **36.6** | 97 | Algeria | **16.1** |
| 21 | Estonia | **66.9** | 60 | Kuwait | **35.8** | 98 | Bangladesh | **15.3** |
| 22 | Spain | **66.7** | 61 | Thailand | **35.5** | 99 | Pakistan | **14.7** |
| 23 | Malta | **66.4** | 62 | Colombia | **34.4** | 100 | Namibia | **14.4** |
| 24 | Japan | **63.1** | 63 | Panama | **33.1** | 101 | Senegal | **14.3** |
| 25 | Italy | **61.6** | 64 | Albania | **32.7** | 102 | Rwanda | **13.8** |
| 26 | Cyprus | **61.1** | 65 | Peru | **32.6** | 103 | Nepal | **12.8** |
| 27 | Slovenia | **61.0** | 66 | Kazakhstan | **31.9** | 104 | Cambodia | **12.0** |
| 28 | Korea | **60.8** | 67 | Moldova | **31.6** | 105 | Cameroon | **11.6** |
| 29 | Czech Republic | **60.6** | 68 | Tunisia | **30.4** | 106 | Uganda | **11.6** |
| 30 | Portugal | **60.6** | 69 | Jamaica | **30.1** | 107 | Zimbabwe | **11.5** |
| 31 | Israel | **59.6** | 70 | South Africa | **30.1** | 108 | Zambia | **11.0** |
| 32 | Latvia | **58.3** | 71 | Dominican Republic | **30.1** | 109 | Benin | **10.8** |
| 33 | Poland | **56.7** | 72 | Philippines | **30.0** | 110 | Tanzania | **10.2** |
| 34 | Greece | **53.8** | 73 | Georgia | **30.0** | 111 | Malawi | **7.2** |
| 35 | Lithuania | **53.5** | 74 | Macedonia | **29.2** | 112 | Mali | **6.8** |
| 36 | Croatia | **52.6** | 75 | Morocco | **28.8** | 113 | Madagascar | **6.6** |
| 37 | United Arab Emirates | **52.1** | 76 | Indonesia | **28.5** | 114 | Ethiopia | **5.4** |
| 38 | Slovakia | **50.8** | 77 | Egypt | **28.4** | 115 | Burundi | **3.3** |
| 39 | Hungary | **49.6** | – | – | – | – | – | – |

Source: own elaboration.

## Author

**Vu Thi Thuy**
Vu Thi Thuy is a PhD student in the Business Administration Program at the Faculty of Business and Economics, University of Pécs, Hungary. Her research interests include digital HRM, sustainable HRM and their relationship. She is responsible for the whole article.
**Correspondence to:** Vu Thi Thuy, University of Pécs, Faculty of Business and Economics, Rákóczi út 80, 7622, Hungary, e-mail: thuyvu0202@gmail.com
**ORCID** https://orcid.org/0000-0001-6916-4888

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## Use of Artificial Intelligence

The author declares that the manuscript was prepared and written without support of any AI/GAI tools.

## Conflict of Interest

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

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# Poland's investment development path: Going beyond conventional explanations

**Marian Gorynia, Jan Nowak, Piotr Trąpczyński, Radosław Wolniak**

**ABSTRACT**

**Objective:** This article examines several critical factors influencing the progression of a nation's investment development path (IDP), using Poland's post-transition economy as a case study.

**Research Design & Methods:** Alongside the conventional analysis of foreign direct investment (FDI) as a correlation between economic development, indicated by GDP/GNP growth, and the net outward investment position (NOIP), we examined the influence of institutional factors, particularly government policies, the significance of the domestic and foreign markets, as well as the effects of recent external factors: the COVID-19 pandemic and the conflict in Ukraine. Consequently, we incorporated diverse viewpoints, including those of international business, economic policy, institutional theory, and political economy.

**Findings:** The primary conclusion of this study is that Poland remains firmly embedded at the end of Stage 2 of its IDP, with no tangible indication of progressing, as per the theoretical model, to the more advanced and recommended Stage 3.

**Implications & Recommendations:** One explanation for this seemingly paradoxical scenario of remaining in Stage 2 may reside in the country's peculiarities, partly due to foreign investors' persistent perception of Poland as a moderately developed economy, characterised by a substantial internal market and promising GDP growth potential.

**Contribution & Value Added:** In the analysis of Poland's IDP, we go beyond the variables of the original IDP model. Thus, we significantly contribute to its theoretical development and practical applications.

| | |
|---|---|
| **Article type:** | research article |
| **Keywords:** | investment development path; foreign direct investment; economic growth; Central and Eastern Europe; institutional factors |
| **JEL codes:** | D81, D91, M16 |

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## INTRODUCTION

The interaction of inward and outward foreign direct investment (FDI) with a country's economic development forms the core of the investment development path (IDP) framework (Dunning, 1986; Dunning & Narula, 1994; 1996). In post-transition economies, especially the formerly centrally planned economies of Central and Eastern Europe (CEE), inward FDI has been crucial for economic advancement (Gorynia *et al.*, 2019b). On the other hand, the gradual rise of outward FDI from the region reflected an increasing international competitiveness of previously domestic firms. However, as it has been found so far, the IDP paths of different economies display significant idiosyncrasies depending on a number of country-specific determinants, such as their size, geographic location or government policies (Gorynia *et al.*, 2012; Djokoto & Pomeyie, 2021; Zhubikenov, 2022).

The present study contributes to extant research on Poland's IDP, covering the years from 2013 to 2021 (or the last year with available data, where applicable), though set against a much wider time

frame ranging back to 1990, the beginning of Poland's transformation process. At the same time, we broadened our perspective and analysed several key factors that affect the evolution of a country's IDP, in this case, that of Poland, thus going beyond the variables of the original IDP model. These include the possible effects of institutional factors, the internal market, foreign markets, or external shocks caused by the COVID-19 pandemic and the Russian invasion of Ukraine. Thus, we combined several perspectives, including IB, economic policy, institutional theory, and political economy.

The first part of our article presents the theoretical underpinnings of the IDP concept (model) and a review of extant literature. This is followed by an outline of postulated government policies to be applied in each stage of the IDP. The third part contains a descriptive analysis of Poland's IDP trajectory, where the net outward investment (NOI) position (NOIP) is investigated against the backdrop of changes in inward FDI and outward FDI, parallel to the dynamics of GDP per capita. Afterwards, we qualitatively analyse the impact of other factors affecting the IDP's trajectory. The article wraps up with conclusions, policy implications, and suggestions for further research.

## LITERATURE REVIEW

### The IDP concept: Theoretical Underpinnings and Extant Research

The IDP concept centres on the dynamic interaction between two macroeconomic variables: net outward investment (NOI) per capita and GNP or GDP per capita, which establish a country's placement on the IDP. NOI is determined as the difference between outward FDI and inward FDI stocks. GDP progression is regarded as an indicator of economic advancement and national competitiveness. As nations progress, they typically undergo five sequential stages/phases of the investment development path (IDP). Figure 1 provides a diagrammatic illustration of these IDP stages. Each stage is characterised by different dynamics of NOI values in relation to growing GDP/GNP and is typical for countries at different levels of economic development and different interactions between inward and outward FDI. In Table 1, we present summary characteristics of the five stages of the IDP, considering the interplay between the ownership (O-specific), location (L-specific), and internalisation (I-specific) advantages in determining a country's position on the IDP (Dunning & Narula, 2010).

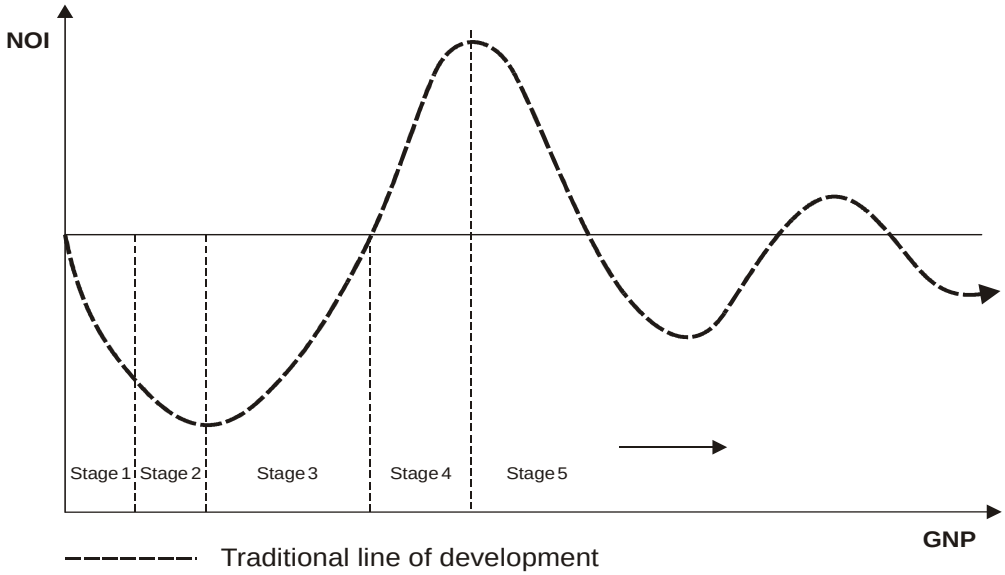


**Figure 1. The investment development path[1] model**

Note: Drawn for illustrative purposes only, *not* to scale.

Source: Dunning and Narula, 2002, p. 139.

[1] Dunning and Narula (2002) termed the IDP referenced line as a traditional one. They overlaid a flatter line, parallel to the old one, which, according to these authors, represents the technological and organisational transformations in foreign direct investment that emerged in the 1990s (Dunning & Narula, 2002, p. 139).

The literature review points to two main areas of IDP-related empirical research:

- Cross-sectional studies comparing several countries (see *e.g.*, Dunning, 1981; Durán & Úbeda, 2001, 2005; Boudier-Bensebaa, 2008; Ragoussis, 2011; Djokoto & Pomeyie, 2021).
- Longitudinal studies concentrating on specific countries (see *e.g.*, Clegg, 1996; Buckley & Castro, 1998; Barry *et al.*, 2003; Bellak, 2001; Gorynia *et al.*, 2007, 2018; Marton & McCarth, 2007; Maşca & Văidean, 2010; Verma & Brenan, 2011; Ferencikova & Ferencikova, 2012; Zhubikenov, 2022).

**Table 1. IDP stages and their basic characteristics: A normative framework**

| IDP Stages | Characteristics |
|---|---|
| **Stage 1:** Less-developed economies | L-specific advantages: mostly related to natural resources and abundance of low-cost labour.<br>O-specific advantages of domestic firms: virtually non-existent.<br>FDI flows: little inward and virtually no outward FDI.<br>NOIP: negative and increasing due to some inward FDI. |
| **Stage 2:** Newly-industrialised, developing, and emerging economies | L-specific advantages: gradually shifting from resource-based and low-cost labour to semi-skilled labour and moderately technology-intensive sectors.<br>O-specific advantages of domestic firms: increasing, focused on medium-technology industries.<br>FDI flows: rapidly growing inward FDI; outward FDI still limited.<br>NOIP: increasingly negative, but stabilises at the end. |
| **Stage 3:** Middle-income developed economies | L-specific advantages: shift away from labour-intensive sectors toward higher value-added and technology-intensive production.<br>O-specific advantages of domestic firms: based on advanced technology and proprietary assets, increasingly exploited through exports and outward FDI.<br>FDI flows: outward FDI exceeds inward FDI.<br>NOIP: negative values diminish and tend to 0. |
| **Stage 4:** High-income developed economies | L-specific advantages: rooted in created assets; production is capital- and knowledge-intensive.<br>O-specific advantages of domestic firms: linked to multinationality.<br>FDI flows: outward FDI grows faster than inward FDI.<br>NOIP: significantly positive. |
| **Stage 5:** Most advanced economies | L-specific advantages: based on knowledge- and service-oriented created assets.<br>O-specific advantages of domestic firms: on par with those from other advanced economies.<br>FDI flows: high levels of both inward and outward FDI, dominated by intra-firm and intra-industry flows.<br>NOIP: initially falls, then fluctuates around zero. |

Source: own study based on Dunning (1997), Dunning and Narula (1996, 2002), Dunning and Lundan (2008), and Narula and Dunning (2010).

As it has been argued, cross-sectional analysis is burdened with significant limitations since the IDP per se is a dynamic and country-specific model (Dunning & Narula, 1996). Therefore, it can provide wrong conclusions about an 'optimal' level of FDI for a certain GDP level (Narula & Dunning, 2010). Moreover, the transition between the stages is affected by the economic structure of a country, the types of FDI it creates and receives, and factors such as market size, government policies, or resource endowments (Durán & Úbeda, 2001). Unsurprisingly, similarly developed countries differ in their IDP positions (Iacovoiu & Panai, 2014). For CEE economies, institutional reforms and policies, including those induced by EU membership, have been found to affect IDP patterns (Narula & Guimón, 2010; Stoian, 2013; Gorynia *et al.*, 2019a). Thus, in the next section, we turn to the role of government policies in determining the juxtaposition of inward and outward FDI.

## IDP and Government Policies

Government policies can play an important role in positioning a country on its IDP (Sawatiri & Brennan, 2022). Governments aim at creating conditions conducive to inward FDI and promoting the country to foreign investors. Conversely, they should also apply policies and regulations that are supportive of outward FDI. Each IDP stage will require different approaches to FDI, different object-

tives and different sets of policy measures emphasising either inward FDI (IFDI) or outward FDI (OFDI), an evolution that we shall review below.

Government policies in Stage 1 should aim at improving basic infrastructure, as well as upgrading human resources via education and training (Dunning & Narula, 2002). Import protection and export subsidies will be typical policy measures undertaken by the government. Limited, if any, policies will be deliberately applied to upgrade the country's created assets, as O advantages of local firms will be limited (Dunning & Narula, 2002).

In Stage 2, government policy should aim at attracting foreign investors by engaging, *inter alia*, in bilateral or multilateral investment agreements, joining regional integration groupings, improving commercial infrastructure (*e.g.*, assuring competitive transportation costs), enlarging the pool of skilled labour and professional workers through education and training, aligning FDI regulations with those of major investing countries, and engaging in promotional activities at both national and regional levels (Cass, 2007; Gorynia *et al.*, 2020; Sawatiri & Brennan, 2022). For domestic firms to develop O advantages and engage in OFDI, the government should focus on building technological capacity in selected industries (typically primary industries) and on the development of labour skills (Dunning & Narula, 2002). Governments can also stimulate joint venture formation between domestic companies and multinational enterprises (MNEs), thus generating spillover effects (Sawatiri & Brennan, 2022), and assist local firms wishing to invest abroad by providing foreign-market intelligence, loan guarantees and other forms of financial support and fiscal incentives (Gorynia *et al.*, 2015b). If there are any restrictions to investing abroad, they should be removed (Yin *et al.*, 2021), as deregulation policies generally tend to promote OFDI (Buckley *et al.*, 2010).

In Stage 3, attracting IFDI remains one of the main objectives of government policies, yet with a focus on attracting MNEs activity with potential for linkage and spillover creation (Narula & Dunning, 2010). Governments should focus on market-seeking and efficiency-seeking IFDI, particularly destined to less competitive industries and regions (Sawatiri & Brennan, 2022). Specific policy measures include simplifying investment procedures; creating special economic zones and industrial clusters; providing land and infrastructure; providing investment assistance and offering financial and fiscal incentives on a selective basis (ibid.), if permitted. Governments should also engage in policies aimed at encouraging and assisting exporting firms to internalise the market for their O advantages by engaging in FDI rather than exports or other contractual entry modes (Dunning & Narula, 2002). Governments should also attempt to create and transform national champions into MNEs.

In Stage 4, policies become less interventionist and more oriented towards ensuring that markets can operate efficiently. Moreover, in the face of the increasing competition between countries with similar income levels, economic structures, resources, and capabilities, governments assume a more strategic role in their policy formation towards FDI (Dunning & Narula, 2002). In terms of IFDI, governments should maintain their supervisory and regulatory function to safeguard fair competition and beneficial contributions made by foreign-based MNEs to the country's development (Cass, 2007; Sawatiri & Brennan, 2022). As far as OFDI is concerned, which is already growing faster than IFDI, there is no need to stimulate its growth per se. Instead, it is pertinent for governments to assist in upgrading the innovatory capacity of domestic companies to strengthen their international competitiveness and help turn some of the home-grown multinationals into truly global players.

In Stage 5, the role of government in attracting IFDI and stimulating OFDI is further reduced (Sawatri & Brennan, 2022), as both forms of FDI continue to grow autonomously, mostly through intra-firm investment and M&As (Dunning & Narula, 2002). What comes to the fore in this stage are policies aimed at developing linkages and creating clusters of domestic firms around multinationals. Thus, policy measures should prioritise the development of relationships between multinationals and domestic businesses, universities, research institutes and industry associations (Narula & Gimón, 2010). Generally, the role of governments is no longer that of an interventionist and selective promoter of FDI projects but assumes a more strategic orientation.

In the context of the present article, we were primarily interested in government policies in IDP Stages 2 and 3. The analysis presented later suggests that during the period under study, Poland went through and is still at the end of Stage 2. Thus, apart from analysing the impact of government policies throughout Stage 2, it is pertinent to make policy recommendations for facilitating the country's move

into the next IDP Stage 3.

## RESEARCH METHODOLOGY

Once we have introduced the IDP framework, with a particular focus on the factors driving the transition between its stages and the role of institutional factors in this progression, we follow up with a descriptive analysis of Poland's IDP trajectory based on available UNCTAD data. The analysis sets out with several insights into the main building blocks of the IDP concept, namely the country's inward and outward FDI stocks as well as its GDP.

Subsequently, Poland's NOIP, NOIP per capita (p.c.), GDP, GDP p.c. and their dynamics will be analysed. Finally, we qualitatively reviewed a number of factors which affected the development of Poland's inward and outward FDI, leading to outcomes which are partly divergent from theoretical expectations, most notably the country's staying in Stage 2 of its IDP.

## RESULTS AND DISCUSSION

### Tracing Poland's IDP Trajectory (2013-2021)

In the investigated time frame (2013-2021), Poland's GDP recorded continuous growth except for two years (2015 and 2016). It should be noted at this point that in 2020, during the COVID-19 pandemic, GDP was up but by only 1%, however, in 2021, it swiftly recovered, rising by 13%.

Changes in GDP were accompanied by those in the country's inward and outward FDI stocks (see Table 2). In 2014, inward FDI stock (IFDIS) was down (year to year) by 8% whereas outward FDI stock (OFDIS) remained practically unchanged, with GDP rising by 5% In 2015, IFDIS recorded a sharper drop of 12%, but OFDIS declined by only 1%, with GDP falling this time by a substantial 11% In 2018, IFDIS declined again but only by 5%, however, OFDIS went down much more (16%) with GDP rising 12%. In 2021, both IDFIS and GDP increased, but OFDI declined slightly by 2% All the above changes seemed to be haphazard as to the links between them, but did not alter the general rising trend in all three investigated variables. As far as the share of IFDIS in GDP is concerned, one could likewise observe an overall rising trend (Table 3) in the whole period from 1990 to 2021. In the currently analysed time frame from 2013, the said share showed signs of relative stabilisation with an average of 40.9%, although the share in 2021 was 40.3%, down from 44% in 2013.

**Table 2. Inward, outward FDI stocks, and GDP of Poland in million USD, 1990-2021**

| Year | Inward FDI Stock | Inward FDI Stock (previous year = 100) | Outward FDI Stock | Outward FDI Stock (previous year = 100) | GDP(a) at current prices | GDP (previous year = 100) |
|---|---|---|---|---|---|---|
| 1990 | 109 | | 95 | | 66050 | |
| 1991 | 425 | 390 | 88 | 93 | 85651 | 130 |
| 1992 | 1370 | 322 | 101 | 115 | 94472 | 110 |
| 1993 | 2307 | 168 | 198 | 196 | 96310 | 102 |
| 1994 | 3789 | 164 | 461 | 233 | 110945 | 115 |
| 1995 | 7843 | 207 | 539 | 117 | 142294 | 128 |
| 1996 | 11463 | 146 | 735 | 136 | 160193 | 113 |
| 1997 | 14587 | 127 | 678 | 92 | 159358 | 99 |
| 1998 | 22461 | 154 | 1165 | 172 | 174686 | 110 |
| 1999 | 26075 | 116 | 1024 | 88 | 170031 | 97 |
| 2000 | 33477 | 128 | 268 | 26 | 172220 | 101 |
| 2001 | 40394 | 121 | 304 | 114 | 190905 | 111 |
| 2002 | 47295 | 117 | 432 | 142 | 199070 | 104 |
| 2003 | 56110 | 119 | 382 | 89 | 217829 | 109 |
| 2004 | 84102 | 150 | 698 | 183 | 255107 | 117 |
| 2005 | 86345 | 103 | 1776 | 254 | 306146 | 120 |
| 2006 | 115792 | 134 | 4402 | 248 | 344627 | 113 |
| 2007 | 164370 | 142 | 7279 | 165 | 429021 | 124 |

| Year | Inward FDI Stock | Inward FDI Stock (previous year = 100) | Outward FDI Stock | Outward FDI Stock (previous year = 100) | GDP(a) at current prices | GDP (previous year = 100) |
|---|---|---|---|---|---|---|
| 2008 | 148417 | 90 | 8205 | 113 | 533600 | 124 |
| 2009 | 167399 | 113 | 11504 | 140 | 439732 | 82 |
| 2010 | 187602 | 112 | 16407 | 143 | 475697 | 108 |
| 2011 | 164424 | 88 | 18928 | 115 | 524374 | 110 |
| 2012 | 198953 | 121 | 26102 | 138 | 495231 | 94 |
| 2013 | 229167 | 115 | 27725 | 106 | 515762 | 104 |
| 2014 | 211484 | 92 | 27757 | 100 | 539081 | 105 |
| 2015 | 185986 | 88 | 27492 | 99 | 477111 | 89 |
| 2016 | 188734 | 101 | 27874 | 101 | 470025 | 99 |
| 2017 | 240382 | 127 | 29190 | 105 | 524641 | 112 |
| 2018 | 229527 | 95 | 24618 | 84 | 588780 | 112 |
| 2019 | 240586 | 105 | 26939 | 109 | 596058 | 101 |
| 2020 | 249723 | 104 | 28136 | 104 | 599443 | 101 |
| 2021 | 269225 | 108 | 27562 | 98 | 679442 | 113 |

Note: (a) – according to the official exchange rate.
Source: UNCTAD, (http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx. 25.05.2023).

**Table 3. Poland's inward FDI stock as a percentage of GDP, 1990-2021**

| Year | Inward FDI stock as % of GDP |
|---|---|
| 1990 | 0.2 |
| 1991 | 0.5 |
| 1992 | 1.5 |
| 1993 | 2.4 |
| 1994 | 3.4 |
| 1995 | 5.5 |
| 1996 | 7.2 |
| 1997 | 9.2 |
| 1998 | 12.9 |
| 1999 | 15.3 |
| 2000 | 19.4 |
| 2001 | 21.2 |
| 2002 | 23.8 |
| 2003 | 25.8 |
| 2004 | 33.0 |
| 2005 | 28.2 |
| 2006 | 33.6 |
| 2007 | 38.3 |
| 2008 | 27.8 |
| 2009 | 38.1 |
| 2010 | 39.1 |
| 2011 | 31.1 |
| 2012 | 39.9 |
| 2013 | 44.0 |
| 2014 | 39.0 |
| 2015 | 38.9 |
| 2016 | 39.9 |
| 2017 | 45.7 |
| 2018 | 39.1 |
| 2019 | 40.3 |
| 2020 | 41.9 |
| 2021 | 40.3 |

Source: UNCTAD, (http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx, 25 May 2023).

### Net Outward Investment Position of Poland

Table 4 presents Poland's NOIP, NOIP per capita (p.c.), GDP, GDP p.c. and their dynamics and Figures 2, 3, and 4 visualise it. We observed improvement in both the absolute and per capita values of NOIP in 2014, 2015, and later in 2018, in the sense that these values were negative but decreasing, indicating the desired movement towards Stage 3 in the IDP model. This positive change evidenced once more the possibility of IDP reversibility, which we noted also in the previous studies, not only concerning Poland but also other countries of CEE and EU members. Noteworthy, Dunning's original IDP model did not account for such reversibility and therefore we may consider it as its idiosyncratic modification, at least when applied to the region of CEE.

**Table 4. NOIP and GDP of Poland in million USD, 1990-2021**

| Year | NOIP | GDP(a) | NOIP p.c. in USD | GDP(a) p.c. in USD | NOIP p.c. (previous year = 100) | GDP p.c. (previous year = 100) |
|---|---|---|---|---|---|---|
| 1990 | -14 | 66050 | -0.4 | 1735 | | |
| 1991 | -337 | 85651 | -8.8 | 2244 | 2400.6 | 129.3 |
| 1992 | -1269 | 94472 | -33.2 | 2470 | 375.7 | 110.1 |
| 1993 | -2109 | 96310 | -55.0 | 2513 | 165.9 | 101.8 |
| 1994 | -3328 | 110945 | -86.7 | 2891 | 157.6 | 115.0 |
| 1995 | -7304 | 142294 | -190.2 | 3705 | 219.3 | 128.2 |
| 1996 | -10728 | 160193 | -279.4 | 4172 | 146.9 | 112.6 |
| 1997 | -13909 | 159358 | -362.3 | 4150 | 129.7 | 99.5 |
| 1998 | -21297 | 174686 | -554.9 | 4551 | 153.2 | 109.7 |
| 1999 | -25051 | 170031 | -653.1 | 4433 | 117.7 | 97.4 |
| 2000 | -33209 | 172220 | -862.5 | 4473 | 132.1 | 100.9 |
| 2001 | -40090 | 190905 | -1036.9 | 4938 | 120.2 | 110.4 |
| 2002 | -46864 | 199070 | -1212.6 | 5151 | 116.9 | 104.3 |
| 2003 | -55727 | 217829 | -1442.9 | 5640 | 119.0 | 109.5 |
| 2004 | -83404 | 255107 | -2160.9 | 6610 | 149.8 | 117.2 |
| 2005 | -84569 | 306146 | -2192.3 | 7936 | 101.4 | 120.1 |
| 2006 | -111390 | 344627 | -2889.7 | 8940 | 131.8 | 112.7 |
| 2007 | -157091 | 429021 | -4078.0 | 11137 | 141.1 | 124.6 |
| 2008 | -140212 | 533600 | -3639.7 | 13852 | 89.3 | 124.4 |
| 2009 | -155895 | 439732 | -4043.4 | 11405 | 111.1 | 82.3 |
| 2010 | -171196 | 475697 | -4435.4 | 12325 | 109.7 | 108.1 |
| 2011 | -145497 | 524374 | -3767.3 | 13577 | 84.9 | 110.2 |
| 2012 | -172851 | 495231 | -4475.0 | 12821 | 118.8 | 94.4 |
| 2013 | -201442 | 515762 | -5217.7 | 13359 | 116.6 | 104.2 |
| 2014 | -183727 | 539081 | -4762.0 | 13972 | 91.3 | 104.6 |
| 2015 | -158494 | 477111 | -4111.1 | 12375 | 86.3 | 88.6 |
| 2016 | -160859 | 470025 | -4174.7 | 12198 | 101.5 | 98.6 |
| 2017 | -211192 | 524641 | -5480.8 | 13615 | 131.3 | 111.6 |
| 2018 | -204909 | 588780 | -5319.3 | 15284 | 97.1 | 112.3 |
| 2019 | -213647 | 596058 | -5550.2 | 15485 | 104.3 | 101.3 |
| 2020 | -221587 | 599443 | -5766.2 | 15599 | 103.9 | 100.7 |
| 2021 | -241663 | 679442 | -6308.5 | 17736 | 109.4 | 113.7 |

Note: (a) – according to the official exchange rate.
Source: own study based on UNCTAD, (http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx. 25 May 2023).

In the years 2016-2021, with the exception of 2018 noted above, NOIP and NOIP p.c. of Poland declined continuously, thus further embedding the whole economy in Stage 2. The latest sign of perpetuation of this trend was the increasing rate of the said decline in 2021 of 9.4% (year to year) vs. 2020 and

3.9% respectively. Further evidence of this was the growing gap between the much larger values of IDFIS and OFDIS. In 2013, the share of OFDIS in IFDIS was 12.1%, whereas in 2021, it went down to 10.2%.

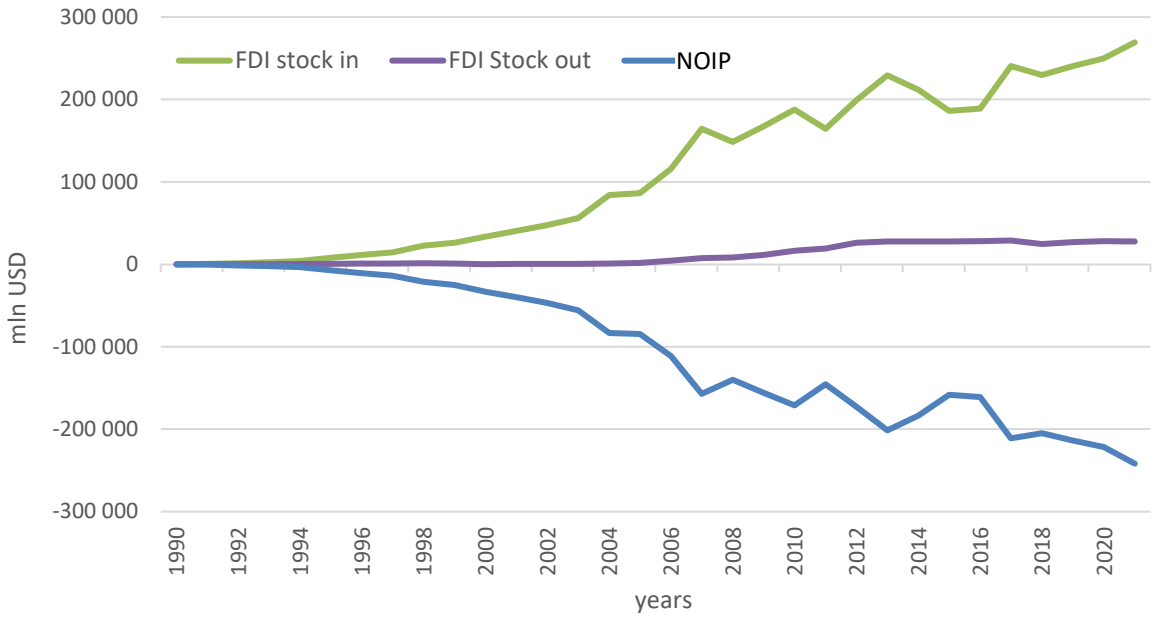


**Figure 2. Poland's inward FDI stock, outward FDI stock and NOIP in million USD, 1990-2021**
Source: own elaboration.

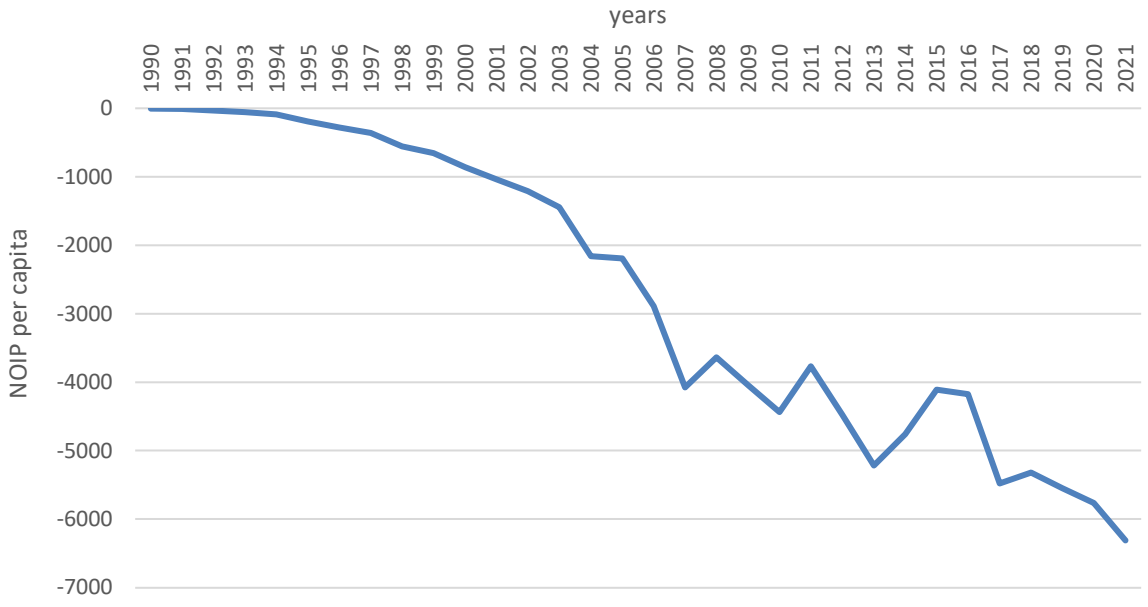


**Figure 3. Poland's NOIP per capita in USD, 1990-2021**
Source: own elaboration.

Surprisingly, the above facts show that no significant and compelling signs have so far been found that Poland was on the verge of moving into Stage 3 or that such a move was imminent. On the contrary, the economy remained firmly entrenched in Stage 2. The principal factor accounting for this situation seems continuously to be the dominant lure of Poland's large internal market and its growth perspectives as reflected by its GDP dynamics, plus the still favourable general investment climate.

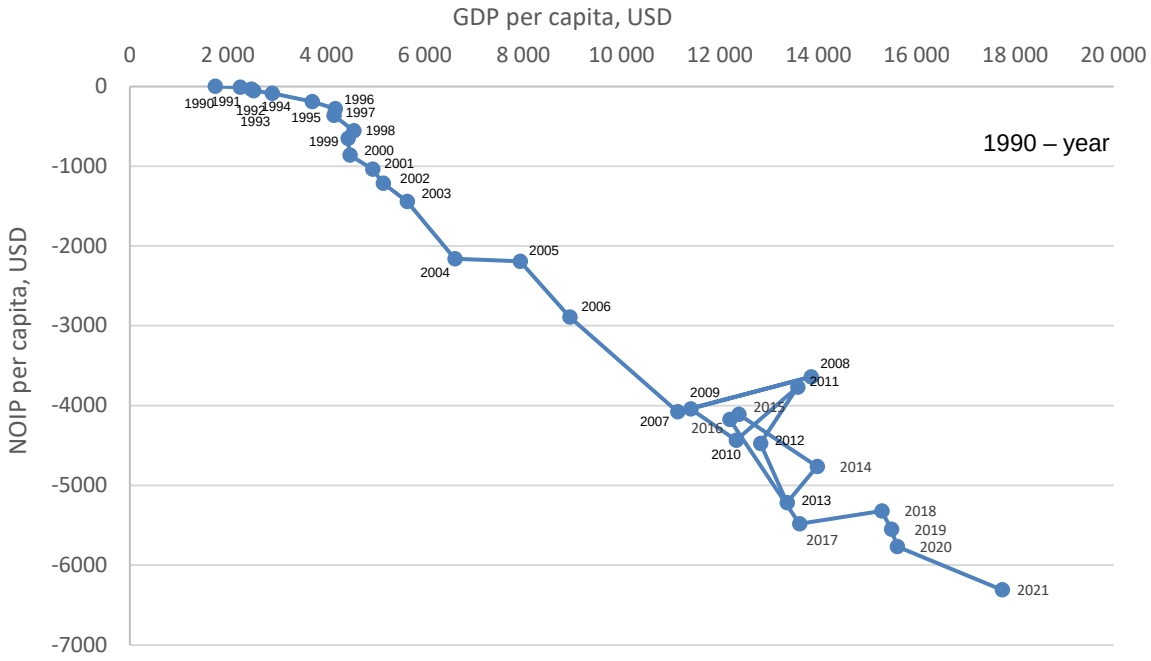


**Figure 4. Poland's GDP per capita and NOIP per capita in USD, 1990-2021**
Source: own elaboration.

### Inward and Outward FDI Performance Indexes

Table 6 presents Poland's inward and outward performance indexes. The values of the inward index have been consistently higher than those of the outward index, reflecting the higher competitiveness of Poland's internal market when compared with domestic firms' international competitiveness.

The inward index in 2013 with the value of 0.375 was very low when viewed from the perspective of the whole period going back to 1990. But right next year it shot up to 1.504, thereafter, fluctuating, it reached the value of 2.232 in 2021, which was the second highest after that of 3.004 in 2004 when Poland had entered the European Union as a full member. Noteworthy, the scale of values above 2 signifies that Poland was receiving substantially more inward FDI than expected on the basis of its economic potential.

On the other hand, the outward index recorded in 2013 had a negative value of -0.047, which in practice indicated disinvestment that year by Polish investors abroad. Then, for three years, it rose to reach in 2016 the maximum value in the whole period from 1990 of 1.183. However, it dropped to only 0.015 in 2021. This latter record, signifying a still relatively low competitive potential of Polish firms, seems to have been at least partly due to the disruptions caused by the COVID-19 pandemic, resulting in the breaking up of global value chains in which these firms were participating. Thus, the data of both indices indicate that Poland was destined to remain at Stage 2 on its IDP trajectory.

### Discussion of Key Factors Affecting Poland's IDP

#### Internal Market

The first variable explaining the persistent disproportion between inward and outward FDI in Poland is its significant internal market size (Trąpczyński *et al.*, 2019), which has attracted MNEs in their 'going East' strategies since the 1990s. Cost advantages played a particularly significant role in vertical FDI, where plants in CEE were integrated into international supply chains. The gradual shift from production to higher value-adding activities in the value chain led to their functional upgrading and higher productivity (Burger *et al.*, 2018).

However, the large internal market also acts as a factor slowing down the progress of outward FDI (Gorynia *et al.*, 2019b), as local firms may focus on domestic investment supported with exports

(Trąpczyński, 2016). In this sense, these patterns are consistent with the predictions of the internationalisation process model (Vahlne, 2020).

**Table 6. Poland's inward (IFDIPI) and outward (OFDIPI) FDI performance indexes, 1990-2021**

| Year | IFDIPI | OFDIPI |
|---|---|---|
| 1990 | 0.150 | 0.008 |
| 1991 | 0.658 | -0.010 |
| 1992 | 1.127 | 0.017 |
| 1993 | 2.110 | 0.021 |
| 1994 | 1.862 | 0.026 |
| 1995 | 2.329 | 0.026 |
| 1996 | 2.283 | 0.027 |
| 1997 | 2.037 | 0.019 |
| 1998 | 1.697 | 0.084 |
| 1999 | 1.301 | 0.006 |
| 2000 | 1.365 | 0.003 |
| 2001 | 1.269 | -0.054 |
| 2002 | 1.197 | 0.048 |
| 2003 | 1.303 | -0.102 |
| 2004 | 3.004 | 0.031 |
| 2005 | 1.343 | 0.251 |
| 2006 | 1.547 | 0.425 |
| 2007 | 1.416 | 0.104 |
| 2008 | 0.992 | 0.130 |
| 2009 | 1.121 | 0.211 |
| 2010 | 1.288 | 0.618 |
| 2011 | 1.396 | 0.089 |
| 2012 | 1.291 | 0.343 |
| 2013 | 0.375 | -0.047 |
| 2014 | 1.504 | 0.311 |
| 2015 | 1.168 | 0.458 |
| 2016 | 1.249 | 1.183 |
| 2017 | 0.872 | 0.209 |
| 2018 | 1.625 | 0.139 |
| 2019 | 1.343 | 0.243 |
| 2020 | 2.044 | 0.236 |
| 2021 | 2.232 | 0.015 |

Source: own study based on UNCTAD, (http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx, 25 May 2023).

**Foreign Markets**

Polish outward FDI, particularly that conducted by SMEs, has traditionally focused on Europe (Gorynia *et al.*, 2019b), partly due to limited access to capital, but also due to market-seeking motivations and focus on sales subsidiaries in close markets (Gorynia *et al.*, 2015a), with signs of technology-seeking investments in more developed EU markets (Trąpczyński, 2016). The relatively unfavourable competitive position of Polish investors is particularly reflected by Poland's more negative NOI values (and, therefore, earlier IDP positioning) in relation to more developed economies, explaining the overall position in Stage 2 (Gorynia *et al.*, 2019b). In fact, Polish subsidiaries have performed relatively worse in highly advanced economies (Trąpczyński & Banalieva, 2016), which might be due to their still limited endowment in managerial capabilities (Trąpczyński, 2018).

The tense geopolitical situation since 2022 and the resulting pressure for firms to re-orient their exports and investments towards Western markets may deepen the exposure to markets where Polish firms need to upgrade their capabilities, thus fostering the progression through Stage 3 in the long term but cementing positioning in Stage 2 in the short and middle time frame.

**Institutional and Regulatory Environment**

Extant research clearly indicates that institutional quality affects MNEs' location decisions (Dunning, 2004). A comparably low quality of intellectual property rights has been suggested to explain a relatively low share of 2.1% of inward investors in the domestic R&D expenses, which is one of the lowest scores in CEE (OECD, 2017). On the other hand, the Corruption Perception Index score for Poland since 2015 has regularly declined (Corruption Perception Index, 2019).

On the side of OFDI, government support was long dispersed across different bodies and also involved IFDI support due to policy priorities (creation of jobs or tax revenue, rather than capital outflows). Thus, state support concentrated mostly on agreements with other countries in aspects such as investor protection or double taxation (Gorynia *et al.*, 2015b). Only in 2011, did the Polish Information and Foreign Investment Agency (PAIiIZ) launch a dedicated OFDI support program (Gorynia *et al.*, 2015a), which complemented measures such as export finance or the creation of the Network of Investor and Exporter Assistance Centres (Trąpczyński *et al.*, 2019). Since 2017, different agencies offering support for OFDI have been integrated around the Polish Development Fund (PFR), with key central units such as PFR TFI (Investment Fund Company), PAIH (Polish Agency for Investment and Trade), BGK (Bank of the National Economy), KUKE (Corporation of Export Credit Insurance), as well as their regional counterparts. A focal entity in the structure of supporting units is the Polish Investment and Trade Agency S.A. (PAIH). The instruments offered by PAIH include investment workshops, foreign missions, foreign location visits (so-called study tours), strategic consulting, advice on acquiring national and local support instruments, advice on obtaining foreign investment incentives, or relational support. A significant role in supporting Polish investors was also assigned to PAIH's Foreign Trade Offices (ZBH), which are the first point of contact for Polish investors.

Apart from PAIH, an important entity supporting Polish investors planning or conducting business activity abroad is PFR TFI, which manages the Foreign Expansion Fund (FEZ). The fund grants loans to foreign subsidiaries owned by Polish enterprises on market terms and also offers equity financing to foreign subsidiaries. Its activities include investments in production, distribution, and service companies, both in the European Union and in high-risk countries.

Outward FDI success depends on targeted support instruments and business competitiveness, especially in developed nations. Polish enterprises' digital technology adoption and innovation remain below the EU average (OECD, 2023). After an expanded, volume-based R&D tax reduction was implemented in 2016, the following reforms have increased R&D investment incentives. The 2022 'Polish Deal' tax plan included many incentives to stimulate innovation and attract foreign investment. In particular, incentives have been introduced for R&D organisations that lower the cost of collaboration between firms and research institutions, automation and robotisation, new product and patent development, and business expansion (OECD, 2023). Since SMEs account for a large portion of Polish external FDI, their competitiveness and innovation will determine their success, especially in developed nations.

**The Role of Unexpected Factors: The COVID-19 Pandemic and the War in Ukraine**

In the case of Poland, after a discernible impact in 2020 related to the disruption of global value chains (GVCs), the pandemic did not affect Poland's inward and outward FDI in the mid-term perspective. Investment projects postponed in 2020 resumed in 2021 and 2022, leading to record OFDI values (PwC, 2022). Record inward FDI values also indicated that Poland indeed benefited from the worldwide reshoring trend and a stronger regionalisation of value chains.

Since the end of February 2022, the Russian invasion of Ukraine has affected the functioning of firms and their supply chains. While the COVID-19 pandemic had already contributed to port congestion, shortages of containers, delays, and increasing rates for transport from China to Europe, the war in Ukraine made these phenomena even more acute, additionally increasing the risk for CEE-based investments. Overall, both the COVID-19 pandemic and the war in Ukraine have raised questions regarding the stability of GVCs. Indeed, we can expect a shift of priorities, within GVCs, towards a greater balance between efficiency and resilience, which can possibly contribute to an increase in IFDI to Poland and a further reinforcement of its positioning in Stage 2 of the IDP. On the other hand, we may

expect CEE locations, including Poland, to act as secure hubs for further investments within a broader strategy of MNEs. Not least, the post-war landscape in Ukraine can also constitute a source of opportunities, for instance in the construction or infrastructure sector. In turn, these factors can accelerate outward FDI from Poland and accelerate the country's progression towards Stage 3 of the IDP.

**Policy Implications**

In light of the above discussion, an important question pertains as to what policy measures can be conducive to fostering Poland's progression towards and through Stage 3 of the IDP, given the challenging international environment, especially since the beginning of the 2020s. The system of support for OFDI reviewed above still has the chance to become an effective tool to be widely used by Polish investors.

Gorynia *et al.* (2015a) suggested classifying outward FDI support measures to include policies that boost domestic enterprises' competitiveness and internationalisation. As recommended by the OECD (2023), bespoke consultation services that provide expert technical assistance to help SMEs invest in digital technologies can boost local enterprises' innovativeness and international competitiveness. Many ICT investments can be profitable, but SMEs lack the knowledge and skills to choose the right tools, resulting in low demand. The Future Industry Platform programme promotes Industry 4.0 technology in production and provides advisory and technical support. Polish Agency of Entrepreneurship Development, PARP advises and supports new and established businesses and typically promotes product or process innovation. PARP could extend and broaden stand-alone consulting services to advise SMEs on digitalisation and give financial and technical support to ICT-investing enterprises.

Gorynia *et al.* (2019) further note that support programmes for external FDI should assume that different host nations face different obstacles and that outward investors' needs would vary greatly. For countries in the first or second stages of the IDP, support recipients may need image enhancement, legitimacy building, or networking services to compete in economically more sophisticated host economies. However, such situations may require building a more competitive product or service in the home country before expanding abroad. Thus, Polish government policies encourage multinational enterprises to build technological or managerial capabilities to compete in sophisticated economies. Guarantees, loans, and diplomatic aid should serve to increase market understanding and reduce political and business risks in host nations like Poland.

## CONCLUSIONS

This study's main finding is that Poland is still in Stage 2 of its IDP, with little sign of shifting to Stage 3 as the theoretical model implies. This seemingly perplexing situation may be due to the country's idiosyncrasies and foreign investors' consistent view of Poland as a mid-developed (or still advancing) economy with a large internal market and dynamic GDP growth over the last decade. These two drivers continue to lure inward FDI to Poland, which may be greater than the Polish enterprises' outbound FDI push. There are also other reasons for Polish OFDI being still limited, including the country's institutional environment over the years, as well as the limited competitiveness of Polish investors in more developed economies, followed by unexpected external shocks of the 2020s. Therefore, the general outlook and prediction emanating from the findings of the present study tend to indicate that Poland, for a still unspecified period, is likely to remain at the end of its IDP Stage 2.

Importantly, one should treat the findings and conclusions of the present study with caution due to the fact that the analysis is of a descriptive and qualitative nature and thus requires further verification using appropriate quantitative methodology. In particular, it would be insightful to create a panel based on secondary data to compare Poland and its CEE peers against more advanced economies, and explore the effects of the variables mentioned in our descriptive analysis, *i.e.*, the domestic market size, the geographic structure of FDI, and the number and type of FDI-supporting policies in these countries. Such comparative analysis could shed more light on the role of these factors, while providing insights into specific countries' idiosyncrasies.

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## Authors

The contribution share of the authors is equal and amounts to 25% for each of them.

**Marian Gorynia**

Full Professor, employed at the Poznań University of Economics and Business (Poland), a former Rector of this university in the years 2008-2016, and a former Vice-rector for scientific research and international cooperation in 2002-2008. He is a Vice-chair of the Scientific Excellence Council from 2020-2023, the institution which supervises post-doc degrees in Poland. His research interests include firm competitiveness, international business strategies and globalisation. He has published his research in many prestigious journals, including International Business Review, Eurasian Geography and Economics, Communist and Post-Communist Studies, and Post-Communist Economies.

**Correspondence to:** Marian Gorynia, Poznań University of Economics and Business, Al. Niepodległości 10, 61-875 Poznań, Poland, e-mail: marian.gorynia@ue.poznan.pl

**ORCID** https://orcid.org/0000-0002-7633-8249

**Jan Nowak**

Retired University Professor. Former Rector of the European University of Business. Has worked for universities in Poland, Canada, Fiji Islands and Hungary, where he held teaching and academic-related administrative positions. His research interest include marketing, firm internationalisation, foreign direct investment, and globalisation. His work was published in such scholarly journals as the *Journal of International Consumer Behaviour, International Review of Retail, Distribution and Consumer Research, East European Economics, Eurasian Geography and Economics, Communist and Post-Communist Studies, Post-Communist Economies, and International Business Review*.

**Correspondence to:** Jan Nowak, ul. Na Popielówkę 67M/2, 32-087 Zielonki, e-mail: nowakj07@gmail.com

**ORCID** https://orcid.org/0000-0001-7914-491X

**Piotr Trąpczyński (corresponding author)**

Associate Professor at the Poznań University of Economics and Business, Department of International Competitiveness at the Institute of International Business and Economics. His research interests include foreign direct investments and divestments, export performance and export exits, along with business models. He has published his research, among others, in the Journal of World Business, Journal of Business Research, International Business Review, European Management Journal and European Journal of International Management.

**Correspondence to:** Piotr Trąpczyński, Department of International Competitiveness, Poznań University of Economics and Business, al. Niepodległości 1, 61-875 Poznań, Poland, e-mail: piotr.trapczynski@ue.poznan.pl

**ORCID** https://orcid.org/0000-0001-8154-9174

**Radosław Wolniak**
Adjunct professor at the Faculty of Economic Sciences of the University of Warsaw, Poland. He has researched foreign direct investment, the strategy of multinational firms and international economic integration. He has published articles in international refereed journals including International Business Review, Eastern European Economics, Eurasian Geography and Economics, and Communist and Post-Communist Studies, as well as books on these subject areas. He has over 50 years of teaching experience in international business, strategy of multinational firms and international marketing. Besides holding administrative posts at Polish universities, he has also held positions on management and supervisory boards of Polish companies.
**Correspondence to:** Radosław Wolniak, Faculty of Economic Sciences, University of Warsaw, ul. Długa 44/50, 00-241 Warsaw, Poland, e-mail: wolniak@wne.uw.edu.pl
**ORCID** https://orcid.org/0000-0003-1801-2408

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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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# Intra-industry trade: A portrait of global patterns during 2000-2022

**Elżbieta Czarny, Paweł Folfas, Aleksandra Szarek-Piaskowska**

**ABSTRACT**

**Objective:** The article aims to identify patterns of world intra-industry trade (IIT) during the turbulent period 2000-2022. This period includes global slowdown after attack on World Trade Centre (2001-2002), global prosperity and intensive internationalisation known as 'hyper-globalisation' (2002-2008), global financial (2008) and economic (2009) crisis, post-crisis economic rebound (2010), stagnation or moderate growth period (2010-2019), pandemic (2020-2021), and escalation of war in Ukraine (2022). The article includes studies on intra-industry trade of selected countries and groups of countries, as well as an analysis of the world and the European Union average of two-way trade.

**Research Design & Methods:** We analysed IIT disaggregated into six-digit Harmonized System codes using the United Nations Comtrade database. We employed Grubel-Lloyd indices.

**Findings:** Our results confirmed that world trade is still mainly inter-industry and that the developed countries conduct much more intensive IIT than the rest of the world. The slight decline between years 2000 and 2022 in global intra-industry's share has been accompanied by the increasing role of developing countries in international trade flows. We proved that some developing countries are, with time, more intensive IIT participants. It holds especially for members of RTAs with developed countries and participants in international production.

**Implications & Recommendations:** We examined IIT of about 150 countries over more than the last two decades and found that, as expected, in many developing countries the share of IIT was still low. Despite the much bigger engagement of developing countries in global value chains and global production networks, their trade remains mainly inter-industry. Thus, there is a space for industrial policies in developing countries. We recommend more intensive capital inflows into these countries and intensification of their manufacturing production, e.g., in the framework of global value chains. Moreover, to address low levels of IIT in some developing countries, international policy should focus on reducing trade barriers, promoting product differentiation, and encouraging economies of scale. Specifically, trade liberalisation, investments in research and development, and policies that foster competition can help boost IIT.

**Contribution & Value Added:** IIT is still a hotly debated issue. We calculated Grubel-Lloyd indices for country-pairs from the whole world (bilateral trade), for selected countries with all partners and also the world average for more than twenty years. To our best knowledge, there has been no such analysis of world IIT during the period 2000-2022 thus far. Moreover, our study brings valuable conclusions, recommendations and research future directions which are crucial for the growing role of International Economics (and International Business) in social sciences.

| | |
|---|---|
| **Article type:** | research article |
| **Keywords:** | intra-industry trade; world trade; Grubel-Lloyd index; G7 countries; BRICS countries; EU trade |
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## INTRODUCTION

International trade is more and more intensive despite the progressing mobility of production factors, pandemics as well as conflicts destroying traditional ties and transportation roads. However, trade's characteristics, especially its material structure and geographic pattern, have changed. Nowadays, trade includes not only the exchange of goods differing by their material characteristics and purpose (compliments) but also similar goods (substitutes). Simultaneous exports and imports of goods stemming from the same industry in bilateral trade is called intra-industry trade (IIT).

Countries conducting IIT are usually developed and have similar economic structures with expanded manufacturing industries producing a big array of goods that are imperfect substitutes. Citizens of these countries have a similar level of wealth. However, with the continuing process of catching up, more and more new industrialised countries begin to participate in this type of trade.

The main research objective was to identify patterns of world IIT during the turbulent period 2000-2022. This period includes global slowdown after attack on World Trade Centre (2001-2002), global prosperity and intensive internationalisation known as 'hyper-globalisation' (2002-2008), global financial (2008) and economic (2009) crisis, post-crisis economic rebound (2010), stagnation or moderate growth period (2010-2019), pandemic (2020-2021), and escalation of war in Ukraine (2022). The article includes studies on intra-industry trade of selected countries and groups of countries, as well as an analysis of the world and the EU average of two-way trade. In general, the large geographical coverage limits the detail of our research, and this is why we did not analyse IIT in individual industries. We realise that our study does not answer the questions concerning factors shaping IIT or detailed tendencies in IIT. However, it gives a worldwide view of IIT. We intentionally accepted this trade-off.

We considered IIT of the main participants of world trade, especially the biggest and intensively trading developed countries from the group G7 (the United States, Canada, France, Germany, Italy, the United Kingdom, Japan), as well as the EU members from outside of the G7 differing in respect of economic advancement, potential and level of citizens' welfare. We looked at IIT of important developing challengers gathered in BRICS (Brazil, China, India, Russia, South Africa). To give a picture of global IIT, we supplemented our analysis with information about the IIT of countries representing all inhabited continents and having different characteristics.

Our research covers a relatively long period of 23 years (2000-2022). In our opinion, it is enough to show the tendency of IIT development. We expect the most developed countries to be especially intensive IIT participants, whereas the developing countries are generally expected to have IIT below the world average. However, we believe that some developing countries show a tendency to increase their IIT shares over time.

The novelty of this article is to analyse the intensity of IIT for selected country-pairs (bilateral trade) from the whole world and also the world as well as the EU average, for more than twenty years. To our best knowledge, there has been no such extended analysis of the world IIT conducted for so long and eventful period so far. To fill this gap, our research focuses on seeking answers to the following research questions:

**RQ1:** What were the patterns of world intra-industry trade in the turbulent period 2000-2022?

**RQ2:** What are the differences between the intensity of IIT of developed countries with various characteristics, and how have they changed over time?

**RQ3:** What were the differences between the intensity of IIT of developed and developing countries?

**RQ4:** What are the recommendations for the industrial policy of developing countries in the context of their IIT?

Moreover, we selected groups of countries differently from the major authors. We based our selection not only on economic but also political criteria. Specifically, we compared IIT shares of G7 and BRICS countries as well as respective shares of selected countries from all inhabited continents. The only traditional group in our research was the EU. We juxtaposed the IIT shares of all the mentioned countries and groups of countries with the world average IIT shares.

This article proceeds as follows. Section 2 reviews the literature on intra-industry trade. We pay a lot of attention to the most complex analyses and to the newest ones. We also discuss the pioneering works as well as unusual results and settings. We stress the limited research framework of the majority of analyses. Section 3 describes our research methodology. Section 4 presents and discusses the study's results. We compare and discuss the IIT shares of countries and groups of countries with the world or the EU average. We separately analyse the IIT shares of G7 and BRICS countries. We supplement this research with an analysis of the EU members' IIT as well as with an analysis of the IIT of selected countries from all inhabited continents. This section is followed by conclusions.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

There are plenty of studies on intra-industry trade in the literature, both theoretical and empirical. For a review of the extensive literature on intra-industry trade in four distinct areas: theory, measurement, empirical evidence and policy aspects, see Aggarwal (2023). For new theoretical models, see, *e.g.*, Afonso *et al.* (2021).

Most empirical studies examine intra-industry trade for a selected industry (*e.g.*, Hoang, 2019; Leitão & Faustino, 2008; Łapińska *et al.*, 2019; Marius-Răzvan & Camelia, 2015; Szczepaniak, 2013; Tayyar, 2024; Türkcan, 2011), several industries (*e.g.*, Brkić, 2018; Brülhart & Elliott, 1999; Globerman & Dean, 1990; Globerman, 1992; Islam, 2018; Khalid, 2023; Kılavuz *et al.*, 2013; Kumar & Ahmed, 2015; Lyu & Blandford, 2019; Molendowski, 2006; Porto & Costa, 1999; Rossini & Burattoni, 1999; Zapata *et al.*, 2023), or all industries (*e.g.*, ten main sections of SITC classification: Harfi & Montet, 1999; Kol & Kuijpers, 1999; Kumar & Ahmed, 2015; Özçalık *et al.*, 2021; Sarris *et al.*, 1999; Smeets, 1999; Souguir, 2024; Yong & others, 2015) in different periods. Industry indicators are usually calculated for the total trade of a country or of a group of countries (Brülhart & Elliott, 1999; Globerman & Dean, 1990; Harfi & Montet, 1999; Hoang, 2019; Kılavuz *et al.*, 2013; Kol & Kuijpers, 1999; Leitão & Faustino, 2008; Lyu & Blandford, 2019; Łapińska *et al.*, 2019; Özçalık *et al.*, 2021; Porto & Costa, 1999; Rossini & Burattoni, 1999; Sarris *et al.*, 1999; Smeets, 1999; Souguir, 2024; Szczepaniak, 2013; Tayyar, 2024; Türkcan, 2011) or for bilateral trade of selected countries (Brkić, 2018; Globerman, 1992; Islam, 2018; Khalid, 2023; Kılavuz *et al.*, 2013; Kumar & Ahmed, 2015; Łapińska *et al.*, 2019; Marius-Răzvan & Camelia, 2015; Türkcan, 2011; Yong & others, 2015; Zapata *et al.*, 2023).

There are far fewer studies that analyse total intra-industry trade. In this case, scholars most often calculate the Grubel-Lloyd index for bilateral trade between selected countries (*e.g.*, China with 50 countries: Zhang *et al.*, 2005; EU with its main partners: Bernatonytė & Normantienė, 2007; United States with Canada and Mexico: Ekanayake *et al.*, 2009; Germany and France with ten largest trade partners, China and seven Eastern European countries: Ito & Okubo, 2011; Bosnia and Herzegovina with Croatia: Brkić, 2018; Indonesia with RCEP countries: Handoyo & Syahnie, 2020; China with the top ten EU 28 members: Souguir, 2024), or between a country and an integration grouping or a group of countries (*e.g.*, the Netherlands with EC6: Kol & Kuijpers, 1999; Greece with EU12 and non-EU12: Sarris *et al.*, 1999; Germany with EU12, EU6, the rest of Europe and the rest of world: Smeets, 1999; CEFTA countries with the EU: Molendowski, 2006; Portugal with the EU15: Leitão & Faustino, 2008; United States with NAFTA: Ekanayake *et al.*, 2009; an intraregional trade of EU15 countries and 13 East Asian countries: Kang, 2011; new member states of the EU with EU15 and EU10: Molendowski & Polan, 2013; 55 countries with developed and developing economies: WTO, 2013; new member states with EU15 and among new member states: Czarny & Śledziewska, 2016; V4 countries with EU12, EU14 and the 26 biggest non-EU partners: Toporowski, 2017; Croatia with the 24 most important trade partners: Jošić & Žmuk, 2020; 8 CEEC with the EU, CEFTA and other RTAs: Zaninović, 2022; China with the EU28: Souguir, 2024). There are fewer works containing an analysis of total intra-industry trade of selected countries with all their trading partners (*e.g.*, 11 EU trading entities: Brülhart & Elliott, 1999; France: Harfi & Montet, 1999; Portugal: Porto & Costa, 1999; Greece: Sarris *et al.*, 1999; Germany: Smeets, 1999; China: Deese, 2017; Zhang *et al.*, 2005; Lithuania: Bernatonytė & Normantienė, 2007; 214 countries in 2006: Brülhart, 2008; 55 countries: WTO, 2013; 5 countries with the largest and smallest values for IIT index: Soo, 2016). In the last

years, there have appeared more and more articles on the IIT of developing countries. Besides the works mentioned before, let us also note the article by Saparamadu and Weerasinghe (2021) studying Sri Lanka's IIT with 3 South Asian countries (India, Pakistan, Bangladesh), as well as Agarwal and Betai (2021) discussing India's IIT with 15 most significant trade partners. These articles bring valuable development policy recommendations. In turn, there are only a few articles in the literature on intra-industry concerning world trade flows.

Brülhart (2008) conducted a study of global intra-industry trade for the longest time period. He calculated the Grubel-Lloyd index for the period 1962-2006 and based on trade data from the WITS database and the COMTRADE database. Because the range of countries was not uniform from 1962 to 2006, he established a list of 56 countries that have reported trade data in at least 40 of the 45 sample years. For this dataset, he retained only data reported by importing countries. Furthermore, he established a second dataset using data from exporters to fill in as many gaps as possible in the import data for the four sample years: 1962, 1975, 1990 and 2006. Consequently, a dataset for 1962 covered trade flows for 177 countries and for 2006 – for 214 countries. In this way, Brülhart incorporated many low-income countries into the analysis. Brülhart conducted his calculations mainly at the 5-digit level of the SITC classification, and for comparison, some IIT calculations at the SITC 3-digit level. His research illustrates that, regardless of the level of categorical aggregation, global IIT showed a secular upward trend that stabilised in the mid-1990s. Based on the smaller countries sample, he calculated that in 1962, intra-industry trade accounted for only about 10% of world trade at the 5-digit level of the SITC classification and about 25% at the SITC 3-digit level. The results obtained for the second dataset were lower – in the last analysed year, 27% of world trade flows were intra-industry at the 5-digit level (44% at the 3-digit level). The reason for this discrepancy is that the first dataset did not include the lowest-income countries. Brülhart also calculated IIT, *e.g.*, by income group, by product group, by SITC sector, by countries, with world regions, etc. He concluded that the upward trend in IIT suggests a process of world-wide structural convergence: economies are becoming more similar over time in terms of their sectoral compositions.

Brülhart's work (2008) is a background contribution to the World Bank's World Development Report (2009). The report focuses on IIT by world region and by product group, both at the 3-digit level, and by income group (at the 5-digit level). It indicates that in 2006, within-region, intra-industry trade was low in most regions and high in a few (North America, Australia and New Zealand, Western Europe and East Asia). The IIT trade consisted of primary, intermediate, and final goods, with all having increased considerably in the years 1962-2006. Throughout the period analysed, the highest share of intra-industry trade occurred for intermediate products. The second place went to intra-industry trade in final products, and the last one to primary products. The report highlights that global IIT is no longer confined to rich countries. In the 1960s and 1970s, intra-industry trade surged between high-income countries. However, in the beginning of the 1980s, IIT between medium- and high-income countries expanded and later the same process was visible between other categories of countries. This was due to lower transport and communication costs, changes in the composition of goods traded, as well as the love of variety by consumers (users).

Global intra-industry trade in the twenty-first century was analysed by Czarny and Śledziewska (2012) as well as by Emlinger and Piton (2014). The first study deals with intra-industry trade during the 2008-2010 crisis, with the year 2000 as a reference point. The authors conducted the analysis using COMTRADE data at the 6-digit HS code level. Czarny and Śledziewska pointed out that in 2000, IIT accounted for more than a third of world trade (the share was even higher among developed countries, but lower among developing and transformation countries). In 2008, the share of IIT in world trade and in all three groups of countries decreased compared to their values in 2000. The global IIT shares declined by more than 4 percentage points (p.p.) during the period specified. In the following two years, declines in the share of intra-industry trade in world trade did not exceed 1 p.p. compared to the year in which the crisis began. In addition to global intra-industry trade, Czarny and Śledziewska (2012) analysed the IIT shares in the commodity exchange of groups of countries with different levels of development with particular groups of partners, as well as the IIT of the EU, the euro area and

Poland with the world and with different partner groups. The analysis was not limited to total intra-industry trade, but it was conducted for horizontal and vertical trade as well.

The article by Emlinger and Piton (2014) covers a greater number of years than the book of Czarny and Śledziewska (2012). Emlinger and Piton (2014) studied world trade using a new database built on a harmonised version of Trade Unit Values, CEPII's database providing a world trade matrix of unit values for more than 230 countries and 5 100 products over the period 2000-2012. In their database, each flow was associated with a trade type (one-way trade, intra-industry trade in similar products or in differentiated products). The article shows that world trade is still mainly inter-industry. Over the period 2000-2012, along with the increasing role of developing countries in international trade, the share of intra-industry trade in global turnover decreased from approximately 30% to 23%. During the analysed period, there was also a decline in the share of IIT in vertically differentiated products. Moreover, their article indicates that intra-industry trade took place mainly between countries that were generally close, either economically or geographically (*e.g.*, France and Germany), and inter-industry trade was typical for remote trading partners or partners characterised by large differences in factor endowments (*e.g.*, the United States and China).

However, the literature lacks an analysis of global intra-industry trade in the second and early third decades of the twenty-first century, a period of many changes in the global economy such as growing protectionist tendencies in trade, epitomised, among others, by the trade war between the US and China under the first Trump presidency, the COVID-19 pandemic, Brexit, or Russia's armed attack on Ukraine. Global financial and economic crisis, coronacrisis (2020), rising protectionism, geopolitical tensions, and anti-globalisation sentiment contributed to the slowdown of globalisation ('slowbalisation'), which can hamper the IIT's development. Thus, it is justified to check whether it is true or false.

Studies of global intra-industry trade in the literature end in 2012. The same is true for analyses of individual countries' intra-industry trade with all trading partners, which were conducted until around the middle of the second decade of the twenty-first century. More recent studies of intra-industry trade are limited to the analysis of the intra-industry trade of individual countries with selected trading partners or for selected industries.

Based on the literature review, we formulated the following hypotheses:

**H1:** In a period of many changes in the global economy world intra-industry trade is subject to fluctuations.

**H2:** The most developed countries are intensive IIT participants.

**H3:** The developing countries have IIT intensity below the world average, but some developing countries show a tendency to increase their IIT shares over time.

## RESEARCH METHODOLOGY

We calculated Grubel-Lloyd (GL) indices based on values of exports and imports derived from the WITS-COMTRADE database. We chose the COMTRADE database because it covers the whole world. We realise that sometimes the data presented there are less accurate than in the Comext databases (there are more gaps in the COMTRADE database than in the Comext dataset), which in turn are limited by the number of countries for which data are available. Furthermore, the COMTRADE database is one of the most prestigious and reliable sources of statistics, which confirms the right of our choice. As statistics for the quantity of exports (imports) are shaky and the problem of missing data is more serious than in the case of statistics measuring the value of trade, especially for developing countries, we computed only GL indices for total IIT, and we refrain from calculating GL indices for horizontal and vertical IIT. For the same reasons, we did not count GL indices for particular industries. Moreover, we assumed that a proper approximation of industry is a group of products meant as the 6-digit HS code level (WITS-COMTRADE database does not include more disaggregated statistics).

We calculated three types of GL indices. The first one was GL index in bilateral trade (for a selected country-pair) – see formula (1).

$$GL_{ij} = 1 - \frac{\sum_{b=1}^{k} |X_{ijb} - M_{ijb}|}{\sum_{b=1}^{k} (X_{ijb} + M_{ijb})} \quad (1)$$

in which:

$i$ - reporter (reporting country);
$j$ - partner (trading partner);
$b$ - industry (6-digit HS code level);
$k$ - number of industries in total trade (trade of all products);
$GL_{ij}$ - Grubel-Lloyd index in bilateral trade between country $i$ and country $j$;
$X_{ijb}$ - exports from country $i$ to country $j$ of products from industry $b$;
$M_{ijb}$ - imports to country $i$ from country $j$ of products from industry $b$.

The second one is GL index for a selected country, see equation (2).

$$GL_i = 1 - \frac{\sum_{j=1}^{n} \sum_{b=1}^{k} |X_{ijb} - M_{ijb}|}{\sum_{j=1}^{n} \sum_{b=1}^{k} (X_{ijb} + M_{ijb})} \quad (2)$$

in which:

$i$ - reporter (trading country);
$j$ - partner (trading partner);
$n$ - number of trading partners;
$b$ - industry (6-digit HS code level);
$k$ - number of industries in total trade (trade of all products);
$GL_i$ - Grubel-Lloyd index for country $i$;
$X_{ijb}$ - exports from country $i$ to country $j$ of products belonging to industry $b$;
$M_{ijb}$ - imports to country $i$ from country $j$ of products belonging to industry $b$.

The third one is GL index for the world – see formula (3). Using the corresponding formula, we also calculated GL index for the EU (the reporters are limited to the EU member states). Table 1 presents the number of reporters ($m$) used in calculating $GL_{world}$.

$$GL_{world} = 1 - \frac{\sum_{i=1}^{m} \sum_{j=1}^{n} \sum_{b=1}^{k} |X_{ijb} - M_{ijb}|}{\sum_{i=1}^{m} \sum_{j=1}^{n} \sum_{b=1}^{k} (X_{ijb} + M_{ijb})} \quad (3)$$

in which:

$i$ - reporter (trading country);
$m$ - number of reporters (trading countries);
$j$ - partner (trading partner);
$n$ - number of partners (trading partners);
$b$ - industry (6-digit HS code level);
$k$ - number of industries in total trade (trade of all products);
$GL_{world}$ - Grubel-Lloyd index for the world;
$X_{ijb}$ - exports from country $i$ to country $j$ of products belonging to industry $b$;
$M_{ijb}$ - imports to country $i$ from country $j$ of products belonging to industry $b$.

**Table 1. Number of reporters during 2000-2022**

| Year | $m$ | Year | $m$ | Year | $m$ | Year | $m$ |
|---|---|---|---|---|---|---|---|
| 2000 | 137 | 2006 | 158 | 2012 | 170 | 2018 | 171 |
| 2001 | 142 | 2007 | 165 | 2013 | 170 | 2019 | 166 |
| 2002 | 147 | 2008 | 164 | 2014 | 157 | 2020 | 163 |
| 2003 | 153 | 2009 | 168 | 2015 | 167 | 2021 | 162 |
| 2004 | 152 | 2010 | 170 | 2016 | 172 | 2022 | 143 |
| 2005 | 159 | 2011 | 167 | 2017 | 173 | | |

Source: own study based on Comtrade database https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 15 May 2024.

The number of reporters varies over time, but in all years, all developed countries and the majority of developing countries are included. Gaps in statistics usually refer to island countries in the Pacific or in the Caribbean Sea, and also to some African countries, especially those touched by war. There is also missing data from countries with dictatorial rules.

## RESULTS AND DISCUSSION

### World Intra-industry Trade

World trade is still mainly inter-industry. In 2000, intra-industry trade accounted for about 32% of world trade and in 2022 for about 29% (Figure 1). Our results are compatible with the results of Emlinger and Piton (2014) and with the outcomes presented by Czarny and Śledziewska (2012).

Despite the turbulent changes occurring in the analysed period, including 'hyper-globalisation,' global financial and economic crisis, 'slowbalisation' and pandemic, the share of intra-industry trade remained quite stable (3 p.p. decrease over more than two decades). The IIT has reached its peak in the year 2001 (33%) and further decreased till 2012-2013 (26%), which we can see as a result of smaller purchases, especially in international space during and after the economic crisis. Next, it has increased to 30% in the years 2017-2020 and finally declined by 1 p.p.

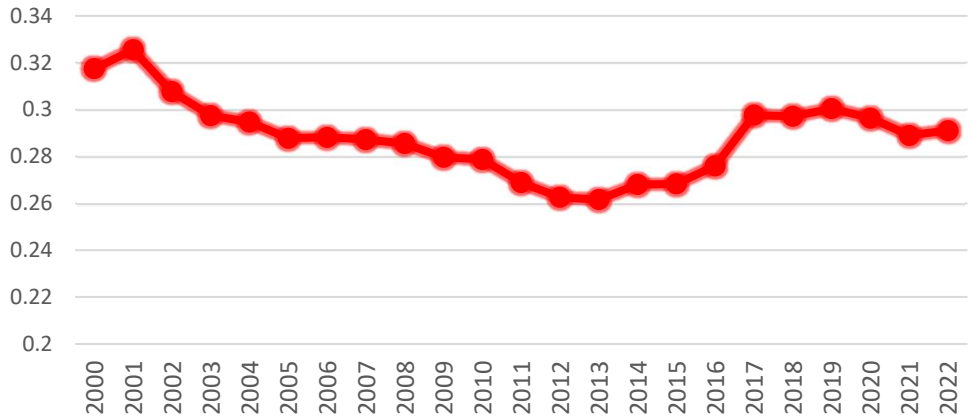


**Figure 1. Intra-industry trade: World average**
Source: own elaboration based on Comtrade database, https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 15 May 2024.

### Intra-industry Trade of The G7 Members

Nowadays, the G7 countries account for about 28% of global exports and for ca. 34% of imports of goods, which confirms that this bloc plays a significant role in the world trade. Thus, it was worth examining the total IIT of G7 countries and bilateral IIT between pair of group members. We were especially interested in this group as researchers overlook IIT of its members.

As expected, the majority of G7 members reveals very intensive IIT with the maximal value of 43% (Canada, 2002) and the minimal one of 24% (2012, Japan – see Figure 2). In the years 2004-2013, France had the highest IIT shares. In the years 2014-2015, Canada reached the same shares as France. In 2015, Germany also reached France's level. Before 2004, the leader was Canada (in 2001 with the same share as France), and since 2016, it has been Germany. Generally, during the analysed period three mentioned states (Canada, France, Germany) had significantly more intensive IIT than any other country from this group. It is understandable as they are industrialised, rich, and integrated in RTAs (Germany and France in the EU, Canada in USMCA), which helped them to freely trade with the groupings' partners. At the same time, they have big economic potential, which, however, is not so huge as to make them self-sufficient, as, *e.g.*, the United States.

The case of the United Kingdom is interesting. Until 2009, it was the fourth biggest IIT participant among the G7 members. Referendum on leaving the EU in 2016 has led to only a small decrease in its IIT share: yearly decrease in 2017 was 1 p.p. Deep breakdown (-5 p.p. yearly) came in 2022, which was

the second year of real trade disintegration with the other EU members. This fall in the British IIT share caused the biggest decrease in the whole sample during the analysed period (2000-2022: -10 p.p.). We observed the second biggest drop in the U.S. IIT share (-8 p.p.).

U.S. IIT shares achieved in the years 2001-2004, 2006, 2008-2009, 2011, 2015 the levels equal to the world average. In 2000, American IIT share was by 2 p.p. higher (34%), and after 2015 constantly lower than the global shares, which confirms a high extent of self-sufficiency of the USA. After 2015, the USA remained the G7 member with the lowest IIT share, replacing Japan in this position.

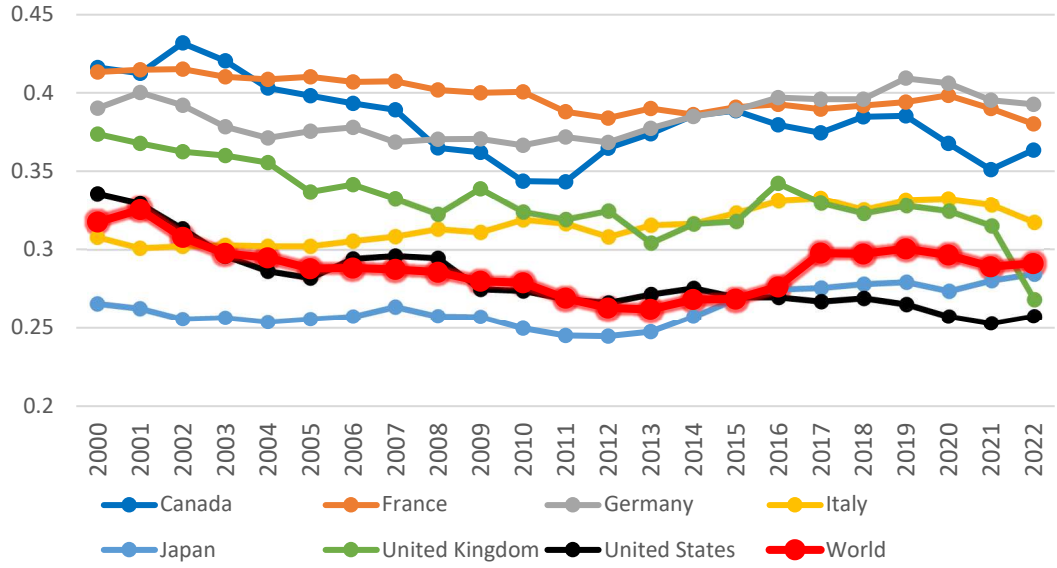


**Figure 2. Intra-industry trade of G7 states**
Source: own elaboration based on Comtrade database, https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 15 May 2024

We attribute relatively low IIT shares of Japan to loose links to RTAs with similar economic potential and its specialisation in technologically advanced goods (mainly electric and electronic devices, pharmaceuticals, (Czarny *et al*., 2023, pp. 30-31)) sold abroad in exchange for less technologically advanced goods. Interestingly, only Japan and Italy had higher IIT shares in the last year of research than in the first one, even if they are among G7 members with rather low IIT shares. It means that they have intensified their IIT. In the case of Japan, IIT intensification is probably going hand in hand with involvement in RTAs.

As far as bilateral IIT between G7 members is concerned (Table 1), unsurprisingly, we observed the highest shares in trade of the EU members (France, Germany, Italy). They reached or exceeded 50% of their total bilateral turnover. Surprisingly, bilateral IIT between Canada and the USA, representing USMCA was not much lower. In both years of research (2000, 2022), its shares were equal 46% despite the fact that USMCA was less deeply integrated than the EU.

The United Kingdom has lost a lot of its IIT intensity after the EU exit. Its IIT shares in trade with all G7 members but Japan were in 2022 noticeably lower than in 2000. In the case of IIT, the UK's expectations of a trade boom in the transatlantic area have failed. Simultaneously, it has lost part of its IIT connections with the main EU partners. In our opinion, this decrease in IIT intensity will probably continue as traditional trade ties with the EU members will weaken.

### Intra-industry Trade of Selected EU Member States

The next analysed group were the EU members. We chose countries with the highest trade potential (France, Germany, Italy) as well as three countries joining the EU in 2004 (Czechia, Poland, Slovakia). We completed the sample with Sweden – a rich and developed EU member with a peripheral location. These seven EU members are important for world trade. Their joint share in global exports and imports reached almost 16%. We compared their IIT shares with the EU average (Figure 3). Interestingly, the EU average stays stable throughout the whole analysed period.

**Table 2. Bilateral intra-industry trade between G7 countries**

| Reporter | Partner | 2000 | 2022 | Reporter | Partner | 2000 | 2022 |
|---|---|---|---|---|---|---|---|
| Canada | France | 0.23 | 0.25 | Japan | Canada | 0.14 | 0.10 |
| | Germany | 0.18 | 0.14 | | France | 0.21 | 0.23 |
| | Italy | 0.13 | 0.12 | | Germany | 0.29 | 0.37 |
| | Japan | 0.06 | 0.08 | | Italy | 0.19 | 0.21 |
| | UK | 0.26 | 0.11 | | UK | 0.23 | 0.31 |
| | US | 0.46 | 0.46 | | US | 0.32 | 0.29 |
| France | Canada | 0.26 | 0.29 | UK | Canada | 0.30 | 0.17 |
| | Germany | 0.56 | 0.55 | | France | 0.46 | 0.41 |
| | Italy | 0.44 | 0.45 | | Germany | 0.53 | 0.40 |
| | Japan | 0.18 | 0.26 | | Italy | 0.37 | 0.29 |
| | UK | 0.50 | 0.44 | | Japan | 0.17 | 0.29 |
| | US | 0.44 | 0.43 | | US | 0.50 | 0.47 |
| Germany | Canada | 0.24 | 0.28 | US | Canada | 0.46 | 0.45 |
| | France | 0.57 | 0.50 | | France | 0.42 | 0.32 |
| | Italy | 0.38 | 0.47 | | Germany | 0.41 | 0.37 |
| | Japan | 0.30 | 0.42 | | Italy | 0.27 | 0.19 |
| | UK | 0.49 | 0.42 | | Japan | 0.28 | 0.26 |
| | US | 0.45 | 0.45 | | UK | 0.49 | 0.44 |
| Italy | Canada | 0.12 | 0.10 | | | | |
| | France | 0.44 | 0.41 | | | | |
| | Germany | 0.40 | 0.45 | | | | |
| | Japan | 0.18 | 0.23 | | | | |
| | UK | 0.36 | 0.27 | | | | |
| | US | 0.26 | 0.21 | | | | |

Source: own study based on Comtrade database, https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 15 May 2024.

France and Germany had the highest IIT-levels, which have swapped places during the analysed period: the leader, France, has given way to runner-up Germany to take the runner-up position behind them. Only these two countries constantly reach IIT shares exceeding the EU average, which proves their significant position in the EU IIT. Moreover, these countries display the highest shares in global exports and imports in the sample (Germany about 6% and France ca. 3%).

Czechia had the third-highest IIT share, with stable shares ranging from 36% (2000-2009, 2015-2019) to 34% (2022). It makes Czechia the most successful new EU member in respect of IIT development. It also proves Czechia's advancement in the production of manufactures, which are differentiated goods, some of them technologically advanced.

The remaining four countries (Italy, Poland, Slovakia, and Sweden) had considerably lower IIT shares. All of them were far below the EU average. Italy's IIT shares were relatively stable, whereas the Polish ones showed the most fluctuations. One can explain Poland's and Slovakia's low IIT shares with their relatively lower level of development and smaller potential to exchange substitutes with the highly developed partners (especially those gathered in the EU). Regarding Sweden, the reason for its poor IIT participation might be its peripheral location.

The next part of our analysis compares IIT shares of the selected EU members with IIT shares of the United Kingdom (Figure 4). We checked whether the decision about leaving the EU and then the actual exit from the grouping influenced British IIT shares in trade with the EU members. We expected that it had as the EU is deeply integrated and developed. Its members are intensively trading with substitutes, and IIT is especially sensitive to trade barriers.

In the first year of research (2000), the UK achieved the third-highest IIT share in the EU (37%), placing it behind France and Germany. This share went continuously down till 2008 (32%) and then

fluctuated between 30% (2013) and 34% (2016) before dropping to 27% in 2022. We attributed this last decline to a real change in the rules of trade between the EU and the UK.

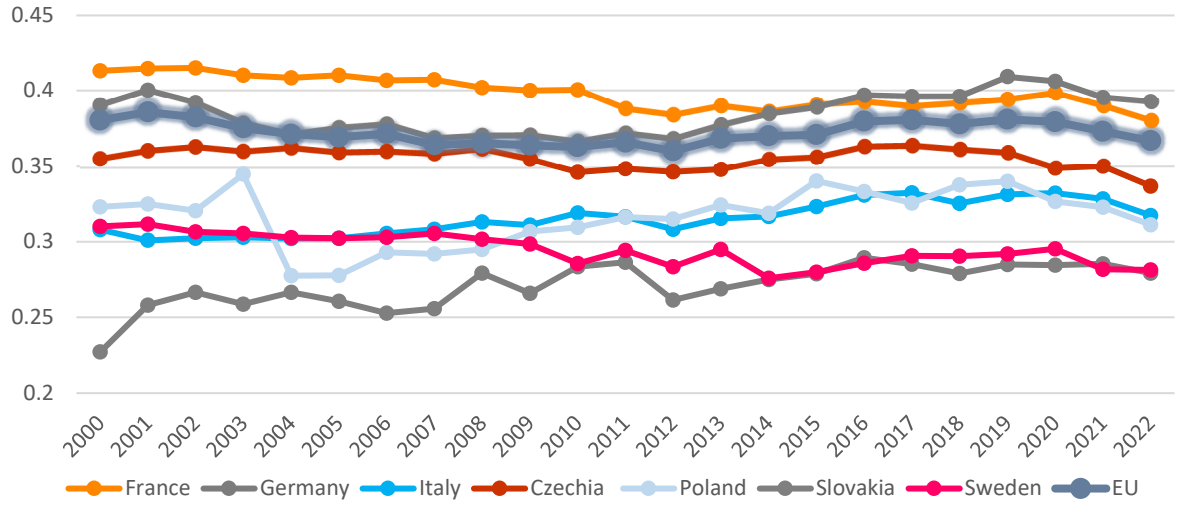


**Figure 3. Intra-industry trade of selected EU Member States**
Source: own elaboration based on Comtrade database,
https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 15 May 2024.

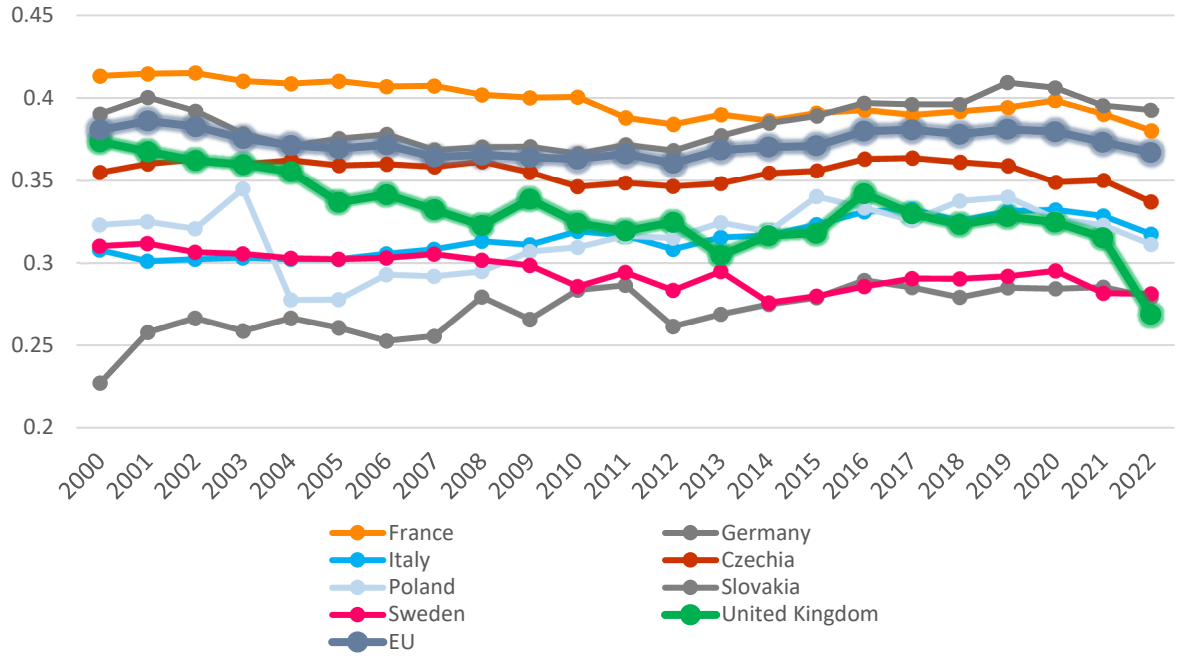


**Figure 4. Intra-industry trade of selected EU Member States with reference to the United Kingdom and the EU average**
Source: own elaboration based on WITS-COMTRADE database,
https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 15 May 2024.

### Intra-industry Trade of the BRICS Countries

Let us now look at IIT of the BRICS members. They are still developing countries, but they have big economic, political, and population potential as mirrored in more and more active participation in global trade. They account for 20% of global exports and for 16% of global imports of goods.

The BRICS countries constantly reveal much lower IIT shares than the world average and all the more lower than the EU average (Figure 5). Brazil had the highest share in the dominant part of the analysed period, with the peak value of 22% in the crisis year 2008, which seems to be connected with its intensive trade in the framework of MERCOSUR. In the years 2003-2017, its shares were higher than those of China (in 2014, the respective shares of both countries were equal). However, at the beginning of the analysed period (2000-2002) and in the last years (2019-2022), China had the highest shares in the group. It might be the result of an increase in its participation in global exports of the most technologically advanced goods. For example, in 2021, telecommunication equipment and parts thereof constituted over 20% of global exports of these goods, cathode valves and tubes over 19%, and automatic data processing machines also over 19% (Czarny *et al*., 2023, pp. 30-31). GL indices for China were higher than those presented by Deese (2017) who calculated them at the HS8 level. However, the general tendency as the same, decrease in years 2000-2013 and slight increase after 2013.

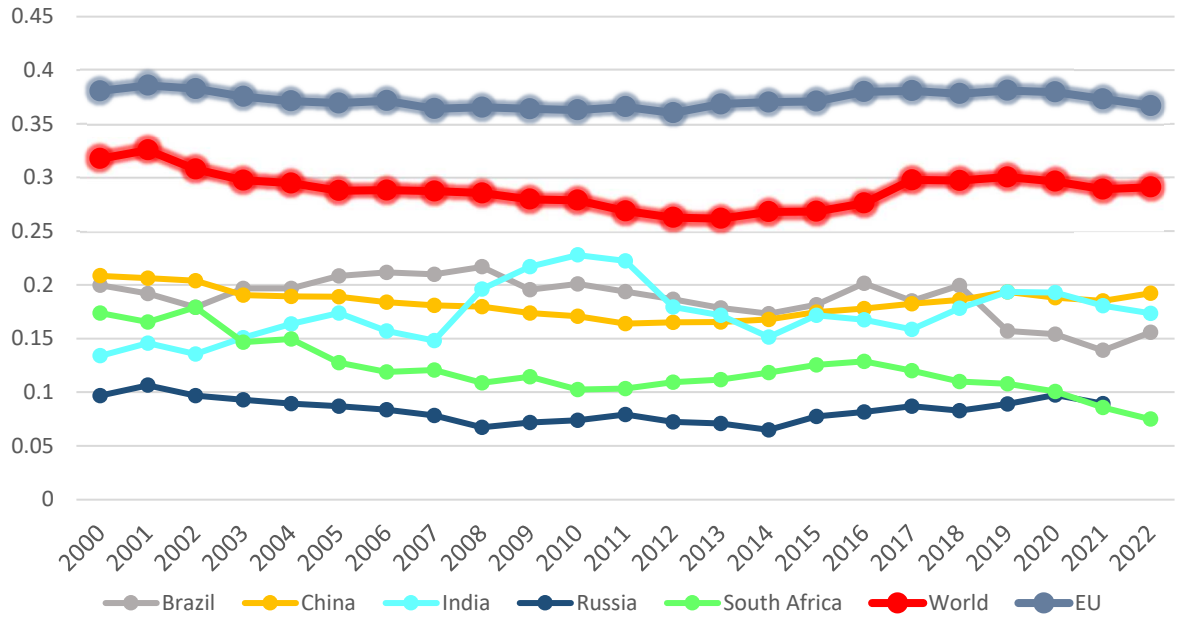


**Figure 5. Intra-industry trade of BRICS-countries**
Note: In the case of Russia, there was no data for 2022. Thus, we did not calculate the indicator of IIT.
Source: own elaboration based on Comtrade database,
https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 5 May 2024.

Increase in IIT shares of the BRICS members found confirmation only in the case of India: its IIT share increased during the years 2000-2022 by 4 p.p. from 13% to 17%. India had also reached the highest overall IIT share in the group: 23% in 2010. Moreover, it recorded an increase in IIT shares during the economic crisis and immediately afterwards (2008-2010). India's current improvement in IIT might be a consequence of its participation in GVCs and an increase in exports of the most technologically advanced products.

In the case of Brazil, we noticed a visible drop in IIT shares during and after the pandemic. South Africa experienced a constant decrease in IIT shares since 2016. In the years 2016-2022, its shares dropped by 6 p.p. from 13% to 7%.

Generally, BRICS countries remain masters of inter-industry trade, mainly specialised in the production of raw-material and labour-intensive goods. IIT shares have exceeded 20% only in the case of Brazil (2000, 2003-2010, 2016, 2018) and India (2008-2011). As mentioned, it was probably due to their participation in trade with developed countries and in international production. Let us also note the relatively big IIT shares of both mentioned countries during the financial crisis (2008) and the global trade collapse (2009). It looks like they became more attractive partners than in good times. Russia had the lowest IIT shares in the sample, with the highest value of 11% achieved in the

year 2001 and the lowest value of 7% in the years of crisis (2008-2010). It is not surprising, given that its exports consist mainly of fuel and raw materials. Since the start of the war with Ukraine (2022), Russia's data concerning IIT has been missing.

**Intra-industry Trade of Selected Developing Countries from Latin America, Asia, and Africa**

For further investigation, we chose a few economically and politically significant developing countries from all inhabited continents. We discuss their IIT shares and make comparisons with the world and the EU average, as well as with the results of selected G7 or BRICS members.

Latin American countries whose IIT shares we investigated were Argentina, Chile, Cuba, Mexico, Uruguay, and Venezuela (Figure 6). We compared their IIT shares with the respective shares of Brazil, which is a member of BRICS. The analysed countries did not participate in the IIT intensively. The exception was Mexico. Its IIT shares were in the first years of investigation comparable with the EU average and in the year 2000 even by 2 p.p. higher. Afterwards, these shares decreased considerably and by the end of the analysed period reached a value of 29%. It was by 11 p.p. lower than in 2000.

For most of the time, Argentina had the second-highest IIT shares, which Uruguay overtook only in the years 2000-2001. Argentina's IIT was generally more intensive than that of Brazil and, in many years, comparable with the world average but significantly lower than the Mexican one. In the years 2012-2013, it was even slightly above the world average. It means that Mexico and Argentina were relatively nearer in respect of IIT to the developed countries than any other country from this sample. For Mexico, its free trade and international production cooperation in the USMCA are important. Argentina enjoys free trade in MERCOSUR.

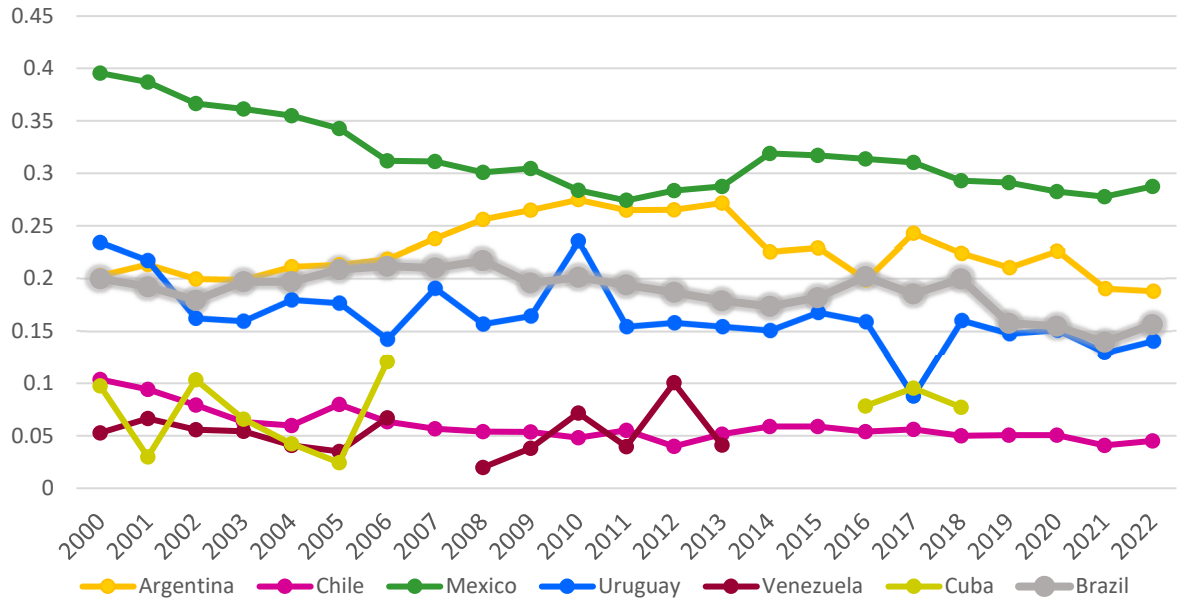


**Figure 6. Intra-industry trade of selected developing countries from Latin America**
Note: For Cuba and Venezuela, data were available only for selected years.
Source: own elaboration based on Comtrade database,
https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 15 May 2024

The cases of Cuba and Venezuela are interesting. They had very low IIT shares. Cuba achieved the highest value of 12% in 2006, and Venezuela 10% in 2012 (the lowest values were in both countries 2% – for Cuba in 2005 and for Venezuela in 2008). Both countries have incomplete data about IIT in the analysed period, visible as discontinuous lines in Figure 6. The dictatorship in political life goes in their case together with limping cooperation with international statistical agencies.

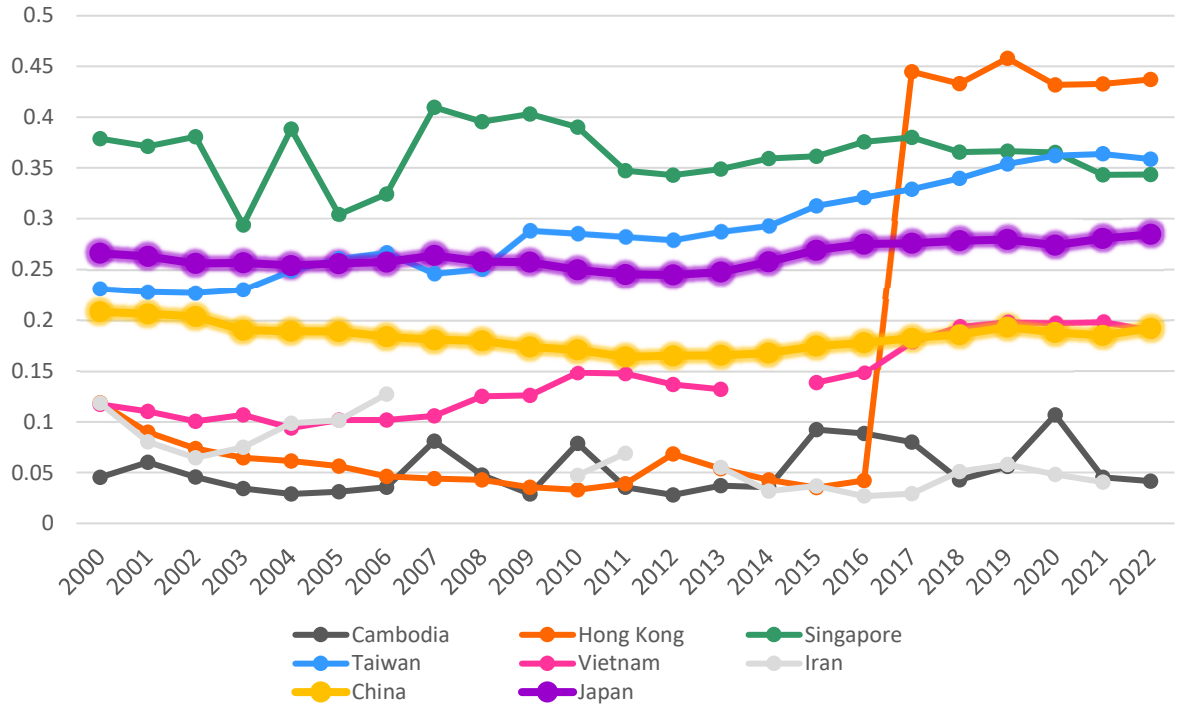


**Figure 7. Intra-industry trade of selected developing countries from Asia**
Note: In the case of Iran, data was available only for selected years, and for Vietnam, there was no data for 2014.
Source: own elaboration based on Comtrade database,
https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 15 May 2024

As representatives of Asia, we chose Cambodia, Hong Kong, Iran, Singapore, Taiwan, and Vietnam (Figure 7). We compared their IIT shares with the respective shares of Japan as the Asian most developed country with the constantly lowest IIT shares among G7 members, as well as with IIT shares of China – a BRICS member with relatively high IIT shares and the leader of the world exports.

The weakest participants in IIT in this sample were Iran with the highest share 13% in the year 2006 and Cambodia with the highest share of 11% in 2020; the respective lowest values were: 3% in 2013, 2016-2017 in Iran and in 2003-2004, 2009, and 1012 in Cambodia. In both of them, at the end of the analysed period, we observed a decreasing tendency for these shares.

At the other extreme were Singapore and Taiwan. They participated in IIT relatively intensively. Throughout the dominant part of the analysed period, Singapore had the highest and relatively stable IIT shares. Hong Kong overtook it in 2016 and Taiwan in 2021. Singapore's IIT shares fluctuated between 29% in 2003 and 41% in 2007. It achieved the share of 40% in the years 2008-2009, which proves its intensive participation in IIT during the financial and economic crisis. Singapore's IIT shares were higher than those of Japan and China throughout the whole analysed period. It seems to confirm the high quality/price ratio of its goods. However, during the whole period, Singapore recorded a 4 p.p. fall in the IIT shares from 38% in 2000 to 34% in 2022.

Hong Kong started with a very poor participation in IIT. In 2000, its IIT share was equal to 12%. In 2017, Hong Kong made a jump in IIT share from 4% in 2016 to 44% in 2017. Afterwards, it stayed stable on the new level (2022 – 44%). In 2017, it became the sample leader and remained in this position till the last year of research.

An interesting case is Vietnam, which we may see as an example of successful catching up. Its IIT share increased by 7-8 p.p. from 12% in 2000 to 20% in 2019-2020 and 19% in 2022. It means that Vietnam has managed to produce and sell abroad more advanced (differentiated) goods.

Angola, Botswana, Cameroon, Senegal, Tunisia, and Morocco represented African countries. We compared them with South Africa, a member of BRICS located in Africa (Figure 8). The first feature of IIT of these countries is that all samples but Botswana had IIT shares lower than 25% and thereby

considerably lower than the world average. Angola constituted a special case. Data for it about IIT was unavailable up to 2008, and afterwards – up to the year 2014 – equalled zero. In effect, we present its IIT in Figure 8 exclusively for the years 2015-2022.

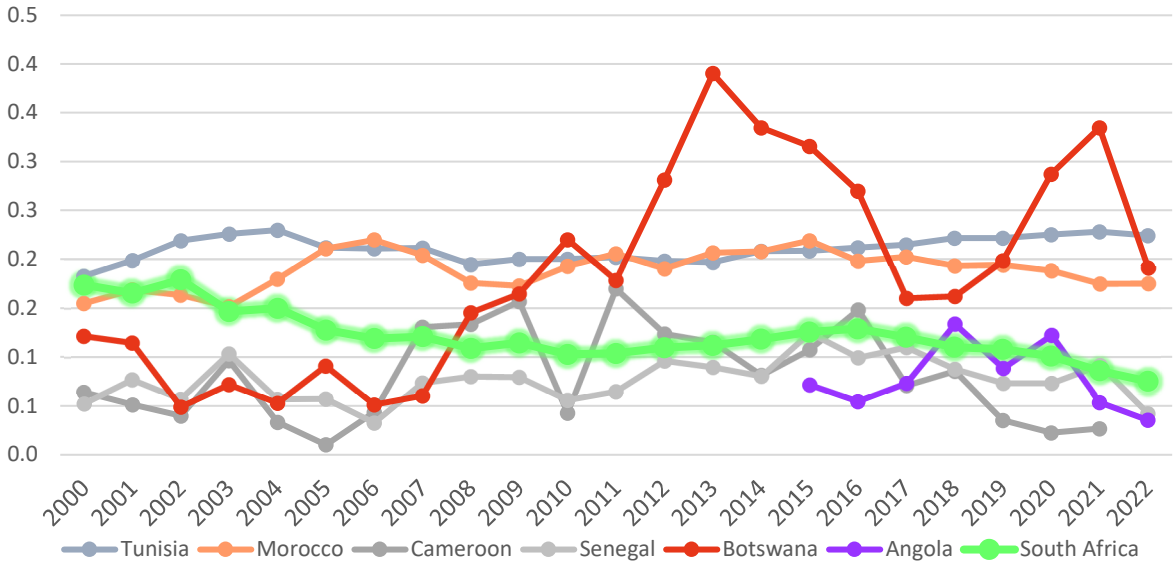


**Figure 8. Intra-industry trade of selected developing countries from Africa**
Note: For Angola, (non-zero) data were available from 2015, and for Cameroon, data were missing for 2022.
Source: own elaboration based on Comtrade database,
https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx accessed on 15 May 2024.

The second feature of IIT shares of African countries was their volatility. Tunisia with a fluctuation range of 5 p.p. was an exception. We observed the biggest fluctuations in the IIT shares of Botswana (34 p.p.). The reason might be relatively small trade volume (besides diamond export) and, consequently, a big impact of a few transactions on the whole result. Tunisia had the highest shares in the dominant part of the analysed period, which Morocco overtook in a few years. Tunisia's IIT shares varied between 23% in 2003-2004 as well as in 2020-2021, and 18% in 2000 (2022 – 22%). Its shares showed a slight tendency to increase. Morocco had the lowest value of 15% in 2003 and the highest (22%) in 2006 and in 2015. Both countries experienced an increase in their IIT shares during the whole period (Tunisia by 4 p.p. and Morocco by 3 p.p.).

GL indices for G7 and other developed countries, as well as for BRICS and other developing countries, were lower than those presented by WTO (2013), which calculated them for the years 1996 and 2011 at the HS4 level. However, the general conclusion is the same. In 2011, industrialised developed economies and rapidly industrialising developing economies tended to engage in more intra-industry trade, whereas resource-rich developing economies and least developed countries. Furthermore, GL indices presented in this article were also lower than those presented by Brülhart (2008), who computed them for the period 1962-2006 at the SITC3 and SITC5 level. However, again, the regularities were similar. The highest GL indices were for high-income countries and the lowest for low-income countries. Middle-income countries were somewhere in between.

## CONCLUSIONS

Similarly to previous studies, we showed that world trade is still mainly inter-industry. In 2000, intra-industry trade accounted for about 32% of world trade and in 2022, for about 29%. The slight decline in IIT shares has been accompanied by an increasing role of developing countries in international trade flows. Our analysis confirmed that the developed countries conduct much more intensive IIT than the rest of the world. This means that we proved hypothesis H2 that the most developed countries are intensive IIT participants.

Developing countries still have not caught up with the developed ones as far as IIT is concerned. Their IIT shares are still much lower than those of developed ones. However, in a few of them, like India or Vietnam, the intensification of IIT is visible. It follows that we also confirmed hypothesis H3 that the developing countries have IIT intensity under the world average, but some developing countries show a tendency to increase their IIT shares over time. Thus, there is a space for industrial policies in developing countries. We recommend more intensive capital inflows into these countries and intensification of their manufacturing production, *e.g.*, in the framework of global value chains.

The problem of measuring the IIT of developing countries is not only their insignificant shares but also the lack of necessary data. We have described it in the cases of Cuba, Venezuela, and Angola, but this is a much more general problem. The political systems of many developing countries and their poor statistical institutions do not allow for collecting and reporting data to international organisations. Sometimes, they just do not collect such data.

During 23 years of our investigation, the world economy changed drastically. The most important change came with progressing digitisation that changed the ways to conduct business, making shopping, and influenced even consumers' preferences. The COVID-19 pandemic caused another change. In effect volume and pattern of international cooperation have evolved. Moving away from globalisation to regionalisation in international production is of special importance. The next factor changing international cooperation is the many conflicts and even wars experienced in the last decades. All these changes seem to have a big impact on IIT and the fact that its shares remained relatively stable in global as well as in national terms. This means that hypothesis H1 is false. This is the most surprising result of our investigation.

This article is an empirical paper. We do not contribute anything to the theory of IIT. A novel theory of IIT could explore how technological advancements and the increasing complexity of production processes influence the exchange of similar goods between countries. This corresponds to our recommendations for policy (focus on technological innovation). In this context, this article can be a starting point for studies on the grounds of IIT.

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## Authors

The contribution share of authors is equal and amounts to ⅓ for each of them.
EC – conceptualisation, discussion, PF – conceptualisation, calculations, AS – literature review, discussion.

**Elżbieta Czarny**
Full Professor at Warsaw School of Economics (Poland). She is employed at the Institute of International Economics. Her research interests include international trade, international production, microeconomics, and economics of digitisation.
**Correspondence to:** Prof. Elżbieta Czarny, Professor, Institute of International Economics, Warsaw School of Economics, al. Niepodległości 162, 02-554 Warszawa, Poland, e-mail: eczary@sgh.waw.pl
**ORCID** https://orcid.org/0000-0003-2124-2140

**Paweł Folfas**
Associate Professor at Warsaw School of Economics (Poland). He is employed at the Institute of International Economics. His research interests include international trade, global value chains and game theory.
**Correspondence to:** Prof. Paweł Folfas, PhD, Institute of International Economics, Warsaw School of Economics, al. Niepodległości 162, 02-554 Warszawa, Poland, e-mail: pfolfa@sgh.waw.pl
**ORCID** https://orcid.org/0000-0002-6052-7125

**Aleksandra Szarek-Piaskowska (corresponding author)**
Assisstant Professor at Warsaw School of Economics (Poland). She is a research fellow and lecturer of the Global Economic Interdependence Department at the Warsaw School of Economics (Poland). She has several years of experience in the consulting industry in the field of EU and national funds, among others, as Deputy Director for Structural Funds. Her research interests include international trade, market information asymmetry, economic integration, innovation of economies and EU funds.
**Correspondence to:** Aleksandra Szarek-Piaskowska, PhD, Global Economic Interdependence Department, World Economy Research Institute, Warsaw School of Economics, al. Niepodległości 162, 02-554 Warszawa, Poland, e-mail: aszare@sgh.waw.pl
**ORCID** https://orcid.org/0000-0002-9553-7761

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# The importance of the market offer in building the international competitiveness of food industry enterprises

**Katarzyna Łukiewska**

**ABSTRACT**

**Objective:** The article aims to determine the importance of the market offer on the international competitiveness of food industry enterprises.

**Research Design & Methods:** The study consisted of several stages. The first one involved a systematic review of the literature on competitiveness, competitive factors, market offerings, and new food trends. In the empirical part, I conducted CATI interviews with representatives of a representative sample of food industry enterprises. At the inference stage, I used descriptive statistics, the Kruskal-Wallis test, the Mann-Whitney test, the multiple comparison test, and box-plot plots.

**Findings:** The original empirical study shows that implementing certain market offer solutions can enhance the international competitiveness of food industry enterprises. Quickly responding to customer signals plays a crucial role in building competitiveness. Solutions such as the development of traditional food, introduction of diversity of the commercial offer, development and popularisation of own brands, creation of a product brand with unique values for the consumer, promotion of local products, and development of functional food will have a high impact.

**Implications & Recommendations:** Identifying factors that contribute to enhancing the competitiveness of food industry enterprises on the market should be useful for managers involved in formulating strategies, including competitive strategies. Implementing appropriate solutions related to shaping the market offer will enable obtaining many benefits (e.g., standing out on the market, increasing the value of the offer, building customer loyalty and satisfaction, increasing demand) and improving competitiveness.

**Contribution & Value Added:** The rapid changes in the environment create undiscovered potential for new opportunities to compete and create a competitive advantage for food entities. From a cognitive and application perspective, an important and insufficiently researched issue is to determine the factors of international competitiveness of these entities. The study fills a research gap in the scope of the importance of an appropriate market offer (especially in the context of new food trends) from the perspective of the competitiveness of food businesses. In the literature, the offer analysis is mainly from the consumer's perspective. The added value of this study lies in the gradation of selected solutions and the assessment of their significance for competitiveness, ranging from very high to very low.

**Article type:** research article

**Keywords:** competitiveness; competitive advantage; food industry; market offer; new food trends

**JEL codes:** L66, F00

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## INTRODUCTION

Interest in competitiveness is related to the ongoing processes of globalisation and internationalisation, and, consequently, more open markets and intensive changes in market rules (Vega *et al*., 2019). In the conducted scientific discourse, various aspects of competitiveness are examined, including competitive potential, strategies and instruments of competition, and competitive results. From the

cognitive and application point of view, an important research problem is to determine the factors that make some entities do well on the market and are competitive, while others do not. Competitiveness factors are dynamic and, as Kuchmieiev (2023) notes, the issue of determining them not only does not lose its importance, but requires a new approach. Rapid changes in global economies and societies are creating new conditions for the functioning and competition of entities. Currently, manufacturing companies are facing new challenges, including unstable demand and changing customer requirements, as well as the rapid development of new technologies (Demartini *et al*., 2018; Boikova *et al*., 2021). This also applies to the food industry. Many authors emphasise that the supply chain has been 'inverted' in this industry. The supply-based approach has changed to a demand-based approach, in which consumers indicate to producers what they want to eat (Boland, 2008; Bigliardi & Galati, 2013; Demartini *et al*., 2018; Matsumoto *et al*., 2020). New models of food consumption and consumer behaviour are emerging, resulting from the interaction of many social, cultural, economic, and environmental factors (Franc & Kujevac, 2021; Hassoun *et al*., 2022). According to Aday and Aday (2020), new nutritional expectations have also emerged due to the increased awareness of food safety and health during the COVID-19 pandemic. On the other hand, emerging technological breakthroughs of industry 4.0 have paved the way for food producers to create a new generation of foodstuffs. The fourth industrial revolution has also revolutionised the way food is produced, transported, and stored worldwide (Marvin *et al*., 2022; Hassoun *et al*., 2024). This creates an unexplored potential for new opportunities for food entities to compete and create a competitive advantage. In the literature, the analysis of food offers and trends are mainly conducted from the perspective of consumer preferences, consumer rationale, environment and sustainable development, as well as the impact of diet on people's functioning and health (*e.g.*, Siegrist & Hartmann, 2020; Topolska, 2021; Siddiqui *et al*., 2022; Alae-Carew, 2022; Magalhaes *et al*., 2023). However, there is a need to better understand the creation of an appropriate market offering (especially in the context of new food trends) from the perspective of the ability of food entities to compete. The identification of the research gap in this area became the premise for undertaking the study.

The research objective was to determine the importance of the market offer on the international competitiveness of food industry enterprises (from the perspective of Poland). Moreover, I asked the following research questions:

**RQ1:** Which elements related to the market offer are of high, medium and low importance in building the international competitiveness of the food industry?

**RQ2:** Does the perception of the importance of elements related to the market offer in building international competitiveness differ between food and beverage companies?

**RQ3:** Does the perception of the importance of elements related to the market offer in building international competitiveness differ between companies with small, medium and long experience on the market?

The considerations presented in the article aim to address the cognitive gap identified in the existing literature on the topic. In the practical dimension, understanding the importance of elements related to the market offer can become the basis for further discussion on the implementation of appropriate solutions contributing to more efficient operation, as well as gaining an advantage and increasing the international competitiveness of food production companies and the entire food industry. The study presents the current state of knowledge on the discussed issue. The empirical layer uses information gathered from interviews conducted among representatives of a representative sample of food industry companies using the CATI method. I used descriptive statistics, the Kruskal-Wallis test, the Mann-Whitney test, the multiple comparison test and box-plot charts to analyse the data.

The article is structured as follows. The literature review discusses the concept of international competitiveness and the selected conditions and changes in demand on the food market. The research methods section presents the methodological approach and the quantitative tools used. Then, the article presents and discusses results. The conclusions summarise the article, include implications for practice, emphasise the limitations of the study and possible directions for further analysis.

## LITERATURE REVIEW

Due to the multi-aspect nature of competitiveness, various economic theories (including economic growth, microeconomics and international trade) refer to the issue as well as to entities at various economic levels (enterprises, industries, sectors, regions, national economies) (*e.g.*, Sanli & Ates, 2018; Charles & Sei 2019; Yanton-Drozdovska, 2020). Competitiveness reflects how entities manage their competencies and use resources to achieve long-term prosperity or profit (Deakins & Freel, 2012; Bhawsar & Chattopadhyay, 2015). It is associated with better and sustainable multidimensional economic performance (Fischer & Schornberg, 2007). The complexity and multidimensionality of competitiveness mean that there is no clearly developed and widely accepted definition of this concept. In a general approach, we may understand it as the ability to win and gain benefits in a market with increasing competition (Maroto-Sanchez & Cuadredo-Roura, 2013) or the ability to compete in a competitive environment, to grow, and be profitable (Sipa *et al*., 2015). When reviewing the literature on the subject, we can notice that the way of defining and then analysing competitiveness depends not only on the adopted level of analysis (country, region, industry, enterprise), but also on the emphasised aspect of this multidimensional phenomenon. Various definitions perceive the competitiveness of enterprises and industries as the ability of an entity to achieve specific goals, such as providing added value to stakeholders (Dwyer & Kim, 2003), being profitable and maintaining a dominant position on the market (Lombana, 2006; Wijnands *et al*., 2007). Many definitions of competitiveness emphasise the aspect of the market offer and the ability to adapt to customer needs. For example, as indicated by Domazet (2012) and Harvey *et al*. (2017), we may define competitiveness as 'the ability of firms to consistently and profitably produce products that meet the requirements of an open market in terms of price [and] quality.' According to Dolzhansky and Zagórna (2006), we may interpret an enterprise's competitiveness as 'the ability to produce and sell products quickly and in sufficient quantities, at a high technological level of services and as the ability to effectively dispose of own and borrowed funds on the terms of a competitive market.' In the article, I consider competitiveness with particular emphasis on the aspect of the importance of the market offer and its adjustment to customer needs.

The changes taking place in the food market, as well as the specificity and special importance of food products, mean that producers striving to be competitive on the market and satisfying the modern consumer should consider many important factors related to the offer, which are diverse. A modern approach to the sales process requires a quick response to customer needs. This constitutes the basis of the agile concept described in the literature, which we can treat as a key element enabling companies to effectively adapt to changing market conditions and achieve success (Wiechmann *et al*., 2022). According to Porter (1980), we may also associate competitive advantage with the creation of unique products that stand out from the competition with special features, quality, or design. The product is perceived as unique and provides the customer with benefits that other products on the market do not offer. The literature also draws attention to the growing demand for food products, including high-quality products, due to the growth in the world population and the growth in income in developing countries (Franc & Kujevac, 2021; Siddiqui *et al.,* 2022). Higher-income buyers perceive food products as those that can satisfy various needs, not only basic ones (*e.g.*, emphasising the appropriate status) (Lazaridis & Drichoutis, 2005). Due to the ongoing demographic changes, the structure of consumers is also changing. The increase in the share of people over 65 years of age is increasing the demand for personalised and nutrient-enriched products (Franc & Kujevac, 2021; Aguilera & Covacevich, 2023). As indicated by many domestic and foreign researchers (*e.g.*, Demartini & Melissa, 2018; Arenas-Jal, 2019; 2020; Franc & Kujevac, 2021), an important trend in the global food industry is the change in purchasing requirements and preferences associated with changes in eating habits. They occur in parallel with the combined effects of urbanisation and globalisation (Belahsen, 2014; Imane *et al*., 2020) and reflect the increased awareness of food chain participants about the impact of food systems on health and the environment (Hassoun *et al.,* 2024). In the new consumption model, more attention focuses on organic, natural, and healthy food (Bendarz, 2017). Consumers are increas-

ingly reaching for minimally processed products without artificial additives. Products providing a specific health benefit, beyond basic nutrition, referred to as functional food (Alongi & Anese, 2021), are playing an increasingly important role. Products of this type may contain additional ingredients, such as probiotics, prebiotics, omega-3 acids, vitamins, or minerals. Some authors indicate that interest in healthy and functional food has increased during the COVID-19 pandemic as a way to care for health and strengthen the body's immunity (*e.g*., Galanakis *et al*., 2020; Vishwakarma *et al*., 2022). In response to consumer expectations, a group of light food products has also been created, which by definition have a reduced energy value (or a limited amount of fat, sugar, salt), which can support weight control and nutrient intake (Szczepańska & Grudowska, 2020). A new nutritional trend that has emerged, among others, thanks to the development of mass media, which have a large impact on the formation of consumer beliefs about food, is the implementation of an elimination diet, most often gluten or lactose. This applies to people with hypersensitivity, allergy, or intolerance, in whom these ingredients cause non-specific diseases, as well as being fashionable among people who, despite the lack of medical indications, believe that such a way of eating supports digestion, improves well-being and contributes to better weight control and energy levels (Jones, 2017; Devulapalli, 2021). An important area of interest, which according to some authors may shape the future of the food industry, is personalised food (Derossi *et al*., 2020; Ueland *et al*., 2020). There is no universal solution when it comes to diet, because nutritional preferences and needs may vary depending on the person (Gan *et al.,* 2019; Ordovas *et al*., 2018). In this respect, new possibilities have been opened up by the development of 3D printing technology (Sun *et al*., 2015; Dankar *et al.*, 2018; Baiano, 2022; Portanguen *et al.*, 2019). The literature on the subject also indicates the growing popularity of prosumption in the food industry (Bednarz, 2017; Vicdan *et al*., 2024). The most engaged prosumers are invited to design new products, packaging, or come up with advertising slogans. Less active customers take part in campaigns organised by manufacturers and evaluate products on online forums and store websites.

This study contributes to the existing knowledge by presenting the importance of the market offer, including new trends in the food market from the perspective of their impact on the competitiveness of the food industry. The conclusions result directly from an original, nationwide empirical study on a representative sample. I included business practitioners, *i.e.*, representatives of food industry companies, in the discussion.

## RESEARCH METHODOLOGY

The research procedure consisted of several stages. The first stage analysed the scientific achievements in the field of competitiveness and factors shaping it. I also conducted a literature review in the field of the importance of the offer in creating competitiveness, the situation and changes in demand on the food market and food trends. Using the method of analysis and criticism of secondary sources of information, *i.e.,* articles and compact items of national and international scope, a list of 15 factors related to the market offer was developed, which may be important in building the international competitiveness of food industry enterprises:

C01 – development of functional food
C02 – development of organic food
C03 – development of convenient food
C04 – development of minimally processed food
C05 – development of traditional food
C06 – personalisation of food products
C07 – promotion of local products
C08 – development of food that limits calorie consumption (so-called light food)
C09 – development of products related to the fashion for a specific diet (e.g. lactose-free, gluten-free)
C10 – development of products imitating animal products
C11 – diversity of the commercial offer
C12 – development and popularisation of own brands
C13 – creation of a product brand with unique values for the consumer

C14 – prosumption, *i.e.*, active involvement of consumers in the process of developing new products on the market
C15 – speed of response to customer signals

Based on the literature review, I developed a structured interview questionnaire as a research tool. The respondents assessed the importance of the indicated factors in building international competitiveness on a five-point Likert scale (Likert, 1932).

The second stage included the study implementation. The target group of respondents were representatives of food companies whose activities were included in section C of the PKD 2007 (Polish Classification of Activities 2007) Industrial processing, Section 10 – Food production and Section 11 – Beverage production. I used a stratified random sample selection and the stratification criterion was the PKD section and the size of the company. Based on the formula for the minimum sample size, its size was set at 376 units. I assumed a confidence coefficient of 95% and a maximum estimation error of 5%. I used computer-assisted telephone interviewing (CATI) to collect the data. The companies were located throughout Poland. The sample structure was dominated by those employing up to 10 people (82%). The second group consisted of small companies (14%). The smallest group consisted of medium and large companies (4%). Such asymmetry in the size of companies is consistent with the average size of the population of Polish food industry companies. When examining the structure of the sample based on the period of operation on the market, I found that most of them had at least twenty years of experience (75%). Almost 16% of the entities surveyed had been operating on the market for 10-20 years, and 9% for less than 10 years. Beverage producers accounted for over 5%, and food producers, almost 95%.

In the third stage, I analysed the collected data and made inferences based on statistical methods. I used descriptive statistics including the arithmetic mean and median, lower quartile, upper quartile, mode, standard deviation and coefficient of variation to assess the significance of the analysed factors. Based on the arithmetic mean, I created a ranking of the analysed components, which I grouped according to their importance in building international competitiveness according to my scale (Table 1).

**Table 1. The importance of factors in building international competitiveness**

| Range of arithmetic mean scores | Importance of competitiveness factors |
|---|---|
| 4.20-5.00 | very high |
| 3.40-4.19 | high |
| 2.60-3.39 | medium |
| 1.80-2.59 | low |
| 1.00-1.79 | very low |

Source: own study based on Çelik and Oral (2016), and Renault *et al*. (2018).

Then, I analysed the answers considering the subsector of activity (food producers and beverage producers) and the age of the company (<10 years, 10-20 years, >20 years). I used statistical tests to determine whether there were statistically significant differences between the groups in the assessment of competitiveness factors. In the first case, I used the Mann-Whitney test. I used the test to test the equality of distribution of the two populations:

$$H_0\text{: the medians of the two population are the same}$$
$$H_1\text{: the population medians are not equal} \quad (1)$$

Test statistics take the form:

$$Z = \frac{R_1 - R_2 - (n_1 - n_2)(n_1 + 1)/2}{\sqrt{(n_1 n_2 (n+1)/3}} \quad (2)$$

where:

$n_1, n_2$- number of samples;
$n$ - number of all observations;
$R_1$- the sum of ranks awarded to the values of the first attempt.

If I observed significant differences in the evaluation of elements based on the test, then I deepened the analysis. I used box-plot charts, which presented the median, quartiles, minimum, and maximum for the individual analysed groups.

I used the Kruskal-Wallis test to analyse the significance in the groups of enterprises by age. The test allowed testing the null hypothesis that the k samples are from the same population:

$$H_0\text{: all medians are equal}$$
$$H_1\text{: not all medians are equal} \quad (3)$$

I used the non-parametric analogue of a one-way ANOVA test, which one can use when assumptions of normality and/or homoscedasticity are not met (Hecke, 2012; Muhammad *et al*., 2021). For verification, I used the H statistic with an asymptotic distribution with the number of degrees of freedom equal to the number of groups k minus 1:

$$H = \frac{12}{N(N+1)} \sum_{i=1}^{k} \frac{R_i^2}{n_i} - 3(N+1)$$
$$N = \sum_{i=1}^{k} n_i \quad (4)$$

where:

$n_i$ - number of observations in *i* group;
$N$ - number of all observations;
$k$ - number of compared groups;
$R_i$ - sum of ranks in *i* group.

If I found significant differences based on this test, I applied the multiple comparison test. The test consists of comparing the mean ranks for each pair of groups. On this basis, I created p-value matrices. Box-plot charts present the assessments of the analysed groups.

## RESULTS AND DISCUSSION

In the empirical study, I asked the representatives of food industry companies for their opinion on the significance of elements selected on the basis of the subject literature related to the market offer in building the international competitive advantage of the company (on a 5-point Likert scale). In the inference process, I created a ranking based on the arithmetic mean (Figure 1), determined basic positional measures, and presented them in box-plot graphs (Figure 2). I grouped the studied factors into those of very high, high, medium and low importance in building international competitiveness (none of the analysed factors was assessed as a factor of very low importance). Moreover, I analysed the assessment of factors considering the production specificity (food production and beverage production) and the company age (Table 2-3, Figure 3-4).

### Factors of Very High Importance in Building International Competitiveness

The conducted study shows that, in the opinion of representatives of food industry companies, the most important element in building international competitiveness related to the market offer was quick response to customer signals (C15). We may describe its importance as very high. The arithmetic mean of the ratings was 4.33. Definitely more than half of the respondents (56.10%) rated the importance of the speed of response to customer needs as 5. The coefficient of variation was relatively low and amounted to 21.31%. The study also shows that the perception of this factor did not differ significantly among food and beverage producers, as well as among companies with small, medium and long experience on the market. We may also see the positive relationship between responding to customer needs and business results in studies on other industries/markets, including the Vietnamese market and the seafood market (*e.g*., Nguyen & Barrett, 2006; Nguyen *et al*., 2006; Nguyen & Khoa, 2020). As Skyrius and Valentukevi (2021) note, companies that can respond quickly to changes often have a competitive advantage because they can take advantage of new opportunities before their competitors do.

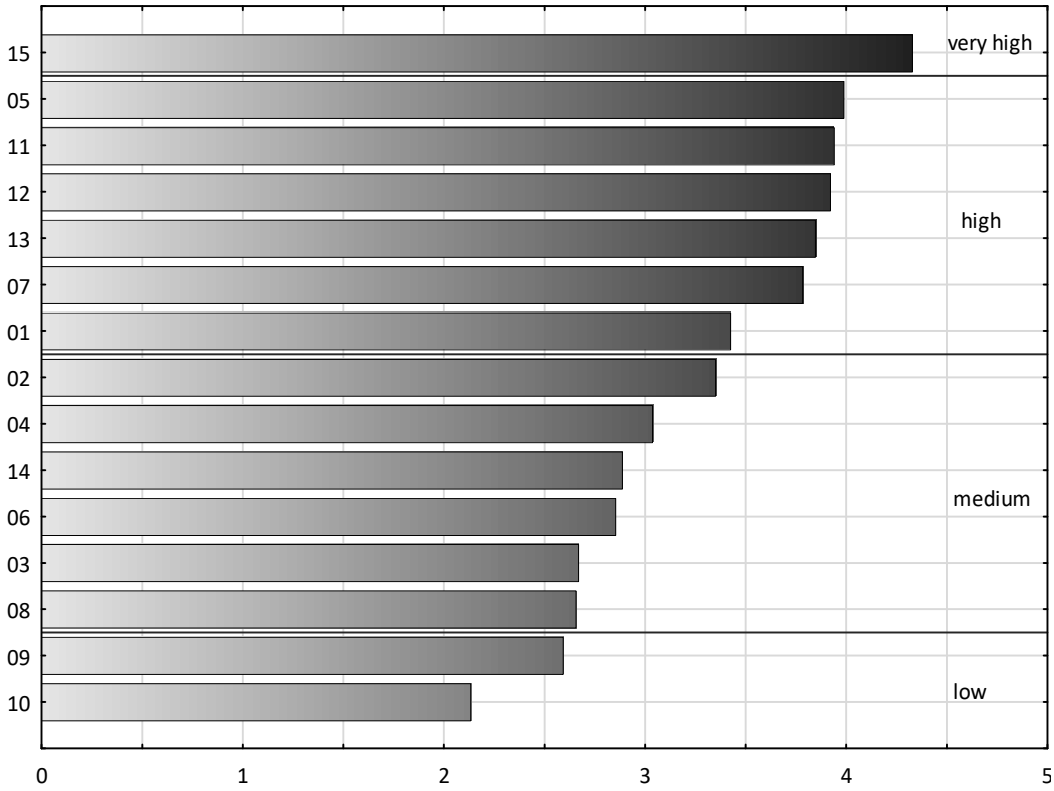



**Figure 1. Ranking of the importance of factors related to the market offer on the competitiveness of food industry enterprises according to the arithmetic mean**
Source: own elaboration based on research.

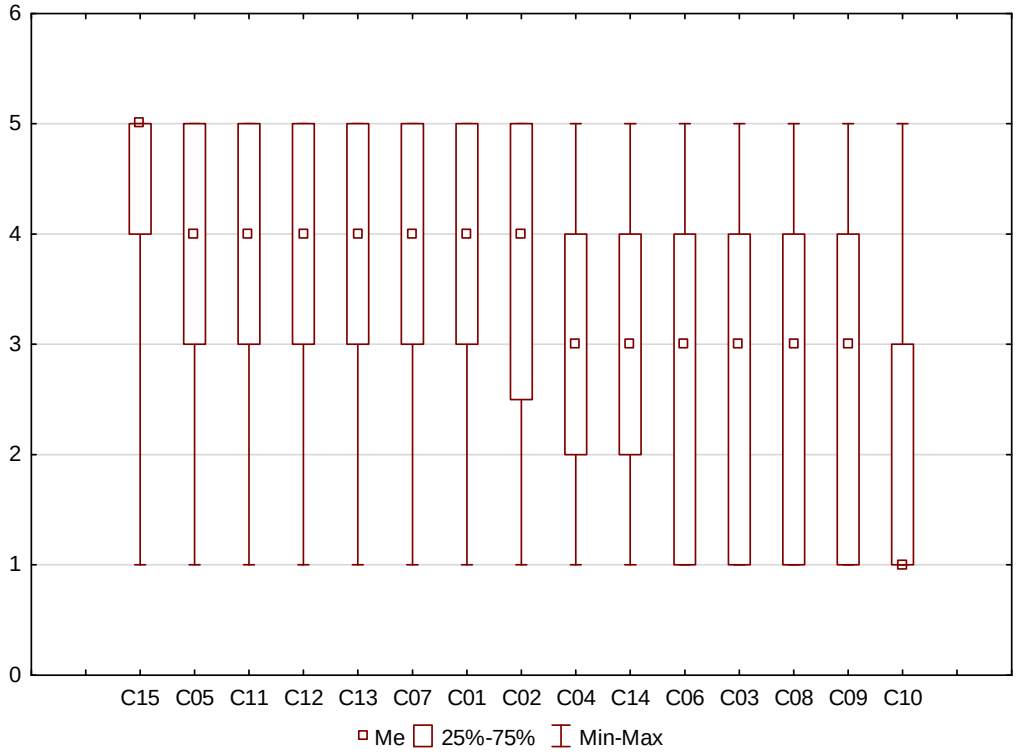



**Figure 2. Box-plot charts for assessing the importance of factors related to the market offer on the competitiveness of food industry enterprises**
Source: own elaboration based on research.

**Factors of High Importance in Building International Competitiveness**

Respondents attributed high significance in building international competitiveness to such elements as the development of traditional food (C05), diversity of the commercial offer (C11), development and popularisation of own brands (C12), creation of a product brand with unique values for the consumer (C13), and promotion of local products (C07). The arithmetic mean of the ratings was at the level of 3.78-3.99. The most common rating was 5 (38.00-44.70%). The median indicates that 50% of respondents rated the importance of these factors at least 4. The group of factors of high importance also includes the development of functional foods due to the growing interest in health-promoting food (C01). The arithmetic mean in this case was 3.43, and the median and mode were 4.

Moreover, based on the Mann-Whitney test, I observed significant differences in the perception of the importance of the development of traditional food (C05), the creation of a product brand with unique values for the consumer (C13), and the development of functional food (C01) among food producers and beverage producers. Based on the arithmetic mean and positional measures presented in the box-plot charts, we can assume that food producers attributed greater importance to the development of functional food and the development of traditional food. In the group of food producers, the arithmetic mean of the ratings of these factors was 3.46 and 4.06, respectively, and the median was 4. In the group of beverage producers, the arithmetic mean of the ratings of both factors was 2.68, and the median was 3. On the other hand, beverage producers attributed relatively greater importance to creating a product brand with unique values for the consumer. The arithmetic mean in the first group was very high and amounted to 4.58, while in the second group it was 3.81. The results of the Kruskal-Wallis test indicated differences in the assessment of the importance of the development of traditional food (05), the diversity of the commercial offer (C11) and the promotion of local products (C07) depending on the company's seniority. Based on the multiple comparison tests, I observed that the importance of the development of traditional food was significantly lower among companies with long seniority than in those with medium seniority, and the importance of the promotion of local products was significantly higher in companies with short seniority than in companies with medium seniority. This is also confirmed by box-plot charts. The multiple comparison test did not provide an unambiguous answer as to which groups differ in terms of the diversity of the commercial offer. However, based on positional measures, we can assume that the greatest importance was attributed to this factor by respondents representing companies with a small experience (arithmetic mean 4.09, median 4.5).

Jakubowska is one of the authors who studied the development of traditional food on the Polish market (*e.g.,* Jakubowska *et al*., 2023). These studies show that providing access to traditional food products in a larger number of points of sale accelerates development, while the lack of mass distribution is perceived as the main barrier to further expansion. Moreover, producers who offer traditional food products should pay attention to the diversity of buyers' expectations, because competition on the market will intensify with the increase in their availability. The importance of diversifying the market offer is also confirmed by Osiekowicz and Sierodzka (2024) in research conducted using an online survey among young people. They indicate that the diversity of the assortment is important for consumers, and sellers should strive to offer a wide range of products to attract and retain customers. Ciechomski (2018) indicates that it is possible to obtain benefits from the development of private labels by producers, as well as trading companies and consumers. According to this author, the production of private labels allows for an increase in the scale of production, improvement of the brand's position, use of free production capacities, and indirectly gaining a competitive advantage. Low-priced private labels are most often developed. Sometimes, products with luxury product features are introduced, but also at prices lower than the corresponding branded products. Another way to increase competitiveness may be to offer a unique product (Kuncoro & Suriani, 2018; Wibowo *et al*., 2024). As Bryła (2015) notes, the uniqueness of the product may be a distinguishing feature of the offer, as well as protection against imitation and lead to the development of economic structures and behaviours characteristic of monopolistic competition. It may result from production methods, forms of distribution or the sensory profile of the food product. Bryła (2015) also indicates that for agri-food processing companies, using the niche of demand for local

products is a way to increase sales, rapid development, greater profitability, and diversification of operations. Studies by various authors show that the functional food market is a developing market. However, as indicated by Çakiroğlu and Uçar's research (2018) among 1182 consumers using 18 functional foods on the Turkish market, increasing sales of this type of product can be additionally achieved through communication with consumers and even implementing educational programs. The research by Çakiroğlu and Uçar (2018) and the research by Ares *et al*. (2008) conducted on the Uruguayan market confirm that knowledge clearly increases consumer interest in functional food.

### Factors of Low Importance in Building International Competitiveness

In the conducted study, respondents attributed low importance in building international competitiveness to the development of products related to the fashion for a specific diet (*e.g.*, lactose-free, gluten-free) (C09) and the development of products imitating animal products (C10). The arithmetic mean of the ratings of these factors was 2.13-2.59. These factors were characterised by the relatively greatest diversification of responses. The coefficient of variation was 55.00%-63.38%. The results of the Mann-Whitney test indicate differences in the assessment of the importance of the development of products imitating animal products among food producers and beverage producers. The arithmetic

**Table 2. Mann-Whitney test results and arithmetic mean of assessing the importance of factors related to the market offer on competitiveness of food industry enterprises by subsector**

| Component | Subsector | Mann-Whitney test | | | Arithmetic mean |
|---|---|---|---|---|---|
| | | Sum of rank | Z | p | |
| C01 | F | 68 195.50 | 2.01088 | 0.04434** | 3.46 |
| | B | 2 680.50 | | | 2.68 |
| C02 | F | 67 868.50 | 1.27603 | 0.20195 | 3.38 |
| | B | 3 007.50 | | | 2.84 |
| C03 | F | 68 006.50 | 1.59101 | 0.11161 | 2.70 |
| | B | 2 869.50 | | | 2.16 |
| C04 | F | 68 027.00 | 1.62568 | 0.10402 | 3.07 |
| | B | 2 849.0 | | | 2.47 |
| C05 | F | 68 976.50 | 3.87887 | 0.00010*** | 4.06 |
| | B | 1 899.50 | | | 2.68 |
| C06 | F | 67 581.50 | 0.63841 | 0.52321 | 2.87 |
| | B | 3 294.50 | | | 2.63 |
| C07 | F | 66 914.00 | -0.86158 | 0.38892 | 3.78 |
| | B | 3 962.00 | | | 3.89 |
| C08 | F | 67 323.50 | 0.06365 | 0.94925 | 2.66 |
| | B | 3 552.50 | | | 2.63 |
| C09 | F | 67 766.50 | 1.05911 | 0.28955 | 2.61 |
| | B | 3 109.50 | | | 2.26 |
| C10 | F | 68 024.50 | 1.70241 | 0.08868* | 2.16 |
| | B | 2 851.50 | | | 1.58 |
| C11 | F | 67 017.00 | -0.63173 | 0.52756 | 3.94 |
| | B | 3 859.00 | | | 4.05 |
| C12 | F | 66 760.50 | -1.21763 | 0.22336 | 3.91 |
| | B | 4115.50 | | | 4.21 |
| C13 | F | 66 068.00 | -2.78251 | 0.00539*** | 3.81 |
| | B | 4 808.00 | | | 4.58 |
| C14 | F | 65 817.50 | -3.27580 | 0.00105*** | 2.84 |
| | B | 5 058.50 | | | 3.84 |
| C15 | F | 66 967.50 | -0.78987 | 0.42960 | 4.32 |
| | B | 3 908.50 | | | 4.53 |

Notes: F – food producers, B – beverage producers; ***, ** and * significances at the 0.01; 0.05 and 0.1 levels, respectively
Source: own study in STATISTICA.

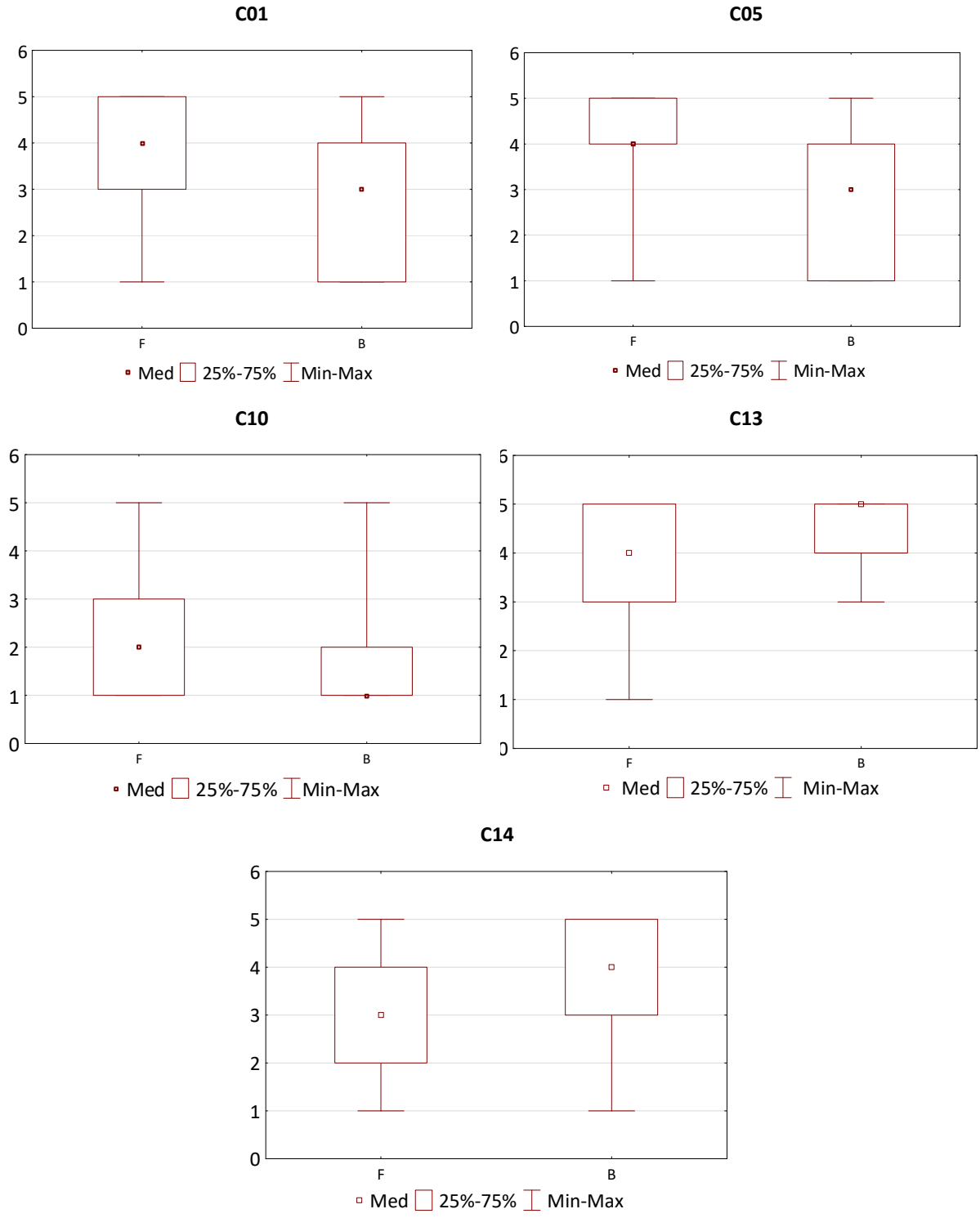



**Figure 3. Box-plot charts of assessing the importance of selected factors related to the market offer on the competitiveness of food industry enterprises by subsector**
Source: own elaboration based on research.

mean and positional measures indicate that food producers rated their importance higher. In this group, the arithmetic mean of the scores was 2.16, the median was 2, and the upper quartile was 3. Moreover, I found no statistically significant differences in the perception of these factors among companies with small, medium, and long experience on the market. The literature on the subject emphasises the systematic development of the market for both products related to the fashion for a specific diet (*e.g.*, lactose-free, gluten-free), as well as imitating animal products (*e.g.*, Kulshrestha,

2022; Szenderak *et al*., 2022). Therefore, it seems that in the future, they may have the potential to create a competitive advantage for food companies on the market.

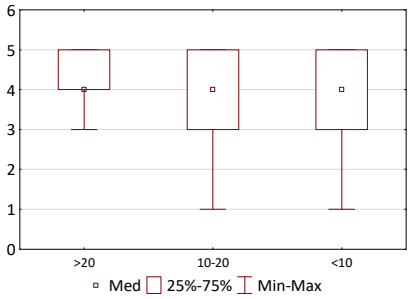
**Table 3. Kruskal-Wallis test results and arithmetic mean by assessing the importance of factors related to the market offer on the competitiveness of food industry enterprises by age**

| Component | Age | Kruskal Wallis test | | | | Arithmetic mean |
|---|---|---|---|---|---|---|
| | | Sum of rank | Mean of rank | H | P | |
| C01 | <10 | 54 652.00 | 187.98 | 3.885 | 0.143 | 3.41 |
| | 10-20 | 10 208.50 | 164.65 | | | 3.11 |
| | >20 | 54 652.00 | 193.80 | | | 3.50 |
| C02 | <10 | 6 381.00 | 199.41 | 3.718 | 0.156 | 3.47 |
| | 10-20 | 10 244.00 | 165.23 | | | 3.03 |
| | >20 | 54 251.00 | 192.38 | | | 3.41 |
| C03 | <10 | 6 361.00 | 198.78 | 1.757 | 0.415 | 2.81 |
| | 10-20 | 10 732.00 | 173.10 | | | 2.47 |
| | >20 | 53 783.00 | 190.72 | | | 2.70 |
| C04 | <10 | 6 648.50 | 207.77 | 2.368 | 0.306 | 3.28 |
| | 10-20 | 10 743.50 | 173.28 | | | 2.82 |
| | >20 | 53 484.00 | 189.66 | | | 3.06 |
| C05 | <10 | 5 743.00 | 179.47 | 10.990 | 0.004*** | 3.81 |
| | 10-20 | 9 357.00 | 150.92 | | | 3.52 |
| | >20 | 55 776.00 | 197.78 | | | 4.11 |
| C06 | <10 | 6 736.50 | 210.52 | 6.221 | 0.045*** | 3.16 |
| | 10-20 | 9 926.50 | 160.10 | | | 2.47 |
| | >20 | 54 213.00 | 192.24 | | | 2.90 |
| C07 | <10 | 7 095.00 | 221.72 | 5.147 | 0.076* | 4.19 |
| | 10-20 | 10 568.50 | 170.46 | | | 3.55 |
| | >20 | 53 212.50 | 188.69 | | | 3.79 |
| C08 | <10 | 6 214.50 | 194.20 | 0.424 | 0.809 | 2.72 |
| | 10-20 | 11 228.00 | 181.09 | | | 2.56 |
| | >20 | 53 433.50 | 189.48 | | | 2.67 |
| C09 | <10 | 6 488.00 | 202.75 | 2.039 | 0.361 | 2.78 |
| | 10-20 | 10 723.00 | 172.95 | | | 2.39 |
| | >20 | 53 665.00 | 190.30 | | | 2.62 |
| C10 | <10 | 5 602.50 | 175.08 | 1.286 | 0.526 | 2.00 |
| | 10-20 | 11 177.00 | 180.27 | | | 2.00 |
| | >20 | 54 096.50 | 191.83 | | | 2.18 |
| C11 | <10 | 6 714.50 | 209.83 | 5.024 | 0.081* | 4.09 |
| | 10-20 | 10 181.00 | 164.20 | | | 3.69 |
| | >20 | 53 980.50 | 191.42 | | | 3.98 |
| C12 | <10 | 6 370.50 | 199.08 | 0.990 | 0.61 | 4.00 |
| | 10-20 | 11 046.00 | 178.16 | | | 3.82 |
| | >20 | 53 459.50 | 189.57 | | | 3.94 |
| C13 | <10 | 6 776.50 | 211.76 | 1.772 | 0.412 | 4.09 |
| | 10-20 | 11 635.00 | 186.04 | | | 3.84 |
| | >20 | 52 464.50 | 187.66 | | | 3.82 |
| C14 | <10 | 6 628.50 | 207.14 | 3.978 | 0.137 | 3.13 |
| | 10-20 | 10 291.50 | 165.99 | | | 2.61 |
| | >20 | 53 956.00 | 191.33 | | | 2.92 |
| C15 | <10 | 6 426.00 | 200.81 | 1.774 | 0.412 | 4.47 |
| | 10-20 | 10 851.50 | 175.02 | | | 4.24 |
| | >20 | 53 598.50 | 190.07 | | | 4.33 |

Notes: F – food producers, B – beverage producers; ***, ** and * significances at the 0.01; 0.05 and 0.1 levels, respectively.
Source: own study in STATISTICA.

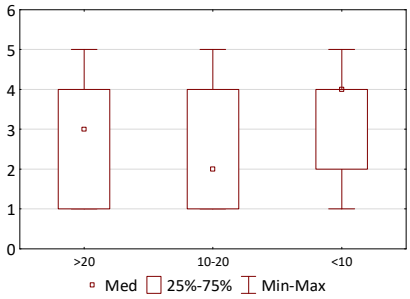
| Multiple comparison test (p-value) | | | |
|---|---|---|---|
| Age | <10 | 10-20 | >20 |
| <10 | - | 0.682545 | 1.000000 |
| 10-20 | 0.682545 | - | 0.006330*** |
| >20 | 1.000000 | 0.006330 | - |

**C05**



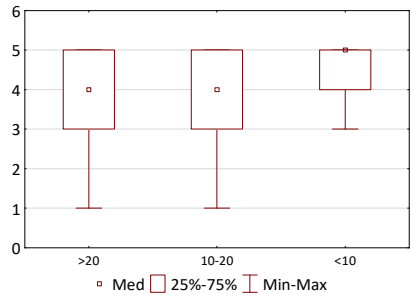

| Multiple comparison test (p-value) | | | |
|---|---|---|---|
| Age | <10 | 10-20 | >20 |
| <10 | - | 0.099300 | 1.000000 |
| 10-20 | 0.099300 | - | 0.105042 |
| >20 | 1.000000 | 0.105042 | - |

**C06**




| Multiple comparison test (p-value) | | | |
|---|---|---|---|
| Age | <10 | 10-20 | >20 |
| <10 | - | 0.090768 | 0.310077 |
| 10-20 | 0.090768 | - | 0.694791 |
| >20 | 0.310077 | 0.694791 | - |

**C07**




| Multiple comparison test (p-value) | | | |
|---|---|---|---|
| Age | <10 | 10-20 | >20 |
| <10 | - | 0.16145 | 1.000000 |
| 10-20 | 0.161455 | - | 0.222852 |
| >20 | 1.000000 | 0.222852 | - |

**C11**

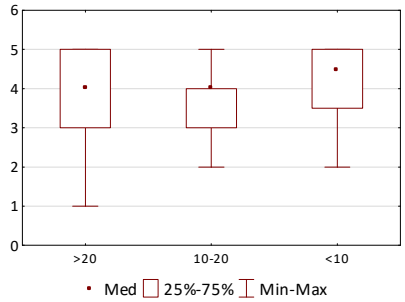



**Figure 4. Multiple comparison tests and box-plot charts of assessing the importance of selected factors related to the market offer on the competitiveness of food industry enterprises by age**

Notes: F – food producers, B – beverage producers.

Source: own elaboration.

## CONCLUSIONS

In the current rapidly changing environment, gaining and maintaining competitiveness is a dynamic process that requires considering many factors. The study filled the cognitive gap in the scope of the importance of shaping the market offer from the perspective of the competitiveness of food entities. The original empirical study conducted shows that, according to the representatives of food enterprises, the

application of some solutions in this area may be important in building the competitiveness of food industry enterprises in the international arena. The added value of the study was also the gradation of selected solutions and the assessment of whether their introduction has very high, high, medium, low or very low importance from the point of view of the enterprise. According to the representatives of food enterprises, quick response to customer signals is very important in building competitiveness. Solutions such as the development of traditional food, introduction of diversity of the commercial offer, development and popularisation of own brands, creation of a product brand with unique values for the consumer, promotion of local products, as well as development of functional food will have a high impact. The study also provides evidence of the relationship between the development of organic food, minimally processed food, prosumption, personalisation of food products, the development of convenient food, food that limits calorie consumption and the international competitiveness of enterprises. This relationship was defined as a medium. The least importance was attributed by respondents to the development of products related to the fashion for a specific diet (*e.g.*, lactose-free, gluten-free) and the development of products imitating animal products. I also observed that compared to beverage producers, food producers attributed greater importance to the development of functional food, traditional food, products imitating animal products, and animal products. In turn, beverage producers attributed greater importance to creating a product brand with unique values and prosumption. I also found that the importance of the development of traditional food is significantly lower among long-established enterprises than in those with medium experience, and the importance of promoting local products and personalising food products is significantly greater in enterprises with short experience than in enterprises with medium experience. In companies with a small experience, the diversity of the market offer was also given greater importance than in the others.

The formulated conclusions are a contribution to the literature on the subject and have an application value. Defining the factors that contribute to improving the competitiveness of food industry companies on the market should be useful for managers involved in formulating the company's strategy, including the competitive strategy. Implementing appropriate solutions related to shaping the market offer will allow for obtaining many benefits (*e.g.*, standing out on the market, increasing the value of the offer, building customer loyalty and satisfaction, increasing demand) and improving competitiveness.

When considering the results of the conducted research, it is also necessary to consider potential limitations resulting from, *e.g.*, the methodology or selection of variables. Noteworthy, in the conducted study, the factors considered related to the market offer do not exhaust the list of potential factors influencing the competitiveness of companies and the industry. However, creating a full list of factors related to the market offer seems difficult and certainly requires significantly extended research. Moreover, in addition to factors related to the market offer, other studies should consider factors related to innovation, competitive potential, contemporary economic processes, or macroeconomic conditions. The study also did not consider the full profile of the companies' activities. Future studies could investigate, for example, the size of the company, the market in which it operates, and the type of production conducted. Furthermore, in-depth individual interviews could answer the question of what are the reasons for the established hierarchy and why the importance of specific factors was considered very high, high, medium and low. The presented analyses should therefore be treated as part of the research on the factors of international competitiveness of food and beverage companies and the entire food industry.

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## Author

**Katarzyna Łukiewska**
PhD in Economics; Assistant Professor at the University of Warmia and Mazury in Olsztyn, Poland. Her research interests include innovation, competitiveness and productivity of sectors with particular emphasis on the food industry.
**Correspondence to:** Dr Katarzyna Łukiewska, University of Warmia and Mazury in Olsztyn, Faculty of Economic Sciences, Oczapowskiego 4, 10-719 Olsztyn, Poland, e-mail: katarzyna.lukiewska@uwm.edu.pl
**ORCID** https://orcid.org/0000-0002-3175-5495

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# Reading between the lines of accounting narratives: Testing the obfuscation hypothesis on companies listed at the Warsaw Stock Exchange

**Konrad Grabiński, Piotr Wójtowicz**

**ABSTRACT**

**Objective:** The study explores the problem of the readability of accounting narratives and aims to test the obfuscation hypothesis (OH) in a non-English context and a non-English language. We explored the link between the tendency of managers to obscure accounting narratives to make unfavourable news more difficult for stakeholders to read and process, and the financial health of firms.

**Research Design & Methods:** We applied descriptive statistics, correlation and regression analysis. Our sample consisted of 2 228 firm-year observations of non-financial companies headquartered in Poland, listed on the Warsaw Stock Exchange (WSE), from 2015 to 2024. We proxied the readability of accounting narratives using the FOG index applied to letters to shareholders.

**Findings:** We provide empirical evidence indicating that the OH was valid for companies listed on the Warsaw Stock Exchange. Using the return on assets (ROA), we demonstrate that managers of less profitable firms tend to obfuscate letters to shareholders. We corroborated our findings using the Altman-alike score. The COVID-19 pandemic moderated the impact of financial health on the readability of accounting narratives.

**Implications & Recommendations:** Our research calls for further research on the readability of accounting narratives in non-English settings and non-English languages. It shows other applications of the bankruptcy prediction models, and it demonstrates how to adopt the FOG index to a non-English language context.

**Contribution & Value Added:** The study contributes to the literature on the readability of accounting narratives by offering a proxy for bad news in the context of the obfuscation hypothesis: the Z-score of bankruptcy prediction models, which one may also interpret as a sign of financial health. It also demonstrates how to adopt the FOG index in a non-English setting and in a non-English language.

| | |
|---|---|
| **Article type:** | research article |
| **Keywords:** | readability; obfuscation hypothesis; ROA; letters to shareholders; bankruptcy prediction models; FOG index; Warsaw Stock Exchange; COVID-19 |
| **JEL codes:** | M41, O16, G14, G33 |

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## INTRODUCTION

We aimed to test the obfuscation hypothesis (OH) in a non-English setting and a non-English language. The OH addresses the issue of the readability of accounting narratives, which is another angle for assessing the quality of financial statements. When it comes to accounting narratives, the managers' writing style is specific to many factors, *e.g.*, the CEO's personal traits and motivation, or the sector. In this respect, accounting research provides two important theories that aim to explain managers' behaviour. Impression management theory (IMT) postulates the obfuscation hypothesis. It conjectures that a manager, while obliged to convey unfavourable news in accounting narratives, tends to obfus-

cate and obscure them. By doing that, managers make them more difficult to read, process, and understand. The stakeholders are confused and muddled, and their reaction becomes weaker and delayed. As a result, the negative consequences of bad news for managers diminish. At least several studies provide empirical evidence supporting OH (Dempsey *et al*., 2012; Smeuninx *et al*., 2020). However, they are based on the English-speaking countries. We aimed to fill this gap by testing OH in the non-English setting and non-English language.

There are two similar but different strands of research. The first one refers to a study sample of non-English-speaking countries, in which companies prepare financial statements in English. *e.g*., Qatar (Hassan *et al*., 2019). The second one, where the study sample also consists of non-English-speaking countries, however, companies are using their national/local non-English language while preparing financial statements, *e.g*., Austria (Stellner, 2022). Our setting was the latter case. We focused on the letter to shareholders, an obligatory section of the annual report in Poland. The Regulation of the Minister of Finance of February 19, 2009, on the current and periodic information published by issuers of securities (Regulation of the Ministry of Finance, 2009) introduced such a requirement. In two consecutive amendments to the regulations (2018 and 2025), no changes were made to this requirement. The Polish Accounting Act of 1994 requires the use of the Polish language in maintaining accounting records and preparing financial statements. However, several of the largest and most important companies voluntarily prepare parallel annual reports in the English language. It causes a new problem related to the adoption of readability metrics, such as the FOG, for non-English letters. Overcoming this obstacle is another contribution of our research study.

The OH focuses on situations in which a company must reveal its unfavourable financial situation in the annual report as bad news. In the research design of many studies, specific metrics detect companies suspected of that. Studies usually employ profitability ratios, such as return on assets. However, scholars also use other ratios, like Tobin's Q or EPS. They are argued to be a valid sign of the firm's deteriorating situation. Based on the bankruptcy prediction models' theory, we propose a new proxy for the bad news situation. We applied one of the most popular in Poland Z-scores, the Mączyńska model (Mączyńska & Zawadzki, 2006; Prusak, 2019; Tomczak, 2023; Grabińska & Grabiński, 2025). A Z-score index like this or similar allows for predicting bankruptcy or serious financial problems one or two years before they occur. They are also treated and interpreted as a composite measure of financial health. Therefore, a company may show positive financial results and profitability, but, at the same time, is under bankruptcy risk or exhibits a weak financial situation. Asymmetry between managers and stakeholders allows for fogging bad news in the reports.

We commenced with testing the OH. We conjectured that managers of companies with lower profitability, as proxied by return on assets (ROA), tend to produce less readable accounting narratives. We measured the readability using the FOG index adapted to the Polish language on the letters to shareholders. We tested the hypothesis on the sample of non-financial companies listed on the Warsaw Stock Exchange over the 2015-2024 period. The final sample consisted of 2 228 firm-year observations. The results suggest that managers of less profitable companies write less readable letters to shareholders. The second hypothesis conjectured that managers of companies with a higher bankruptcy risk (worse financial health) are more willing to obfuscate accounting narratives. Our findings imply that Z-score metrics based on bankruptcy prediction models may be used interchangeably with ROA. It is an important result, since studies on the readability of accounting narratives often use financial performance as a control variable (Abernathy *et al.*, 2019; Yu & Zhao, 2024).

The remainder of the article is structured as follows: Section 2 provides a literature review and hypotheses development. It starts with the concept of the readability of accounting narratives. Then, we investigated the issue of financial health and accounting-based bankruptcy models. Section 3 develops the research design, especially adopting FOG to the Polish language, and ends with sample characteristics. Section 4 presents the results and discussion. The last section concludes the most important results of our research.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Scholars define readability as the difficulty of understanding a written text, considering the use of frequent and complex syntactic structures (De Souza *et al.*, 2019). Scholarly efforts to investigate the readability of financial statements' narrative parts are lengthy and promising. The concept of readability is mostly applied to the narrative parts, *i.e.*, management commentary, MD&A, notes to the financial statements, and, foremost, to the letter to shareholders. Therefore, it portrays the intricacy of the information and is responsible for the success of communicating the message to the stakeholders. Smith and Taffler (1992) narrow the definition to the accounting area, noting that readability is about the difficulty found in the text and its relation to understanding the message. From this perspective, the success in communicating the message is linked to the readability of narrative accounting. If not correctly communicated and understood, its usefulness deteriorates, and the financial reporting quality becomes impaired. The message's clarity is paramount for the stakeholder to comprehend, process, and make decisions (Lim *et al.*, 2018). The role of the narratives is to provide context and explanations for the quantitative data (Nadeem, 2020). Bloomfield (2008) notes that more complex narrative reporting requires more time and effort to extract relevant information.

The concept of the readability of accounting narratives is relevant to the stated mission of the IFRS Foundation and the International Accounting Standards Board (IASB), which is to develop International Financial Reporting Standards (IFRSs) that bring transparency, accountability, and efficiency to capital markets (IFRS Foundation, 2018). The Foundation explains transparency as the quality of financial information, enabling market participants to make informed decisions, while accountability as reducing information asymmetry. Therefore, understanding the success of narrative accounting in conveying the exact message to the users seems to be of utmost importance. Schroeder and Gibson (1990) note that effective reporting is not possible without clear and effective communication. Thus far, most accounting research dedicated to the quality of financial information was based on accruals (Licerán-Gutiérrez & Cano-Rodríguez, 2019). However, Biddle *et al.* (2009) conclude that the readability of accounting narratives captures more forward-looking aspects of financial reporting quality than short-term accrual-based measures. The most applied metrics relate to the concept of earnings management (Comporek, 2023).

In accounting research, scholars use the construct of readability for different reasons: (1) as the proxy for the quality of information reported in financial statements, (2) as the input to the decision-making process, and (3) to test motivations of the preparers (*i.e.*, top managers). Leuz and Wysocki (2016) note that internal and external factors shape reporting incentives. Internal factors relate to entity-specific factors, while external factors include legal environment, market forces, and enforcement regimes. The latter comprises institutional and non-institutional forces (*i.e.*, culture and religion). Gosselin *et al.* (2021) categorise factors shaping readability levels into meso (*i.e.*, firm characteristics: size, profitability, industry, etc.), macro (*i.e.*, IFRS adoption, language, country characteristics), and micro (*i.e.*, manager compensation). At the macro level, entrepreneurship is among the driving forces of economic growth (Zarkua *et al.*, 2025).

Gosselin *et al.* (2021) call for research investigating the 'motivations' scene and top managers as the main actors. Moreover, they suggest that other factors, especially external ones, drive the variability of readability, which deserves more attention. They conclude that accounting research should consider the impact of different countries (non-English), cultures, and institutional settings on the readability of narrative accounting. We respond to this call by investigating the Polish setting, a non-English speaking country.

Considering the entity-specific factors, the results of the accounting research suggest that readability is lower for poorly performing companies (Abu Bakar & Ameer, 2011; Ajina *et al.*, 2016; Dempsey *et al.*, 2012; Li, 2008; Miller, 2010; De Souza *et al.*, 2019; Subramanian *et al.*, 1993), lower or less persistent positive earnings, bigger, younger and with more complex business models (Li, 2008), higher cost of debt and stock price crash risk (Ertugrul *et al.*, 2017), companies attempting to reduce litigation risk (Humphrey-Jenner *et al.*, 2024), and those with lower stock liquidity and trading volume (De Franco *et al.*, 2015; Li, 2008; Lang & Stice-Lawrence, 2015). Li (2008) and Laksmana *et al.* (2012) conjecture that larger firms

face higher political costs and, to compensate for that, they prepare more readable narrative disclosures. On the other hand, bigger companies tend to have more complex operations, which translates into less readable financial reporting. For this reason, the results of many studies remain inconclusive. However, size constitutes an important factor shaping financial reporting quality and the readability of narrative parts of financial statements. Gounopoulos *et al.* (2025) argue that high-intensity R&D companies constrain the readability to protect sensitive information and maintain a competitive edge.

Research on the readability of narrative accounting reports employs two complementary theories: impression management theory (IMT) and agency theory (AT), supported by signalling theory (ST). Scholars employ IMT to explain the lower readability as a desire to conceal bad news, whereas according to AT, it reflects managers' intention to inform about the complex business model. Notably, IMT assumes that managers intentionally manipulate the narrative parts of the financial statements, making them less readable to achieve their personal goals. The research consistently indicates that managers can influence the readability of narratives (Hasan, 2020; Xu *et al.*, 2018). In empirical research, IMT manifests as the obfuscation hypothesis (OH), which conjectures that companies tend to make unfavourable news more difficult to read and process (Rutherford, 2003). Courtis (2004) defines obfuscation as a narrative writing technique that obscures the intended message, confuses, distracts, or perplexes readers, and leaves them bewildered or muddled. According to Chakrabarty *et al.* (2018), senior executives employ intricate and convoluted language in financial disclosures to obscure opportunistic actions or the firm's subpar performance. Many empirical studies corroborate OH (Dempsey *et al.*, 2012; Smeuninx *et al.*, 2020). Hadro *et al.* (2017) provide interesting findings regarding the Polish context. Based on the sample of companies listed on the Warsaw Stock Exchange, they conclude that shorter and formal letters to shareholders include defensive arguments and discussions of negative outcomes.

Meanwhile, Bloomfield (2002) proposes the Incomplete Revelation Hypothesis (IRH). Firstly, he conjectures that managers reduce the market response to bad news because they are more costly to analyse. Notably, IRH predicts a larger underreaction to more complex footnotes. Secondly, he assumes that investors struggle to comprehend less readable financial statements, urging them to seek alternative sources of information. Hence, the delayed response makes the decision-making process more costly (Asay *et al.*, 2017). We may find empirical evidence supporting IRH in studies by You and Zhang (2011), Miller (2010), Rennekamp (2012), and Tan *et al.* (2015). The above-mentioned studies refer mainly to English-speaking countries.

In this strand of research, the studies addressing OH as a proxy of unfavourable news employ a different range of metrics, such as higher volatility of the stock return, greater dispersion of analyst, greater absolute earnings surprises (Loughran & McDonald, 2014), less favourable ratings, greater bond rating agency disagreements, higher cost of debt (Bonsall & Miller, 2017). From a more narrow perspective, the OH focuses on financial performance, which one measures as return on assets (Oradi *et al.*, 2024; Ajina *et al.*, 2016; Dempsey *et al.*, 2012), Tobin's Q (Abu Bakar & Ameer, 2011), earnings per share (De Souza *et al.*, 2019), and operating earnings deflated by beginning total assets and a dummy variable of one if a company reports profit and zero otherwise (Li, 2008; Lo *et al.*, 2017).

We propose another proxy of unfavourable news based on accounting prediction models specific to the Polish context. We chose to employ the Mączyńska Z-score, which serves as a proxy for financial condition and, simultaneously, as a bankruptcy prediction. The evolution of the bankruptcy model dates to 1930's. The most notable advancement occurred in 1968 when Altman (1968) applied multivariate statistical methods to formulate the Z-score model. It was followed by models developed by Springate, Zmijewski, and Ohlson. Further developments led to applying logistic regression (Ohlson, 1980), discriminant analysis, and artificial intelligence (AI) techniques, including neural networks and machine learning (Hekanaho *et al.*, 1998; Zięba *et al.*, 2016). It did not take long for the academic world and analysts to notice that the models' efficacy is specific to the industry and the country (Prusak, 2018).

Academia provides a plethora of prediction models that vary based on the type of information they utilise. The most widely used are accounting-based models that rely on information reported in financial statements. Other models are driven by stock market information (*e.g.*, stock prices). The new strand of research combines accounting-based and market-based approaches (Li & Faff, 2019). Market-based models (*i.e.*, Merton's model) are praised for incorporating up-to-date market information.

On the other hand, they assume market informational efficiency, which is not always the case. Consequently, they are vulnerable to stock-market disruptions. Market-based models assume the existence of a developed stock market exhibiting at least semi-strong informational efficiency and sufficient liquidity. This assumption is not valid in the case of many developing and smaller countries. These concerns are irrelevant to accounting-based models based on information derived from financial statements. Thus, accounting-based bankruptcy prediction models allow for reducing the variety of performance measures to a single proxy measuring a firm's financial health (Grice & Dugan, 2003). Z-score models are easy to apply and are widely used in practice. On the other hand, accounting-based models are grounded on historical data and omit key information related to the firm's market position, growth opportunities, macroeconomic factors, managerial experience, or competitiveness (Pilch, 2021). However, as Reisz and Perlich (2007) argue, standard accounting-based prediction models with short horizons (one or two years before bankruptcy) are superior to market-based models in accuracy. Therefore, the Z-score proxy of financial condition based on accounting-based models is a perfect candidate for the financial performance proxy and the driver of the bad news. Thus, we used it to test the obfuscation hypothesis in the Polish context. To the best of our knowledge, no studies have examined the accounting-based bankruptcy prediction models as a proxy for bad news to test the obfuscation hypothesis. Therefore, we adopted the following hypotheses:

**H1:** Companies with lower profitability as measured by return on assets are more inclined to obfuscate accounting narratives.

**H2:** Companies with worse financial health and higher bankruptcy risk tend to obfuscate accounting narratives.

## RESEARCH METHODOLOGY

The most used models for measuring readability are the Flesch reading ease score (FRE), the simple measure of Gobbledygook (SMOG), the Dale-Chall readability formula, the Flesch-Kincaid grade level, and Gunning's fog index formula. Although scholars widely apply these metrics, reinforcement of other attributes (*e.g.*, syntax, style, format, graphic design, human interest) is not considered (Courtis, 1998). Flesch reading ease and Flesch-Kincaid grade level apply parameters typical for the English language. Therefore, its use in the non-English context seems inappropriate. Other methods face similar problems. In our research design, we investigated accounting narratives in Polish, which is considered one of the most complex languages. It employs intricate grammatical structures, including a rich inflexion and verb conjugation system, numerous exceptions, and detailed rules. It makes Polish very different from English.

In line with prior research (Li, 2008), we employed the FOG index (Gunning, 1952), but we modified its formula to Polish. The index score delineates the years of formal education that a person needs to understand the text on the first reading. The FOG formula is calculated as follows:

$$FOG = 0.4 * \left[\frac{words}{sentences} + 100 * \frac{complex\ words}{words}\right] = 0.4 * (ASL + 100 * PCW) \quad (1)$$

The FOG index is based on two main parameters: ASL – the average sentence length, and PCW – the text saturation with complex words. One calculates ASL as a ratio of the number of words divided by the number of sentences in a text. According to this logic, shorter sentences are easier to understand. Moreover, PCW is the number of complex words divided by the number of words and multiplied by one hundred. The higher proportion of complex vocabulary makes the text harder to comprehend. In English, generally, complex words are considered those that have three syllables or more. However, it is disputable because there are examples of longer words, which are quite easy to understand, and shorter ones, which are considered difficult.

We drew upon the relevant Polish-related literature to adapt the FOG index to the Polish context. As far as we know, there is no commonly agreed-upon set of complex words for the Polish language. Thus, we could not apply it in the adapted version of the FOG index. We followed Broda *et al.* (2014) and Dębowski *et al.* (2015) and defined complex words as those having four syllables or more. Antunes and Lopes (2019) adopted a similar approach for Portuguese. We tested the robustness of the four-syllable

threshold in the corpus of 40 361 lexemes of the Polish language (Kazojć, 2009). One-third of the lexemes consisted of four syllables or more. The sample's average number of syllables per lexem was 3.13 (median 3). Hence, the four-syllable threshold seems both a rational and balanced choice. We calculated the FOG elements using the spaCy library and the author-written Python code. Then, we used it to determine the readability of letters to shareholders published alongside financial statements.

Iwanowicz (2018) argues that foreign Z-score models are not optimal in the Polish context. Our research design uses the Mączyńska model, which adapts O. Jacobs' model to the Polish economic environment. It is probably the most widely used bankruptcy prediction model in the Polish context. For this reason, we used the model in the following form (Mączyńska & Zawadzki, 2006):

$$ZM\_score = 1.5 * Z_1 + 0.08 * Z_2 + 10.0 * Z_3 + 5.0 * Z_4 + 0.3 * Z_5 + 0.1 * Z_6 \quad (2)$$

where:

$Z_1$ - (gross profit + depreciation) / liabilities;
$Z_2$ - assets/liabilities and provisions for liabilities;
$Z_3$ - gross profit/assets;
$Z_4$ - gross profit/sales revenue;
$Z_5$ - inventories/sales revenue;
$Z_6$ - sales revenue/assets.

The sample consisted of companies listed on the Warsaw Stock Exchange (WSE), headquartered in Poland. Most companies listed on the WSE prepare their annual reports, including letters to shareholders, exclusively in Polish. Only a small group of the largest companies provides also English-language versions of their annual reports. We excluded firms from the financial sector (*i.e.*, banks), with negative equity or incomplete data. Our research covered ten years (2015-2024). The final sample consisted of 2 228 firm-year observations, covering around 230 companies per year from the 400 listed on the WSE main market (Table 1).

**Table 1. Sample selection process**

| Description | Firm-year observations removed | Firm-year observations remaining |
|---|---|---|
| Initial sample of firm-year observations (2015-2024) | | 4 064 |
| Less: financial sector (banks, insurers) | (540) | 3 524 |
| Less: firm-year observations with negative equity | (189) | 3 335 |
| Less: firm-year observations with missing financial data | (836) | 2 499 |
| Less: firm-year observations with no letters to shareholders | (271) | – |
| Final sample: | – | 2 228 |

Source: own study based on data retrieved from the ORBIS database.

As far as we know, letters to shareholders of companies listed on the WSE are not available for automatic download from databases. Hence, we manually collected the letters to shareholders written in Polish from the companies' websites or databases containing annual reports (*e.g.*, the EMIS database) and converted them to a text file from various file types (*e.g.*, PDF, JPG). Then, we processed them through the spaCy library and the author-written Python code as outlined above. We downloaded financial statements from the Orbis database.

We tested whether the obfuscation hypothesis was valid in our sample. We began with the return on assets (ROA variable) as the proxy for bad news, which we conjectured in H1. Thereafter, we replaced ROA with Mączyńska Z-score, *i.e.*, ZM variable (H2). Following Li (2008), we used a broad set of financial factors as control variables (Table 2), such as a firm's size, age, complexity of operations, volatility of business operations, and capital market assessment. Additionally, we controlled for standing in operating activity, liquidity, and solvency.

The variables in the dataset were winsorised at the 5th and 95th percentiles, except for the FOG variable. The average value of the FOG index of almost 16 (Table 3) suggests that the reader had to hold at least a bachelor's degree or be in the first year of master's degree studies to understand

narrative accounting (around 22 years old). However, one in four reports required a master's degree to understand (Q3 of 17).

**Table 2. Variables employed to test hypotheses H1 and H2**

| Acronym | Description |
|---|---|
| **FOG** | We applied the FOG index, modified for the Polish language, to letters to shareholders to measure readability. Described by formula (1). |
| **ZM** | Z-score for the Mączyńska model, which proxies default risk and financial health. Described by formula (2). |
| **ROA** | Return on assets (ROA), calculated as (profit/total assets) x 100, measures the firm's profitability. |
| **GMAR** | Gross margin calculated as (Gross profit/sales) x 100, which captures business-model differences in cost structure, pricing power, and underlying operating profitability. |
| **MCAP** | Market capitalisation to cash flows from operations captures the cross-sectional differences in the market's assessment of a firm's cash-generating ability. We calculated market capitalisation by multiplying a company's total number of shares outstanding by the end-of-year share price. |
| **EVAL** | Enterprise value to EBITDA, which captures cross-sectional differences in market valuation, reflecting expected growth opportunities, profitability and risk. The enterprise value estimates the total value on the market of a company's operations by the sum of its market capitalisation, the long-term debts and the loans (to financial institutions) minus the cash and cash equivalents. |
| **TURN** | Net asset turnover, calculated as sales/(equity + non-current liabilities), captures cross-sectional differences in a firm's operational efficiency. |
| **CPER** | The collection period, calculated as (trade receivables/operating revenue) x 360, captures the cross-sectional differences in working-capital efficiency, credit policy, and cash-flow timing in the operating cycle. |
| **CRPER** | Credit period calculated as (trade payables/operating revenue) x 360, which controls for the cross-sectional differences in trade credit policy and working-capital investment. |
| **LIQ** | Liquidity calculated as (current assets – inventory)/current liabilities, which captures the cross-sectional differences in short-term financial health, risk of financial distress, the capacity to absorb shocks, and business-model differences in asset structure. |
| **SOL** | Solvency (asset-based) calculated as (equity/total assets) x 100, which captures the cross-sectional differences in liquid asset buffers and exposure to short-term liquidity risk. |
| **SIZE** | A proxy for the firm's size as the natural logarithm of end-of-year total assets, which captures the cross-sectional differences in business and organisational complexity, market power, information environment, visibility, and stakeholder diversity. |
| **AGE** | We calculated firm's age as the natural logarithm of the number of days since the first appearance on the WSE, which captures information asymmetry (Li, 2008). |
| **BSEG** | The number of business segments, which captures the economic complexity of firms' operations (Li, 2008). |
| **GSEG** | The number of geographic segments, which captures the spatial complexity of firms' operations (Li, 2008). |
| **SITEM** | Special items measured as the amount of unusual & exceptional income or expenses scaled by the total assets and multiplied by 100. Companies with more negative special items are more likely to experience unusual events (Li, 2008). |
| **EVOL** | Earnings volatility proxied by the standard deviation of operating earnings over the prior five years and divided by 1 000. EVOL captures the volatility of business operations (Li, 2008). |
| **COVID** | COVID variable controls for the COVID-19 pandemic effect. It is a dichotomous variable that takes a value of zero for the period 2015-2019 (1 068 observations) and one otherwise (1 160 observations). |

Source: own study.

The Q1, median, and Q3 for ZM indicated that most companies in the sample exhibited good financial health and no bankruptcy risk (ZM above zero). However, in 390 firm-year observations out of 2 228, the ZM-score was below zero, implying the opposite. Considering profitability, the average value of the ROA was positive; however, in 217 firm-years out of 2 228, it was negative. In both cases, the skewness (not tabulated), as expected, was negative, suggesting that most companies in the sample exhibited decent profitability and financial health simultaneously. Lastly, there were 7(134) firm-year

observations where the ZM was below(above) zero, and the ROA was positive(negative). Therefore, profitability and financial health (default risk) were not conceptually identical.

**Table 3. Descriptive statistics of variables used to test H1 and H2**

| Variable | Unit | Mean | Std. Dev. | Min | Q1 | Median | Q3 | Max |
|---|---|---|---|---|---|---|---|---|
| FOG | Years | 15.71 | 2.23 | 9.90 | 14.30 | 15.50 | 17.00 | 34.40 |
| ZM | Dimensionless | 0.89 | 3.91 | -13.95 | 0.61 | 1.46 | 2.57 | 6.28 |
| ROA | Percent | 2.52 | 10.43 | -29.42 | 0.32 | 3.88 | 7.84 | 19.17 |
| GMAR | Percent | 32.99 | 19.70 | 5.68 | 18.26 | 28.96 | 43.15 | 80.67 |
| MCAP | Multiplication | 5.09 | 12.18 | -25.84 | 1.31 | 4.59 | 9.28 | 34.60 |
| EVAL | Multiplication | 6.20 | 8.46 | -13.89 | 3.00 | 5.48 | 8.76 | 28.32 |
| TURN | Multiplication | 1.71 | 1.41 | 0.04 | 0.69 | 1.33 | 2.29 | 5.52 |
| CPER | Days | 47.27 | 30.11 | 3.31 | 24.43 | 43.83 | 65.17 | 116.69 |
| CRPER | Days | 43.69 | 29.11 | 7.73 | 23.27 | 37.42 | 56.20 | 129.75 |
| LIQ | Multiplication | 1.39 | 1.33 | 0.26 | 0.64 | 0.99 | 1.53 | 6.27 |
| SOL | Percent | 50.85 | 19.69 | 9.42 | 38.59 | 51.41 | 64.70 | 87.68 |
| SIZE | Log total assets | 5.58 | 0.78 | 2.48 | 5.06 | 5.53 | 6.06 | 8.50 |
| AGE | Log days | 8.34 | 0.63 | 2.77 | 8.03 | 8.43 | 8.80 | 9.34 |
| BSEG | Number | 4.06 | 2.49 | 1.00 | 2.00 | 4.00 | 6.00 | 15.00 |
| GSEG | Number | 3.86 | 4.29 | 1.00 | 1.00 | 2.00 | 5.00 | 38.00 |
| SITEM | Percent | 0.06 | 0.18 | -0.20 | 0.00 | 0.01 | 0.09 | 0.61 |
| EVOL | Number divided by 1000 | 40.61 | 76.70 | 1.05 | 3.90 | 10.68 | 31.71 | 319.85 |

Source: own study.

We test our hypotheses using the following model:

$$\begin{aligned} FOG_{i,t} = {} & \beta_0 + \beta_1 COVID_t + \beta_2 MainVariable_{\mathrm{i,t}} + \beta_3 (Covid \times MainVariable)_{i,t} \\ & + \beta_4 GMAR_{\mathrm{i,t}} + \beta_5 MCAP_{\mathrm{i,t}} + \beta_6 EVAL_{\mathrm{i,t}} + \beta_7 TURN_{\mathrm{i,t}} \\ & + \beta_8 CPER_{\mathrm{i,t}} + \beta_9 CRPER_{\mathrm{i,t}} + \beta_{10} LIQ_{\mathrm{i,t}} + \beta_{11} SOL_{\mathrm{i,t}} + \beta_{12} SIZE_{\mathrm{i,t}} \\ & + \beta_{13} AGE_{\mathrm{i,t}} + \beta_{14} BSEG_{\mathrm{i,t}} + \beta_{15} GSEG_{\mathrm{i,t}} + \beta_{16} SITEM_{\mathrm{i,t}} + \beta_{17} EVOL_{\mathrm{i,t}} + \xi_i \end{aligned} \quad (3)$$

We used ROA as the *MainVariable* to test H1 and ZM to test H2.

## RESULTS AND DISCUSSION

Table 4 presents the Pearson and Spearman correlations of the variables used in the model to test H1 and H2. Formula (1) defines the FOG index. Table 2 describes explanatory variables. The coefficients were statistically significant at the level, respectively, ***p < 0.01; **p < 0.05; *p < 0.1. There was a very low correlation between the readability (FOG) and other variables. However, some were statistically significant. The highest and most significant coefficients were between the ZM-score and the ROA, suggesting one may use them interchangeably. Both were accrual-based. As expected, liquidity (LIQ) was associated with the solvency (SOL). However, neither of them correlated with financial health (ZM) or profitability (ROA). Finally, the size of the company (SIZE) was strongly and positively correlated with the volatility of earnings (EVOL). Not surprisingly, net asset turnover (TURN) had a negative association with gross margin (GMAR).

As for other control variables, SIZE correlates with almost all variables, including a strong positive correlation (Pearson 0.79; Spearman 0.68) with EVOL. We included the Mean VIF among the post-estimation tests to detect potential multicollinearity of explanatory variables. Moreover, COVID negatively correlates with market capitalisation (CAP) and enterprise value (EVAL). Thus, the pandemic destroyed a portion of companies' value. Furthermore, COVID negatively impacts credit and collection periods (CPER and CRPER) and increases liquidity (LIQ). We interpreted these results as a signal that businesses increased their amount of cash and its equivalents to mitigate bankruptcy risk during and after the turbulent period. There was a positive correlation between the number of business segments (BSEG) and gross margin (GMAR), size (SIZE), firms' age at the market (AGE), number of geographic

segments (GSEG), and earnings volatility (EVOL). Simultaneously, negative correlations between BSEG and GSEG, and LIQ suggest that firms with complex and diversified business models are less liquid.

Table 5 presents regression results. We used the OLS estimator with robust standard errors. The number of observations was 2 228. Table 5 presents models' coefficients, adjusted R-squared, F statistics, and Mean VIFs. The t-statistics appear immediately underneath in parentheses. The coefficients and F statistics were statistically significant at the level, respectively, ***p < 0.01; **p < 0.05; *p < 0.1. We regressed the ROA (Panel 1) and ZM (Panel 2) scores with the FOG as the dependent variable in two settings.

Firstly, we use a dummy variable COVID (COVID = 0 for observations in 2015-2019 and COVID = 1 for the period 2020-2024), because we conjectured that the shock caused by the pandemic may have significantly influenced the analysed phenomenon. COVID builds on years; thus, due to the collinearity, its use precludes year fixed effects from the model. However, we may perceive COVID as a counterpart of them. The main difference is that it considers two compound periods instead of ten years. The results for ROA and ZM as the *Main Variable* are presented in subpanels (1.1) and (2.1), respectively. Secondly, we considered year fixed effects to test the robustness of our results. Subpanels (1.2) and (2.2) present the results.

The intercept (constant) above 13 in subpanels (1.1) and (2.1) implies that, in 2015-2019, a reader required, on average, more than 13 years of education (first year of the first-cycle study) to read and understand a letter. The parameters on COVID are differential intercepts. They suggest that in 2020-2024, the length of the required education period reduced by over 0.2 years (almost a quarter). Thus, despite the statistical significance, the differential intercepts were not substantively important.

The parameter in subpanel (1.1) indicates the negative impact of ROA on FOG, that is, a 1%-point increase in ROA resulted in a 0.0336 years (0.0336 × 365 = 12.26 days) reduction of education time required to understand the text. The parameter on COVID×ROA (*Main Variable*) was a differential slope coefficient indicating that the slope in the second period differed substantively (-0,0102 = -0.0336 + 0.0234). In other words, there was still a negative but much weaker impact of profitability (ROA) on readability (FOG). The value of the parameter on ROA (*Main Variable*) in panel (1.2) corroborates this result. The difference in absolute values of parameters results from the use of year-fixed effects, and in fact, that parameter in panel (1.2) represents an 'average' impact of ROA on FOG over the sample period. As for the ZM-score as the *Main Variable*, panels (2.1) and (2.2), results were similar. There was a negative impact of firms' financial health on the readability of letters to shareholders, *i.e.*, the healthier the firm, the more readable the letter. In the same vein, the differential slope coefficient of -0.0639 indicates that in 2020-2024, the impact remained negative but weaker. The findings were robust to the use of year fixed effects instead of the COVID dummy.

We tested all models for multicollinearity using the variance inflation factor (VIF). The mean VIF for all subpanels was about 2.8, indicating a lack of multicollinearity problems. We also tested the robustness of our results using Tobin's Q and the Poznański Z-score model (Hamrol *et al.*, 2004) as the main variable. The non-tabulated results were generally the same in terms of parameters on the *Main Variable*.

As for control variables, the results were very consistent. There as a set of variables that negatively influenced FOG. Thus, increases in their values improved readability. Firms with higher values of market capitalisation to cash flows from operations (MCAP) were under increased pressure and expectations from the capital market. It is also a sign that investors perceive these companies as more trustworthy. Therefore, we conjectured that managers are motivated to produce more readable financial statements. Net asset turnover (TURN) measures how efficiently managers use assets in a company to generate revenue. Our results suggest that managers of firms with underutilised assets tend to produce less readable accounting narratives. Lower liquidity (LIQ) obscures the readability of financial statements. Managers of bigger firms (SIZE) tend to prepare more readable letters. In contrast, managers of firms with longer existence in the market (AGE) tend to write less readable letters. We attribute this result to the more developed and complicated operations of older firms.

**Table 4. Pairwise correlations – Pearson (lower triangle) and Spearman (upper triangle) – of variables used to test H1 and H2**

| Variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) FOG | | -0.19 *** | -0.21 *** | -0.01 | -0.19 *** | -0.15 *** | -0.13 *** | 0.04 ** | 0.06 *** | -0.01 | -0.05 ** | -0.09 *** | 0.12 *** | 0.00 | -0.09 *** | 0.06 *** | -0.03 | -0.01 |
| (2) ZM | -0.18 *** | | 0.92 *** | 0.32 *** | 0.37 *** | 0.14 *** | -0.02 | -0.05 ** | -0.35 *** | 0.30 *** | 0.38 *** | 0.12 *** | 0.04 * | -0.02 | 0.10 *** | -0.04 ** | 0.02 | 0.04 *** |
| (3) ROA | -0.18 *** | 0.88 *** | | 0.22 *** | 0.37 *** | 0.12 *** | 0.14 *** | -0.03 | -0.32 *** | 0.25 *** | 0.28 *** | 0.11 *** | 0.01 | -0.01 | 0.14 *** | -0.04 * | 0.03 | 0.04 *** |
| (4) GMAR | -0.01 | 0.1 *** | 0.10 *** | | 0.19 *** | 0.17 *** | -0.47 *** | -0.06 *** | -0.21 *** | 0.12 *** | 0.29 *** | -0.08 *** | -0.03 | -0.13 *** | -0.03 * | -0.09 *** | -0.05 ** | -0.01 |
| (5) MCAP | -0.14 *** | 0.29 *** | 0.27 *** | 0.10 *** | | 0.41 *** | 0.03 | 0.01 | -0.16 *** | 0.11 *** | 0.21 *** | 0.08 *** | 0.01 | 0.02 | 0.17 *** | 0.03 | -0.01 | -0.06 *** |
| (6) EVAL | -0.138 *** | 0.32 *** | 0.26 *** | 0.16 *** | 0.29 *** | | 0.01 | -0.02 | -0.09 *** | -0.09 *** | 0.03 | 0.12 *** | -0.12 *** | 0.00 | 0.11 *** | -0.01 | 0.02 | -0.11 *** |
| (7) TURN | -0.10 *** | 0.10 *** | 0.08 *** | -0.43 *** | 0.00 | -0.01 | | -0.02 | 0.04 * | -0.20 *** | -0.33 *** | 0.01 | 0.04 * | 0.04 * | 0.22 *** | 0.08 *** | 0.00 | -0.00 |
| (8) CPER | 0.05 ** | -0.04 * | -0.02 | -0.09 *** | -0.03 | -0.04 ** | -0.09 *** | | 0.25 *** | 0.30 *** | 0.12 *** | -0.11 *** | 0.02 | 0.06 *** | 0.14 *** | 0.13 *** | -0.18 *** | -0.10 *** |
| (9) CRPER | 0.08 *** | -0.38 *** | -0.36 *** | -0.14 *** | -0.17 *** | -0.16 *** | -0.04 ** | 0.25 *** | | -0.29 *** | -0.31 *** | -0.01 | 0.00 | 0.03 | -0.04 * | 0.06 *** | -0.05 ** | -0.09 *** |
| (10) LIQ | -0.06 *** | 0.04 * | 0.11 *** | 0.27 *** | 0.04 * | -0.04 * | -0.27 *** | 0.14 *** | -0.19 *** | | 0.57 *** | -0.19 *** | -0.03 | -0.02 | -0.01 | 0.00 | -0.19 *** | 0.02 |
| (11) SOL | -0.08 *** | 0.24 *** | 0.28 *** | 0.25 *** | 0.12 *** | 0.04 ** | -0.39 *** | 0.11 *** | -0.31 *** | 0.57 *** | | -0.22 *** | 0.06 ** | -0.07 *** | 0.03 | -0.03 | -0.24 *** | 0.01 |
| (12) SIZE | -0.07 *** | 0.27 *** | 0.21 *** | -0.11 *** | 0.09 *** | 0.13 *** | 0.01 | -0.12 *** | -0.10 *** | -0.23 *** | -0.16 *** | | 0.15 *** | 0.29 *** | 0.19 *** | -0.06 *** | 0.79 *** | 0.05 ** |
| (13) AGE | 0.12 *** | 0.10 *** | 0.04 * | -0.04 * | -0.02 | -0.08 *** | 0.05 ** | 0.02 | -0.03 | -0.12 *** | -0.00 | 0.13 *** | | 0.14 *** | 0.06 *** | 0.09 *** | 0.14 *** | 0.32 *** |
| (14) BSEG | 0.03 | 0.08 *** | 0.06 *** | 0.16 *** | 0.01 | 0.03 | 0.00 | 0.03 | -0.03 | -0.11 *** | -0.05 ** | 0.31 *** | 0.17 *** | | 0.25 *** | 0.01 | 0.20 *** | -0.01 |
| (15) GSEG | -0.07 *** | 0.10 *** | 0.10 *** | -0.05 ** | 0.07 *** | 0.06 *** | 0.12 *** | 0.03 | -0.05 ** | -0.06 *** | -0.00 | 0.18 *** | 0.09 *** | 0.23 *** | | 0.06 *** | 0.12 *** | -0.01 |
| (16) SITEM | 0.05 ** | -0.03 | -0.04 | -0.09 *** | 0.02 | 0.02 | 0.02 | 0.11 *** | 0.05 ** | -0.04 * | -0.05 ** | -0.05 ** | 0.09 *** | 0.02 | -0.03 | | -0.04 * | 0.04 *** |
| (17) EVOL | -0.01 | 0.02 | 0.00 | -0.03 | 0.00 | 0.00 | -0.08 *** | -0.12 *** | -0.07 *** | -0.11 *** | -0.12 *** | 0.68 *** | 0.09 *** | 0.24 *** | 0.11 *** | -0.05 ** | | 0.16 *** |
| (18) COVID | -0.01 | 0.01 | 0.02 | 0.00 | -0.05 ** | -0.07 *** | -0.01 | -0.11 *** | -0.07 *** | 0.05 ** | 0.01 | 0.05 ** | 0.32 *** | -0.01 | 0.05 ** | 0.02 | 0.08 *** | |

Source: own study using STATA.

**Table 5. Regression results: H1 and H2**

| Variable | Panel 1 ROA as *Main Variable* | | Panel 2 ZM as *Main Variable* | |
|---|---|---|---|---|
| | (1.1) | (1.2) | (2.1) | (2.2) |
| Constant | 13.5533*** (13.32) | 13.4111*** (12.99) | 13.2042*** (12.71) | 13.0859*** (12.37) |
| COVID | -0.2109** (-2.17) | – | -0.2303** (-2.36) | – |
| *Main Variable* | -0.0336*** (-4.03) | -0.0207*** (-3.49) | -0.0852*** (-3.92) | -0.0514*** (-3.05) |
| COVID×*Main Variable* | 0.0234** (2.55) | – | 0.0639*** (2.67) | – |
| GRMAR | 0.0027 (0.75) | 0.0032 (0.90) | 0.0022 (0.61) | 0.0027 (0.75) |
| MCAP | -0.0086** (-2.18) | -0.0083** (-2.11) | -0.0089** (-2.26) | -0.0086** (-2.16) |
| EVAL | -0.0069 (-1.13) | -0.0071 (-1.16) | -0.0060 (-0.98) | -0.0063 (-1.03) |
| TURN | -0.275*** (-5.05) | -0.2560*** (-4.71) | -0.2729*** (-4.99) | -0.2542*** (-4.63) |
| CPER | 0.0007 (0.37) | 0.0008 (0.39) | 0.0006 (0.32) | 0.0008 (0.38) |
| CRPER | 0.0003 (0.13) | 0.0007 (0.32) | 0.0003 (0.14) | 0.0007 (0.33) |
| LIQ | -0.0779* (-1.65) | -0.0804* (-1.67) | -0.0821* (-1.75) | -0.0851* (-1.77) |
| SOL | -0.005 (-1.28) | -0.0038 (-0.95) | -0.0056 (-1.43) | -0.0042 (-1.05) |
| SIZE | -0.2338** (-2.18) | -0.2113** (-1.97) | -0.2289** (-2.11) | -0.2006* (-1.85) |
| AGE | 0.4304*** (5.24) | 0.4012*** (4.67) | 0.4692*** (5.74) | 0.4320*** (5.04) |
| BSEG | 0.0497** (2.22) | 0.0498** (2.21) | 0.0501** (2.24) | 0.0498** (2.21) |
| GSEG | -0.0245** (-2.00) | -0.0237* (-1.92) | -0.0256** (-2.09) | -0.0249** (-2.02) |
| SITEM | 0.2766 (1.08) | 0.2777 (1.08) | 0.2847 (1.11) | 0.2865 (1.11) |
| EVOL | -0.0003 (-0.28) | -0.0004 (-0.43) | -0.0003 (-0.33) | -0.0005 (-0.53) |
| Industry | Y | Y | Y | Y |
| COVID | Y | – | Y | – |
| YEAR | – | Y | – | Y |
| Adj.R2 | 0.26 | 0.26 | 0.26 | 0.26 |
| F | 11.95*** | 11.04*** | 11.83*** | 10.82*** |
| Mean VIF | 2.84 | 2.79 | 2.85 | 2.79 |

Source: own study using STATA.

The high number of geographic segments (GSEG) denotes firms operating in several countries. We suspect that managers of those firms strive to provide readers with more readable information to compensate for cross-country differences. In contrast, firms with a higher number of business segments (BSEG) denote firms with more complex business models. Thus, managers are forced to provide more detailed information, resulting in less readable narratives.

Our findings corroborate H1 and H2, suggesting that managers of companies that report bad news, as proxied by ROA and the Mączyńska Z-score (ZM), tend to obfuscate accounting narratives. The pandemic moderating effect weakened the influence of bad news on the financial statements' readability (as reflected in the slope coefficients). However, the statistical significance remained. We suspect that pandemic times changed social behaviours as well as the perception of bad news, which now seems more prevalent in the public domain, while the audiences become more desensitised to it. Thus, the OH mechanism is still at work, but on a somewhat different scale, meaning that more bad news is now required to achieve the same effect on the decline in financial report readability.

## CONCLUSIONS

We aimed to investigate the readability of accounting narratives in non-English settings and non-English languages. We build on the obfuscation hypothesis, supported by impression management theory. As far as we know, empirical evidence has been drawn mainly from the English setting and even more from the English language. We broadened the scope of prior research by including a Polish context. We adjusted the FOG to a local context by analysing specific features of the Polish language. We employed a dataset of firms listed on the WSE, involving 2 228 firm-year observations over the 2015-2024 period. Our results suggest that bad news, as proxied by return on assets (ROA) and the Mączyńska Z-score (ZM), obfuscates the readability of accounting narratives. The results are consistent and are robust to alternative specifications of the profitability proxy (Tobin's Q) and the Z-score (Poznański model). As a result, scholars may use ROA and ZM interchangeably for testing OH. This is an intriguing conclusion, given that these two metrics depict similar economic meanings, *i.e*., profitability and financial situation, but are not identical and have different interpretations. Profitability captures the firm's historical performance, while accounting-based bankruptcy forecasts capture bankruptcy risk and relate to a firm's future financial situation. Although we lack direct evidence and this issue requires further investigation, we suspect that more recently developed bankruptcy prediction models may provide a more accurate measure of bad news. By demonstrating that companies in a bad situation in terms of profitability and bankruptcy risk provide less readable accounting narratives, our findings corroborate the results of other studies examining OH (Li, 2008; Dempsey *et al.*, 2012; Miller, 2010; Ajina *et al.*, 2016; De Souza *et al.*, 2019; Smeuninx *et al.*, 2020; Gianfelici *et al.*, 2021).

This article enriches the literature on readability in several ways. Firstly, we used an accounting-based Mączyńska Z-score as a proxy for bad news. To our knowledge, our study is the first to employ such a measure as a proxy for bad news in the OH context. Secondly, we extended the scope of OH by examining the moderating influence of the COVID-19 pandemic on the relationship between bad news and readability. Thirdly, we adopted the FOG index for the Polish language, paving the way for scholars in other non-English-speaking countries to follow suit. Finally, we examined the set of other readability determinants as control variables, which yielded insightful conclusions.

Our study period covers 2015-2024, marked by the COVID -19 pandemic, which we control as a moderating variable to test the interaction with the main variables. Our findings confirm that during the pandemic, the mechanisms underlying the obfuscation hypothesis, driven by the need to report bad news, remain in place. However, the trigger point is set higher. In other words, more bad news is required to achieve the same level of decrease in the readability of accounting narratives. We suspect that prolonged periods of adversity and increased exposure to negative information foster desensitisation among investors and other stakeholders, thereby increasing their tolerance for such content. From the managers' perspectives, it translates into a change in perception of what constitutes bad news and how much obfuscation is needed to achieve certain goals.

Moreover, our study provides interesting results related to the control variables. There are at least three groups of factors. The first relates to market visibility, including size, internalisation (GSEG), and market expectations for a firm's growth opportunities (MCAP). Public attention puts more pressure on managers, who, in turn, provide more readable accounting narratives. In this regard, our findings are consistent with those of Laksmana *et al.* (2012). The second group addresses the business model complexity and the stock market listing history. The more complex the model and the longer the history

listing, the longer the story is to be told, and the more detailed the issues to be explained, all of which translate into lower readability. The last group reflects the firm's internal managerial efficiency in terms of liquidity (LIQ) and asset utilisation (TURN). Our findings suggest that more efficient managers tend to prepare more readable accounting narratives.

Regarding the study's limitations, the research design used only one financial situation metric (bankruptcy risk). Future research may employ other z-scores as well as bankruptcy models based on neural networks or artificial intelligence. This is also a problem of results generalisation. The study may be replicated only in countries where the academic community develops adequate bankruptcy risk models. Secondly, our model considered only a limited set of firm characteristics. For this reason, the model's predictive power was moderate ($R^2$ of 26%).

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## Authors

The contribution share of authors is equal and amounted to 50% for each of them.
KG & PW – conceptualisation, literature writing, methodology, calculations, discussion.

**Konrad Grabiński (corresponding author)**
PhD, Associate Professor at the Krakow University of Economics (Poland), Department of Financial Accounting. His research interests include earnings quality, earnings management, financial reporting, accounting diversity, and corporate finance.
**Correspondence to:** Dr hab. Konrad Grabiński, Prof. UEK, Krakow University of Economics, Department of Financial Accounting, ul. Rakowicka 27, 31-510 Kraków, Poland; e-mail: kg@uek.krakow.pl
**ORCID** https://orcid.org/0000-0002-1071-3317

**Piotr Wójtowicz**
PhD, Associate Professor at the Krakow University of Economics (Poland). His research interests include financial reporting, earnings management, and the impact of cultural factors on earnings quality.
**Correspondence to:** Dr hab. Piotr Wójtowicz, Prof. UEK, Uniwersytet Ekonomiczny w Krakowie, Katedra Rachunkowości, 31-510 Kraków, ul. Rakowicka 27, Polska, e-mail: piotr.wojtowicz@uek.krakow.pl
**ORCID** https://orcid.org/0000-0001-5054-9964

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## Use of Artificial Intelligence

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# Beyond compliance: Decoding the time effects of banking regulations on credit risk in the EEA banks

**Przemysław Borkowski, Magdalena Markiewicz, Maria Spanou**

**ABSTRACT**

**Objective:** The article aims to determine whether banks promptly react to risk-related regulatory changes or if there is a delayed response. Considering the complexities of the financial system, our study underscores the need to examine the time-sensitive impact of banking regulations on credit risk. Separating intricate dynamics, measuring responsiveness, and assessing compliance, we probe this research to find the assumptions for strengthening financial resilience in a dynamic landscape.

**Research Design & Methods:** The research design in this study is quantitative. We collected the initial data through desk research, sourcing information from regulatory documents, financial reports, and other relevant documents related to banking supervision rules. We used a dynamic panel data model to analyse the collected data, specifically examining the relationship between regulatory changes and banks' responses to these changes. The study's sample size involves quantitative data from multiple banks over time, allowing for an assessment of regulatory pressure's effects on credit risk and the tPime required for banks to achieve compliance.

**Findings:** The article sheds light on how alterations in regulatory policies for risk influence the responsiveness of systemically important banks (SIBs). We explored how long it takes for banks to comply fully with regulatory changes regarding risk. The results show that the effects of regulatory pressure may be delayed more than conventional models suggest, even as much as two years, with potential consequences for the efficacy of regulatory interventions.

**Implications & Recommendations:** The study results contribute to understanding the time dynamics of regulatory impacts on the banking sector, particularly concerning credit risk, and bring valuable insights into sustainable finance. It aids in identifying opportunities to align regulatory frameworks with sustainability objectives, and greater financial resilience. Policymakers and banks should invest in enhanced monitoring systems to track the time-sensitive responses of banks, primarily SIBs, to ensure regulatory interventions achieve their intended outcomes.

**Contribution & Value Added:** This research revealed the timing and progression of banks' responses to risk-related regulatory changes over time, offering valuable insights for policymakers and financial institutions. This alignment offers insights for fostering long-term financial stability and resilience.

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## INTRODUCTION

The banking sector's role in the economy has expanded significantly, providing innovative financial products that enhance credit market flexibility and introduce risk. Given the sector's close ties to the real economy, adequate regulatory and supervisory frameworks are essential for financial stability. Historical crises, such as the 2008-2009 financial crisis and the Great Depression, demonstrate how

financial market risks can disrupt the broader economy, raising concerns over deposit security and liquidity (Anginer *et al.*, 2019; Arrigoni & Rivolti, 2022; Böhnke *et al.*, 2023). Early regulations aimed to reduce bankruptcy risks through portfolio management (Dothan & Williams, 1980; Sharpe, 1978). Financial crises have prompted government and industry self-regulation, with the Basel Committee on Banking Supervision offering guidelines for managing key risks (Ambrocio *et al.*, 2020; Barth *et al.*, 2013). However, the timing and implementation of regulations remain underexplored.

This study investigated how regulatory interventions influence liquidity creation and examined the relationship between regulatory pressure and credit risk, providing valuable insights for policy development. Key questions include whether strict regulation enhances or hinders efficiency (Barth *et al.*, 2004; Barth *et al.*, 2013). While swift interventions during crises aim to improve banking system safety and performance, concerns persist over supervisory involvement, particularly regarding potential political influences on credit allocation (Beck *et al.*, 2010). Regulators increasingly influence banks' operations, impacting financial reporting and oversight changes. Regulatory statements on credit risk prevention often prompt swift strategy adjustments. While regulations enforce strict credit risk standards to protect consumers and the economy, banks' readiness to implement these changes quickly is crucial. The article examines how regulations affect credit risk and capital reserves needed for sudden changes and explores whether banks adapt promptly to regulations or if delays undermine the policies' objectives.

While compliance is generally accepted, evidence from financial crises suggests that banks may implement measures selectively to minimise the impact on efficiency (Anginer *et al.*, 2019; Hellmann *et al.*, 2000; Kashyap *et al.*, 2020). This raises the question: Does regulatory pressure achieve its intended result? The existing research produces mixed results regarding the effects of regulatory pressure on risk. Some authors show that growth in value-maximising bank incentives decreases asset risk as capital increases (Furlong & Keeley, 1989). According to other studies, capital regulation stimulates banks to take excessive risks by allowing them to increase riskier investments with the increase of bank capital (Siddika & Haron, 2020). Taking prior empirical results into consideration and a testing sample of several banks from the European Economic Area (EEA), and concentrating on the systemically important banks (SIBs), our research aims to answer the questions how changes in capital and risk regulations affect the time of responsiveness of the banks concerning their size and capitalisation.

We hypothesised that regulatory pressure effects are delayed far longer than conventional models assume. If true, this suggests that consistent, less restrictive regulation is more effective than reactive, one-time interventions. We propose that while regulatory changes significantly affect the responsiveness of SIBs, their timing and extent vary widely. In the EEA, SIBs show differing adaptation speeds due to regulatory complexity and internal risk management capabilities. These delays highlight a gap between expected and actual outcomes, suggesting potential inefficiencies in regulatory interventions.

From a policy perspective, constant and predictable oversight may foster sustainable risk management practices rather than sporadic restrictive measures, allowing banks to adapt gradually.

The article is structured as follows. The first part reviews current research on banking supervision rules and presents the hypotheses and research questions. The following section formulates methods for data collection, modelling, and analysis. A discussion of the results follows this. The article ends with conclusions, limitations and directions for future research.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The regulatory framework is built to create a financial stability architecture and network, evaluated in the context of the bank's size, performance, and willingness to adopt the regulations. Commercial banks' goals include maximising profits and operating efficiently, with a positive attitude toward regulations due to the perception of stability. On the other hand, it is impossible to maintain relative efficiency and improve the economic position of an entity with stricter buffers and reserves. Scholars widely analysed the evolution in bank capital regulations and bank risk after the global financial crisis in search of the factors ensuring the quality of capital and reducing bank risk (Kashyap *et al.*, 2020; Repullo, 2004; Sharpe, 1964). Surveys on bank regulation and supervision try to give evidence on

whether bank regulatory and supervisory requirements enhance or impede the banks' ability to create liquidity (Barth *et al.*, 2013; Mendicino *et al.*, 2021).

Empirical evidence on the impact of regulation and supervision on bank performance and risk-taking remains inconclusive, showing that tighter rules are not always beneficial (Barth *et al.*, 2004; Barth *et al.*, 2013; Chen, 2007). Some research distinguishes between regulatory intent and supervisory effects, with regulations imposing strict rules and enabling tailored interventions to prevent crises (Cihak *et al.*, 2013). Enhanced supervision has yielded valuable insights into the efficiency of post-crisis regulations. Following the 2008 financial crisis, policymakers introduced stricter capital regulations regarding capital level and quality (Anginer *et al.*, 2019). The impact of these regulations on banks' operations and liquidity creation remains uncertain, with empirical and theoretical analyses yielding conflicting results. Some researchers argue that activity restrictions promote bank stability (Agoraki *et al.*, 2011; Buckmann *et al.*, 2023; Kashyap *et al.*, 2020), while others declare the opposite opinion (Ahnert *et al.*, 2021; Demirgüç-Kunt *et al.*, 2004), which is in line with the assessment of anticipatory effects of regulatory proposals within Basel III (Hendricks *et al.*, 2023; Laeven & Levine, 2009; Mirzaei & Samet, 2022). Regulatory and supervisory policies are vital for safeguarding the financial sector, particularly in managing credit risk, which often underpins economic crises. Regulations aim to prevent past mistakes linked to credit product failures, but their effectiveness varies depending on the type of regulation and a bank's market power. Capital requirements generally lower risk, though this effect diminishes for banks with significant market power (Agoraki *et al.*, 2011). Restrictions on activities, when paired with market power, can reduce credit and default risks, with supervisory capacity influencing risk levels (Klomp & De Haan, 2015). In the EU, deregulation has improved loan quality and lowered credit risk by encouraging better borrower screening amid competition (Chen, 2007) and supervisory monitoring of bank risks during crises (Hoque *et al.*, 2015). Regulations significantly impact high-risk banks but have limited influence on low-risk institutions (Klomp & De Haan, 2015; Klomp & Haan, 2012).

The above analysis leads us to formulate a research question **(RQ1)**: Do changes in capital and risk regulation affect banks' responsiveness to risk? The hypotheses corresponding to RQ1 are:

**H1a:** Regulatory pressure does not significantly influence banks' responsiveness to risk-related regulations.

**H1b:** Larger banks take on more risk, affecting regulatory response by maintaining risky assets in their portfolios.

Modern banks operate in a globalised, complex environment with easy financial access, intense competition, and rigorous regulations focused on risk management and capital requirements. While the measures strengthen central supervisory bodies, they can threaten banking stability. Research on the credit and sovereign debt crises suggests that deposit insurance schemes increased moral hazard, leading banks to take significant risks and underperform during the crises (Hoque *et al.*, 2015). Some studies explored factors affecting default distance and systemic risk, finding that regulatory restrictions and monitoring influenced bank risk (Acharya, 2009; Barth *et al.*, 2004; Laeven & Levine, 2009). Intense supervision and monitoring help reduce systemic fragility in the banking sector (Anginer *et al.*, 2019; Cihak *et al.*, 2013; Demirgüç-Kunt *et al.*, 2004). In-depth research using the database on bank regulation and supervision in 107 countries showed the existing relationship between specific regulatory, supervisory practices and banking-sector development, efficiency, and fragility (Hellmann *et al.*, 2000). It examined factors such as regulatory restrictions, capital adequacy, supervisory power, loan classification, diversification standards, deposit insurance systems, and information disclosure. The findings suggest that accurate information disclosure and the empowerment of private-sector governance improve bank performance and stability. The interconnectedness of banking and the real economy underscores the need for effective regulation. The sector's growing role and innovative but riskier financial products highlight the importance of ensuring deposit security and liquidity during crises. Basel III addresses these issues, providing guidelines for capital management, particularly for major banks (Chaikovska, 2021; Gržeta *et al.*, 2023).

Some studies suggest that as a bank's capital increases, its incentives to take on higher asset risk decrease (Kim & Santomero, 1988; McKeever, 2023). Others argue that capital regulation can encourage excessive risk-taking by allowing banks to make riskier investments with more capital (Furlong &

Keeley, 1989). The pressure of regulation forces banks to impose rules and mechanisms speedily regarding compliance management, processes, and systems. The question arises whether this is an antidote to the financial crisis. Financial regulation, particularly capital requirements, aims to reduce credit risk, making banks less prone to fast implementation and enabling different supervisory approaches. Recent studies explore how these reforms impact risk-taking. Chen *et al.* (2024) analysed the effect of liquidity regulation on risk-taking and shadow banking in China, while Xiao *et al.* (2023) examined cross-holdings and systemic risk. Other research showed improvements in capital ratios and a decline in non-performing loans after regulatory reforms (Alley *et al.*, 2023). The studies in the UAE found that innovative technologies facilitate efficient service delivery, but the complexity of implementing regulations remains unclear (Oudat *et al.*, 2023). The evidence from the Middle East and North Africa (MENA) regions examining the determinants of capital structure decisions for banks found that profitability, bank size, and macroeconomic and institutional factors as key drivers of bank leverage (Khan *et al.*, 2023).

While there are different regulatory frameworks across world economies, the Bank for International Settlements (BIS) regulations seem universally accepted by the banking industry. It has issued a series of influential international banking standards known as the Basel Accords: Basel I (1988), Basel II (2004), Basel III (2010), and the revisions of Basel III, called Basel IV (Basel Committee on Banking Supervision, 2017). The Basel III framework introduced high-quality assessment and liquidity standards, raising questions about whether regulation is a long-term solution to financial crises or merely delays future risks (Hendricks *et al.*, 2023). Basel III responded to stringent capital requirements, including a standard equity tier 1 capital ratio and the quality of capital. The influence of BIS regulations extends beyond individual jurisdictions, creating a harmonised approach to banking supervision and reducing the risk of regulatory arbitrage. The comprehensive Basel risk assessment focus has led banks to develop sophisticated risk measurement models and frameworks with substantial capital buffers and risk management practices. Not all countries adopt these standards in the same way or at the same pace. Some jurisdictions modify certain aspects to suit their specific circumstances better, leading to variations in implementation.

Based on these assumptions, we proposed the second research question **(RQ2):** Do banks tend to take more time to respond to regulatory changes relating to risk and delay implementing regulations? The hypothesis corresponding to RQ2 was:

**H2:** The effects of regulatory pressure on banks' risk levels are delayed and do not produce immediate responses.

Analysing the EU banking sector, some research showed that banking deregulation may improve loan quality and lower credit risk as banks invest resources in screening borrowers when there is an entry threat (Chen, 2007). Modern banks function in a globalised and complex environment marked by easy financial access, increased market competition, and a regulatory focus on risk management and capital requirements. Some researchers analysed whether regulation reduced risk during the credit and sovereign debt crises for a cross-section of global banks (Hoque *et al.*, 2015), finding that deposit insurance schemes enhanced default risk and moral hazard in the banks (Acharya, 2009; Barth *et al.*, 2004; Laeven & Levine, 2009). Large banks create liquidity using a solid position as intermediaries in the market, referring to depositors and borrowers. The effect of liquidity creation on actual economic output may be beneficial, particularly in bank-dependent industries (Berger *et al.*, 2023) or negatively charged (Acharya & Yorulmazer, 2007). When there is little regulatory pressure and banks experience lower supervision, they are likely to experience a faster implementation of credit risk requirements, complying with supervisory standards, which creates a significant regulatory gap (Acharya, 2009). Regulatory standards for reporting credit risk are established in a self-regulatory system to avoid confusion during financial crises and to promote good practices. Many authors have analysed the context of liquidity creation (Bauer *et al.*, 1998; Kladakis *et al.*, 2022; Saar *et al.*, 2023). Their critical observation is that banks with a high conditional accounting conservatism in the pre-adoption period significantly increased risk-taking in the post-adoption period.

These expectations gave us the input to the following research question **(RQ3):** Does a bank's size affect responsiveness to an imposed regulatory change? The hypotheses corresponding to RQ3 are:

**H3a:** Banks of larger total asset size tend not to respond directly to a regulatory change.

**H3b:** The presence of risky assets in a bank's portfolio significantly impacts the risk adjustment levels.

The formulation of research question **RQ4**: *Do overcapitalised banks tend to avoid adjustments to risk levels following a regulatory change?* is grounded in prior empirical evidence on bank capital regulations and risk-taking behaviour. The existing literature suggests that banks with excess capital may exhibit lower sensitivity to regulatory changes as they already maintain substantial buffers, reducing their need for further risk adjustments (Furlong & Keeley, 1989; Kim & Santomero, 1988). Studies also indicate that banks prioritise capital accumulation over immediate risk reduction when faced with increased regulatory scrutiny, as capital buffers offer a protective mechanism against unforeseen market disruptions (Kashyap *et al.*, 2020).

Given the conflicting evidence on whether regulatory interventions effectively curb risk or merely alter capital management strategies, we developed **H4**: *EEA banks facing regulatory pressure prefer to increase their capital rather than decrease risk levels*. We aimed to explore whether overcapitalised banks opt for passive compliance through capital adjustments rather than actively reducing risk exposure. This hypothesis is particularly relevant in the context of the EEA, where banking regulations emphasise capital adequacy as a primary tool for financial stability.

## RESEARCH METHODOLOGY

We collected the initial data for research through desk research, sourcing information from regulatory documents, financial reports, and other relevant documents related to banking supervision rules. We used a dynamic panel data model to analyse the data, specifically examining the relationship between regulatory changes and banks' responses to these changes.

The study's sample size involved quantitative data from multiple banks over time, collected via Bank Scope. We prepared a set of selection criteria to pick a sample of representative banks from each of the 32 EEA countries. Firstly, the bank had to be the relevant market participant. We satisfied this by selecting banks as G-SIBs (global systemically important banks), SIBs (systemically important banks), or OSII (other systemically important institutions). It allowed us to include banks, which contribute to a system where the potential failure of a single large institution can have broader effects that reverberate throughout the global economy. Secondly, we decided to look for banks with headquarters in all 32 EEA countries to account for possible country bias, and specific bank characteristics considered, such as capital ratio, the largest bank by assets or capital, national/foreign capital, and credit exposure. We decided to use the 2011-2018 period because it covers the timeframe directly in the aftermath of the financial crisis of 2008-2010, before the Brexit referendum in 2019 and the COVID-19 outbreak in March 2020. It creates a 'window effect' for a research analysis. We applied dynamic panel data techniques as the primary statistical/econometric tools, allowing for an assessment of regulatory pressure's effects on credit risk and the time required for banks to achieve compliance.

Unlike previous empirical studies (Aggarwal & Jacques, 2001; Rime, 2001; Shrieves & Dahl, 1992), we employed dynamic panel data techniques to solve the models defined in the above sections. Scholars widely use panel data analysis to examine two-dimensional (typically cross-sectional and longitudinal) datasets, where data is collected over time for the same individuals and allowing for a regression analysis across these two dimensions. Panel data analysis offers three independent approaches: independently pooled panels, random effects models, and fixed effects models (or first-differenced models). The selection between random and fixed effects, as well as panel vs pooled models, depends on the research objective and the exogeneity of explanatory variables.

We conducted multiple statistical tests to assess performance and robustness to determine the appropriate model. We applied the Durbin-Watson test to detect the presence of autocorrelation in residuals, with a test statistic of 1.154706, indicating positive autocorrelation. We also performed the Hausman test to determine whether we should select fixed or random effects, with an asymptotic test statistic of Chi-square(13) = 153080, p-value = 0, validating the appropriateness of the fixed effects model. Moreover, a joint test on named regressors confirmed the explanatory power of the

independent variables, with a Chi-square(13) statistic of 568.028 and a p-value of 8.34388e-107, demonstrating significant contributions to the model. To further assess model reliability, we tested the normality of residuals, with a Chi-square(2) value of 5.662 and a p-value of 0.0590, indicating deviations from normality. The final decision on model selection (from tested candidates) was based on the highest performance indicators, including R-squared values, correlation coefficients, and the AIC test. Based on these results, we initially considered the panel data model with random effects, but we ultimately rejected it in favour of the panel fixed effects model, as it provided more reliable estimates in line with the observed data patterns.

For the initially tested random effects models, we also performed the Breusch-Pagan test to assess heteroskedasticity. Under the null hypothesis (where the variance of the unit-specific error equals 0), the test yielded a Chi-square value of 0.286014 with a p-value of 0.592786, leading to the rejection of the null hypothesis and confirming that the panel were preferable over pooled OLS. Nevertheless, since the Hausman test pointed to the use of a fixed model, the BP test was not critical.

Table 1 presents all variables selected for the research process based on the data available and suggested from the literature review.

**Table 1. The dataset of variables used in modelling**

| Variable | Variable definition | Min | Max | Type | Source |
|---|---|---|---|---|---|
| REGA | (Regulatory Component measured as (1/CAR – 1/8). It measures the banks' responses to the 8% risk-based capital standard.) | -0.7098 | 0.986111 | ratio | Shrieves & Dahl (1992); Rime (2001); Aggarwal & Jacques (1997); Van Roy (2005a); Jacques & Nigro (1997); Heid *et al*. (2003) |
| REGB | Reverse of REGA | -0.98611 | 0.709795 | ratio | Shrieves & Dahl (1992) |
| ROAA | Return on Average Assets | -11.55 | 5.11 | ratio | Rime (2001); Aggarwal & Jacques (1997) |
| TEA | Total Earning Assets | 264038 | 2.08E+09 | th EUR | Roy (2005a); Jacques & Nigro (1997) |
| TA | Total assets | 400484 | 2.16E+09 | th EUR | Heid *et al*. (2003), Shrieves & Dahl (1992); Rime (2001) Aggarwal & Jacques (1997) |
| CL&Adv/ TA | Customer loans & advances / Total assets | 17.51 | 80.2 | th EUR | |
| GL&Adv/ TA | Gross loans and advances to customers | 207245 | 8.64E+08 | th EUR | Roy (2005a); Jacques & Nigro (1997); Heid *et al*. (2003) |
| NL&Adv | Net loans and advances to customers | 204563 | 8.4E+08 | th EUR | Haubrich & Wachtel (1993); Jacques & Nigro (1997) |
| CET1 | Common Equity / Core Tier 1 (CET1) (as reported) | -407284 | 76131000 | th EUR | Shrieves & Dahl (1992); Rime (2001); Aggarwal & Jacques (1997) |
| CET1ratio | Common Equity / Core Tier 1 ratio (as reported) | -1.9 | 27.01 | th EUR | Roy (2005a); Jacques & Nigro (1997); Heid *et al*. (2003) |
| Tier 1 | The ratio of a bank's core tier 1 capital to its total risk-weighted assets. | -1.27 | 28.7 | ratio | Shrieves & Dahl (1992); Rime (2001); Aggarwal & Jacques (1997); Rime (2001) |
| Tier 1 Capital | A bank's core equity capital to its total risk-weighted assets (RWA). | -95957 | 84773000 | th EUR | Roy (2005a); Jacques & Nigro (1997); Heid *et al*. (2003); Shrieves & Dahl (1992) |
| TE/RWAs | Total equity / Risk-weighted assets (RWAs) | -3.19 | 32.91 | th EUR | Rime (2001); Aggarwal & Jacques (1997); Roy (2005a) |
| CAR | Total Capital Adequacy Ratio (%) | -1.71 | 31.8 | th EUR | Jacques & Nigro (1997); Heid *et al*. (2003); Rime (2001) |

Source: own study.

In terms of the selection of the 32 EEA countries and selecting a sufficiently representative bank, we examined the criteria starting from the productivity and liquidation potential of a bank expressed by the total capital ratio (higher capital ratio compared to other peers in the market) and where this was not sufficient or there was no relevant data, we considered the financial group that the candidate

bank would belong to as well as size of the bank in terms of number of employees or market presence over the years. Table 2 summarises the criteria chosen per selected bank based on data availability and size or market presence. The key selection criterion is the type of bank, whether it is a G-SIB, SIB, or OSII. Once it entered the data set, we selected the probe by a metric such as the country's 'highest total capital ratio,' the largest bank by total assets, or one of the leading banks by total assets.

**Table 2. Sample selection criteria**

| EEA Country | Bank | GSIB/SIB/OSII | HQ | Selection factor / Remarks |
|---|---|---|---|---|
| **Denmark** | Danske Bank | SIB | Denmark | Higher total capital ratio req. |
| **France** | BNP Paribas | G-SIB | France | Higher total capital ratio req. |
| **Germany** | Deutsche Bank | SIB | Germany | Higher total capital ratio req. |
| **Italy** | UniCredit Group | G-SIB | Italy | Higher total capital ratio req. |
| **Lithuania** | AB Šiaulių bankas | SIB | Lithuania | Lithuanian Bank, not a subsidiary |
| **Netherlands** | ING Bank | G-SIB | Netherlands | Higher total capital ratio req. |
| **Norway** | DNB ASA | SIB | Norway | Higher total capital ratio req. + largest financial group |
| **Poland** | PKO BP | SIB | Poland | Higher total capital ratio req. + largest financial group |
| **Spain** | Banco Santander | G-SIB | Spain | Higher total capital ratio req. |
| **Sweden** | SwedBank | G-SIB | Sweden | Higher total capital ratio req. |
| **UK** | HSBC | G-SIB | UK | Higher total capital ratio req. |
| **Switzerland** | Credit Suisse | G-SIB | Switzerland | Higher total capital ratio req. |
| **Austria** | Erste Group | OSII | Austria | Higher total capital ratio req. + largest financial group |
| **Belgium** | Dexia Group | G-SIB | Belgium | Higher total capital ratio req. |
| **Bulgaria** | First Investment Bank | n/a | Bulgaria | Largest bank |
| **Croatia** | Zagrebačka Banka d.d. | OSII | Croatia | Largest bank |
| **Cyprus** | Bank of Cyprus Plc | OSII | Cyprus | Largest bank |
| **Czech Republic** | Česká spořitelna, a.s | OSII | Czech Republic | Leading bank by total assets |
| **Estonia** | LHV Pank | n/a | Estonia | 2nd largest bank & Estonian origin |
| **Finland** | OP Group | OSII | Finland | Largest Finnish Financial Group |
| **Greece** | National Bank of Greece | OSII | Greece | The oldest and largest bank as of 2016 |
| **Hungary** | OTP Bank Nyrt | OSII | Hungary | Higher total capital ratio req. + largest bank |
| **Iceland** | Arion banki hf | OSII | Iceland | Higher total capital ratio req. + largest bank |
| **Ireland** | Allied Irish Banks plc | OSII | Ireland | One of the big four commercial banks |
| **Latvia** | ABLV Bank AS | OSII | Latvia | One of the largest banks in the Baltic states |
| **Liechtenstein** | VP Bank AG | n/a | Liechtenstein | The top 2 are of German and French nationality, respectively (i.e., Deutsche Bank Luxembourg S.A. ; Société Générale Bank & Trust S.A.); This bank is a G-SIB. The other two are OSIIs |
| **Luxembourg** | Banque Internationale à Luxembourg S.A. | OSII | Luxembourg | One of the most important financial organisations |
| **Malta** | Bank of Valletta Group | OSII | Malta | Higher total capital ratio req. + largest bank |
| **Portugal** | Caixa Geral de Depósitos | OSII | Portugal | Higher total capital ratio req. + second largest bank |
| **Romania** | Banca Comercială Română S.A | OSII | Romania | Higher total capital ratio req. + largest bank |
| **Slovakia** | Všeobecná úverová banka a.s. | OSII | Slovakia | Higher total capital ratio req. + of the largest bank |
| **Slovenia** | NLB | OSII | Slovenia | Higher total capital ratio req. + of the largest bank |

Source: own study.

The selected model is based on the general idea of Shrieves and Dahl's simultaneous equations, which are analysed and described using panel data regression for 32 selected countries (Shrieves & Dahl, 1992). The designed and used model assesses how banks react to regulatory requirements on their risk levels. Panel data regression is used to specify and estimate the model and its associated results, and panel data analysis serves analyse two-dimensional (typically cross-sectional and longitudinal) panel data. The data is collected over time and with the same individuals, and regression is run over these two dimensions. An essential aspect of the model initially suggested by Shrieves and Dahl is that changes in risk and capital have endogenous (*i.e.*, discretionary) and exogenous components. In the model, observed risk level changes include a discretionary adjustment and a change caused by factors exogenous to the bank. Concerning risk, exogenous variables changes include unanticipated shocks to the national and local economy, such as the changing characteristics of a bank loan portfolio or volatility of loan collateral such as real property. Therefore, the model specified looks like in Equation 1.

$$\Delta RISK_{j,t} = \Delta^d RISK_{j,t} + S_{j,t} \tag{1}$$

in which:

$\Delta RISK_{j,t}$ - the observed change in risk levels for bank j in period *t*;

$\Delta^d RISK_{j,t}$ - the discretionary change in risk while there are the random shocks.

The discretionary changes in risk $\Delta^d RISK_{j,t}$ are modelled based on delayed (or lagged, as they are statistically called) data for the selected variables, thereby recognising that banks may not be able to adjust their desired risk. Under this framework, the discretionary changes in risk are proportional to the difference between the target levels and the observed levels in period t-1. Thus, the model equations are as follows (Equations 2 and 3):

$$\Delta RISK_{j,t} = \beta(RISK^*_{j,t} - RISK_{j,t-1}) \tag{2}$$

in which:

$RISK^*_{j,t}$ - the bank's target risk levels;

$\beta$ - a parameter.

We may write the observed changes in capital, risk, and liquidity as follows:

$$\Delta RISK_{j,t} = \beta\left(RISK^*_{j,t} - RISK_{j,t-1}\right) + S_{j,t} \tag{3}$$

in which:

$RISK^*_{j,t}$ - the bank's target risk levels;

$\beta$ - a parameter.

Based on model equation (3), the observed changes in risk in period *t* are a function of the target risk level in period *t*; the risk level is not directly observable but is assumed to be dependent on some set of visible variables describing the bank's financial condition and the state of the economy in each country. Risk is defined as the denominator in the ratio of total capital to total risk-weighted assets (RWA) and any adjustments (A) that could take place from imposed regulation, as in Equation 4:

$$RISK = \frac{RWA}{A} \tag{4}$$

in which:

$RWA$ - the risk weighted assets;

$A$ - the total assets.

Meanwhile, REGA variable equals the difference between the inverse of the individual bank capital ratio (CAR) and the inverse of the regulatory minimum risk-based ratio of 8%.[1] Therefore, REGA equals (1/CAR-1/8) for all banks with risk-based ratios of less than or equal to 8% and 0 for all banks with a total risk-based ratio above the required minimum. This measure recognises the non-linear relationship between the regulatory capital and either a change in portfolio risk or capital ratios. REGB measures 'distance to default' from above. It equals the difference between the inverse of the regulatory minimum

[1] The capital adequacy ratio calculates a bank's capital by its risk-weighted assets. Currently, the minimum ratio of capital to risk-weighted assets is 8% under Basel II and 10.5% (which includes a 2.5% conservation buffer) under Basel III. This article uses a Basel II threshold similar to Shrieves & Dahl, excluding the conservation buffer.

risk-based ratio of 8% and the inverse of the individual bank capital ratio (CAR). Therefore, REGB equals (1/8-1/CAR) for all banks with risk-based ratios greater than or equal to 8 and 0 otherwise.

$$REGA = \left(\frac{1}{CAR} - \frac{1}{8}\right) if\ CAR\ \leq 8\%; 0\ otherwise \tag{5}$$

$$REGB = \left(\frac{1}{8} - \frac{1}{CAR}\right) if\ CAR \geq 8\%; 0\ otherwise \tag{6}$$

Therefore, the final risk model equation came out to be as follows:

$$\begin{aligned} dRISK_{j,t} = {} & \beta_0 + \beta_1 ROAA_{j,t} + \beta_2 TEA_{j,t} + \beta_3 TA_{j,t} + \beta_4 CL\&Adv/TA_{j,t} + \beta_5 GL\&aDV/TA_{j,t} \\ & + \beta_6 NL\&Adv_{j,t} + \beta_7 CET1_{j,t} + \beta_8 CET1_{ratio\,j,t} + \beta_9 Tier1ratio_{j,t} \\ & + \beta_{10} Tier1_{j,t} + \beta_{11} TE/RWAs_{j,t} + \beta_{12} CAP_{j,t} + \beta_{13} RISK/RWA_{j,t-1} \\ & + \beta_{14} dCAP_{j,t-3} + \beta_{15} REGA_{j,t-1} + \beta_{16} REGA_{j,t-2} + \beta_{17} REGA_{j,t-3} \\ & + \beta_{18} REGB_{j,t-1} + \beta_{19} dRISK_{j,t-1} + \beta_{20} dRISK_{j,t-2} + \beta_{21} dRISK_{j,t-3} + S_{j,t} \end{aligned} \tag{7}$$

## RESULTS AND DISCUSSION

The results of the study provide empirical insights into how regulatory changes impact credit risk in systemically important banks across the EEA. The findings illustrate banks' responsiveness to risk-related regulations over time and highlight the extent of delays in compliance. The study examines whether banks proactively adjust their risk strategies following regulatory interventions or if structural and operational limitations constrain their reactions. By analysing a comprehensive dataset through dynamic panel data modelling, we identified patterns in risk adjustments, capital allocation, and regulatory adherence. This section presents the key statistical findings, including regression coefficients, significance levels, and trends in bank risk behaviour, offering a detailed assessment of the interplay between banking regulations and risk management practices.

The risk model equation is as follows:

$$\begin{aligned} dRISK_{j,t} = {} & -2.27 + 0.00675 ROAA_{j,t} - 2.53\text{e}-09 TEA_{j,t} + 2.79\text{e}-09 TA_{j,t} \\ & + 0.00305 CL\&Adv/TA_{j,t} + 2.88\text{e}-09 GL\&aDV/TA_{j,t} - 3.81\text{e} \\ & - 09 NL\&Adv_{j,t} - 5.42\text{e}-09 \beta_7 CET1_{j,t} - 0.0270 CET1_{ratio\,j,t} \\ & - 0.0137 Tier1ratio_{j,t} + 2.73\text{e}-09 Tier1_{j,t} Capital \\ & - 0.0255 TE/RWAs_{j,t} + 0.0675 CAP_{j,t} + 0.0143 \beta_{13} RISK/RWA_{j,t-1} \\ & - 0.00700 \beta_{14} dCAP_{j,t-3} - 4.09 REGA_{j,t-1} - 4.74 REGA_{j,t-2} \\ & - 6.67 REGA_{j,t-3} + 2.83 REGB_{j,t-1} \\ & - 0.542 dRISK_{j,t-1} - 0.377 dRISK_{j,t-2} - 0.152 dRISK_{j,t-3} + S_{j,t} \end{aligned} \tag{8}$$

n = 105, loglikelihood = -92.2

Table 3 presents the primary statistical features of our dataset.

Concerning the capital variable in the risk equation, the bank size factor (total assets) and the presence of the risky asset in the bank's portfolio (RiskRWA assets) impacted the risk adjustment levels significantly and positively, with correlation coefficients of 2.792 and 0.0142, respectively. The positive effect of bank size on risk agrees with other studies and means that larger banks have or tend to have higher risk levels than smaller banks. In addition to holding riskier assets in its portfolio, a bank may be guaranteeing some level of protection against further increases in risk levels or regulatory pressure that the bank may face in the future or even possible losses from riskier activities.

The second most important variables were the total capital ratio and total earning assets. Regarding total earning assets, it is sensible that in the long term, a bank may be willing to be more conservative in terms of the risk it would undertake, as it may not be able to base its risk-taking approach on an income-producing indicator like this. Earning assets include stocks, bonds, income from rental property, certificates of deposits, and other interest or dividend-earning accounts or instruments.

**Table 3. Variables analysis**

| Variable | Coefficient | Standard errors |
|---|---|---|
| ROAA | 0.00675 | (0.0327) |
| TotalEarningAssets | -2.53e-09 | (1.04e-09) |
| TotalAssets | 2.79e-09 | (1.01e-09) |
| CustomerLoansAdvancesTot | 0.00305 | (0.00418) |
| GrossLoansAdvances to customers | 2.88e-09 | (3.03e-09) |
| Netloansadvances to customers | -3.81e-09 | (3.34e-09) |
| CommonEquityCoreTier1CE | -5.42e-09 | (6.07e-09) |
| CommonEquityCoreTier1rat | -0.0270 | (0.0439) |
| Tier1Ratio | -0.0137 | (0.0452) |
| Tier1Capital | 2.73e-09 | (7.73e-09) |
| TotalEquityRiskweightedas | -0.0255 | (0.0162) |
| TotalCapitalRatio | 0.0675 | (0.0293) |
| RiskRWAAssets | 0.0143 | (0.00414) |
| dCAPCAPjtCAPjt1CAPJ | -0.00700 | (0.00809) |
| REGA_1 | -4.09 | (3.73) |
| REGA_2 | -4.74 | (3.03) |
| REGA_3 | -6.67 | (5.24) |
| REGB | 2.83 | (3.06) |
| dRisk_1 | -0.542 | (0.0727) |
| dRisk_2 | -0.377 | (0.0882) |
| dRisk_3 | -0.152 | (0.0694) |

Source: own study.

$$\begin{aligned} dRISK_{j,t} = {} & -2.27 + 0.00675ROAA_{j,t} - 2.53\text{e}-09TEA_{j,t} + 2.79\text{e}-09TA_{j,t} \\ & + 0.00305CL\&Adv/TA_{j,t} + 2.88\text{e}-09GL\&aDV/TA_{j,t} - 3.81\text{e} \\ & - 09NL\&Adv_{j,t} - 5.42\text{e}-09\beta_7 CET1_{j,t} - 0.0270CET1_{ratio\,j,t} \\ & - 0.0137Tier1ratio_{j,t} + 2.73\text{e}-09Tier1_{j,t}Capital \\ & - 0.0255TE/RWAs_{j,t} + 0.0675CAP_{j,t} + 0.0143\beta_{13}RISK/RWA_{j,t-1} \\ & - 0.00700\beta_{14}dCAP_{j,t-3} - 4.09REGA_{j,t-1} - 4.74REGA_{j,t-2} \\ & - 6.67REGA_{j,t-3} + 2.83REGB_{j,t-1} \\ & - 0.542dRISK_{j,t-1} - 0.377dRISK_{j,t-2} - 0.152dRISK_{j,t-3} + S_{j,t} \end{aligned} \tag{9}$$

Table 4 summarises critical statistical values for each of the model's variables.

In the case of the total capital ratio (capital adequacy ratio), and given its definition (total capital divided by the RWA), the riskier assets a bank holds in its portfolio, the lower the capital ratio for the bank is, as per Basel guidelines, no lower than 8%. Central banks and bank regulators typically set this ratio to prevent banks from taking excessive leverage and becoming insolvent. In the absence of any statistical impact of the regulatory component on the risk levels, it stands as an important finding that the total capital ratio positively impacts the risk adjustment level, as this indicates some protection against possible losses for the bank, as it serves as a minimum regulatory buffer for the capital ratio.

One of the key findings after examining the possible impact of each independent variable on the risk level adjustments (dependent variable is the REG estimate obtained for the EEA banks in scope indicates that banks facing regulatory pressure tend to increase the risk-weighted assets in their portfolio. They consider the distinction from how the two regulatory components have been previously defined (REGA for undercapitalised banks and REGB for adequately capitalised banks).

There is a disconnect between the expected and actual effects of regulatory pressure on risk, as indicated by the non-significant impact of regulatory components on risk level adjustments. This suggests potential shortcomings in the effectiveness of regulatory interventions in achieving desired outcomes.

**Table 4. The summary of the main statistics**

| Variable | Mean | Median | Minimum | Maximum |
|---|---|---|---|---|
| REGA | -0.061438 | -0.064723 | -0.70980 | 0.98611 |
| REGB | 0.061438 | 0.064723 | -0.98611 | 0.70980 |
| ROAA | 0.36617 | 0.59500 | -11.550 | 5.1100 |
| Total Earning Assets | 2.7347e+008 | 4.8154e+007 | 2.6404e+005 | 2.0843e+009 |
| Total Assets | 3.0679e+008 | 6.0629e+007 | 4.0048e+005 | 2.1641e+009 |
| CustomerLoansAdvancesTot | 55.091 | 57.935 | 17.510 | 80.200 |
| GrossLoansAdvancesToCustomers | 1.4718e+008 | 4.1502e+007 | 2.0724e+005 | 9.0603e+008 |
| NetLoansAdvancesToCustomers | 1.4203e+008 | 3.6981e+007 | 2.0456e+005 | 8.8272e+008 |
| CommonEquityCoreTier1CE | 1.3762e+007 | 6.2252e+006 | -4.0728e+005 | 7.6131e+007 |
| CommonEquityCoreTier1rat | 13.706 | 13.300 | -1.9000 | 27.100 |
| Tier1Ratio | 14.660 | 14.350 | -1.2700 | 28.700 |
| Tier1Capital | 1.4438e+007 | 4.6194e+006 | -95957. | 8.4773e+007 |
| TotalEquityRiskweighted Assets | 17.373 | 16.910 | -3.1900 | 32.910 |
| TotalCapitalRatio | 16.931 | 16.540 | -1.7100 | 31.800 |
| RiskRWAAssets | 45.405 | 45.495 | 15.487 | 85.086 |
| dCAPCAPjtCAPjt1CAPJ | 1.5340 | 0.030231 | -7.2047 | 19.633 |
| dRisk | -0.074121 | -0.25415 | -0.63004 | 2.8370 |
| dRisk_1 | -0.075140 | -0.25485 | -0.63004 | 2.8370 |
| dRisk_2 | -0.088645 | -0.25994 | -0.63004 | 2.8370 |
| dRisk_3 | -0.080036 | -0.26114 | -0.63004 | 2.8370 |
| dRisk_4 | -0.066024 | -0.27112 | -0.63004 | 2.8370 |
| REGA_1 | -0.061121 | -0.065334 | -0.70980 | 0.98611 |
| REGA_2 | -0.057125 | -0.065564 | -0.093553 | 0.98611 |
| REGA_3 | -0.056658 | -0.065334 | -0.093553 | 0.98611 |
| REGB_1 | 0.061121 | 0.065334 | -0.98611 | 0.70980 |
| REGB_2 | 0.057125 | 0.065564 | -0.98611 | 0.093553 |
| REGB_3 | 0.056658 | 0.065334 | -0.98611 | 0.093553 |
| **Variable** | **Std. Dev.** | **C.V.** | **Skewness** | **Ex. kurtosis** |
| REGA | 0.079986 | 1.3019 | 6.9659 | 134.16 |
| REGB | 0.079986 | 1.3019 | -6.9659 | 134.16 |
| ROAA | 1.6948 | 4.6285 | -3.7393 | 20.255 |
| TotalEarningAssets | 4.5634e+008 | 1.6687 | 2.0773 | 3.5552 |
| TotalAssets | 5.1406e+008 | 1.6756 | 2.0807 | 3.4716 |
| CustomerLoansAdvancesTotal | 13.159 | 0.23887 | -0.85917 | 0.22429 |
| GrossLoansAdvancesToCustomers | 2.2018e+008 | 1.4960 | 1.7627 | 1.9783 |
| NetLoansAdvancesToCustomers | 2.1347e+008 | 1.5030 | 1.7577 | 1.9749 |
| CommonEquityCoreTier1CE | 1.8160e+007 | 1.3196 | 1.6096 | 1.6950 |
| CommonEquityCoreTier1rat | 4.2058 | 0.30687 | 0.18034 | 1.9629 |
| Tier1Ratio | 4.0903 | 0.27900 | 0.32811 | 1.9784 |
| Tier1Capital | 2.0317e+007 | 1.4072 | 1.6789 | 1.8466 |
| TotalequityRiskweightedas | 5.1763 | 0.29796 | -0.010736 | 1.5365 |
| TotalCapitalRatio | 4.2235 | 0.24945 | 0.019647 | 2.5612 |
| RiskRWAAssets | 16.549 | 0.36448 | 0.18436 | -0.70132 |
| dCAPCAPjtCAPjt1CAPJ | 4.6279 | 3.0168 | 2.6932 | 5.8369 |
| dRisk | 0.55876 | 7.5384 | 2.5382 | 7.8119 |
| dRisk_1 | 0.56678 | 7.5429 | 2.6136 | 8.2308 |
| dRisk_2 | 0.56911 | 6.4201 | 2.8118 | 9.4929 |
| dRisk_3 | 0.60081 | 7.5067 | 2.7711 | 8.7814 |
| dRisk_4 | 0.65434 | 9.9107 | 2.5979 | 7.1830 |
| REGA_1 | 0.085363 | 1.3966 | 6.5441 | 117.88 |
| REGA_2 | 0.078687 | 1.3774 | 12.643 | 164.94 |

| Variable | Mean | Median | Minimum | Maximum |
|---|---|---|---|---|
| REGA_3 | 0.085572 | 1.5103 | 11.787 | 141.12 |
| REGB_1 | 0.085363 | 1.3966 | -6.5441 | 117.88 |
| REGB_2 | 0.078687 | 1.3774 | -12.643 | 164.94 |
| REGB_3 | 0.085572 | 1.5103 | -11.787 | 141.12 |
| Variable | 5% Perc. | 95% Perc. | IQ range | Missing obs. |
| REGA | -0.083771 | -0.035450 | 0.018441 | 0 |
| REGB | 0.035450 | 0.083771 | 0.018441 | 0 |
| ROAA | -1.9625 | 1.8775 | 0.88500 | 0 |
| TotalEarningAssets | 1.5217e+006 | 1.5146e+009 | 2.2754e+008 | 0 |
| TotalAssets | 1.7934e+006 | 1.6212e+009 | 2.4892e+008 | 0 |
| CustomerLoansAdvancesTotal | 26.811 | 71.665 | 16.143 | 0 |
| GrossLoansAdvancesToCustomers | 7.8832e+005 | 6.9839e+008 | 1.5226e+008 | 0 |
| NetloansAdvancesToCustomers | 7.3321e+005 | 6.7140e+008 | 1.5184e+008 | 0 |
| CommonEquityCoreTier1CE | 1.7051e+005 | 5.7273e+007 | 1.5849e+007 | 2 |
| CommonEquityCoreTier1rat | 7.6400 | 21.200 | 4.5200 | 5 |
| Tier1Ratio | 9.0520 | 21.419 | 5.2000 | 3 |
| Tier1Capital | 1.1416e+005 | 6.1205e+007 | 1.5696e+007 | 0 |
| TotalEquityRiskWeightedAs | 10.243 | 26.536 | 5.8250 | 3 |
| TotalCapitalRatio | 11.118 | 24.110 | 5.0750 | 0 |
| RiskRWAAssets | 19.328 | 74.272 | 26.662 | 76 |
| dCAPCAPjtCAPjt1CAPJ | -0.43418 | 14.580 | 0.53165 | 1 |
| dRisk | -0.55636 | 1.3174 | 0.40316 | 77 |
| dRisk_1 | -0.54783 | 1.3177 | 0.40175 | 98 |
| dRisk_2 | -0.55883 | 1.3181 | 0.39963 | 119 |
| dRisk_3 | -0.56259 | 1.3484 | 0.34566 | 140 |
| dRisk_4 | -0.57962 | 1.3715 | 0.36405 | 161 |
| REGA_1 | -0.083695 | -0.035634 | 0.017525 | 31 |
| REGA_2 | -0.081565 | -0.032148 | 0.017081 | 62 |
| REGA_3 | -0.081878 | -0.034006 | 0.016680 | 93 |
| REGB_1 | 0.035634 | 0.083695 | 0.017525 | 31 |
| REGB_2 | 0.032148 | 0.081565 | 0.017081 | 62 |
| REGB_3 | 0.034006 | 0.081878 | 0.016680 | 93 |

Source: own study.

Changes in risk regulation *do not significantly* affect these banks' levels of responsiveness, as indicated by the non-significant impact of regulatory components on risk level adjustment, which simultaneously answers **RQ1**. The results have proven that the banks' responsiveness is not affected by the imposed regulation about risk. The risky assets are either already sufficiently regulated or remain (short-term) unaffected by a change in risk regulation. This suggests that banks may already be operating under well-established risk management frameworks, making additional regulations less impactful in the short term (Alexander & Baptista, 2017; Andrieş & Pleşcău, 2020; Benoit *et al.*, 2017; Stolz *et al.*, 2011). The model has also validated that banks need more time to feel certain before they adjust their risky assets. The model has shown that the regulation does not impact the banks' decisions even after adding many quarters. The actual effects will only start to appear within 2-3 years. We proved H1a that *regulatory pressure does not significantly influence banks' responsiveness to risk-related regulations* (H1a).

The model's results indicate that changes in regulatory policies for risk do not significantly impact the level of banks' responsiveness. The non-significant impact of regulatory components on risk level adjustments suggests that banks may already be operating under well-established risk management frameworks, making additional regulations less impactful in the short term. Regarding hypothesis H1b**:** *Larger banks take on more risk, affecting regulatory response by maintaining risky assets in their portfolios*, we found that bank size (measured by total assets) positively correlates with risk levels. This

suggests that larger banks are more likely to take on higher risk levels, affecting their response to regulatory pressure, and they maintain or increase risk exposure despite regulatory interventions, as they have greater capacity to absorb potential losses or adjust their portfolios. Similarly, studies indicate that regulatory adjustments often fail to alter pre-existing risk strategies in larger banks due to their capacity to absorb regulatory shocks (Ambrocio *et al.*, 2020; Murinde *et al.*, 2022; Rizwan *et al.*, 2024; Van Roy, 2005). However, other research suggests that in some cases, regulatory tightening can lead to increased risk-taking as banks attempt to offset the impact of stricter capital requirements (Admati, 2016; Böhnke *et al.*, 2023; Das & Ghosh, 2004b, 2004a).

Referring to **RQ2**, we may state that banks do not respond quickly to regulatory changes relating to risk, as indicated by the lack of significant effects of regulatory pressure on banks' responsiveness.

We positively verified **H2**: *The effects of regulatory pressure on banks' risk levels are delayed and do not produce immediate responses*. The study confirms that banks do not respond immediately to regulatory changes. Instead, their reactions are delayed, and the actual effects of regulatory pressure only appear within 1-3 years. This finding aligns with previous research showing that banks require significant time for capital and operational adjustments to comply with new regulations (Ambrocio *et al.*, 2020; Benoit *et al.*, 2017; Furlong & Keeley, 1989). The model results show that banks do not respond immediately to regulatory changes. The regulatory pressure variable was insignificant, and the study suggests that banks require a more extended adjustment period before implementing changes, supporting the hypothesis that regulatory effects manifest only over time and regulatory pressure does not lead to immediate compliance (Admati, 2016; Alnor *et al.*, 2024; Tanda, 2015).

Moreover, banks do not require a specific timeframe to arrive at the compliance level desired by the regulations, as indicated by the non-significant influence of regulatory components on the time required for compliance (**RQ3:** Does a bank's size affect responsiveness to an imposed regulatory change?). The study found no significant relationship between regulatory components and banks' time to reach compliance. Larger banks tend not to respond directly to a regulatory change, which is consistent with literature highlighting their ability to manage risk internally without major strategic shifts (Andrieş & Pleşcău, 2020; Böhnke *et al.*, 2023; Kashyap *et al.*, 2020), which proves **H3a**: *Banks of larger total assets size tend not to respond directly to a regulatory change*. Concerning **H3b:** *The presence of risky assets (RiskRWAAssets) in a bank's portfolio significantly impacts the risk adjustment levels*, reinforcing the notion that risk-laden portfolios drive capital strategy decisions more than direct regulatory pressure (Andrieş *et al.*, 2016; Benoit *et al.*, 2017; Stolz *et al.*, 2011).

Regarding the banks' capital profile (**RQ4***: Do overcapitalised banks tend to avoid adjustments to risk levels following a regulatory change?*), prior research suggests that overcapitalised banks tend to avoid adjustments to risk levels following a regulatory change. Institutions with excess capital buffers may exhibit lower sensitivity to regulatory interventions. This is because their pre-existing capital surplus provides a natural cushion against potential regulatory constraints, reducing the need for proactive risk adjustments (Ambrocio *et al.*, 2020; Benoit *et al.*, 2017; Furlong & Keeley, 1989; Kashyap *et al.*, 2020). Empirical evidence indicates that capital-rich banks often prioritise stability and prefer to maintain their existing risk profiles rather than engage in costly restructuring of their portfolios (Bauer *et al.*, 1998).

Our study verified that EEA banks facing regulatory pressure, particularly undercapitalised ones, as measured by the REGA component, as the REGB that represents the adequately capitalised banks is dropped due to collinearity, prefer to increase their capital rather than decrease their risk levels (H4).

The adequately capitalised banks, represented by the REGB component, were excluded from the analysis due to collinearity, reinforcing the focus on capital-deficient institutions. This aligns with findings that banks often respond to regulatory requirements by adjusting their capital levels rather than engaging in immediate risk reduction, as capital accumulation provides a more flexible and long-term response to regulatory scrutiny (Alnor *et al.*, 2024; Benoit *et al.*, 2017; Van Roy, 2005). Given the importance of capital adequacy regulations in the European banking sector, this study further investigates whether regulatory interventions effectively influence risk behaviour or primarily drive capital adjustments as a compliance strategy.

However, some authors report differing effects, with specific studies finding no relationship between regulation and risk levels across both adequately and undercapitalised banks (Andrieş &

Pleşcău, 2020; Rime, 2001; Stolz *et al.*, 2011), while others observe significant adverse effects of regulatory pressure on risk-taking (Admati, 2016; Murinde *et al.*, 2022; Rizwan, 2021). Some authors seem to agree with the findings for the undercapitalised banks for 1993-1996, for which regulatory pressure harmed the risk levels (Aggarwal & Jacques, 2001). Others find no relationship between all banks, adequate or undercapitalised ones (Rime, 2001; Van Roy, 2005). The positive results we achieved for banks as a whole concerning the impact of regulatory pressure on risk are in line with the works of Van Roy (2005) and Stolz *et al.* (2011), while others indicated significantly negative results (Das & Ghosh, 2004b; Murinde *et al.*, 2022). Accordingly, Aggarwal and Jacques achieved significantly positive results for adequately capitalised banks (Aggarwal & Jacques, 2001).

**Table 5. Summary of the study results**

| Hypothesis | Status | Related RQ |
|---|---|---|
| H1a: Regulatory pressure does not significantly influence banks' responsiveness to risk-related regulations | Proven | RQ1 |
| H1b: Larger banks take on more risk, affecting regulatory response by maintaining risky assets in their portfolios | Proven | RQ1 |
| H2: The effects of regulatory pressure on banks' risk levels are delayed and do not produce immediate responses | Proven | RQ2 |
| H3a: Banks of larger total assets size tend not to respond directly to a regulatory change. | Proven | RQ3 |
| H3b: The presence of risky assets (RiskRWAAssets) in a bank's portfolio significantly impacts the risk adjustment levels. | Proven | RQ3 |
| H4: EEA banks that face regulatory pressure prefer to increase their capital rather than decrease their risk levels. | Proven | RQ4 |

Source: own study.

Table 6 shows a detailed comparison of our findings with the results of other authors on the relationship between risk levels and regulatory pressure.

**Table 6. Comparison with other selected findings**

| Source | Year | Sample and period | Impact of regulatory pressure on RISK (REGA) |
|---|---|---|---|
| Our research | 2023 | 32 EEA Banks over nine years (2010-2018) | + for B |
| (Van Roy, 2021) | 2005 | 586 banks from G10 (with assets over USD100m) over eight years (1988-1995) | + and 0 for B |
| (Murinde *et al.*, 2022) | 2004 | 98 banks in 11 countries during eight years (1995-2002) | - and 0 for B |
| (Das & Ghosh, 2004b) | 2004 | 27 Indian banks over seven years (1996-2001) | - for B |
| (Stolz *et al.*, 2011) | 2003 | 550 German savings banks over eight years (1994-2002) | + and 0 for B |
| (Rime, 2001) | 2001 | 152 Swiss banks over eight years (1989-1996) | 0 for A<br>0 for U |
| (Aggarwal & Jacques, 2001) | 2001 | 1 685 US banks (with assets over USD100m) over six years (1991-1996) | + for A in 91<br>+ for U in 91<br>0 for A in 92<br>0 for U in 92<br>- for A in 93-96<br>- for U in 93-96 |
| (Das & Ghosh, 2004a) | 1992 | 1 800 US Banks over three years (1984-1986) | - for B |

Notes: + significant positive, - significantly negative, 0 insignificant; A adequately capitalised banks, U undercapitalised banks, B banks as a whole.
Source: own study based on indicated sources.

Although we considered both the REGA and REGB in the model-building process, due to collinearity, we omitted REGB, which captures the adequately capitalised banks (REGB = (1/8 – 1/CAR), if CAR ≥ 8%,

0 otherwise). Therefore, the REGA that e kept as an essential factor in the risk model equation expresses the regulatory pressure in the case of undercapitalised banks (REGA = (1/CAR – 1/8) if CAR ≤ 8%, 0 otherwise). Following the model run, we may consider a non-significant impact of the regulatory components a two-fold outcome. Either the risk component was already sufficiently regulated, any additional regulation (at that time) was not having another effect, or it could be that having risky assets (measured through the model variable RiskRWAAssets) in a bank's portfolio impacts total risk adjustments (measured through the model variable dRisk), with the regulatory measures, being still ineffective.

This research led to the results that changes in regulatory policies for risk *do not* significantly impact the level of responsiveness of banks, as indicated by the non-significant impact of regulatory components on risk level adjustments. Banks within the EEA *do not* demonstrate differing speeds in responding to regulatory changes related to risk, as *the model did not find significant effects of regulatory pressure on banks' responsiveness*. The time required for banks to achieve compliance with risk-related regulatory changes is not significantly influenced by factors such as the clarity and specificity of regulations, implementation complexity, or resource availability, as indicated by *the lack of significant impact of regulatory components on risk level adjustments*.

## CONCLUSIONS

We explored whether the banks in scope responded immediately to a regulatory change relating to risk, how fast they respond, and whether there is a delay in the response. We found that the banks require sufficient time to adjust to any regulatory changes imposed by their regulator. This aligns with previous research emphasising the gradual nature of risk management adaptation in financial institutions (Alexander & Baptista, 2017; Ambrocio *et al.*, 2020; Anginer *et al.*, 2019; Benoit *et al.*, 2017).

We examined whether changes in risk regulation affect banks' responsiveness. The results validate that regulatory pressure significantly reduces risk levels, aligning with a negative relationship across all banks, not just undercapitalised ones (Hoque *et al.*, 2015; Rime, 2001; Rizwan, 2021; Shrieves & Dahl, 1992). However, other studies suggest that regulatory pressure may not always reduce risk, particularly in banks with substantial capital buffers that tend to maintain their pre-existing risk profiles (Admati, 2016; Andrieş & Pleşcău, 2020; Tanda, 2015).

A general conclusion based on the model is that the more time passes, the more mature decisions about the risk the banks in scope would be willing to undertake. A common outcome of all models tested was that the regulatory pressure is insignificant, even after lagging the corresponding variable to allow for some time before a bank adjusts its risk levels. This aligns with findings that regulatory measures often have long-term rather than immediate effects (Admati, 2016; Böhnke *et al.*, 2023; Das & Ghosh, 2004b). This means that the regulatory threshold does not decrease the risk for EEA banks in scope that face regulatory pressure (mainly the undercapitalised ones measured by the REGA component, as the REGB that represents the adequately capitalised banks is dropped due to collinearity). Instead, these banks prefer to increase their capital rather than decrease their risk levels, consistent with previous studies showing that banks prioritise capital accumulation to mitigate regulatory constraints (Alnor *et al.*, 2024; Ambrocio *et al.*, 2020; Arrigoni & Rivolti, 2022; Van Roy, 2005).

The presence of risky assets (RiskRWAAssets) in a bank's portfolio significantly impacts the risk adjustment levels across all models tested. This is supported by findings that banks with higher exposure to risky assets tend to respond to regulatory changes by altering their capital structures rather than modifying risk-taking behaviour (Benoit *et al.*, 2017; Kashyap *et al.*, 2020). It could also be that banks had no way to introduce such regulatory measures because they could not sell risky assets, given the market circumstances at that time, a phenomenon previously observed in financial crises (Admati, 2016; Alnor *et al.*, 2024; Böhnke *et al.*, 2023; Stolz *et al.*, 2011).

Research on banks' responsiveness to changes in regulatory frameworks and their impact on risk is crucial for several reasons. Firstly, understanding how banks respond to regulatory changes is essential for maintaining financial stability. Effective regulations can prevent excessive risk-taking by banks, contributing to the financial system's stability. This study evaluates the effectiveness of existing regulatory measures in influencing banks' risk management practices. It provides insights into whether regulatory

changes lead to the desired outcomes in mitigating risk. Findings about delays in responsiveness can inform policymakers and regulators about the effectiveness of current regulatory frameworks, highlighting the potential gaps and the need for adjustments or new interventions to enhance the banking sector's resilience. This knowledge is essential for preventing or mitigating financial crises.

Furthermore, the relationship between regulatory changes and banks' behaviour offers critical insights into economic outcomes, including credit availability, investment, and growth. Identifying delayed responses or regulatory gaps can signal vulnerabilities, enabling early detection and prevention of financial crises. As banks' reactions may not align with expectations, this underscores the importance of timely interventions. Policymakers and banks should invest in enhanced monitoring systems to track the time-sensitive responses of banks, primarily SIBs, to ensure regulatory interventions achieve their intended outcomes.

This research also contributes to the field of sustainable finance, which is key to achieving the United Nations Sustainable Development Goals (SDGs). By examining the impact of regulatory changes on credit risk, the study aligns regulatory frameworks with sustainability objectives, fostering a more resilient banking sector and promoting long-term value creation while minimising negative social and environmental impacts. This aligns with the broader global agenda of transitioning towards a sustainable and resilient financial system. By shedding light on the effectiveness of regulatory interventions in promoting sustainable finance practices, particularly in managing credit risk, our research contributes to the ongoing discourse on shaping financial systems that are not only robust but also environmentally and socially responsible.

The limitation of the study is its focus on banks in the EEA countries, where cultural and systemic differences may limit the generalizability of findings to other regions. It covers the period from 2011 to 2018, excluding key events such as Brexit and the COVID-19 pandemic, which might affect regulatory responses. The research assumes a stable regulatory environment, although unforeseen changes or uncertainties may influence results. Moreover, the model assumes a direct influence of regulatory changes on banks' risk levels, neglecting other factors like economic cycles or bank strategies. The omission of REGB due to collinearity might lead to omitted variable bias, limiting the findings' scope.

Future research could adopt a global perspective, examining banks across various regulatory and economic contexts. This would enhance understanding of the broader relationship between regulatory changes and bank responsiveness. Long-term studies could assess how regulatory effects persist over time, while event-based analyses could capture the immediate impacts of significant regulatory shifts. Exploring the effects of dynamic regulatory environments on bank decision-making would also provide insights into short-term responsiveness and potential delays in adjustments.

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## Authors

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**Przemysław Borkowski**
Associate Professor at the Department of Transport Economics, Faculty of Economics, University of Gdansk (Poland). His research interests include risk in transport, transport economics, mobility and micromobility, investment strategies and investment risk.
**Correspondence to:** Dr hab. Przemysław Borkowski, prof. UG, University of Gdansk, Faculty of Economics, Armii Krajowej 119/121, 81-824 Sopot, e-mail: przemyslaw.borkowski@ug.edu.pl
**ORCID** https://orcid.org/0000-0002-5998-6965

**Magdalena Markiewicz (corresponding author)**
Assistant Professor at the Department of International Business, Faculty of Economics, University of Gdansk (Poland). Her research interests include banking and financial markets, currency internationalisation and digitalisation, M&A, sustainable finance.
**Correspondence to:** Dr Magdalena Markiewicz, University of Gdansk, Faculty of Economics, Armii Krajowej 119/121, 81-824 Sopot, e-mail: magdalena.markiewicz@ug.edu.pl
**ORCID** https://orcid.org/0000-0002-8075-857X

**Maria Spanou**
Financial Analyst, PhD candidate, Faculty of Economics, University of Gdansk (Poland). Her research interests include banking and financial markets.
**Correspondence to:** Maria Spanou, University of Gdansk, Faculty of Economics, Armii Krajowej 119/121, 81-824 Sopot, e-mail: ma.spanou@hotmail.com
**ORCID** https://orcid.org/0009-0000-1391-3472

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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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# Company's inclusive approach to internal and external stakeholders: In search for theories and concepts

**Alicja Winnicka-Wejs, Aleksandra Burgiel-Szewc, Anna Mercik**

**ABSTRACT**

**Objective:** The article aims to explore the current state of knowledge on inclusion and identify manifestations of the company's inclusive approach described in the literature. The objective of the article is to answer the following questions: (1) What theories and inclusion-related concepts may provide insight into an inclusive approach of a company in its relations with internal and external stakeholders? (2) How does the company's inclusiveness manifest itself in relations with those stakeholders? (3) How should we understand the concept of an inclusive approach (inclusiveness), with particular regard to internal (employees) and external (customers) stakeholders?

**Research Design & Methods:** We conducted a systematic literature review (SLR) following the seven-step procedure. It included both a bibliometric and content analysis of the articles retrieved from the Scopus database. We used VOSviewer to identify the most influential publications and the most popular concepts related to inclusiveness and inclusion.

**Findings:** We indicated the main theories used in inclusion studies, among which the most important ones were: stakeholder theory, social exchange theory, institutional theory, diversity management, and inclusive leadership theory. We developed a list of inclusive approach manifestations concerning both, employees and customers. Specific manifestations of the employee-inclusive approach regarded areas of organisational culture, management and leadership, as well as human resource management. We identified specific manifestations of a consumer-inclusive approach in the fields of marketing and customer experience. Moreover, the literature review allowed us to identify more general manifestations of a stakeholder-inclusive approach in the area of corporate governance. We operationalised the category of an 'inclusive approach' in a company's activity based on the critical elements of inclusion definitions identified during the review, *i.e.*, stakeholder inclusion, financial inclusion, and social inclusion.

**Implications & Recommendations:** These SLR results should facilitate developing a theoretical foundation for studying the concept of inclusion and inclusiveness as well as implementing this concept in modern organisations. They also indicate important directions for future studies in this field, *e.g.*, the impact of the organisation's inclusive approach on building its strategic advantage, competitiveness, and resilience.

**Contribution & Value Added:** The article refers to the relatively understudied concept of the company's inclusive approach towards its main stakeholders, *i.e.*, employees and customers. It contributes to the existing body of knowledge by listing the most significant theoretical frameworks used to study inclusion and identifying a broad range of symptoms representing the inclusive approach.

| | |
|---|---|
| **Article type:** | literature review |
| **Keywords:** | inclusiveness of an organisation; inclusive approach; DEI (diversity, equity, inclusion); inclusion of employees; inclusion of customers; stakeholder inclusion |
| **JEL codes:** | M14; L29; D21 |

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## INTRODUCTION

Current trends in the economic, socio-demographic, and political environment offer an opportunity but also create an urgent need to redefine traditional business goals and re-examine commonly used business practices. We could reduce one of the most significant challenges faced by modern organisations to one simple word, *i.e.*, 'inclusion.' However, its simplicity is illusory, because inclusion represents such a complex and multifaceted concept that various sciences have been exploring it for years. However, something that makes the essence of the inclusion idea is even more difficult. We mean its implementation in everyday practices of enterprises, offices, non-profit institutions, schools, and all types of organisations, etc.

Inclusion is not a new concept, since we may track its origins back to the early 1900s and the welfare pioneers. However, its real development started in the 1960s when policies of segregation were questioned (Hodkinson, 2011). Today, promoting and enhancing social, economic, and political inclusion of all people, regardless of their age, gender, race, ethnicity, nationality, religion, economic, health or any other status, is one of the main tasks set by the strategic goal 'Reduce Inequality' being a part of the UN 2030 Agenda for Sustainable Development (Transforming Our World, 2015). More and more companies are applying universal principles relating to the Sustainable Development Goals (SDGs) set by this Agenda, treating inclusiveness and sustainability as complementary features of responsible economic growth. Similarly, we can observe growing investments in the 'Diversity, Equity, and Inclusion' (DEI) programs that have evolved into important business functions in both large and small enterprises (Dong, 2021).

Inclusion is important not only as a concept subject to scientific analysis but also as a certain philosophy, an approach, and a style of acting. Consequently, it has received a lot of attention, but mainly in the areas of education, sociology, and psychology as well as health, digital, and political sciences, etc. (Sunkler, 2024; Halder & Squires, 2023). Meanwhile, the discussion within the economics sciences is dominated by the concept of financial inclusion, its determinants and implications for economic growth, well-being, and poverty reduction (Ouechtati, 2020). The literature does not precisely define or operationalise 'inclusion' as such, but particularly 'an inclusiveness' or 'an inclusive approach' perceived as a distinctive feature of an organisation. There are numerous articles suggesting reference to inclusion but after closer inspection, one sees that they just mention the category once or twice, and provide it among keywords. In fact, there are too many, often vague and overly simplistic explanations of inclusion. The economic literature lacks a cohesive and uniform interpretation of the company's inclusiveness and several authors call for a more precise definition of this category (Gupta & Vegelin, 2023). The challenge lies in defining and operationalising the notion of an 'inclusive approach' in a way that is both theoretically robust and practically applicable. Considering the above, there is a clear need to explore both the essence of inclusiveness and how organisations apply it in relations with their stakeholders.

We sought to address the identified gap by:

- investigating conceptual foundations of an inclusive approach in relation to internal and external stakeholders,
- developing a comprehensive framework that enables empirical analysis of inclusiveness in business practices while facilitating its implementation in diverse organizational settings.

Therefore, we aimed to identify diverse modes of interpretation and manifestations of inclusion with regard to relations between an organisation and its stakeholders.

To ensure a focused discussion, we concentrated on organisational inclusiveness in relations with two key stakeholder groups, *i.e.*, employees and customers. However, this did not exclude other stakeholder relationships. On the contrary, we sought to develop a broader framework applicable to other stakeholders, such as local communities and investors, providing a foundation for future research in these areas.

This review addresses the following research questions:

- What theories and inclusion-related concepts may provide insight into an inclusive approach of a company in its relations with internal and external stakeholders?
- How does the company's inclusiveness manifest itself in relations with those stakeholders?

– How should we understand the concept of an inclusive approach (inclusiveness) with particular regard to internal (employees) and external (customers) stakeholders?

To respond above questions, we conducted a systematic literature review, including both bibliometric and content analysis, using 'inclusion,' 'inclusive,, and 'inclusiveness' as the main search criteria. By clarifying and refining the concept of organisational inclusiveness, this research aims to contribute to the management and economic sciences, providing a foundation for future studies and developing stakeholder engagement strategies.

The rest of the article is structured as follows. The next section presents the methodological solutions applied in the process of literature review. Then we discuss the results, considering bibliometric analysis first and then content analysis. The latter section is divided into two subsections, which refer consecutively to employees as internal stakeholders and customers as external stakeholders. The last section summarises the research results by relating them to the stated objectives and research questions. Finally, we present study limitations and suggested directions for future research.

## MATERIALS AND METHODS

### Criteria Used in SLR and Retrieval Process

In this article, we applied the method of a systematic literature review as described by Czakon (2011) who suggested a procedure consisting of seven stages. We conducted the first three stages at the end of December 2023.

In the first stage, we defined the purpose of the study which was the analysis of the inclusiveness concept. In the second step, we selected a collection of publications to be explored. We decided to use the Scopus database due to its extensive scientific data coverage and its wide recognition as a trusted source for academic and bibliometric studies (Falagas *et al*., 2008). The Scopus database has also been used and validated in similar studies (*e.g.* Annahar et al., 2023), and its search engine allows for convenient and precise searches.

The next stage of the procedure regards the selection of a primary set of publications with the use of some chosen criteria. The overall number of documents indexed in the Scopus database somehow referring to inclusion proves that it is a popular research topic. The very first search using only 'inclusion' and words derived from it (*e.g.*, 'inclusive,' 'inclusiveness') returned almost 145 000 publications (Table 1).

Narrowing the search criteria to publications related to two areas, *i.e.*, 'economics, econometrics, and finance' and 'business, management, and accounting' returned still an enormous number of over 6.5 thousand scientific publications referring to 'inclusion' within these disciplines. We decided to further limit the search by setting the timeframe to the last five years (2019-2023) as we wanted to include only the most recent publications. Using time criterion supplemented with two other ones (see step 3 in Table 1) resulted in a database containing around three thousand articles. This high score came as no surprise, hence following the study assumptions, we narrowed search results by using reference to two stakeholder groups, employees and customers. Furthermore, we requested that only English-language, scientific articles published in the 'open access' system be retrieved. This step allowed us to obtain 'reviewable' set of 183 papers.

We conducted the fourth stage of the systematic review procedure, *i.e.*, the development of the final database, in January 2024. We identified and removed repetitive items as well as the ones not fitting the criteria (*e.g.*, one non-English text of full paper). Then we reviewed abstracts to eliminate publications not related to the issue under study. This step led to narrowing the set of publications to 154 articles subject to a full-text analysis.

Exclusion of 28 publications after the review of abstracts resulted from:

– article's non-economic character –18 publications,
– referring to different (not applicable) meanings of 'inclusion' (e.g., all-inclusive hotels, non-inclusive research) – 5 publications,
– considering 'inclusion' in the context of consumers'/households' attribute when analysing consumer (and not organizational) behaviour – 5 publications.

**Table 1. Steps in the retrieval process and their results**

| Steps | Consecutive selection criteria | Search strings | Output (no. of publications) |
|---|---|---|---|
| 1 | 'inclusion' and all words derived from it (*i.e.*, inclusive, inclusiveness, inclusivity) in keywords | KEY(inclusi*) | 144 707 |
| 2 | publications in the fields of economics, econometrics and finance and business, management and accounting | KEY(inclusi*) AND (LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "ECON")) | 6 590 |
| 3 | timeframe 2019-2023, articles only, final versions, language limited to English | KEY (inclusi*) AND PUBYEAR > 2018 AND PUBYEAR < 2024 AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "ECON")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) | 3 096 |
| 4 | all words derived from 'inclusion' co-occurring with keywords characterizing employees (with synonyms) and customers (with synonyms); limited to open-access documents | KEY (inclusi*) AND (KEY(employ* OR work* OR labor* OR stakehold* OR custom* OR client* OR consume* OR purchas* OR buy* OR use*)) AND PUBYEAR > 2018 AND PUBYEAR < 2024 AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "ECON")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (OA, "all")) | 183 |

Source: own study on the Scopus database search results.

We performed the bibliometric analysis, being the fifth stage of the SLR, using VOSviewer (version 1.6.20) to identify the most influential publications and the most popular concepts related to inclusiveness and inclusion used within the economic sciences. We prepared additional calculations (frequencies, time trends, and rankings) with Microsoft Excel. We conducted this part of the analysis on sets of 183 articles, meeting the search criteria in the fourth step of the retrieval process (see Table 1). Analysis of the dataset led to the identification of the strongest associations with a perception of an inclusive approach being focal to this article.

To gain a deeper and more comprehensive understanding of inclusiveness, in the sixth stage, we conducted a content analysis of all texts included in the final set of 154 documents using the narrative review method (Gondek & Mazur, 2020, p. 141). Parallelly, we applied a meta-analysis procedure that considered such elements of the reviewed articles as keywords, stated research problems, regarded theories, key-concepts, inclusion/inclusiveness definitions and their types, as well as contexts of the studied inclusion). Of all the documents that we analysed, 112 refer to the inclusion of employees and 42 – to the inclusion of customers or other stakeholders. We will present the analysis results separately for these two groups.

## Bibliometric Analysis

As we mentioned above, 154 articles met the final search criteria. The bibliometric analysis shows that the publication trend is increasing – between 2019 and 2023 the number of articles meeting search criteria increased by over 3 times, from 13 to 45 respectively. Citation analysis indicated that those 154 publications reached a total of 1830 citations. Table 2 presents the ten most cited articles.

Analysis of the occurrence of keywords provided by authors allowed us to identify a significant number of 677 keywords. To conduct keyword mapping, we assumed that only keywords that appear in no less than two articles would be included in the analysis. This allowed us to limit the number of authors' keywords to the 72 most frequent ones. The mapping distinguished 11 subject areas (clusters) (see Figure 1 and Table 3).

**Table 2. The most cited publications meeting the selection criteria**

| Document Title | Authors & Publication Year | Journal Title | Cited by* |
|---|---|---|---|
| Unearthing antecedents to financial inclusion through FinTech innovations | Senyo & Osabutey, 2020 | Technovation | 133 (125) |
| Responsible innovation in business: a critical reflection on deliberative engagement as a central governance mechanism | Brand & Block, 2019 | Journal of Responsible Innovation | 81 (81) |
| Tourism, inclusive growth and decent work: a political economy critique | Bianchi & de Man, 2021 | Journal of Sustainable Tourism | 81(79) |
| Human resource management research and practice in Asia: Past, present and future | Cooke *et al.,* 2020 | Human Resource Management Review | 75 (70) |
| Thriving of employees with disabilities: The roles of job self-efficacy, inclusion, and team-learning climate | Zhu *et al.,* 2019 | Human Resource Management | 60 (58) |
| Elevating the human experience (HX) through service research collaborations: introducing ServCollab | Fisk *et al.*, 2020 | Journal of Service Management | 51 (33) |
| Digital financial inclusion and sustainable employment: Evidence from countries along the belt and road | Geng & He, 2021 | Borsa Istanbul Review | 45 (44) |
| From ideal workers to ideal work for all: A 50-year review integrating careers and work-family research with a future research agenda | Kossek *et al.*, 2021 | Journal of Vocational Behavior | 44 (41) |
| Diversity and inclusion branding: a five-country comparison of corporate websites | Jonsen *et al.*, 2019 | International Journal of Human Resource Management | 43 (42) |
| Sharing economy: Studying the social and psychological factors and the outcomes of social exchange | Davlembayeva *et al.*, 2020 | Technological Forecasting and Social Change | 43 (41) |

Note: * a number in parentheses excludes self-citations.
Source: own study based on the analysis of the Scopus database search results.

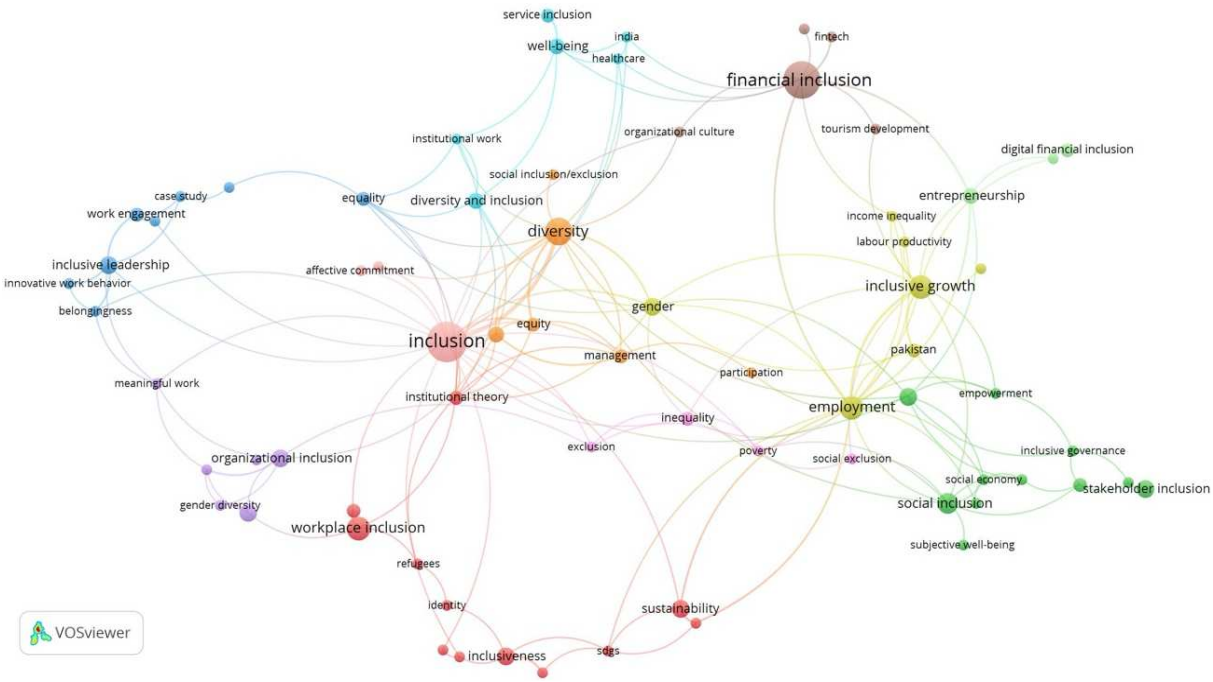


**Figure 1. Map of author keywords co-occurrence in selected publications**
Source: own elaboration based on data analysis made in VOSviewer

**Table 3. Characteristics of identified clusters of papers**

| Cluster | Colour in Fig. 1 | No. of keywords | Most common examples of keywords (occurrences) | Regarded research |
|---|---|---|---|---|
| 1 | red | 12 | workplace inclusion (9); inclusiveness (5); sustainability (5); disability (3); institutional theory (3) | relationship between workplace inclusiveness and sustainability |
| 2 | green | 11 | social inclusion (7); stakeholder inclusion (5); stakeholders (5); stakeholder theory (3) | inclusivity with respect to different stakeholder groups |
| 3 | dark blue | 8 | inclusive leadership (5); equality (3); work engagement (3) | role of leadership in building an inclusive work environment |
| 4 | yellow | 7 | employment (9); inclusive growth (9); gender (5) | relations between inclusion and economic growth |
| 5 | purple | 6 | gender diversity (5); organizational inclusion (5) | inclusive management |
| 6 | turquoise | 6 | diversity and inclusion (4); well-being (4); service inclusion (3) | links between inclusiveness and well-being |
| 7 | orange | 6 | diversity (12); leadership (4) equity (3); management (3) | link between diversity and organizational leadership |
| 8 | brown | 5 | financial inclusion (21) | financial inclusion |
| 9 | pink | 4 | inequality (3); exclusion (2) poverty (2); social exclusion (2) | general studies on exclusion |
| 10 | salmon | 3 | inclusion (25); affective commitment (2); perceived diversity(2) | link between inclusion and diversity |
| 11 | light green | 3 | entrepreneurship (4); digital financial inclusion (3); household consumption (2) | links between entrepreneurship and digital financial inclusion |

Source: own study based on data analysis made in VOSviewer.

Mapping results clearly indicate that there is a gap in knowledge regarding how organisations, including business entities, approach the inclusiveness issue, particularly in relation to their external stakeholders, such as customers. Overall, the research on the essence of an organization's inclusive approach in relation to both internal and external stakeholders is scarce, hence there is an increasing urgency to fill the identified gap.

## LITERATURE REVIEW AND THEORY DEVELOPMENT

### Content Analysis of the Search Results: Inclusion of Employees and Customers

Following the systematic literature review and the bibliometric analysis, we conducted a content analysis of the 154 articles meeting the search criteria. We examined the content of all identified articles to investigate:

- the detailed field/area in which inclusion was analysed,
- the conceptualisation of inclusiveness and its links with other significant terms and categories,
- the theoretical framework and perspective adopted in each study,
- the key aspects and manifestations of the inclusive approach addressed in the article.

Initially, we noted that inclusion and inclusiveness are examined with equal interest in the fields of economics and management. Furthermore, researchers adopt both macro-level (economic, national) and micro-level (organisational) perspectives. We present the detailed findings of the content analysis in the subsequent subsections: the first focuses on studies addressing employee inclusion, while the second explores the inclusive approach towards customers.

### Organisation's Inclusive Approach to Employees

There were 112 publications referring to the employees' inclusion selected for the content analysis. Table 4 summarises research areas, theories, and concepts distinguished in the course of the analysis.

**Table 4. Inclusion of employees: Summary of identified theories and concepts**

| Key concept | No. of articles | Theoretical framework |
|---|---|---|
| Workplace inclusion; Inclusion; Inclusion practice | 34 | diversity management; critical grounded theory; person-environment fit theory; organizational justice theory; instrumental stakeholder theory; a stakeholder theory; human-centric design; social exchange theory; work-family; organizational behaviour; institutional theory; organizational and management theory; status characteristics theory |
| Social inclusion | 23 | critical management studies; industrial relations; social identity theory; ecological economics |
| Inclusive growth; Inclusive development | 11 | demographic transition; feminist economics theory; theory of sustainable tourism |
| Financial inclusion | 11 | macroeconomics; Tourism Economics |
| Inclusive labour market; Labour inclusion | 10 | theory of planned behaviour; institutional theory; micro-institutional theory |
| Inclusive leadership | 10 | social exchange theory; social identity theory; theory of social and organisational learning; inclusive leadership theory; optimal distinctiveness theory; feminist theory |
| Inclusive (work) environment; Inclusive climate | 8 | diversity management; exchange theory |
| Inclusive HRM; Diversity & inclusion | 5 | human resource management |

Source: own study.

The largest number of publications deals with inclusion, inclusion practices, and workplace inclusion analysed from the perspective of an organisation and its diverse employees. Workplace practices that acknowledge the invisible and visible identities of the employees are a positive step toward real workplace inclusion. However, the latter still poses a strategic concern and challenge for the organizations. Bhardwaj (2022) and Salter and Migliaccio (2019) stress that increasing heterogeneity of the workforce leads to greater complexity in collaborative teamwork.

The authors of articles in this group discussed inclusion practices in managing very diverse groups of employees, including workers with disabilities (Zulmi *et al*., 2021; Zhang *et al*., 2023; Jammaers, 2023; Ochrach *et al*., 2022); blue-collar government workers (Kruyen & Sowa, 2023); sabotaged racialized public servants (Asey, 2022); under-resourced employees of low socioeconomic status (Fujimoto *et al.*, 2023); LGBT/TGD (transgender and gender-diverse) persons (Ladwig, 2023; Sabharwal *et al.*, 2019); potentially marginalized groups (Arman, 2023; Huang *et al.*, 2020; Johnsen *et al.*, 2023). Kallmuenzer *et al.* (2023) explore whether including employees in the planning and implementation of CSR measures contributes to the success of organisational transformation.

Scholars devote special attention to gender-inclusive approaches, particularly women's inclusion in organisations. The following authors explored it: Murray and Southey (2020), Kalogeraki and Georgakakis (2022), Mikhailova *et al.* (2023), Francis and Michielsens (2021), AlEssa and Durugbo (2022), Rahman *et al.* (2023).

Another issue considered within this thread of discussion were factors determining inclusion, such as safe working environment (Amon *et al.*, 2022), inclusive consideration of human rights (Koenigstorfer *et al.*, 2023), bureaucratic organisation structure minimizing status differences (DeHart-Davis *et al.*, 2023), stressful work experiences (Behnke *et al.*, 2023), information and communication technology use (Tarafdar *et al.*, 2023), the use of co-working spaces (Jeske & Ruwe, 2019).

Some research suggested that integration is currently aspirational only (Kossek *et al.*, 2021), although human service organisations are reconfiguring to address diversifying populations (Aby & Gonzalez Benson, 2021). In the context of Industry 4.0, workers' diversity in terms of experience, productivity, and physical capacity represents a significant challenge for companies (Battini *et al.*, 2022).

The virtual work environment may weaken some negative aspects of bias and discrimination while strengthening others (Lauring & Jonasson, 2023). Line managers should offer rewards to enhance employee motivation, adopt an inclusive approach and attend to other challenges inhibiting employee performance (Chikwariro *et al.*, 2021). Offering employees quality jobs and an empathetic environment can lead to early organizational buy-in and change acceptance, thereby improving long-term organization efficiencies and outputs (Hubbart, 2023).

Enehaug *et al.* (2022) introduced the term 'workplace inclusion competence', which they operationalised as inclusion opportunity and inclusion capability. The authors explored its association with two distinct work-organizational categories, *i.e.*, participation- and control-oriented management. Finally, Kornau *et al.* (2023) explore how institutional actors push or resist equality, diversity, and inclusion (Germany and Turkey).

Over twenty publications included the key term 'social inclusion' concerning very diversified groups, *e.g.,* disabled people (Girlevičienė & Kvietkauskienė, 2021; Lindsay *et al.*, 2019); youth groups, NEET (Jonsson & Goicolea, 2020; Ord & Davies, 2022); deaf and hard-of-hearing youth (Bolshakov & Walker, 2023); youth in the disaster resilience model (Rauhaus & Guajardo, 2021); informally employed workmen (Clark *et al.*, 2022); refugees (Koburtay *et al.*, 2020) or migrant workers (Peter *et al.*, 2020).

Another stream of studies refers to social inclusion (or its lack) considered from the employment perspective. Jobs are essential for social inclusion, as they guarantee the financial resilience of (welfare) states (Bohnenberger, 2022). However, work plays a crucial role in rising social inequalities, which result from unequal working opportunities for different social groups (van Dijk *et al.*, 2020). Yet, work requires different organisations so that it is no longer the main mechanism for livelihood provisioning and social inclusion (Gerold *et al.*, 2023) and sustainability transitions in collaborative spaces should be made (Brandellero & Niutta, 2023). Other topics include monetising the social value of inclusive entrepreneurship (Barba-Sánchez *et al.*, 2021), social inclusion as a benefit of the application of blockchain technology (Gong *et al.*, 2022), social innovation and employment in the digital age (Enciso-Santocildes *et al.*, 2021), inclusive unionism (Yu, 2019), and inclusive and exclusive approach to talent management (Ishiyama, 2022). Yu and Pekarek (2023) note that social recognition defines life and professional experience. Mussida *et al.* (2023) argue that only social inclusion funds mean a lower relative risk of material deprivation. The research by Pucci *et al*. (2019) proposes a synthetic 'index of inequalities in access to job opportunities' (IAO) to identify disadvantaged urban areas related to socio-economic deprivations, low accessibility to employment as well as low mobility and poor quality of transport supply.

Other articles cover the topic of 'inclusive growth' in Africa and Asia (Asongu & Odhiambo, 2020; Biltagy & Nassar, 2020; Henry *et al.*, 2022; Lawrence, 2020; Majid & Siegmann, 2021; Mulugeta Woldegiorgis, 2023; Siegmann & Majid, 2021). Based on the comparative analysis of 83 countries, scholars observed that socio-digital inclusion and green energy impact positively on inclusive growth in all income groups (Ghouse *et al.*, 2022). In both developed and developing economies increased robot adoption is linked with significantly higher income inequality, although there is no evidence of technological unemployment yet (Fu *et al.*, 2021). Sustained and inclusive growth reinforces the primacy of capital and continues to perpetuate a growth-driven tourism development model (Bianchi & de Man, 2021). Privileging foreign firms is a regional trend and a major obstacle to tourism-led inclusive growth policy (Jeyacheya & Hampton, 2020).

Financial inclusion is a frequently explored topic in selected African countries. Articles from this group consider financial support directed at enterprises (Bhattacharyya *et al.*, 2023; Lakuma *et al.*, 2019), in the form of microcredits boosting employment rates (Atiase *et al.*, 2019); leveraged to improve access to financial services for marginalised communities (Subashini *et al.*, 2023). Data from 42 African countries show that SMEs with access to formal financing create more jobs than firms without such access (Brixiová *et al.*, 2020). Financial inclusion is central to bridging the socio-economic differences (Kanungo & Gupta, 2021). Sabiu and Abduh (2021) explore the impact of Islamic banking inclusion on SME employment growth in Nigeria. Digital financial inclusion drives sustainable employment in lower-middle-income economies but the effect is insignificant in upper-middle-income and high-income economies (Geng & He, 2021). Macroeconomic demand conditions constrain the potential for

women's self-employment to increase livelihoods and support development (Vasudevan & Raghavendra, 2022). The financial inclusion on the happiness index in EU-27 countries is changing with a country's level of income (Akgun *et al*., 2023), and it has a significant positive correlation with various aspects of tourism development – more so in emerging than advanced economies (Shi *et al*., 2021).

The topic of inclusive labour market most frequently relates to active inclusive programmes aimed at excluded communities, *i.e.*, the disabled (Pérez-Conesa *et al*., 2020) or autistic people (Pesonen *et al*., 2022), and is analysed from the perspective of inclusive employers and social enterprises in Slovakia (Priesol, 2021), disability employment service providers in Australia (Mahasneh *et al*., 2023), social partners in Spain, France, and Sweden (Scalise, 2021). We can also learn about street-level bureaucrats and the limits to inclusive active labour market programmes in the UK (Johnson *et al*., 2023), contributions of Swedish Third Sector Organizations to the promotion of professional inclusion among those disfavoured on the ordinary labour market due to their age, disability, or origin (Lindberg *et al*., 2022). Other articles focus on including labour migrants (de Haan, 2020) and refugees (Ortlieb & Knappert, 2023). Finally, Ključnikov *et al*. (2023) examine how labour productivity will increase in future workplaces employing human resources and machine technologies.

Ten publications discuss inclusive leadership (IL). It constitutes one of the contextual factors contributing to inclusion, alongside inclusive climate, and inclusive practices (Shore *et al*., 2011). Inclusive leaders are those who demonstrate openness and availability in their interactions with followers (Nembhard & Edmondson 2006, cited in Guo *et al*., 2023) as well as trust, courage, humility, empathy and gratitude, which leads to business success (Vladić *et al*., 2021). Mansoor *et al*. (2021) indicate that the inclusion of employees in the key decision-making enhances their ability to perform their tasks. In Chinese industries, scholars analysed the mediating role of job crafting between inclusive leadership and innovative work behaviour (Guo *et al*., 2023). Inclusive leadership positively relates to employee work engagement through person-job fit (Bao *et al*., 2022). Data from employees working in the Dutch public sector confirmed personal and organisational antecedents of inclusive leadership. Top management support plays an important role in changing organizational culture and norms (Ashikali, 2023). Inclusive leadership proved to be an important issue in remote work. Employers will need to reinforce a culture of inclusion (Byrd, 2022) by rethinking social distancing and remote working as a platform for rebuilding the fundamentals of humanity (Antonacopoulou & Georgiadou, 2021). Increased diversity in inclusive organisations is a challenge for leaders. In the absence of two elements, a positive perception of work and inspirational leaders, negative work behaviours may result in the emergence of excluded groups and individuals. Consequently, cynicism, discontentment, resentment and conflicts will affect organizational inclusion (Bhatti *et al*., 2022). Green inclusive leadership (GIL), which is a specific manifestation of inclusive leadership, has been defined as leadership practices characterized by openness, accessibility, and availability, leading toward achieving environmental objectives (Aboramadan *et al*., 2022; Banu-Lawrence *et al*., 2020).

An inclusive work environment, perceived as an inclusive organisational culture adopting an inclusive diversity paradigm, was another strand of research. In organizations with an inclusive climate, employees respond with higher levels of affective commitment (Li *et al*., 2019). Gender diversity, diversity management, and organizational inclusion can effectively predict workplace happiness (Mousa, 2021). In Italy and Poland, scholars found a link between union democracy and the inclusion of precarious workers (Marino *et al*., 2019). In Chinese factories, inclusion and team-learning climate fosters employees thriving in a diverse workforce (Zhu *et al*., 2019). In public hospitals in Egypt, workplace fun positively affects organizational inclusion (Mousa *et al*., 2021). In Poland, scholars found a positive correlation between perceived diversity and an inclusive work environment and job satisfaction (Maj, 2023). Scholars also diagnosed the positive impact of inclusive organizational climate among the growing Muslim community in Australia, New Zealand, USA, and Canada (Khan *et al*., 2022).

Furthermore, scholars discussed the concept of diversity & inclusion (D&I) in the context of inclusive human resource management (IHRM) with regard to employer branding and employer of choice (Jonsen *et al*., 2021). Scholars also noted the issue of IHRM in freelancers' employment relationships (van den Groenendaal *et al*., 2023). The literature also analyses the top 43 European companies from the 2021 Refinitiv Diversity and Inclusion index in terms of how they use diversity and inclusion (D&I)

signals in they employer branding communication (Confetto *et al*., 2023). Two experiments used fictitious job advertisements to examine the effects of a strong diversity, equality, and inclusion (DEI) value statement (Heath *et al*., 2023). Employee voice, D&I, employee well-being and resilience, preparing and responding to crises, and green HRM are currently critical themes (Cooke *et al*., 2020).

**Organisation's Inclusive Approach Towards Customers and Other Stakeholders**

The final database of articles being subject to content analysis included only 42 publications that (according to search criteria) related to the customers' inclusion. However, as it occurred during the publications review, they regarded various groups of stakeholders, among which there were those searched ones, *i.e.*, subjects representing the demand side of the market, referred to as customers, consumers, buyers, clients, and households. Such a situation was not a problem though, since the ultimate goal of our studies is to define an inclusive approach towards all stakeholders, not only employees or customers. However, the scope of the current search was narrowed as we planned to focus on the specific features of the company's inclusive approach in its relations with these two main stakeholder groups.

Based on the analysis of keywords provided by the authors as well as on the articles' content review, we could distinguish key concepts related to the inclusion of the above-mentioned stakeholders and the main areas and contexts of the inclusion-related studies. First of all, we identified two types of studies on inclusiveness, adopting respectively macro (13 papers) and micro (29 papers) perspectives. The former ones include mostly cross-country and cross-regional analyses and utilise secondary macro data, collected over longer periods or certain macro indexes (*e.g.*, GDP growth, poverty, income equality or unemployment measures). Meanwhile, the ones taking a micro perspective explore the behaviour of particular market entities and their mutual relations and in majority they are based on primary research results.

Among thirteen publications representing the first group (see Table 5), two are most general and regard inclusive growth and development (Ghouse *et al*., 2022; Gupta & Vegelin, 2023) while eleven refer to financial inclusion. This is in fact the most common topic of the analysed articles, because there are also seven articles on financial inclusion adopting micro perspective. Majority of these articles consider financial inclusion as a determining factor and analyse its impact on the country consumption, investment, overall economic situation, or tourism development (Compaoré, 2022; Emara & Zhang, 2021; Luo *et al*., 2022; Zhang *et al*., 2023), but particularly on sustainability (Khan & Rehan, 2022; Murshed *et al*., 2023; Tufail *et al*., 2022; Yang *et al*., 2022). Articles adopting a micro perspective verify the relationship between financial inclusion and customer loyalty, households' consumption, and digital inclusion (Alwahidin *et al*., 2023; Aurazo & Vega, 2021; Vo *et al*., 2020).

**Table 5. Inclusion of customers: The summary of concepts in papers adopting a macro perspective**

| Key concept | No. of articles | Context of exploring inclusiveness |
|---|---|---|
| Financial inclusion | 11 | financial inclusion (FI) as a determinant of sustainability, consumption, investment, tourism development, country economic situation and stability, and entrepreneurial behaviour; FI as an effect of digital inclusion |
| Inclusive growth | 1 | inclusive economic growth vs. green energy consumption |
| Inclusive development | 1 | exploring actual meaning and indicators of the 'inclusive development' concept |

Source: own study.

A different approach presented in the literature regards financial inclusion as the effect of certain processes and actions, and those analyses were also undertaken on macro and micro scale. However, regardless of the scale, the main facilitator of the financial inclusion explored in those studies is digital inclusion (Bayar *et al*., 2021; Correa *et al*., 2022; Dimitrova-Grajzl *et al*., 2023; Hasbi & Dubus, 2020; Mohd Daud *et al*., 2021; Senyo & Osabutey, 2020; Wamba *et al*., 2021).

Considering the goals of this study, the publications representing a micro approach to the issue of inclusiveness are by far more important. As we mentioned, there are twenty-nine of them, and seven regard financial inclusion which was already described (see Table 6).

The most common and at the same time the broadest concept considered in the other articles from this group is stakeholder inclusion. However, this is not a homogeneous group and we could identify four threads of considerations, among which inclusive governance and inclusive corporate governance were the most popular issues. In general, articles from these categories analyse certain processes (*i.e.*, governing, managing, planning, decision-making, and developing innovations) and how to ensure their inclusiveness.

**Table 6. Customer-inclusive approach: The summary of concepts identified in micro-analyses**

| Key concept | No. of articles | Context of exploring inclusiveness/Related concepts | Stakeholders considered | Theoretical framework |
|---|---|---|---|---|
| Stakeholder inclusion | 14 | urban governance, citizen inclusion, inclusive planning and decision-making, participatory management, inclusive place branding | all, citizens, residents, and local communities | Stakeholder Management Theory, Theory of Power, Organizational Listening |
| | | inclusive corporate governance, deliberative governance, multi-stakeholder initiatives, stakeholder-oriented approach | all | Stakeholder Theory, Social Impact Theory |
| | | responsible innovation, inclusive innovation design | all | Theory of Responsible Innovation |
| | | practising stakeholder inclusion (in platform organizations) | customers | Stakeholder Theory |
| Financial inclusion | 7 | FI as a determinant of household consumption, customer loyalty, digital inclusion | customers | CSR Pyramid Model, Signal Theory |
| | | FI as an effect of fintech adoption, digital inclusion, free financial counselling | customers (incl. native Americans) | Technology Acceptance Model, Unified Theory of Acceptance And Use of Technology |
| Inclusive customer experience | 5 | inclusive marketplace (preventing retail exclusion) | customers | Social Comparison Theory, Equity Theory |
| | | inclusive services, improving human wellbeing through inclusive services, including disabled customers in the service design process, transformative service research | customers (incl. disabled and their families) | Service Inclusion Theory, Transformative Service Research |
| Inclusive marketing practices | 2 | diversity-and-inclusion-engaged marketing (DIEM) | customers | Institutional Theory |
| | | cultural stereotyping in advertising as a non-inclusive marketing practice | customers | Interpretive Advertising Theory |
| Social inclusion | 1 | effects of participation in the sharing economy on users' social inclusion | customers | Social Exchange Theory |

Source: own study.

In their conceptual paper, Andersen *et al*. (2021) start by exploring the meaning of a 'stakeholder' category and investigate how stakeholders are identified and included in the scenario planning process. Inclusive planning in practice, *i.e.*, applied in developing sustainable urban tourism, is studied by Koens *et al*. (2022). Nguyen *et al*. (2022), Snis *et al*. (2021), and Zinchuk *et al*. (2021) investigated how the inclusion of stakeholders (particularly citizens, residents, and local communities) may shape the urban/rural transformation and development and help solve urban problems, *e.g.*, the ones accompanying major construction projects (Maddaloni & Sabini, 2022). Hakala (2021) presents an interesting concept of inclusive place branding that is created through inclusive urban governance.

With regard to inclusive corporate governance, Andersen *et al*. (2023) propose a model for more sustainable stakeholder inclusion on the example of port governance but they also stress how difficult it is to find a model considered fair by all stakeholders. Sacchetti and Catturani (2021) assess the effects of the diversified governance styles (exclusive vs. inclusive) and describe inclusive governance structures, while Fiandrino *et al*. (2022) describe how multi-stakeholder initiatives and deliberative govern-

ance in an organisation may enhance its inclusiveness thereby foster its social impact. Siebold *et al*. (2023) assess the practice of stakeholder inclusion by analysing AirBnB policies in times of the COVID-19 pandemic and conclude that, despite its declarations, the company's approach was not really inclusive. Finally, Phaswana and Pelser (2021) conducted a study that verified compliance between banks' strategies and the principles of the 2016 King IV Report on Corporate Governance™ for South Africa (King IV Report, 2016). This was of particular importance to our article since one of the principles mentioned by the Report defines a 'stakeholder-inclusive approach.' It is described as an approach that 'balances the needs, interests, and expectations of material stakeholders in the best interests of the organization over time' (Phaswana & Pelser, 2021, p. 38).

Stakeholder inclusion is also desirable in the process of innovation design. Popa and Blok (2022) postulate including all the stakeholders in the early stages of research and development process which represents the core of a responsible innovation idea. Moreover, Brand and Blok (2019) introduce the concept of 'deliberative engagement,' which reflects the vision that innovation processes should be organised inclusively and democratically, *i.e.*, by engaging and involving (in contrast to merely consulting) stakeholders and the wider public within and throughout these processes.

The next key concept identified in the article during the content analysis was inclusive customer experience. The creation of such an experience is discussed in terms of building an inclusive marketplace and designing inclusive services, with the latter topic being much better represented in the analysed publications. However, in both cases, the authors refer mostly to the inclusion of vulnerable, potentially excluded groups of customers, *e.g.*, disabled persons. Lu and Sinha (2023) explore possibilities of developing a more inclusive marketplace and assume that this may be achieved by preventing retail exclusion. Therefore, they focus on identifying exclusive marketing practices that are likely to make customers feel ignored or rejected. On this basis, they recommend proactive strategies leading to inclusive customer experience.

In contrast, articles referring to inclusive services use the framework set by the service inclusion paradigm which requires that service providers 'anticipate, diagnose, and rectify problems that might preclude or disadvantage some consumers from realizing value in a service experience' (Fisk *et al*., 2018, as cited in Kipnis *et al*., 2022, p. 667). Articles from this category consider, *e.g.* inclusion of disabled customers in the tourist service design process and its consequences (Cerdan Chiscano & Binkhorst, 2019), enhancing value-centred care by technology-integrated (re)design of the service (Kipnis *et al*., 2022), and overall demonstrate that inclusive services improve consumer well-being (Fisk *et al*., 2020; Leino *et al*., 2021).

Only two articles fall into the category that seems critical, considering the goals of the present study, as it refers to inclusive marketing practices. Moreover, one of the articles actually regards non-inclusive practice, since Yoon and Kelly (2023) address the problem of racial stereotypes in advertising and discuss it on the example of three controversial campaigns; they also analyse company responses to the hype created by these campaigns. The second article introduces a very important category, *i.e.*, 'diversity-and-inclusion-engaged marketing' (DIEM). Kipnis *et al*. (2021) define it as 'actions in marketing research, education, and practice that proactively and consistently promote the advancement of diversity and inclusion for all marketplace participants' (p. 144). Authors claim that DIEM is an important well-being-enhancing mechanism that is currently underutilised in the marketplace and, they identify barriers that inhibit effective implementation of diversity and inclusion initiatives.

The last article relates to social inclusion. Davlembayeva *et al*. (2020) explore how the sharing economy (SE) influences users' integration with the community and confirm that more frequent and intensive use of SE platforms increases users' feeling of social inclusion. Unfortunately, the psycho-sociological perspective adopted in this article makes it less useful for our study.

### Inclusive Approach of a Company: Definition

Since the reviewed publications lack a direct definition of an inclusive approach per se, we attempt to define this category based on the critical elements of inclusion definitions identified during the review, *i.e.*, stakeholder inclusion (Fiandrino *et al*., 2022; Phaswana & Pelser, 2021), financial inclusion (Correa *et al*., 2022; The World Bank Group 2008, in: Wamba *et al*., 2021), and social inclusion (Davlembayeva

*et al*., 2020). On this basis, we propose the following general definition: a company is characterised by the inclusive approach (inclusiveness) when it balances its own interests with the needs, expectations, and interests of its stakeholders who are adequately involved in various aspects of this organisation's activity, including decision-making process.

In particular, such a company:

- ensures that employees, including vulnerable groups, get access to workplaces, are treated fairly, and invited to participate in planning and decision-making etc.,
- enables all groups of customers, but particularly those marginalised or under-represented, to access products (services), ensures that they are offered inclusive customer experience and that they may fully connect with a company,
- engages stakeholders in various initiatives and develops multi-stakeholder partnerships.

## DISCUSSION

When searching for the theories and concepts regarded in the studies on the company's inclusive approach, we discovered that the researchers most often refer to stakeholder theory, social exchange theory, institutional theory, diversity management, and inclusive leadership theory (see Tables 4-6). We also developed a long list of inclusive approach manifestations in relation to both, employees and customers. Moreover, the literature review allowed us to identify more general manifestations of a stakeholder-inclusive approach. Table 7 summarises and classifies the identified manifestations, indicating the most important references.

The findings of our research indicate that an inclusive approach can manifest in numerous domains, including organisational culture, management, human resources, marketing, and customer experience, as well as corporate governance. The results suggest also that the stakeholder-inclusive approach is not a temporary trend or a rhetorical device. Rather, it can serve as a strategic instrument for organizations seeking to build a competitive advantage by incorporating their stakeholders into the decision-making process or to increase the level of creativity of managers (Tajpour *et al.*, 2025; Tajpour *et al.*, 2017).

## CONCLUSIONS

The literature review presented in this paper allowed us to contribute to the existing body of knowledge by:

- identifying theories and inclusion-related concepts that provide insight into a company's inclusive approach,
- characterizing manifestations of the company's inclusive approach towards its various stakeholders,
- conceptually defining the company's inclusive approach to its stakeholders.

The findings of this study have important implications for both academic research and practical applications. The study establishes a theoretical foundation for future research on organisational inclusiveness, offering a structured framework for further exploration. Moreover, by identifying various manifestations of inclusiveness, the study provides valuable insights for companies aiming to enhance their inclusive practices toward various stakeholder groups. The conceptual definition of a company's inclusive approach serves as a practical tool for organisations to assess and refine their stakeholder interactions, fostering more equitable and sustainable relationships.

Beyond these contributions, the study also has broader practical implications. It offers guidance for policymakers in developing regulations and standards related to corporate inclusiveness, ensuring alignment with the best practices. Moreover, it informs business leaders and human resource professionals on strategies for cultivating inclusive organisational cultures that enhance employee engagement and customer trust. Finally, the findings can support investors and socially responsible investment initiatives in evaluating companies based on their commitment to inclusiveness, thereby encouraging more ethical and stakeholder-oriented business practices.

**Table 7. Manifestations of stakeholder-inclusive approach in companies' activity: Summary**

| Stakeholders | Area | Key-concepts (references) | Specific manifestations |
|---|---|---|---|
| Employees | Organisational culture | Culture of inclusion and diversity; inclusion practices in the workplace; inclusive climate; inclusive work environment (Byrd, 2022; Li *et al*., 2019; Maj, 2023; Mousa *et al*., 2021; Salter & Migliaccio, 2019; Zhu *et al*., 2019) | – employees enjoy respect, feel like valued and esteemed members of the team, are treated fairly, in a way that satisfies their needs for belongingness and uniqueness<br>– employees can participate in many activities organized by the employer<br>– there are norms and symbols signalling that all employees are welcome |
| | Management and leadership | Inclusive leadership (Ashikali, 2023; Guo *et al*., 2023; Shore *et al*., 2011; Vladić *et al*., 2021) | – leaders demonstrate accessibility, openness and availability in their interactions with followers (employees)<br>– leaders are committed to top-down inclusion |
| | Human resource management | Inclusive HRM (Confetto *et al*., 2023; Cooke *et al*., 2020; Heath *et al*., 2023; Jonsen *et al*., 2021; van den Groenendaal *et al*., 2023) | – implementing inclusive hiring principles<br>– analysing compensation equality with regard to gender, skin colour, etc.<br>– using I&D metrics to assess company's inclusiveness<br>– organising I&D initiatives for employees |
| Consumers | Marketing | D&I-engaged marketing (DIEM); inclusive marketing operations (Brodzik *et al*., 2021; Hakala, 2021; Kipnis *et al*., 2022; Patterson, 2022; Shalvi, 2022; Thompson, 2021) | – proactively and consistently promoting the advancement of I&D for all marketplace participants<br>– evaluating products/campaigns from a perspective of multicultural marketplace well-being outcomes<br>– listening to customers and ensuring access (to essential products, *e.g.,* through digital inclusion)<br>– creating inclusive communication strategy, *e.g.*, campaigns that create feelings of inclusion, empowerment, and social well-being and enable marginalized or under-represented groups to fully connect with brands<br>– incorporating inclusivity of vulnerable and disadvantaged consumers in all marketing operations<br>– developing special roles within organizations (*e.g.*, Chief Empathy and/or Inclusivity Marketing Officer) |
| | Customer experience | Service inclusion (SI); inclusive customer experience; responsible innovation (Brand & Blok, 2019; Cerdan Chiscano & Binkhorst, 2019; Fisk *et al*., 2018; Kipnis *et al*., 2022; Lu & Sinha, 2023; Taylor *et al*., 2019) | – designing and ensuring inclusive customer experience and inclusive service concepts<br>– providing customers with fair access to a service, fair treatment during a service, and fair opportunity to exit a service: service providers should anticipate, diagnose, and rectify problems that might preclude or disadvantage some consumers from realizing value in a service experience<br>– including customers in the design of services before the actual experience takes place; involving customers with special needs to (re)design the experience<br>– creating an inclusive and welcoming shopping environment<br>– implementing employee training programs on diversity, unconscious bias, cultural sensitivity, and disability awareness |
| Stakeholders | Corporate governance | Inclusive governance (Sacchetti & Catturani, 2021); inclusive scenario planning (Andersen *et al*., 2021); multi-stakeholder initiatives (Fiandrino *et al*., 2022) | – involving stakeholders in decision-making processes through workshops, interviews, surveys, games<br>– ensuring and encouraging representation of marginalized communities in decision-making bodies<br>– educating and raising awareness about the importance of inclusivity<br>– building bridges between different communities, fostering dialogue and collaboration; creating spaces for open and respectful discussions<br>– developing innovations in a responsible way, *i.e.*, through the deliberative engagement of all stakeholders at all stages of the innovation process<br>– developing multi-stakeholder partnerships |

Source: own study.

The main limitation of the current study is the selection of the database and the strategy used for the SLR. While some might argue that Scopus is not sufficiently comprehensive, this database is one of the largest and most widely recognised databases of peer-reviewed scientific publications, which we believe is a critical aspect of the high-quality literature review. Another limitation of our study regards the search strategy, particularly setting the time and language constraints and restrictions related to the publication model (excluding non-English and non-open access publications). It is possible that due to these limitations, some significant articles might have been excluded. The selection of the keywords utilized for a review also impacted its outcomes.

Summing up, we may state that despite a considerable number of publications on inclusiveness, there are still significant gaps in the existing body of work confirming the need to continue research in this area. The most important gap refers to the inclusion of customers or, more broadly speaking, entities representing the demand side in market relations. Not only there were much less articles somehow relating to customers in comparison to articles referring to employee inclusion (42 vs. 112), but also the ones identified rarely regarded the inclusive approach towards clients. In fact, only eight out of forty-two publications actually related to enterprises' actions leading to the greater inclusion of their customers. This significant disparity in a number of studies regarding a company's inclusiveness is calling for an urgent supplement. Other important directions of future studies in this field include the impact of the organisation's inclusive approach on building its strategic advantage, competitiveness, and organisational resilience.

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## Authors

The contribution share of authors is equal and amounted to ⅓ for each of them.

**Alicja Winnicka-Wejs (corresponding author)**
Holds a postdoctoral degree in social sciences in management and quality, and works as an associate professor in the Department of Organizational Management at the University of Economics in Katowice, Poland. Her scientific interests include the issues of investing in human capital, the market of development services, management of the organisation's human capital quality and value, personnel marketing, personnel risk, as well as inclusive human resource management.
**Correspondence to:** Associate Professor Alicja Winnicka-Wejs, University of Economics in Katowice, Faculty of Economics, 1 Maja 50, 40-287 Katowice, Poland, e-mail: alicja.winnicka-wejs@uekat.pl
**ORCID** https://orcid.org/0000-0001-8263-8064

**Aleksandra Burgiel-Szewc**
Holds an MA in management and a PhD as well as a postdoctoral degree in economics; she is an associate professor in the Department of Consumer Research at the Faculty of Management at the University of Economics in Katowice, Poland. Her scientific interests include sustainable consumption, the sharing economy, social and psychological determinants of individual choices, market research and its business implications.
**Correspondence to:** Associate Professor Aleksandra Burgiel-Szewc, University of Economics in Katowice, Faculty of Management, 1 Maja 50, 40-287 Katowice, Poland, e-mail: aleksandra.burgiel@uekat.pl
**ORCID** https://orcid.org/0000-0003-4930-709X

**Anna Mercik**
Holds a PhD in economics; she is an assistant professor at the Department of Business Logistics at the Faculty of Management at the University of Economics in Katowice, Poland. Her scientific interests include sustainable urban mobility, financing investments in transport systems, resilience of mobility systems and inclusiveness of mobility systems. She also works on tools to support investment decision-making in the context of sustainable development and on analysing the relevance of information in relation to ESG criteria. She is an expert in EU funding and project management and implementation.
**Correspondence to:** Assistant Professor Anna Mercik, University of Economics in Katowice, Faculty of Management, 1 Maja 50, 40-287 Katowice, Poland, e-mail: anna.mercik@ue.katowice.pl
**ORCID** https://orcid.org/0000-0003-4926-0148

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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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# Hierarchy of responsible consumption: Analysis in the context of the needs-driven purchasing motivations

**Maryla Bieniek-Majka, Agnieszka Szczepkowska-Flis, Magdalena Szczepańska, Zuzanna Urbanowicz, Michał Prusinowski, Zofia Gródek-Szostak**

**ABSTRACT**

**Objective:** The study aims to examine whether, and to what extent, consumer behaviours identified by them as responsible are determined by the needs-driven motivations (NDM) that emerge during their purchasing decisions. Concerning NDM, we made an analogy to Maslow's theory. We categorised the motivations into three hierarchical levels (basic and safety needs, belonging and esteem needs, and self-actualisation).

**Research Design & Methods:** We presented the responsible consumption in three aspects: ecological, economic (mindful spending behaviours), and social. We conducted econometric analyses (logistic regression) using data from a survey (n=1510), based on which we developed a concept of the Hierarchy of Responsible Consumption. We can consider this Hierarchy as an extension of previous studies. The foundation of the Hierarchy consists of motives driven by basic and safety needs, which include concern for one's health as well as financial and climate security.

**Findings:** A key predictor of responsible consumption turned out to be the fear of the consequences of climate change, which is consistent with other authors' findings. The low awareness of prosocial behaviours is concerning.

**Implications & Recommendations:** Therefore, it seems that efforts to promote pro-ecological behaviours should be accompanied by actions promoting behaviours aimed at supporting local communities.

**Contribution & Value Added:** The research results also confirm the globally observed coexistence of attitudes that fit within the trends of rationalisation and environmentalism.

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## INTRODUCTION

The article aligns with the body of work on responsible consumption. In a narrow sense, scholars usually associate responsible consumption with pro-environmental behaviours (Zhenyu *et al.*, 2021). However, from a holistic perspective, referring to the idea of sustainable development (sustainable consumption) (Mehmood *et al.*, 2024) and drawing an analogy to corporate social responsibility (Morgan *et al.*, 2016; Testa *et al.*, 2025), we treat responsible consumption as a function of pro-environmental, prosocial, and economic (mindful spending) behaviours (Tien & Huang, 2023). Regardless of how responsible consumption is to be framed, we can distinguish two main research problems:

– The identification of behaviours aligned with the idea of responsible consumption (Yue *et al.*, 2020), including awareness and society's attitude towards the issue (Rahimah *et al.*, 2024).

– The recognition of factors (usually demographic characteristics) determining responsible consumer behaviours (Fathonah & Nastiti, 2024; Morgan *et al*., 2016).

Combining these two areas of research, we asked the following research questions:

**RQ1:** Do the needs-driven motivations (NDM) guiding consumers' purchasing decisions determine the consumer behaviours identified by them as responsible?

**RQ2:** If so, what is the scope and strength of this impact?

The basis for solving the problem presented in the form of research questions was the results of an empirical study. The analysis used data from a survey conducted in Poland between March and June 2024, involving 1 510 respondents. The main goal of the research was to examine whether, and to what extent, consumer behaviours identified by them as responsible are determined by the needs-driven motivations (NDM) that emerge during their purchasing decisions. We drew the conclusions based on the results of the econometric analysis (logit regression).

Referring to the works of Luchs and Miller (2015) and Schlaile *et al.* (2018), both conceptually and empirically, we considered three aspects of responsible consumption: environmental, economic, and social. In relation to NDM, we applied an analogy to Maslow's classic hierarchy of needs (Maslow, 1943). However, due to the research subject, it was necessary to modify both the number of levels and how the needs manifest in purchasing decisions. We categorised the motivations into three hierarchical levels, assigned respectively to the categories of basic and safety needs, belonging and esteem needs, and self-actualisation needs.

Noteworthy, some authors analyse responsible consumption in the context of motives (Liu, 2024; Luchs & Miller, 2015). However, the attempt to 'anchor' it within Maslow's hierarchy of needs offers a distinct analytical perspective. In this context, we may regard the Hierarchy of Responsible Consumption developed on the basis of the study's findings as an extension of previous research.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Consumption is the satisfaction of needs through the use of goods and services. The scope of consumption is shaped by consumer behaviours, which we can understand as a system of actions aimed at acquiring means for consumption and ways of dealing with those means for the satisfaction of needs (Li *et al.,* 2023; Tsaurai, 2021; Zhou, 2022). Chazhaeva (2023) delivers a broader definition, indicating that when making decisions, a consumer combines psychological and physical values with their motives and causes. In the consumption process, individuals take actions to achieve their goals that provide satisfaction while considering the individual and social consequences of these actions.

Classical economics assumes that homo oeconomicus is selfish and rational in managing resources. Homo oeconomicus calculates costs and benefits, has no interests or opinions, does not succumb to life's temptations and is neither greedy nor altruistic (Bee & Desmarais-Tremblay, 2022). In modern Western culture, strong currents of rationalism, utilitarianism, naturalism, and hedonism are noticeable. This leads to the spread of a lifestyle in which the material dimension is the only measure of human development (Hasbi *et al.*, 2023). A fundamental transition in consumption has taken place over the centuries, primarily in connection with economic shifts. Although it is hard to pinpoint the inception of consumerism in time, Fromm was the first to use the term homo consumens (Ballesteros, 2018). He pointed out that the new economic species of human not only wants to possess things but rather ever-increase consumption (Fromm, 1965). Thus, homo consumens struggles with imposing limitations on the use of goods.

Like a belief system, consumerism can justify and shape people's behaviour (Fredstrom, 2023). However, new approaches to consumption are emerging. Ecologization, ethnocentrism, and sustainable consumption are listed as examples (Abulkhair, 2025; Altın & Kırçova, 2024; Mesaifer & Alrasheed, 2025; Altın & Kırçova, 2024). According to Mariyappan and Sangeetha (2024) and Santuso *et al.,* 2024, the new approaches in consumer behaviour are defined by external factors: economic (consumer incomes, product prices) and non-economic (consumer environment, culture, traditions, opinions of others), as well as internal factors stemming from the consumer's personality and beliefs. When scholars recognised that consumer society could pose a threat to people and the environment, the concept of sustainable con-

sumption began to be discussed in the context of sustainable development (Amrilah, 2024). Many researchers (Caeiro *et al.,* 2012*;* Keyzer, 2023; Liobikienė & Brizga, 2022) attempted to define sustainable consumption, which points out the necessity to minimise the use of natural resources and materials harmful to the environment when satisfying needs, as well as limiting waste, in compliance with the principle of social justice (sustainability of resources for future generations). Therefore, sustainable consumption is not about renunciation but a change in purchasing behaviours (Lorek & Fuchs, 2005).

Sustainable consumption is practised by consumers who make choices guided by the principles of sustainable development, which render the choices socially and environmentally responsible (Shen, 2024). According to White *et al.* (2019), sustainable consumer behaviours may include the voluntary limitation of individual consumption, the choice of products with sustainable sourcing, production, and features, saving goods, and applying more sustainable ways of disposing of them.

On the micro level, through their daily practices, consumers can initiate a cycle of actions aimed at achieving the goals of sustainable consumption (Han *et al*., 2024). Consumer decision-making should involve answering questions such as: what to buy?, whether to buy?, where to buy?, and how to use? (Ersoy, 2022). Adopting a sustainable lifestyle is a choice and involves changes in consumer behaviour, demonstrating a higher level of ecological awareness (Laurett *et al.*, 2019).

Internal and external factors constrain and stimulate sustainable consumer behaviours. The most significant factors, both positive and negative, include income level, habits, consumer awareness, openness to knowledge, and social pressure (Zhang *et al*., 2023). According to Kumar (2024), a new paradigm of consumption emerges, one that is conscious and based on responsible consumer choices and decisions.

Based on the existing literature, we developed the analytical framework for research on responsible consumption. It consists of two dimensions. The first dimension refers to the behaviours that consumers define as responsible, while the second relates to the needs-driven motivations (NDM) behind purchasing decisions. In line with the aim of the research, the direction of the relationship between these categories is defined as follows: NDM → responsible behaviours.

Referring to the work of Luchs and Miller (2015) and Schlaile *et al.* (2018), we may distinguish three aspects of responsible consumption: environmental, economic, and social. In terms of consumption, the first of these is manifested by choices made with concern for the natural environment. The economic aspect refers to choices aligned with the idea of balanced consumption in terms of finance, health, and quantity (*i.e.*, avoiding impulsive purchases). The last of the aspects mirrors the idea of corporate social responsibility, wherein a company's priority is not just financial performance but also concern for social well-being. For consumers, this translates to making choices aimed at supporting (both directly and indirectly) other individuals and communities at the local, national, and global levels.

Based on the results of a pilot study on motivations as a consumer's driver towards responsible behaviours (Szczepańska, 2024) and Maslow's theory, we identified three categories of NDM: basic and safety, belonging and esteem, and self-actualisation. The first category reflects concerns about personal health, climate, and financial security. Belonging and esteem express the desire to be part of a group, which manifests in purchasing decisions by, for example, following the opinions of others and keeping up with trends. The need for self-actualisation is associated with an altruistic attitude, the pursuit of personal or professional growth, setting challenges, seeking new experiences, and the belief that a lifestyle (consumption) is a measure of success.

We may describe the study's analytical framework as a 3x3 model: three dimensions of responsible consumption and three hierarchical levels of purchasing decision motivations (NDM). Incorporating Maslow's theory into the research framework implies that the significance of behaviours' motivations in all three aspects aligns with the Hierarchy of Needs. This statement constitutes the research hypothesis.

## Research Methodology

In the analyses, we used primary data collected from a survey conducted using the diagnostic survey method between March and June 2024 in Poland. We employed Computer-Assisted Web Interview (CAWI) as the data collection technique. It involves self-administered online questionnaires. We disseminated links and QR codes to the online questionnaire via social media, emails, and in high schools and universities.

A total of 1 510 respondents participated in the survey, including 19.7% who were under the age of 18. Participation in the study was voluntary. We informed all respondents about the research aim, the anonymous nature of the questionnaire, and their right to withdraw at any time. In line with national and institutional ethical guidelines, no formal ethical approval was required for conducting anonymous and voluntary surveys involving underage participants, as the questionnaire did not include any sensitive or personally identifiable information.

We applied the convenience sampling method, which scholars often use in consumer attitude research (Cuong, 2024; Ghaffar *et al.*, 2023). Therefore, we cannot consider the analysis results representative. Table 1 presents the basic characteristics of the studied population.

**Table 1. The structure of the study population according to selected metric characteristics (n=1510)**

| Characteristic | Answer options | Percentage of indications |
|---|---|---|
| **Gender** | Female | 61.2 % |
| | Male | 34.1 % |
| | I do not identify with any gender | 1.5 % |
| | I do not want to reveal | 3.2% |
| **Age** | under 18 | 19.7 % |
| | 18-25 | 58.4 % |
| | 26-35 | 8.2 % |
| | 36-50 | 10.6 % |
| | 51-55 | 2.2 % |
| | over 55 | 0.8 % |
| **Size of the town of origin** | Village | 30.9 % |
| | City up to 50k | 19.1 % |
| | City 50-150k | 19.4 % |
| | City 150-500k | 14.2 % |
| | City over 500k | 16.4 % |
| **Financial situation** | I have to be frugal to make ends meet | 9.1 % |
| | I have enough for basic needs, but I have to save money for more serious purchases | 56.6 % |
| | I have enough for a lot without saving much | 34.3 % |

Source: own study based on the study results.

Among respondents, women predominated, as did young people (under 25 years of age), urban residents, and individuals whose financial situations one could describe as satisfactory (average, moderate).

In line with the research objective, the analysis focused on the relationship between the needs-driven motivations guiding respondents' purchasing decisions and behaviours identified by them as responsible consumption, *i.e.*, MDN (independent variables) → responsible consumption (dependent variables).

The analyses utilised three dependent variables, indicators reflecting aspects of responsible consumption:

- ecological aspect (InEco),
- economic aspect (InRacg),
- social aspect (InSpol).

In the survey, we operationalised each aspect of responsible consumption using three statements (Table 2): ecological aspect (1-3), economic aspect (4-6), and social aspect (7-9).

The basis for constructing the InEco, InRacg, and InSpol indicators was the respondents' answers to the question 'What is responsible consumption for you?' Using a 5-point Likert scale (ranged from 'definitely yes' to 'definitely not'), respondents indicated to what extent, in their opinion, the behaviours listed in Table 2 correspond to the idea of responsible consumption.

We assumed that in the case of respondents who answered 'definitely yes' and 'yes,' the actual tendency toward behaviours consistent with the idea of responsible consumption was greater than among the remaining respondents. Therefore, we recorded respondents' answers to each of the 9

statements (Table 2) using binary variables: if respondents indicated 'definitely yes' and 'yes,' we assigned responses a value of 1. We assigned value 0 to responses 'unsure,' 'not,' 'definitely not.' If at least two out of the three possible answers for a given aspect were coded as 1, the responsible consumption index (InEco, InRacg, InSpol) for the $i_{th}$ respondent was assigned a value of 1. In all other cases, we assigned indices a value of 0.

**Table 2. Operationalisation of responsible consumption aspects**

| Statements in the question: 'What is responsible consumption for you?' | Aspects of responsible consumption |
|---|---|
| 1. Buying recyclable and/or used products | Ecological **(InEco)** |
| 2. Limiting/avoiding buying unnecessary things because it's good for the environment | |
| 3. Buying products that do not harm the environment and animals | |
| 4. Choosing products with the impact they have on your health today and in the future in mind | Economic **(InRacg)** |
| 5. Making purchases with your financial capabilities in mind today and in the future | |
| 6. Limiting/avoiding buying unnecessary things because it is economically rational | |
| 7. Buying products whose proceeds go to charity | Social **(InSpol)** |
| 8. Buying domestic/regional products because it supports the development of domestic businesses | |
| 9. Boycotting products from countries/companies that use unfair practices and violate human/worker rights | |

Source: own study.

The construction of the InEco, InRacg, and InSpol indicators based on the binary coding of responses on a 5-point Likert scale helped to simplify the analysis, focus on broader trends, and satisfy the assumption of logistic regression (Koo & Yang, 2025). This approach enhances interpretability, especially when some categories are sparsely populated (Koo & Yang, 2025), and, as Çapik and Gözüm (2015) revealed, the results of analyses using Likert and dichotomous format responses were reliable and similar.

The analyses used nine variables describing NDM (M1-M9). We developed the set of variables M1-M9 based on responses to the question 'To what extent do the following statements describe your attitude (motivation) when making purchasing decisions?' (Table 3). We classified NDM expressed in these statements, according to the study's concept, into basic and safety needs (M1, M4, M7), belonging and esteem needs (M3, M6, M9), and self-actualisation (M2, M5, M8).

**Table 3. Operationalisation of the needs-driven motivations that guide respondents in making purchasing decisions**

| Statement in the question: 'To what extent do the following tasks describe your attitude (motivation) in making purchasing decisions?' | Symbol |
|---|---|
| I don't make impulsive purchases because financial security is important to me | $M_1$ |
| I like challenges, gaining new experiences is important to me | $M_2$ |
| Being part of a group makes me feel good, more confident | $M_3$ |
| Taking care of my health is my priority | $M_4$ |
| What I have and how I spend my time is a measure of my personal/professional success | $M_5$ |
| When choosing products/services, I take into account the opinions (lifestyle) of others | $M_6$ |
| I am concerned about the effects of climate change on my safety and that of my loved ones | $M_7$ |
| Helping others (e.g. participating in charity events) gives me a sense of fulfilment | $M_8$ |
| I try to keep up with trends and fashion | $M_9$ |

Source: own study.

In this case as well, we used a 5-point Likert scale in the survey, with possible response options ranging from 'definitely yes' to 'definitely not.' When constructing the independent variables (M1-M9), we recorded the original information using a binary 1-0 scale. If a particular motive was important to the respondent ('definitely yes,' 'yes'), we assigned the variable Mj a value of 1; otherwise, we assigned it a value of 0.

While using the original 5-point scale for the independent variables could potentially allow for more nuanced insights, we concluded that, from the perspective of the research objective, the degree of intensity of the 'importance' / 'unimportance' of a given motive in the respondents' purchasing decisions was not relevant.

We utilised a binary variable model (Kufel, 2007). We modelled the indices of responsible consumption (*InEko*, *InRacg*, *InSpol* – dependent variables) with the assumption that the probability of respondents identifying behaviours as responsible is a function of the NDM ($M_1$-$M_9$ – independent variables). We applied a logistic form of the model in the analyses (Kufel, 2007; Gruszczyński, 2012):

$$y_i^* = ln\frac{p_i}{1-p_i} = \beta_0 + \sum_{j=1}^{k}\beta_j x_{ij} + u_i \quad (1)$$

$y^*$ – the latent variable representing a tendency of a given observation unit to adopt a state (decision-making) corresponding to the value $y_i$=1

$$y_i = \begin{cases} 1 & dla \quad y^* > 0 \\ 0 & dla \quad y^* \leq 0 \end{cases} \quad (2)$$

The expression $ln\frac{p_i}{1-p_i}$ is called the logit, *i.e.*, the logarithm of the ratio of the probabilities of accepting and not accepting the value 1 by the variable $y_i$ (*log – odds*), and $p_i$ is the probability of the dependent variable $y_i$, determined on the basis of the logistic distribution from the equation:

$$\frac{p_i}{1-p_i} = e^{y^*} = e^{\beta_0+\sum_{j=1}^{k}\beta_j x_{ij}+u_i} \quad (3)$$

$$\widehat{p_i} = \frac{1}{1+e^{-y_i^*}} = \frac{1}{1+e^{-(\beta_0+\sum_{j=1}^{k}\beta_j x_{ij})}} \quad (4)$$

If the variable $y_i^* \to \infty$, then $p_i \to 1$; if $y_i^* \to -\infty$, then $p_i \to 0$; and when $y_i^* = 0$ then the probability is equal ($p_i = 0{,}5$).

To interpret the results of the logistic models, we used odds ratios (OR), calculated as $\exp(\beta_j)$ (Gruszczyński, 2012). In the case where the variable $x_j$ is binary, $\exp(\beta_j)$ indicates by how many times the odds of $y_i = 1$ for the '1' category of the variable $x_j$ are greater/less compared to the odds of this event for the '0' category of $x_j$. We set the reference level (baseline) at $M_j$=0.

We determined regression parameter estimates using the maximum likelihood method with a stepwise backwards regression procedure. We tested model significance using the likelihood ratio test (*LR*) and evaluated the statistical significance of individual parameter estimates using the Wald test. The significance level for the tests was set at $p = 0.05$. We used Nagelkerke's pseudo-$R^2$ (Stanisz, 2016) as a measure of model fit for the empirical data.

Before estimating the regression models, we conducted Pearson's chi-square independence tests for the dependent and independent variables. We included in the input model only variables for which there were grounds to reject the null hypothesis ($p<0.05$). To assess multicollinearity among the independent variables, we analysed the phi (φ) correlation coefficients. Statistically significant values of correlation coefficients were less than 0.26, thus we did not find strong multicollinearity.

In the next part of the article, we present the most important results from the perspective of the research objective. We can provide full documentation of the study upon request.

## RESULTS AND DISCUSSION

In the studied group of respondents:

- Responsible consumption was primarily associated with economic (mindful spending) and ecological aspects. The number of respondents for whom the indicators *InRacg* and *InEco* took the value of 1 was 1231 and 1127, respectively. We recorded a much smaller number (769) for the *InSpol* indicator.
- In making purchasing decisions, the most important NDM were those related to fulfilling self-actualisation needs ($M_2$, $M_5$, $M_8$) and basic and safety needs ($M_1$, $M_4$, $M_7$), while those related to belonging and esteem needs ($M_3$, $M_6$, $M_9$) were less significant. The total number of indications assigned a

value of 1 in a given category of needs was 2893 for $M_2$, $M_5$, $M_8$; 2767 for $M_1$, $M_4$, $M_7$; and 2463 for $M_3$, $M_6$, $M_9$. We observed greater variability at the level of individual motives (Figure 1).


**Figure 1. Ranking of NDM according to the number of indications $M_j$=1**
Note: in square brackets, the number of indications for which $M_j$=1 is given.
Source: own elaboration.

Table 4 presents the values of odds ratios for the explanatory variables that we included in the final logit regression models for the variables *InEco*, *InRacg* and *InSpol*. We present detailed results of the econometric analysis in the Annexe in Tables 1-3.

**Table 4. Summary of logit regression results: Odds ratio values for statistically significant variables (reference level Mj=0)**

| Motives | InEco | InRacg | InSpol |
|---|---|---|---|
| $M_1$ | 1.85 | 2.38 | xx |
| $M_2$ | x | x | x |
| $M_3$ | 1.64 | 1.44 | x |
| $M_4$ | 1.43 | 1.72 | 1.49 |
| $M_5$ | x | x | 1,29 |
| $M_6$ | x | 1.61 | x |
| $M_7$ | 3.33 | 2.43 | 1.80 |
| $M_8$ | 1.68 | x | 1.75 |
| $M_9$ | x | xx | xx |

Note: xx – variables $M_1$ and $M_9$ were not included in the input set of explanatory variables in the model for *InSpol*, while $M_9$ was not included in the model for *InRacg based on the results of the* Pearson's chi-square tests; x – in the backwards step-wise regression procedure, the variable was excluded from the final version of the model.
Source: own study based on the study results.

Based on the results of the econometric analysis, we found that in the studied group of respondents:

– The variable $M_7$ was the key motivator for responsible consumer behaviour. This finding applies to all distinguished aspects. Considering the odds ratios, the fear of the consequences of climate change (climate safety) was the most important predictor of behaviours in the following order: pro-ecological, mindful spending, and pro-social.
– Another statistically significant determinant of responsible consumption in all its aspects was the variable $M_4$. However, the importance of the health care motive, compared to $M_7$, was smaller, especially in the case of pro-ecological behaviours.

– Common predictors of pro-ecological behaviours and mindful spending were the variables $M_1$ and $M_3$, with the importance of financial security ($M_1$) for *InEco* and *InRacg* being greater compared to the need to belong to a group ($M_3$). This pattern is especially evident for the explained variable *InRacg* (the odds ratios in the models for *InRacg* and *InEco* calculated for $M_1$ are greater than those for $M_3$).
– A statistically significant determinant of both pro-social (*InSpol*) and pro-ecological (*InEco*) behaviours was the variable $M_8$.
– The variable $M_6$ ($M_5$) was a statistically significant determinant of responsible consumption only in the model for the dependent variable *InRacg* (*InSpol*). In this context, the motives $M_6$ ('when choosing products/services, I take into account the opinions (lifestyle) of others') and $M_5$ can be considered unique features of mindful spending and pro-social behaviours, respectively.
– Although challenges and gaining new experiences ($M_2$) were among the most important NDM (see Figure 1), they were not a statistically significant factor for responsible consumption. We found no statistically significant connection with the variables *InEco*, *InRacg*, and *InSpol* for the variable $M_9$ – 'I try to keep up with trends and fashion.'

In the respondents' opinion, responsible consumption is primarily associated with mindful spending and pro-ecological behaviours (*InEco* and *InRacg*). The idea of consumer minimalism, evident in their responses, appears to be complementary in the context of both environmental sustainability and rationalism. Although their nature differs significantly, they are both based on the same principle: reducing waste and excessive consumerism.

On the other hand, we recorded the lowest percentage of responses for the *InSpol* index, leading to the reflection that the idea of supporting local societies through consumption, characteristic of highly developed economies, is not deeply ingrained in the consciousness of the studied group as a form of responsible consumption. This is indirectly confirmed by Prymon-Ryś's (2017) research on the involvement of Poles in activities supporting NGOs in the context of sustainable consumption. The author notes that the motivations of people engaged in NGO activities are driven more by selfish motives (self-actualisation and individualism) than by collectivism and the pursuit of the common good, which is the essence of the social dimension of responsible consumption.

In light of the results of the study, Prymon-Ryś's conclusion (2017) still appears relevant. According to the Hierarchy of Responsible Consumption presented in Figure 2, needs-driven motivations classified under belonging and esteem needs, which are important for pro-ecological behaviours and mindful spending, were not significant predictors of responsible consumption in its social aspect.

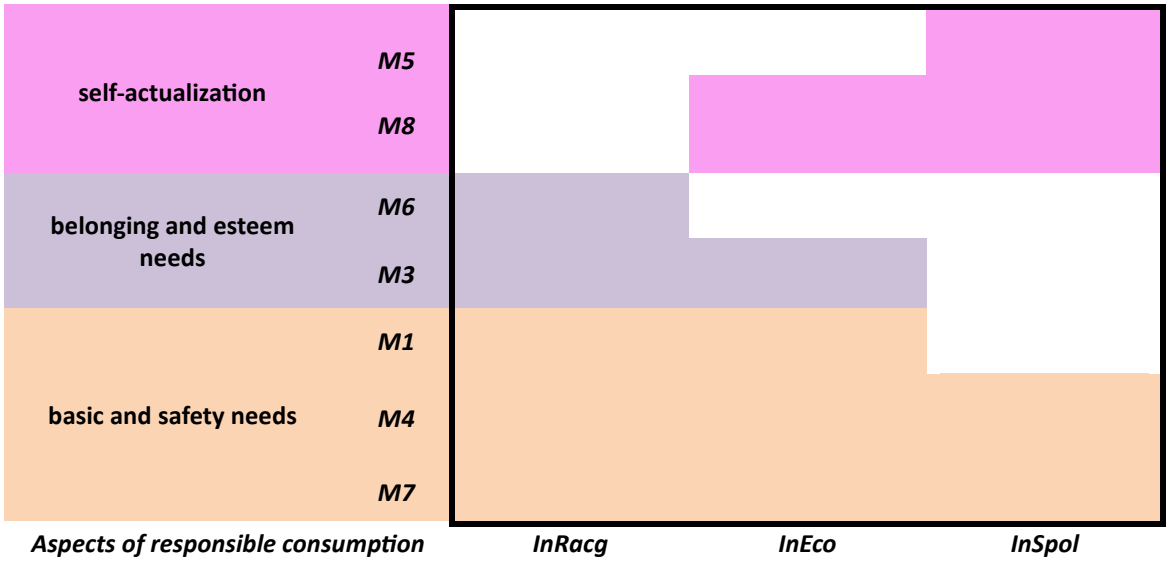


**Figure 2. The Hierarchy of Responsible Consumption**
Note: Coloured fields indicate statistically significant relationships between motivations and individual aspects of responsible consumption.
Source: own elaboration.

Assuming that the area marked in colour on the Hierarchy serves as a specific measure of the importance of each category of NDM for behaviours aligned with the concept of responsible consumption, we can conclude that the key categories stimulating environmentally, socially, and economically responsible behaviours are the motives classified within basic and safety needs. This conclusion is consistent with the results of studies conducted among young people in Poland (Gierszewska & Seretny, 2018) and in Europe (Zuniga, 2023), which found that concerns about personal health, the natural environment, and fears about the effects of climate change form the foundation of responsible consumption.

NDM located at higher hierarchical levels play a lesser role, which is consistent with the formulated research hypothesis, though it does not fully confirm it. This is because the ranking of the importance of motives based on the odds ratios does not allow for their unequivocal placement according to Maslow's hierarchy of needs.

The findings of this study offer novel insights into how consumer motivations, framed through the lens of Maslow's hierarchy of needs, are linked to behaviours identified by individuals as consistent with responsible consumption. The logistic regression results reveal that motivations tied to basic and safety needs (*e.g.*, health concerns, financial prudence, climate anxiety) most consistently predict pro-environmental, economic, and, to a lesser extent, social responsibility in consumption patterns. This outcome supports prior research suggesting that the foundational human concerns of well-being and security often serve as the strongest drivers of sustainability-oriented choices (Clayton & Karazsia, 2020; Mehmood *et al.*, 2024).

The prominence of climate-related concerns, especially in predicting ecological behaviour, aligns with the growing recognition of eco-anxiety as both a psychological burden and a motivational force (Stanley *et al.*, 2021). It appears that individuals who are fearful of environmental degradation are more likely to internalise responsibility and translate it into tangible consumption changes (Helm *et al.*, 2018). Similarly, motivations related to health and financial stability significantly influenced behaviours associated with mindful spending, highlighting the role of self-preservation instincts in responsible consumer decision-making (Kaur & Luchs, 2021).

Interestingly, motivations associated with higher-order psychological needs, such as belonging, esteem, and self-actualisation, played a more selective role. While participants frequently reported these motives in the survey, they did not consistently associate them with responsible consumption behaviours, especially in the social domain. This discrepancy may suggest a value-behaviour gap, where aspirational or identity-related motivations do not easily translate into daily sustainable practices (Gao *et al.*, 2023; Liu, 2024 ).

The limited salience of prosocial behaviours in the respondents' perception of what constitutes responsible consumption is particularly concerning. Despite the global emphasis on social dimensions of sustainability, such as fair trade, community support, and ethical production, we found that participants endorsed such aspects less commonly. This supports earlier findings that while younger consumers are environmentally engaged, they may lack awareness or conviction about the social impact of their consumption (Morgan *et al.*, 2016; Rahimah *et al.*, 2024). The implication is that pro-environmental campaigns alone are insufficient and must be integrated with education about social responsibility and collective well-being.

Moreover, the potential role of consumer ethnocentrism merits further exploration. Prior studies suggest that promoting localism, ethical purchasing, and community engagement can amplify both environmental and social responsibility, particularly in emerging economies (Zuniga, 2023). When framed through the lens of solidarity and sustainability rather than exclusion, ethnocentric appeals may foster stronger prosocial tendencies (Testa *et al.*, 2025).

From a methodological perspective, anchoring NDMs within a simplified version of Maslow's framework allowed for structured analysis, yet it also introduced limitations. Human motivations are rarely hierarchical in practice. Individuals may act simultaneously on multiple need levels, influenced by context, culture, and identity (Hofstede, 2001; Tay & Diener, 2011). Thus, while the proposed Hierarchy of Responsible Consumption offers a useful heuristic, future research should consider dynamic and culturally responsive models of motivation.

Finally, we did not include demographic variables in the modelling, which may have masked significant variations. As shown in earlier studies, gender, age, education, and income can meaningfully shape sustainable behaviours and value orientations (Fathonah & Nastiti, 2024). Including these variables in future analyses could help refine the predictive power of motivational models and better inform policy or educational interventions.

In sum, this study contributes to a growing body of literature by contextualising consumer sustainability within motivational psychology. By bridging responsible consumption with Maslow's needs theory, it offers a conceptual and empirical framework for understanding how individual concerns, ranging from survival to self-realisation, inform everyday consumption choices.

## CONCLUSIONS

In line with the research objective, we aimed to 'anchor' the categories of NDM that determine behaviours identified by respondents as consistent with the idea of responsible consumption within the framework of Maslow's hierarchy of needs. Based on the results, we developed a Hierarchy of Responsible Consumption, with basic and safety needs forming its foundation. Among the motives classified in this group, the fear of the consequences of climate change emerged as a key predictor of responsible behaviour, aligning with findings from other studies. The research results also confirm the globally observed coexistence of attitudes that fit within the trends of rationalisation and environmentalism.

However, we are concerned by the relatively low awareness among the surveyed group, which was predominantly young people, that prosocial behaviours also constitute responsible consumption. Therefore, it appears that efforts encouraging young Poles to engage in pro-environmental behaviours and reduce consumerism must be accompanied by actions promoting ethnocentrism and, more broadly, the idea of helping others through consumption. These efforts are essential for shaping a responsible generation in the context of sustainable consumption.

The study is not without its limitations. First, due to the sampling method, we cannot generalise the formulated conclusions. Similarly, the adoption of Computer-Assisted Web Interview as the data collection technique may have introduced selection bias due to the exclusion of individuals without reliable internet access or those less likely to engage with online surveys. Second, the method of constructing the responsible consumption indices may be subject to debate. However, given the source data (responses measured on an ordinal 5-point Likert scale), it was not possible to use the mean category. Third, the analysis of the relationship between needs-driven purchasing motivations and behaviours identified by respondents as responsible did not consider characteristics such as gender, age, income, etc., which, as various authors suggest, may influence the relationships depicted in the Hierarchy of Responsible Consumption. In this context, one should view the presented study as an initial stage of research. Despite the noted limitations, the observed patterns suggest that the proposed idea of the Hierarchy of Responsible Consumption could provide an interesting research perspective.

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## Appendix:

**Table 1. Results of estimation of the logit model for the dependent variable *InEco***

| Variable | Coefficient | Standard Error | Wald test statistics | p value | 95% Conf. Interval | |
|---|---|---|---|---|---|---|
| $M_1$ | 0.6161 | 0.1294 | 22.6670 | 0.0000 | 0.3625 | 0.8698 |
| $M_3$ | 0.4949 | 0.1333 | 13.7844 | 0.0002 | 0.2336 | 0.7561 |
| $M_4$ | 0.3543 | 0.1399 | 6.4138 | 0.0113 | 0.0801 | 0.6284 |
| $M_7$ | 1.2040 | 0.1396 | 74.3698 | 0.0000 | 0.9304 | 1.4776 |
| $M_8$ | 0.5172 | 0.1309 | 15.6021 | 0.0001 | 0.2606 | 0.7739 |
| Const | -0.6000 | 0.1537 | 15.2317 | 0.0001 | -0.9014 | -0.2987 |
| N= 1510; LR: Chi$^2$: 202.4826, Df: 5, p: 0.0000; pseudo $R^2$ Nagelkerka: 0.1851. | | | | | | |

Note: * reference level of a variable $M_j$=0.
Source: own elaboration based on the study results.

**Table 2. Results of estimation of the logit model for the dependent variable *InRacg***

| Variable | Coefficient | Standard Error | Wald test statistics | p value | 95% Conf. Interval | |
|---|---|---|---|---|---|---|
| $M_1$ | 0.8651 | 0.1419 | 37.1515 | 0.0000 | 0.5869 | 1.1433 |
| $M_3$ | 0.3628 | 0.1481 | 5.9993 | 0.0143 | 0.0725 | 0.6530 |
| $M_4$ | 0.5451 | 0.1499 | 13.2192 | 0.0003 | 0.2513 | 0.8389 |
| $M_6$ | 0.4758 | 0.1456 | 10.6757 | 0.0011 | 0.1904 | 0.7612 |
| $M_7$ | 0.8864 | 0.1525 | 33.7807 | 0.0000 | 0.5875 | 1.1853 |
| *Const* | -0.1658 | 0.1579 | 1.1038 | 0.2934 | -0.4752 | 0.1435 |
| N= 1510; LR: Chi$^2$:148.8492, Df:5, p: 0.0000; pseudo $R^2$ Nagelkerka:0.1524. | | | | | | |

Note: * reference level of a variable $M_j$=0.
Source: own elaboration based on the study results.

**Table 3. Results of estimation of the logit model for the dependent variable *InSpol***

| Variable | Coefficient | Standard Error | Wald test statistics | p value | 95% Conf. Interval | |
|---|---|---|---|---|---|---|
| $M_4$ | 0.3981 | 0.1274 | 9.7714 | 0.0018 | 0.1485 | 0.6477 |
| $M_5$ | 0.2574 | 0.1120 | 5.2793 | 0.0216 | 0.0378 | 0.4770 |
| $M_7$ | 0.5889 | 0.1101 | 28.5927 | 0.0000 | 0.3731 | 0.8048 |
| $M_8$ | 0.5574 | 0.1119 | 24.8329 | 0.0000 | 0.3382 | 0.7767 |
| *Const* | -1.0238 | 0.1291 | 62.8595 | 0.0000 | -1.2768 | -0.7707 |
| N= 1510; LR: Chi$^2$:108.3825, Df:4, p: 0.0000; pseudo $R^2$ Nagelkerka:0.0924. | | | | | | |

Note: * reference level of a variable $M_j$=0
Source: own elaboration based on the study results.

## Authors

All authors contributed equally to this work and share equal authorship (16.67% each).

**Maryla Bieniek-Majka**
Assistant Professor in the Department of Economics, Kazimierz Wielki University in Bydgoszcz, Poland. Her research interests include the economics and organisation of enterprises, forms of market integration, the economics of sustainable development, and rural development.
**Correspondence to:** Dr Maryla Bieniek-Majka, Department of Law and Economics, Kazimierz Wielki University in Bydgoszcz, 11 Weyssenhoffa Sq. 85-072 Bydgoszcz, Poland. e-mail: maryla@ukw.edu.pl
**ORCID** https://orcid.org/0000-0003-1448-7406

**Zofia Gródek-Szostak (corresponding author)**
Assistant Professor, Kraków University of Economics, Institute of Management, Department of Economics and Organisation of Enterprises, Institute of Computer Science, Accounting and Controlling, College of Management and Quality Sciences. Her research interests include innovation management, management of the technology transfer process, commercialisation of innovations, cooperation of the SME sector with business environment institutions, technological cooperation of enterprises, state aid, development of innovative rural entrepreneurship, and sustainable development.
**Correspondence to:** Dr Zofia Gródek-Szostak, Krakow University of Economics, ul. Rakowicka 27, 31-510 Kraków, Poland, e-mail: grodekz@uek.krakow.pl
**ORCID** https://orcid.org/0000-0001-6283-6952

**Michał Prusinowski**
Assistant Professor in the Institute of Economics and Finance, University of Szczecin, Poland. His research interests include economic inequalities, the four-day work week, and consumer behaviour.
**Correspondence to:** Dr Michał Prusinowski, Institute of Economics and Finance, University of Szczecin, Mickiewicza 64, 71-101 Szczecin, Poland. e-mail: michal.prusinowski@usz.edu.pl
**ORCID** https://orcid.org/0000-0002-1347-9888

**Magdalena Szczepańska**
Assistant Professor in the Department of Economics, Kazimierz Wielki University in Bydgoszcz, Poland. Her research interests include consumer behaviour, entrepreneurship and succession intentions.
**Correspondence to:** Dr Magdalena Szczepańska, pl. Weyssenhoff 11, 85-072 Bydgoszcz, Poland, e-mail: magdasz@ukw.edu.pl
**ORCID** https://orcid.org/0000-0002-7752-369X

**Agnieszka Szczepkowska-Flis**
Assistant Professor in the Department of Economics, Kazimierz Wielki University in Bydgoszcz. Her research interests include economic analyses using statistical and econometric tools, research interests include growth and economic development, creative destruction, innovative activity, technological progress, business cycle, and FDI. Assistant Professor in the Department of Economics.
**Correspondence to:** Dr Agnieszka Szczepkowska-Flis, Kazimierz Wielki University in Bydgoszcz, Bydgoszcz, 11 Weyssenhoffa Sq. 85-072 Bydgoszcz, Poland e-mail: agnieszka.szczepkowska-flis@ukw.edu.pl
**ORCID** https://orcid.org/0000-0003-3946-426X

**Zuzanna Urbanowicz**
Assistant Professor in the Department of Business Activity and Economic Policy in the Institute of Economics, Poznań University of Economics and Business, Poland. Her scientific interests include the theory of monetary and fiscal policy as well as business cycles. In her research, she tries to evaluate the role of economic policy instruments in the macroeconomic stabilisation process.
**Correspondence to:** Dr Zuzanna Urbanowicz, Institute of Economics, Poznań University of Economics and Business, al. Niepodległości 10, 61-875, Poznań, Poland. e-mail: zuzanna.urbanowicz@ue.poznan.pl
**ORCID** https://orcid.org/0000-0002-2701-6390

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**Use of Artificial Intelligence**

We hereby declare that the article is free from the use of Artificial Intelligence (AI) or Generative AI (GAI) tools in its preparation, writing, analysis, and interpretation. All ideas, arguments, and writings are the result of the author's own work and critical engagement with relevant academic sources.

**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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# Seducing the crowd: An LDA literature review on language in crowdfunding

**Anna Fornalska, Michał Suchanek, Joanna Adamska, Paula Gorszczyńska, Urszula Mrzygłód**

**ABSTRACT**

**Objective:** As crowdfunding continues to gain traction worldwide as an alternative financing method for entrepreneurs and social initiatives, the language used in campaign communications has become a critical factor influencing funding outcomes. Therefore, understanding how linguistic elements affect backer engagement and campaign success constitutes an increasingly important research area. This article aims to identify the dominant themes and emerging trends in academic research concerning the role of language in crowdfunding. We applied latent Dirichlet allocation (LDA) to systematically explore how scholars have investigated linguistic features in crowdfunding-related studies and how this area has evolved.

**Research Design & Methods:** We applied an LDA topic model to the dynamically growing body of literature on the aspects of language in crowdfunding campaigns to identify the key research topics and find the most current avenues of further research. It is a stochastic-based approach. Therefore, it fits well with the analysis of short blocks of text such as article abstracts. We considered 143 papers from Scopus published on the topic since 2013 to identify the key trends in the contemporary research on language in crowdfunding.

**Findings:** We identified seven key topics, including: (1) language in crowdfunding success, (2) entrepreneurial narratives, (3) emotional language in social/medical campaigns, (4) gender in crowdfunding, (5) branding and linguistic strategies, (6) values in crowdfunding, and (7) ethical considerations. The analysis shows temporal shifts in topic prevalence, highlighting growing interest in interdisciplinary themes such as gender and values, while general or ethical-focused research has declined over time.

**Implications & Recommendations:** The study revealed a shift from basic linguistic metrics to more detailed explorations of identity, ethics, and emotional appeal. It recommends that fundraisers and platforms tailor communication strategies to match backer expectations and influence persuasive narratives. Crowdfunding platforms may enhance user support by integrating language analysis tools and offering narrative-building guidance.

**Contribution & Value Added:** This is the first known study to apply LDA topic modelling to academic literature on language use in crowdfunding. It provides a structured, data-driven mapping of the field's development and offers insights into how language shapes crowdfunding outcomes. It contributes to both the crowdfunding literature and interdisciplinary research, linking linguistics, psychology, marketing and finance, underlining the international applicability of these findings.

| | |
|---|---|
| **Article type:** | research article |
| **Keywords:** | language; crowdfunding; Latent Dirichlet Allocation; Natural Language Processing; topic modelling |
| **JEL codes:** | G23; D83; C88 |

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## INTRODUCTION

Crowdfunding is a form of community financing, where supporters contribute relatively small amounts in exchange for recognition, reward, or a share in the company. It enables entrepreneurs, communities, and individuals to raise capital for commercial, social, or charitable initiatives outside

traditional financial systems, leveraging digital platforms to engage backers to fund projects (Short *et al.*, 2017). Crowdfunding encompasses various fundraising models, the core of them being: crowdlending, donation, reward, and equity crowdfunding (Belleflamme *et al.*, 2014; Mollick, 2014). Shneor *et al*. (2020) further distinguish investment (lending and equity) and non-investment financing (reward and donation) crowdfunding.

Of particular interest in crowdfunding research are the success factors of crowdfunding campaigns. While scholars have widely studied financial and structural factors like campaign duration and funding goals (Adamska-Mieruszewska *et al.*, 2021; Koch & Siering, 2015, 2019; Zhang *et al.*, 2023, 2024), growing attention is now on how language influences backers' support (Zhao & Ryu, 2020). Fundraisers not only present proposals but also use strategic language to craft a vision and engage potential backers. Prior studies have shown that emotional language, credibility markers and narrative framing can significantly impact a campaign's success (Al-Qershi *et al.*, 2022; Lagazio & Querci, 2018; Shneor & Vik, 2020). Luo and Luo (2017) conceptualised fundraisers as storytellers, highlighting the importance of crafting compelling narratives to attract funding. Campaigns that emphasise shared values, identity, and social connection perform better than those relying on rational financial arguments (Pinkow, 2023; Serwaah, 2022). While prior research has explored the role of language in crowdfunding success, most studies focus on individual linguistic variables (*e.g.*, sentiment, credibility markers) rather than taking a topic-based approach. This raises an important question: How has academic research on crowdfunding language evolved, and what are the dominant themes and emerging trends in this field?

To address this question, we applied latent Dirichlet allocation (LDA) topic modelling to conduct a structured literature review on crowdfunding language research to investigate the role of language in crowdfunding campaigns. Specifically, we explored prevalent topics related to language in crowdfunding campaigns, analysed their evolution over time, tracked shifts in scholarly focus, and highlighted emerging areas of interest for future research. Our study offers a structured view of how linguistic research in crowdfunding has evolved, identifying key trends and highlighting emerging interdisciplinary themes such as gender and ethical considerations.

We chose LDA for its ability to uncover latent themes in unstructured text, particularly suitable for abstracts where manual identification of patterns would be challenging (Jelodar *et al.*, 2019). It is a more objective, data-driven alternative to traditional reviews. Scholars have applied LDA in crowdfunding studies (Jiang *et al.*, 2020; Rejeb *et al.*, 2024). However, to the best of our knowledge, none of them was related to language and project descriptions. For completeness, we also considered alternative topic modelling techniques, including non-negative matrix factorisation(NMF), BERTopic, and dynamic topic modelling (DTM). Ultimately, we selected LDA as the most suitable method given our research objectives and dataset characteristics. Notably, LDA is a widely validated probabilistic model for medium-sized text corpora and has demonstrated strong performance with short texts such as article abstracts (Jelodar *et al.*, 2019). In contrast to newer approaches like BERTopic or DTM that require larger corpora or impose complex temporal structures, LDA provides a transparent and interpretable approach well-aligned with our goal of mapping the major themes in this emerging literature.

The contribution of this study lies in its application of LDA topic modelling to capture the nature of the evolving research on language in crowdfunding campaigns. A systematic analysis of a body of research articles allowed us to identify seven distinct topics related to language in crowdfunding, with a particular emphasis on sentiment, style, and values. Notably, our findings revealed a significant increase in the prevalence of research exploring gender in crowdfunding (Topic 4) and values in crowdfunding (Topic 6) in recent years, suggesting a growing interest in interdisciplinary and qualitative approaches to understanding the linguistic aspects of crowdfunding.

The structure of the article is as follows. We briefly examine recent crowdfunding research, focusing on the success factors and linguistic theories in the following section. Next, we provide a thorough explanation of the research methodology, including the literature search approach and criteria employed to determine the optimal number of topics. We then present findings and discuss results. Finally, we outline the limitations of our study and provide concluding remarks.

## LITERATURE REVIEW

A central focus in crowdfunding research is identifying the factors that determine the success of campaigns, particularly whether a campaign meets or exceeds its fundraising goal. Since crowdfunding relies on small contributions, an ambitious financial goal poses the challenge of attracting a sufficient number of backers and has been shown to negatively affect success rates (Koch & Siering, 2015, 2019; Mollick, 2014; Zhang *et al.*, 2023; 2024). Additional success factors include campaign duration, the value of rewards (Zhao & Ryu, 2020), visual content, the category of the project, updates, and external media coverage (Al-Qershi *et al.*, 2022; Lagazio & Querci, 2018; Liu *et al.*, 2023; Shneor & Vik, 2020).

Studies also consider the perspectives of key stakeholders, i.e., backers, platforms, and fundraisers (Liu *et al.*, 2023; Shneor & Vik, 2020). For backers, the number of supporters, as well as their experience, age, and gender, influence outcomes (Adamska-Mieruszewska *et al.*, 2021; Mollick, 2014; Liu *et al.*, 2023). Platform-related success factors include user base size, proportion of returning backers, reputation, operational longevity, and the use of project endorsements (Shneor & Vik, 2020; Liu *et al.*, 2023). Fundraiser-related factors encompass experience, reputation (Pinkow, 2023), educational background (Mollick, 2014), team size (Lagazio & Querci, 2018), and personal networks (Koch & Siering, 2019). Demographics such as gender, location, age, and ethnicity also play a role (Liu *et al.*, 2023; Mollick, 2014; Shneor & Vik, 2020).

Beyond raising funds, crowdfunding facilitates outreach to potential clients, media, investors, and business partners (De Crescenzo *et al.*, 2022; Tosatto *et al.*, 2022). Therefore, communication with the broader community is vital. Fundraisers must present compelling narratives to attract support. Luo and Luo (2017) liken them to storytellers whose persuasive communication, through campaign descriptions, risk sections, or video pitches, can shape outcomes. Following Jakobson's (1960) model of communication, the fundraiser (sender) delivers a message (campaign content) to backers (receivers) via a specific platform (channel) using persuasive language (code) within a given context (the campaign cause). The pragmatics of this interaction, including the fundraiser's intention (illocutionary force) and its effect on the audience (perlocutionary effect), are key to understanding persuasive strategies (Austin *et al.*, 1977; Searle & Vanderveken, 1985).

Although numerous linguistic theories could enrich this field, their application in crowdfunding studies remains limited. Research has primarily drawn on persuasion-related models such as the elaboration likelihood model (ELM), signalling theory (Spence, 1974), and language expectancy theory. Peng *et al.* (2022) found that credibility-enhancing language correlates positively with success, while expressions of uncertainty or negative sentiment reduce it. They also noted that simpler, low-complexity language weakens campaign performance. Allison *et al.* (2024) argue that genre is not the only relevant factor; social and political context also shape outcomes. In developing countries, microlending campaigns gain traction more quickly when they avoid highlighting personal achievements or innovation. Instead, narratives that focus on present struggles and invoke blame tend to evoke a warm-glow effect (Andreoni, 1990), encouraging faster contributions. These findings align with Bollaert *et al.* (2020), Koh *et al.* (2020), and Patel *et al.* (2021), who stress the complex role of entrepreneur visibility.

However, there exists contradictory evidence. Gafni *et al.* (2021) and Patel *et al.* (2021) show that self-referencing and even narcissistic cues can enhance trust and campaign performance. In another content-based study, Allison *et al.* (2017) applied and extended the ELM framework through a simulated crowdfunding experiment. They found that experienced investors respond better to rational, issue-based arguments in high-goal campaigns, while peripheral cues, such as appeals to group identity, are more effective for attracting novice funders in lower-goal campaigns.

Despite the growing sophistication of methods in crowdfunding discourse studies, the integration of linguistic theory remains an area with definite potential for further exploration. While foundational models like the ELM and signalling theory have proven useful in explaining persuasive mechanisms, more recent approaches, such as cognitive linguistics, critical discourse analysis, and deictic shift theory, offer broader possibilities to analyse the relations between language, identity, and engagement. Research synthesising conceptual metaphor theory with discourse and narrative analysis (*e.g.*, Hart, 2019) reveals

how metaphors not only frame information but also shape collective perceptions and emotional alignment. These insights are particularly relevant in multilingual and multicultural contexts, where metaphor use reflects not just stylistic preference but also deeper socio-cognitive schemas.

Furthermore, recent studies demonstrate a turn toward multimodal and culturally sensitive analyses that go beyond purely textual features. For instance, Rama *et al*. (2022) show how visual and textual combinations vary in persuasiveness across cultural dimensions, with high-individualism societies responding more positively to narrative-driven, image-supported appeals. Similarly, Shneor *et al*. (2022) find that the success of campaigns hinges on whether audiences come from high- or low-trust societies, which affects their responsiveness to central (textual) or peripheral (visual, social media) cues. These findings emphasise the necessity of considering both cultural variation and the evolving norms of platform-specific communication. As crowdfunding increasingly leverages integrated media consisting of video, speech, gesture, and visuals, future linguistic research must adapt its scope and tools accordingly. While we did not focus on producing a comprehensive synthesis of multimodal or ethnographic perspectives, our acknowledgement of these studies nonetheless aimed to reflect their growing significance in the field.

## RESEARCH METHODOLOGY

Natural language processing (NLP) focuses on enabling machines to understand, analyse, and generate human language (Khurana *et al.*, 2023). It encompasses techniques like entity recognition, sentiment analysis, and text classification, and plays a key role in information retrieval systems, including document retrieval and question answering (Li, 2015). Notably, NLP models aim to capture semantics, syntax, and language structure. With the exponential growth of scientific literature, traditional literature reviews are increasingly difficult, driving demand for advanced NLP tools (Kang *et al.*, 2020).

Topic modelling, a key NLP and machine learning technique, automatically uncovers hidden themes in large text corpora by clustering frequently co-occurring words (Albalawi *et al.*, 2020). Researchers widely apply it in fields such as text mining, social media analysis, and information retrieval to extract meaning from unstructured data (Blei *et al.*, 2003; Chauhan & Shah, 2022; Jelodar *et al.*, 2019; Petterson *et al.*, 2010). Kherwa and Bansal (2019) categorise topic modelling methods into probabilistic and non-probabilistic models, further divided into supervised and unsupervised approaches, using either bag-of-words or word-sequence techniques.

Among these, LDA is particularly relevant. It represents each document as a mixture of topics, with each topic characterised by a distribution over words (Chauhan & Shah, 2022). Due to its probabilistic nature, LDA is well-suited for short texts like abstracts. It assumes a two-step document generation process: selecting topic distributions for a document, then generating words based on those topics. Words with the highest probability in each topic reveal the dominant themes. Both document-topic and topic-word distributions are governed by Dirichlet priors (Jelodar *et al.*, 2019). In LDA, visible data (words) serve to infer hidden variables (topics and their presence in documents), producing a thematic structure across the corpus. Posterior estimates of these hidden variables enable tasks like information retrieval and document exploration. This process is grounded in a probabilistic generative model, where the observed texts are assumed to result from an underlying thematic process (Blei & Lafferty, 2009).

In the model, a word w is an element of a dictionary {1, …, v}, a document is represented with a sequence of N words and each word (w1, …, wn), wn Є{1, …, v}. A corpus D is a collection of M documents. Given several k topics, the process for a document d is as follows (Kherwa & Bansal, 2019):

1. Sample a K-vector θd from the Dirichlet distribution p(θ|α), where θd is the topic mixture proportion of document d.
2. For i = 1… Nd, sample word wi in the d from the document special multinomial distribution p(wn|θd,β) where α is a K-vector of Dirichlet parameter, and p(θ|α) is given as follows:

$$p(\theta|\alpha) = \frac{\Gamma(\sum_{i=1}^{k} \alpha\iota)}{\prod_{i=1}^{k} \Gamma(\alpha\iota)} \theta_1^{\alpha i-1} \ldots \theta_1^{\alpha k-1} \quad (1)$$

Here, β is a K * V matrix of word probability, where $\beta_{ij} = p(wj = 1|zi = 1), i = 0,1, \dots, k; j = 0,1, \dots, v$.

We conducted all of the analysis in R 4.3.2. using the LDAShiny package and a set of standard data redaction packages. We follow a four-step process suggested by De la Hoz-M *et al.* (2021):

1. Preprocessing – document term matrix.
2. Number of topics inference – 4 criteria.
3. LDA Model.
4. Postprocessing.

To identify relevant studies, we ran a Scopus search using the terms 'crowdfunding' and 'language.' We selected Scopus as the primary database due to its comprehensive coverage of peer-reviewed publications across multiple disciplines, ensuring high-quality and relevant data. This way, we obtained a dataset of 143 articles, including their title, authorship, keywords, and abstracts. After the preliminary check, 121 articles remained in the database. We preprocessed the dataset, selecting the titles of the papers as the IDs, the abstracts as the document vectors to be analysed and the publishing years as the time factor. We operated using sequences of up to three contiguous words, diagrams and trigrams. While it is possible to only work with individual words, the specifics of social science databases are that many terms include multiple words, *e.g.* 'crowdfunding campaign' or 'successfully funded.' In the next step, we prepared the document term matrix (DTM). We disregarded stemming and assumed a standard sparsity of 0.995 (De la Hoz-M *et al.*, 2021). Figure 1 shows the initial graphical output of the DTM (the bar plot of the most frequent terms).

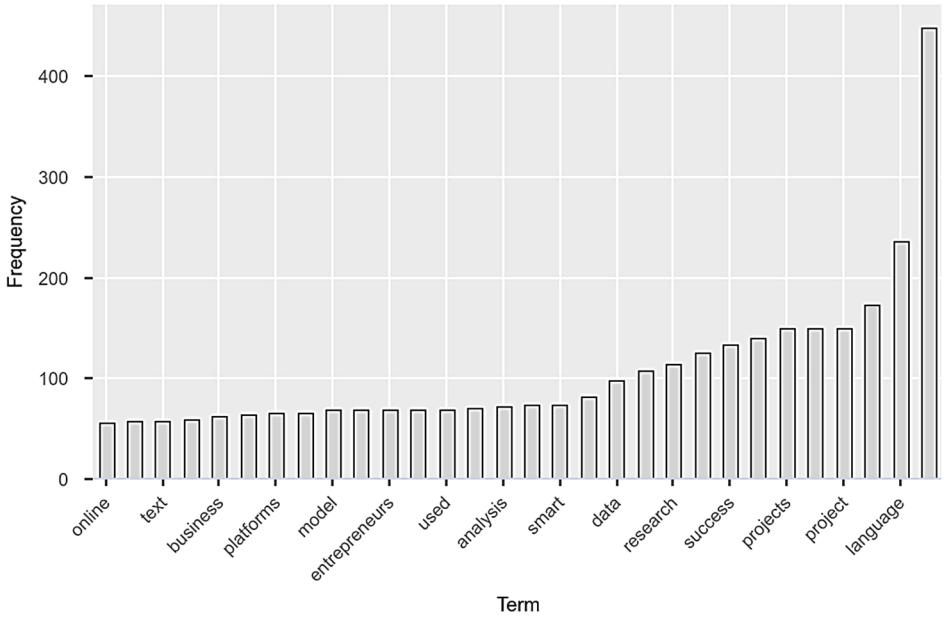


**Figure 1. The frequency of prevalent terms in the document term matrix**
Source: own elaboration.

Notably, LDA utilises the relationships between words and hidden semantic subjects in a set of documents. Hence, as the accuracy of the generated results relies heavily on the inference process of the model, the parameter k (representing the number of topics) of the algorithm is of utmost importance and should be predetermined. Theoretically, a high quantity of topics would result in too narrow subjects, whereas a low quantity would encompass vast and diverse themes (Sbalchiero & Eder, 2020).

We used four criteria to identify the optimal number of topics: coherence (Figure 2), 4-metrics (Figure 3), perplexity (Figure 4), and harmonic mean (Figure 5). For Gibbs sampling, we assume 1000 interactions with a burn-in of 100 to avoid the pollution of the wrong distribution. We assumed the hyperparameter alpha to be 1. We analyse from 2 to 30 potential topics with a step of 2, additionally reviewing 35, 40, 45, and 50 potential topics.

To determine the optimal number of topics for the LDA model, we tested a range of values for *k* using four standard metrics: coherence, 4-metrics, perplexity and harmonic mean. As shown in Figures 215, the coherence and perplexity measures indicated that a 7-topic solution offers a good trade-off between granularity and interpretability. While the Griffiths criterion suggests a higher number of topics, we prioritised thematic clarity as lying in line with our research goal. To identify the dominant research streams, we went for a lower number of suggested topics, in line with previous research applying LDA in similar research avenues (De la Hoz-M *et al.*, 2021).

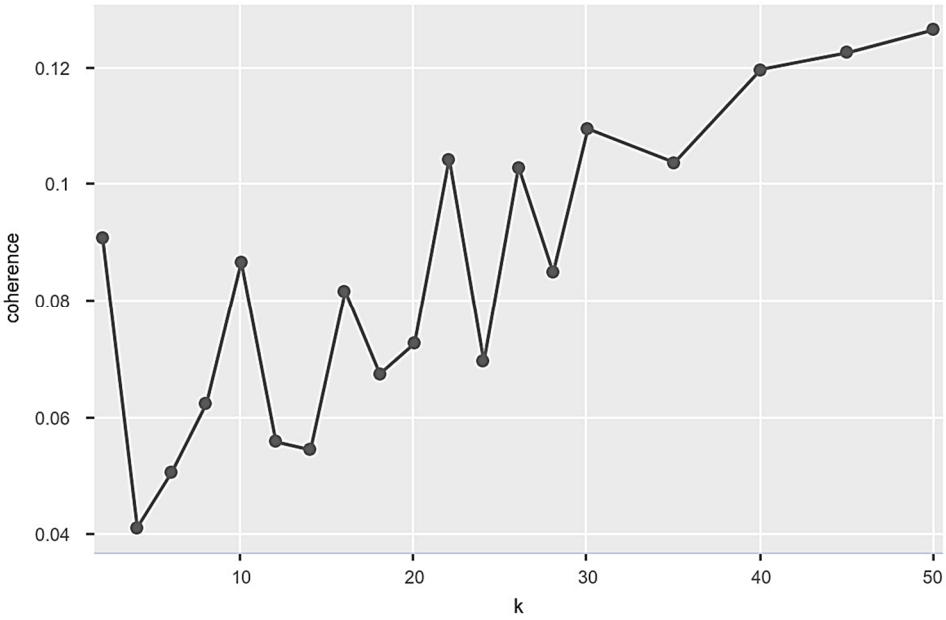


**Figure 2. The criteria for inference of subject number: Coherence**
Source: own elaboration.

Figure 2 shows that coherence has the strongest marginal up to the level of 7 topics after the initial drop, upon which the growth flattens afterwards.

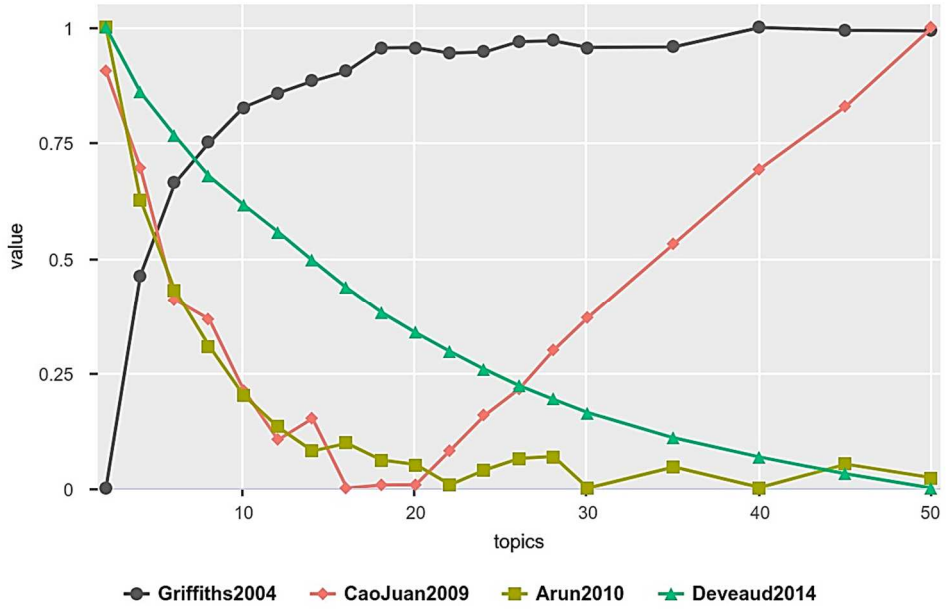


**Figure 3. The criteria for inference of subject number: 4 metrics**
Source: own elaboration.

Figure 3 illustrates convergence in 4-metrics, with diminishing returns beyond 7-10 topics.

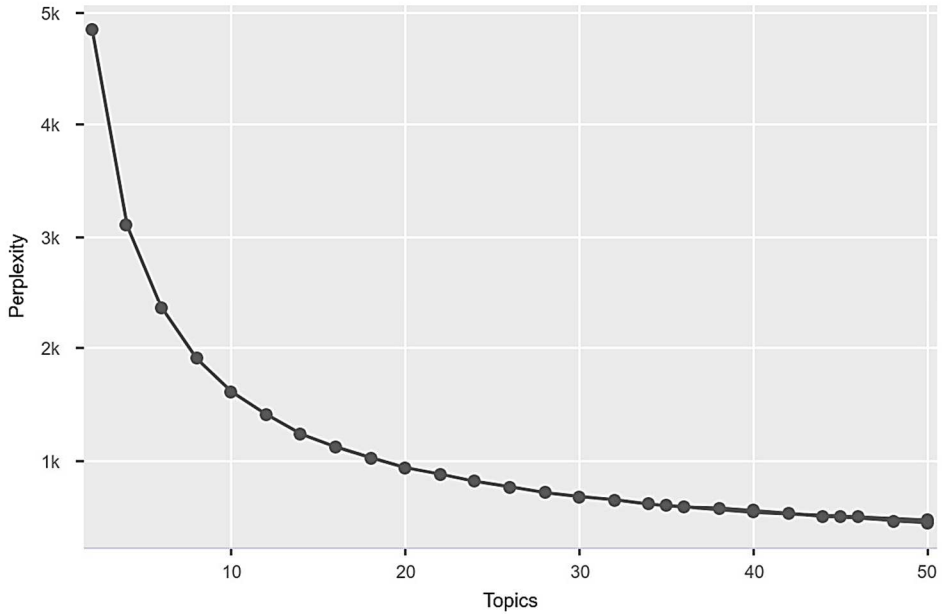


**Figure 4. The criteria for inference of subject number: Perplexity**
Source: own elaboration.

Figure 4 presents a decline in perplexity up to 7, after which the rate of improvement slows.

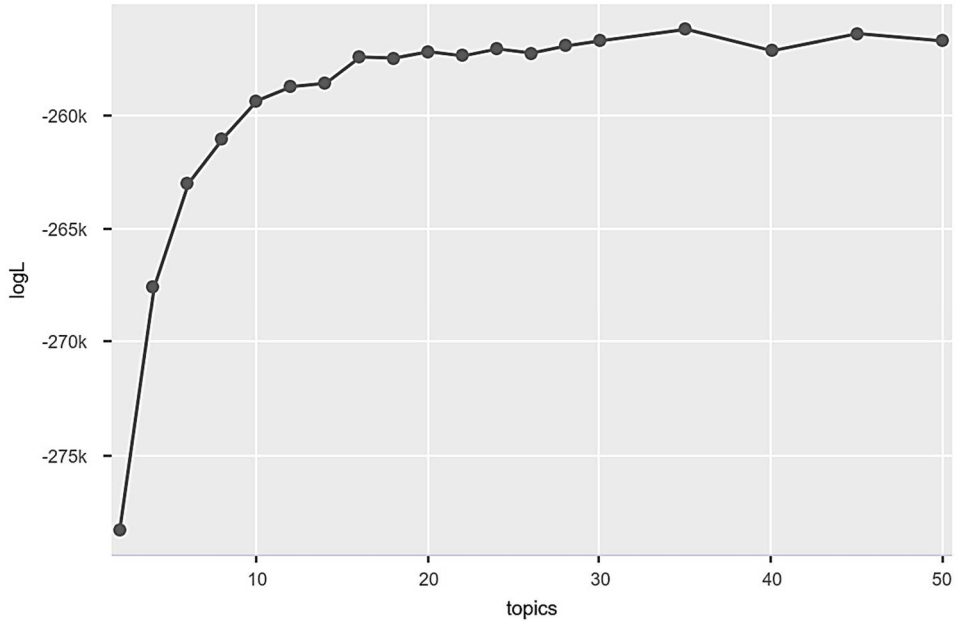


**Figure 5. The criteria for inference of the subject number: Harmonic mean**
Source: own elaboration.

Figure 5 indicates a plateau in the harmonic mean, confirming model stability near k = 7 to k = 10.

The suggested number of topics ranged from 7, suggested by the perplexity and coherence criteria, to over 35, suggested by the Griffiths criterion. Given the fact that the research aimed to identify the main bodies of contemporary research, we selected the lower end as the basis for the construction of the LDA model. For the third step, thus, the k parameter was set at seven.

As a consequence of the previous steps, we set 1000 iterations and a burn-in of 100. In line with Griffiths *et al.* (2007), we set the alpha parameter at 50/k for the value of 7.14. The estimated LDA

model allowed us to identify eight topics with acceptable coherence and a prevalence of between 11.155 and 14.528 (Table 1). There were 316992 entries for the phi catalogue. The primary results of the topic modelling method were a set of phrases together with their corresponding frequencies that define a subject, as well as the composition of each analysed text expressed as a percentage. The allocation of subject words lacked a meaningful interpretation on its own. Nevertheless, in the majority of situations, the themes may be accurately categorised based on the frequency of words used. The R package utilises a topic labelling method that employs a simple n-gram based topic algorithm from the textmineR Package (Jones *et al.*, 2022). Nevertheless, these algorithms possess restricted capability, so as part of the postprocessing, we proceed to reidentify the names of the topics, which leads to the final list in the table (label_expert).

**Table 1. Regression models for the temporal development of the topics**

| topic | estimate | statistic | p.value |
|---|---|---|---|
| t_1 | 0.01 | 2.71 | 0.02 |
| t_2 | -0.02 | -4.02 | 0.00 |
| t_3 | 0.00 | 1.58 | 0.15 |
| t_4 | 0.01 | 4.48 | 0.00 |
| t_5 | -0.01 | -1.45 | 0.18 |
| t_6 | 0.01 | 3.37 | 0.01 |
| t_7 | 0.00 | -0.45 | 0.66 |

Source: own study.

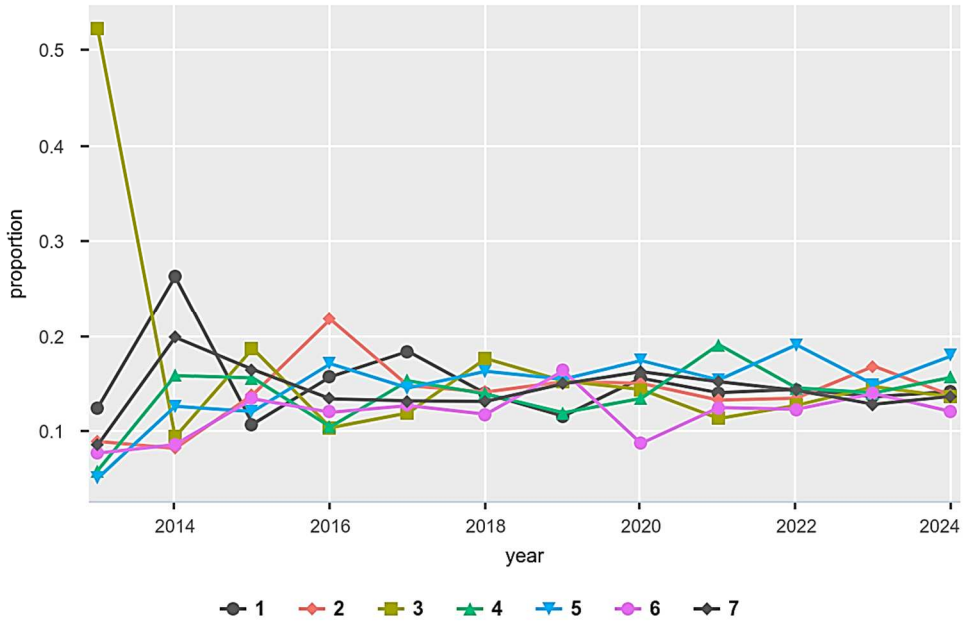


**Figure 6. The development of the share of particular topics over time**
Source: own elaboration.

The heat map specifically indicates a very diversified structure of the popularity of particular topics. Apart from the fifth topic, which had a significant rise at the beginning of the period of analysis, only to drop significantly later, most topics tended to come and go with their popularity increasing for shorter periods, a year or two. Given the relatively small number of researchers in the field, we may attribute such changes to events like conferences or seminars, inflating the interest in a specific topic.

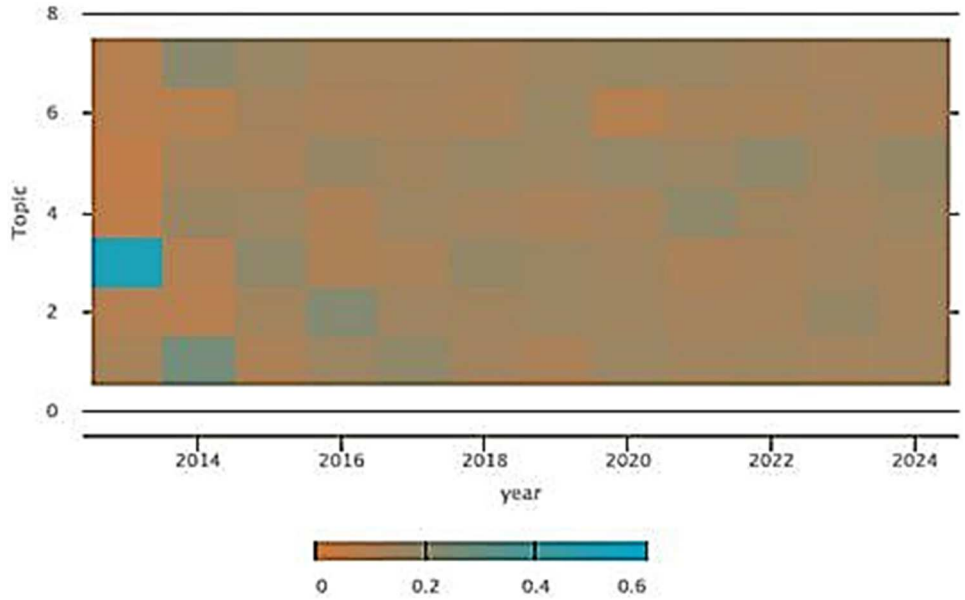


**Figure 7. The development of the share of particular topics over time**
Source: own elaboration.

## RESULTS AND DISCUSSION

Through the application of LDA topic modelling, we identified seven key research themes in crowdfunding language studies. These topics represent dimensions of linguistic strategies, ranging from sentiment and persuasion techniques to branding, gender communication, and ethical considerations. Over time, some topics have gained prominence, reflecting shifting research priorities and methodological advancements in text analysis. The following sections discuss each topic in detail, outlining its significance, key findings, and implications for crowdfunding communication.

### Topic 1: Language in Crowdfunding Success

The first topic explores how various elements related to linguistics influence the project's success. The research within the topic suggests that geographic distance amplifies the importance of high-quality linguistic signals, with distant backers relying more on positive psychological language to reduce the information gap (Johan & Zhang, 2020; Tajvarpour & Pujari, 2022). Surprisingly, the use of communal language in updates can negatively impact funding by making potential backers feel their contributions are less needed (Herd *et al.*, 2022). Furthermore, language suggesting personality traits and optimism can significantly enhance donor support, especially during crises like the COVID-19 pandemic (Allison *et al.*, 2024; Zhang *et al.*, 2023). In general, linguistic styles, such as personality-based, logic-based, and emotion-based, play a crucial role in shaping donor behaviour, with specific types of language positively or negatively affecting donation outcomes (W. Li *et al.*, 2023).

### Topic 2: Entrepreneurial Narrative in Crowdfunding

This topic focuses on how crowdfunders react to the linguistic style of text and how they tend to act strategically to the content at hand. Studies classified within this topic have shown that not only the message, but how it is conveyed is crucial to crowdfunding success; it is not only about emotional contagion, but about signals of entrepreneurial performance. Using intimate and perceptual language positively impacts the financial performance of the campaign (Chen *et al.*, 2023, 2024). Investors respond well to indications of high quality and low risk (Berns *et al.*, 2020). However, if risk in the high-risk projects is disclosed in a balanced tone, it impacts the project positively (Kim *et al.*, 2022). Incremental innovativeness language increases the success chances, as it is associated with the entrepreneurial passion, whereas radical innovativeness language negatively affects the funding outcome (Lu

*et al.*, 2023). An interesting study by Zhang *et al.* (2023) highlights that there is a 70% user attrition rate in crowdfunding and that profit language used in the narrative of the lender's last loan is negatively associated with the retention of lenders, and therefore financial success of the project.

**Topic 3: Emotional Language in Social and Medical Crowdfunding**

The third topic focuses on the effectiveness of emotional and cognitive appeals in crowdfunding narratives in socially oriented and medical projects. These studies have shown that the solidity of messages appeals affects moral emotions such as pride and guilt, which in turn impact donation intentions, in particular, in medical crowdfunding (Naimi *et al.*, 2020; Zhang *et al.*, 2024). Furthermore, social distance and disease severity modulate these effects, indicating the nuanced role of message concreteness in stimulating donations (Zhang *et al.*, 2024). However, scholars have found that in prosocial crowdfunding, cognitive appeals attract more backers (and funds) than emotional ones. Specifically, the use of affective language and negative emotions can discourage potential backers, whereas cognitive, fact-based narratives are more effective in fundraising (C. H. Lee *et al.*, 2019; Naimi *et al.*, 2020). This is consistent with findings which suggest that while positive affective language can enhance funding outcomes, extensive use of social language does not necessarily increase the likelihood of project success (C. H. Lee *et al.*, 2019).

**Topic 4: Gender in Crowdfunding**

Another important area of study focuses on the relationship between gender, language, and crowdfunding success. Studies confirm that one may identify fundraisers' gender based on their writing style, which might significantly impact the project's success (Wan Mohamad Nazarie & Williams, 2021). McSweeney *et al.* (2022) identified four types of assertive language (certain, power, social, tentative) and investigated how they interact with the gender of the fundraiser. They argue that it is more about whether the fundraiser fits into the type of project archetype, as some project categories are attributed mostly to females, others to males. Wang *et al.* (2023) contribute to the discussion by noting that it is about the display of masculinity in online communication, not the gender per se. Wan Mohamad Nazarie and Williams (2021) partly support this notion, arguing that it is not so much about the gender of the author as about the style.

**Topic 5: Branding and Linguistic Strategies**

This topic explores how brand prominence and linguistic strategies influence the success of crowdfunding campaigns across different contexts. Studies indicate that visible display of brand names in project titles and descriptions significantly enhances funding success, particularly when combined with engaging language styles and well-structured narratives (Moradi & Badrinarayanan, 2021; Zihagh *et al.*, 2024). The positive influence of brand prominence is further amplified when textual and visual brand elements are effectively integrated, making campaigns more compelling to potential backers (Zihagh *et al.*, 2024). Moreover, the effectiveness of rhetorical signals such as emotional and cognitive tones and communal language styles in crowdfunding narratives changes over time. Emotional and cognitive tones are more impactful in the early stages of a campaign, while communal language styles become more effective in later phases (Moradi *et al.*, 2024).

**Topic 7: Ethical Considerations & Crowdfunding**

Crowdfunding research in Topic 7 focuses on the complicated language of campaigns, with special emphasis on ethical considerations (Lee *et al.*, 2022; Q. Li & Qu, 2022; Pekar *et al.*, 2024). Pioneering methodologies, such as fraud detection innovations, underscore the commitment to ensuring trust and transparency in crowdfunding campaigns. Articles on the topic show how advanced natural language processing techniques (Chaichi & Anderson, 2019; Pekar *et al.*, 2024), when combined with ethical frameworks, create a more accountable crowdfunding environment. Moreover, researchers not only interpret linguistic patterns but also demonstrate tangible advancements toward ensuring integrity and ethical adherence in crowdfunding initiatives.

Our findings confirm that the publishing trends reveal fluctuating interest in the identified research topics, with some gaining prominence over time while others decline. Notably, topics 4 (gender in crowdfunding), 5 (branding and linguistic strategies), and 6 (values and crowdfunding) began as niche areas, comprising less than 10% of research, but have grown significantly, now accounting for over 50% of all publications in 2023 and 2024. This suggests a rising interest in interdisciplinary and qualitative approaches. Conversely, topic 7 (ethical considerations and crowdfunding), after an early surge, has steadily declined. This pattern may reflect the episodic nature of ethical concerns, which often spike during global crises (*e.g.*, the COVID-19 pandemic) but fade as the urgency subsides, highlighting the event-driven nature of ethics in crowdfunding. Topic 1 (language and crowdfunding success) has shown consistent activity but has declined since 2018. While campaign success remains central, there is a shift toward more nuanced analysis beyond basic quantitative measures (*e.g.*, word count, adjectives). Repeated use of the same variables has reached its limit, prompting a move toward richer, qualitative analysis focusing on framing, emotion, and meaning. Simultaneously, advances in text processing technologies now enable deeper, more objective insights into language content, without needing to manually interpret each campaign's intent. Finally, topic 3 (general language style and complexity), which dominated early research, has declined in relative share. This shift may indicate a saturation point for broad analyses, as the field now favours more specialised, focused studies.

In light of our original research question on how the academic study of language in crowdfunding has evolved, we find a clear progression from foundational studies on general language features (*e.g.*, sentiment, linguistic style) to more specialised themes, including gender dynamics, branding strategies, and values-based communication. The prevalence and evolution of these topics (Topics 1-7) over time indicate a shift from instrumentalist views of language toward more nuanced, interdisciplinary frameworks. Thus, our model helps identify dominant themes but also reveals how scholarly attention has realigned in response to methodological advances and broader societal shifts, such as heightened awareness of diversity and ethics. For both researchers and practitioners, these findings underline the evolving nature of crowdfunding communication and provide a foundation for discussing the broader theoretical and practical implications of our results.

## CONCLUSIONS

This article analyses the dynamically growing body of literature on the aspects of language in crowdfunding campaigns to identify the key research topics and find the most current avenues of further research. Based on the analysis of the LDA model, we have identified seven topics dominating in the subfield of crowdfunding research, including language aspects. We had several topic modelling approaches available and considered them. These included non-negative matrix factorisation(NMF), BERTopic, or dynamic topic modelling (DTM). We selected latent Dirichlet allocation (LDA) due to three key factors. First, LDA remains one of the most widely used and validated probabilistic models for unsupervised topic extraction, particularly for medium-sized corpora like ours. Second, our dataset consists of short texts (abstracts), for which LDA's performance is well-documented (Jelodar *et al.*, 2019). Third, unlike BERTopic or DTM, which require larger corpora or more complex temporal structures, LDA offered a transparent and interpretable model well suited to our aim of mapping major themes in an emerging research area. Nonetheless, we acknowledge that future work could benefit from applying complementary methods for finer-grained or temporally dynamic insights.

Our findings highlight a shift in academic focus from general linguistic complexity towards more nuanced and interdisciplinary analyses of persuasion strategies, gendered communication, branding, and ethical considerations in crowdfunding.

In terms of theoretical implications, our study contributes to the understanding of the importance of language used in crowdfunding dynamics. Studying the interplay between language and campaign success has enabled us to offer a nuanced perspective that enriches existing scientific knowledge. Our identification of key topics related to language in crowdfunding increases the comprehensiveness of scholarly insights, advancing understanding of how language fundraisers utilise language to engage potential backers. Moreover, our research underscores the importance of interdisciplinary approaches

in studying crowdfunding language. Integration of insights from diverse fields such as linguistics, psychology, and marketing will enable a more holistic understanding of the language-crowdfunding relationship. Our findings align with and contribute to the understanding of the ELM, reinforcing the idea that backers process crowdfunding messages through both rational (central route) and emotional (peripheral route) mechanisms. The fact that focus is on values-driven and emotional language suggests that peripheral cues play a dominant role in crowdfunding persuasion.

Furthermore, the fact that we observe growth of branding and linguistic strategies (Topic 5) suggests that fundraisers position themselves as trustworthy actors by employing consistent brand messaging. This is in line with the signalling theory, suggesting that crowdfunding campaigns rely on the credibility and trustworthiness of fundraisers. Finally, the observed rise of gender-related linguistic studies (Topic 4) highlights a broader interdisciplinary interest in diversity, inclusivity, and identity-based financing models, which, in general, contributes to gender literature and studies.

Our findings have practical relevance, especially for fundraisers and crowdfunding platforms. Fundraisers should optimise their language strategies to better connect with potential backers and improve campaign outcomes. Platforms can enhance their services by offering tools and guidance that support effective messaging, helping fundraisers craft compelling narratives and enriching the overall crowdfunding experience.

Despite these contributions, our study has certain limitations. Firstly, these are limitations resulting from LDA method of analysis. Similarly to other research employing LDA our study requires a fixed number of topics k, is limitited to Dirichlet distributions in capturing correlations, does not fully capture the evolution of all topics over time, only these identified in the study, and is based on the oversimplified bag-of-words assumption, *e.g.* (Deremetz, 2023). In other words, LDA assumes Dirichlet-distributed priors (limiting topic correlations), produces a static snapshot (no dynamic topic evolution), and relies on an oversimplified bag-of-words assumption (Deremetz, 2023). Future studies could address these issues by employing dynamic topic models or other advanced techniques (*e.g.*, BERTopic) that capture topic correlations and temporal dynamics.

Secondly, we based our inference on a sample drawn from a single database (Scopus) using a specific set of search terms. While it is a commonly used point of reference and constitutes the mainstream of research published, it does not incorporate many publications, such as preprints or other types of early research, which could also be worth analysing, especially for such a contemporary field of analysis. None of these shortcomings is significant enough to warrant disregarding the results. While this approach ensured quality and focus, it may have omitted relevant studies (for example, preprints or non-Scopus publications). Future research should broaden the scope by using multiple databases and including grey literature to capture a more comprehensive and internationally diverse set of works on crowdfunding language. Future approaches could include corpora consisting of multiple queries over databases other than just Scopus. One could also identify the topics in other ways, *e.g.*, using techniques other than LDA or choosing an LDA-based approach with higher k parameters. While the approach based on coherence that we applied here is valid, higher k parameters could lead to more miniscule classification of the topics, which could be of value, especially when the body of literature on this subject continues to grow at such a rate. Moreover, future work could explore alternative or complementary topic modelling techniques, such as BERTopic or dynamic topic modelling, which may capture context or temporal shifts more effectively than LDA. All in all, our application of LDA offers a novel, data-driven perspective on how language is studied in crowdfunding, and the insights from this review are relevant to crowdfunding research and practice worldwide.

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## Authors

The contribution share of authors is equal and amounted to:
AF (30%) – conceptualisation, literature writing, results and discussion, MS (30%) – conceptualisation, methodology, calculations, findings, JA (20%) – literature writing, results and discussion, PG (10%) – literature writing, UM (10%) – literature writing, results and discussion.

**Anna Fornalska (corresponding author)**

PhD in Economics, professor at the IMC Krems University of Applied Sciences, Austria. Her research interests include alternative finance and socially sustainable development from the perspective of individual consumers and society as a whole.

**Correspondence to:** Prof.(FH) Dr Anna Fornalska, Piaristengasse 1 (Trakt U), 3500 Krems, Austria, e-mail: anna.fornalska@imc.ac.at

**ORCID** https://orcid.org/0000-0003-3066-2542

**Michał Suchanek**

dr hab., associate professor at the University of Gdańsk, Poland. His research interests include transport economics, urban development and sustainability and evaluating policies related to transportation and their socio-economic effects.

**Correspondence to:** Prof. Michał Suchanek, Wydział Ekonomiczny, Uniwersytet Gdański, ul. Armii Krajowej 119/121, Sopot, Poland, e-mail: michal.suchanek@ug.edu.pl

**ORCID** https://orcid.org/0000-0003-3506-6686

**Joanna Adamska**

PhD, assistant professor at the University of Gdańsk, Poland. Her research interests include crowdfunding, alternative finance, social sustainability and community engagement.

**Correspondence to:** Dr Joanna Adamska, Wydział Ekonomiczny, Uniwersytet Gdański, ul. Armii Krajowej 119/121, Sopot, Poland, e-mail: joanna.adamska@ug.edu.pl

**ORCID** https://orcid.org/0000-0002-8138-4004

**Paula Gorszczyńska**
PhD, assistant professor at the University of Gdańsk, Poland. Her research interests include linguistic and cognitive aspects of interpreting and translation, audio description, and crowdfunding discourse.
**Correspondence to:** Dr Paula Gorszczyńska, Wydział Filologiczny, Neofilologia, Uniwersytet Gdański, ul. Wita Stwosza 51, Gdańsk, Poland, e-mail: paula.gorszczynska@ug.edu.pl
**ORCID** https://orcid.org/0000-0002-3125-5116

**Urszula Mrzygłód**
PhD, assistant professor at the University of Gdańsk, Poland. Her research interests include motivation to back crowdfunding and success factors in crowdfunding, as well as the dividend policy of companies listed on emerging stock markets.
**Correspondence to:** Dr Urszula Mrzygłód, Wydział Ekonomiczny, Uniwersytet Gdański, ul. Armii Krajowej 119/121, Sopot, Poland, e-mail: urszula.mrzyglod@ug.edu.pl
**ORCID** https://orcid.org/0000-0003-4130-1494

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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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Department of International Trade
Centre for Strategic and International Entrepreneurship
Krakow Uniwersity of Economics
ul. Rakowicka 27, 31-510 Krakow, Poland
phone +12 293 5929, -5376, fax +12 293 5037
e-mail: ier@uek.krakow.pl
http://ier.uek.krakow.pl

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