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A PESTLE Analysis of the Polish Honey Market

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ABSTRACT

Objective: To conduct a multi-faceted analysis of the honey market in Poland within the context of functioning as part of the European Union. The analysis aims to identify key political, economic, social, technological, legal, and environmental determinants.

Research Design & Methods: The study employs the PESTLE method as an analytical tool to identify the factors influencing the beekeeping sector systematically. The analysis incorporates market reports, academic literature, and documents from both the EU and Poland.

Findings: The analysis revealed that the honey sector in Poland operates within an environment of significant export potential. It is influenced, among others, by the Common Agricultural Policy, climate, growing consumer expectations regarding product quality and origin, and the development of beekeeping technologies. Structural barriers and legislative constraints were also identified.

Implications/Recommendations: The results of the analysis suggest the need to strengthen the role of producer organisations, implement innovative technologies in apiaries, and increase the sector's integration with the EU's pro-environmental policies. The article highlights the low level of consumer education and promotion of honey as a high-value-added product.

Contribution: The article offers practical conclusions for policymakers, industry organisations, and honey producers, pointing to potential development directions for the sector in the context of a sustainable agri-food economy.

Article type: original article.

Keywords: apiculture, beekeeping, honey, Poland, European Union, PESTLE.

JEL Classification: Q13.

1. Introduction

Poland is a significant honey producer in Europe, annually placing itself among the top 10 honey-producing countries (Pawłowska-Tyszko, Jarka & Olech, 2024), granting stability to the honey market in the EU, despite its lower internal consumption levels, as compared to many others, especially “old” EU member states (Kowalczyk, Jeżewska-Zychowicz & Trafiałek, 2017; Pawłowska-Tyszko, Jarka & Olech, 2024). Besides a wide variety of honey production in Poland (Starowicz *et al.*, 2021), apiculture also produces other outputs, such as propolis, bee wax, and pollen (Maciejczak, Olech & Kalinka, 2023), as well as provides ecosystem services, such as pollination (Majewski, 2014; Piechowicz *et al.*, 2022), increasing food security and agricultural resilience (Pawłowska-Tyszko, Jarka & Olech, 2024). Honey also has health benefits due to its nutrient richness and antioxidative properties (Grecka *et al.*, 2018; Halagarda *et al.*, 2020). The study by Kowalczyk *et al.* (2023) on the honey consumption in Poland reports that 90% of their survey respondents consume honey, while during the time of the COVID-19 pandemic, 34% of respondents admitted to increased honey consumption.

Thus, the honey market is an increasingly relevant topic for research, beyond economic considerations, reaching toward its environmental and social functions. This article investigates in an integrated way different factors influencing the honey industry in Poland and compares them to two other studies investigating their national honey markets using the PESTLE method, namely India and Ethiopia. Although these markets seem distant and very different from the Polish one, it is interesting for the overview of this sector, and to compare different incentives and obstacles which rule it. The goal of this article is to assess the relevance of different factors shaping the Polish honey market.

2. Method

The application of the PESTLE method allows for the broad analysis of factors impacting the dynamics of certain phenomena (Boratyńska, 2025). The method divides these factors into six factors, which are Political (P), Economic (E),

Social (S), Technological (T), Legal (L), and Environmental (E). It allows for the assessment of such potential threats as political stability (Zalengera *et al.*, 2014), changes in consumer behaviour (Hamzah & Anggoro, 2023), or technological adoption (Thomas *et al.*, 2021; Singh, Jatav & Pasumarti, 2025). Through the lens of these factors, this article analyses the honey sector in Poland. To enhance the analysis, the qualitative analysis of the literature was supplemented by the indices, which help to understand the situation of the beekeeping industry in Poland.

Most prior studies on honey use either single-factor risk assessments. An application of PESTLE (Political, Economic, Social, Technological, Legal and Environmental) offers a sharper view of the forces shaping the sector. Comparable PESTLE studies already exist for Ethiopia's southwest highlands (Bayissa *et al.*, 2024) and India (Narang, Kumar & Gupta, 2022). The outcomes of these studies were confronted with the analysis of the situation of Polish beekeeping.

3. Results

3.1. Political Factors

Although government subsidies for beekeepers precede Polish accession to the EU, Poland's access to the EU allowed Polish beekeepers to receive more expanded EU payments. Before the Polish access in 2004, Polish beekeepers were receiving funds from the Agricultural Market Agency (Agencja Rynku Rolnego), which existed in the years 1990–2017. Before the EU access, beekeepers were receiving funds for apiary equipment, combating pests, and the beekeeping organisations' support. EU access allowed beekeepers to use funds for further purchases, such as educational workshops, bee queens, or honey analysis, allowing for the improvement of the honey quality and food safety, and supporting beekeepers' income altogether. In 2023, Polish beekeepers utilised 86.9% of the funds dedicated to them from the Common Agricultural Policy (CAP) funds, being 10th regarding the rate of funds utilisation in the EU (average utilisation rate was at 77%). After Romania, Spain, and Greece, Poland received the largest amount of EU funds for beekeeping, i.e. 4.368 bn euro (European Commission, 2023). The EU's ambition of creating sustainable agriculture intertwines political, economic, and environmental factors, as EU-created regulations not only target the economic performance of apiaries but also address ecological concerns, enhancing biodiversity and ecosystem resilience. Conversely, although subsidies can temporarily increase productivity, they can also make apiaries dependent on them, curbing their long-term efficiency, as was observed in other sectors (see: Pisulewski & Marzec, 2022).

Next to the EU initiatives, national ones have also been established, such as the National Breeding Association in 2019, with a goal of breeding practices improvement in Polish apiculture and its management (Bieńkowska, Łoś & Węgrzynowicz,

2020). The beekeeping landscape was also significantly impacted by the COVID-19 pandemic, due to the limited market exposure (Maciejczak, Olech & Kalinka, 2023). Thus, beekeeping also requires more comprehensive support systems in case of an unexpected crisis.

3.2. Economic Factors

The economic factors in the honey industry (similarly to other industries) depend on market supply and demand (and thus prices), the costs of production, and the overall economic situation. Poland has a significant role in the EU honey trade, reflecting its overall position in the agri-food sector. Since Poland joined the EU, it has increased its production as well as export capacity, due to the EU internal market as well as production standards harmonisation (Bajan, Łukasiewicz & Smutka, 2021; Pasimeni, 2021). Although the forecast for the Compound Average Growth Rate (CAGR) for the years 2024–2028 of the industry is at 2.04% (ReportLinker, 2023a), Poland is still reliant on honey imports (especially from China and Ukraine), with only ca. 60–70% self-sufficiency in this product (Pawłowska-Tyszkó, Jarka & Olech, 2024). Specific standards grant consumer confidence in Polish honey also among the “old” EU countries, thus increasing export possibilities (Dluhošová *et al.*, 2018).

Consumer choices shift towards organic honey not only due to its taste but also due to its health benefits, both in traditional and conventional medicine (Pellissery, Raja & James, 2012), such as anti-inflammatory and anti-microbial properties (Soares *et al.*, 2017). This shift is caused by the overall trend of natural and non-processed food consumption (Mancuso, Croce & Vercelli, 2020). On the supply side, the prices of honey are highly influenced by the production equipment (bee hives, honey extractors, etc.), bee feed (as during the winter bees require additional feeding with sugar or honey), and labour costs. The implementation of sustainable practices, which enhance honey properties, may cause additional costs to the production and to its final cost (Çevrimli & Sakarya, 2019).

The honey consumption is affected by the overall economic situation. It is a premium product (Pawłowska-Tyszkó, Jarka & Olech, 2024), and possible economic fluctuations can affect consumers' willingness to pay higher prices, especially for more expensive organic honey (Athari *et al.*, 2022). For instance, during the COVID-19 pandemic, prices have increased by ca. 15%. According to Tultabayeva *et al.* (2023), honey prices are relatively inelastic in the short term, i.e. consumers are less sensitive to their changes, which may lead to persistent periods of low prices that may not cover production costs, negatively affecting the sustainability of honey production, especially in smaller apiaries.

The marketing of Polish honey may be enhanced by branding its qualities, such as local origin and production methods, to capitalise on the health-consciousness

and food quality trends (Haryadi *et al.*, 2022). For some kinds of honey, the labelling is especially relevant, as it signifies their specific origin, and is especially relevant for such Polish kinds of honey as buckwheat and rapeseed varieties (Puścion-Jakubik *et al.*, 2022). The average yield per colony is decreasing, as an increasing amount of beekeepers are hobbyist small-holders. As Żuchowski and Olszewski (2023) point out, the increase in the number of beekeepers does not have to translate to a higher amount of apiary production, as is the case in Poland.

3.3. Social Factors

Historically, honey has been used in Poland both in the cuisine and in traditional medicine. For the latter reason, a higher demand can be typically observed during the cold winter months, as remedies, but also during traditional celebrations (Tkachenko *et al.*, 2023). Thus, traditionally, both festive and medicinal functions of honey reinforce each other. A further significant shift in Polish honey consumption patterns occurred in the 1980s, when in the period of sugar scarcity honey was treated as its substitute, although the current shift is mainly fuelled by the health concerns of the consumers (Kowalczuk, Jeżewska-Zychowicz & Trafiałek, 2017), e.g., during the COVID-19 pandemic, when the honey consumption substantially increased (Olech & Olech, 2024). Overall, the honey consumption in Poland is lower than in Western EU countries, and is highly seasonal, with increases during the cold months.

The shift in consumer preferences is marked by the rising willingness to pay for premium products, e.g., those that display a quality label (Kowalczuk, Jeżewska-Zychowicz & Trafiałek, 2017; Gajda *et al.*, 2018). This poses a challenge for the beekeepers to fulfil specific requirements needed to obtain such labels, but if obtained, it signals to consumers the adherence to sustainable practices, such as avoidance of chemical agents in favour of natural apiary practices (Suhri & Bahar, 2023). Poland can market some local kinds of honey, which are labelled on the EU level, allowing foreign consumers to diversify (Bajan, Łukasiewicz & Smutka, 2021; Pawlak & Smutka, 2022). Besides raising standards and quality, it is also possible due to the strategic location of Poland within the EU (Szczepaniak, 2018).

Besides traditional, festive, and medicinal applications regarding social factors influencing the Polish honey market, there are also educational efforts to increase the societal knowledge of honey. These may be both consumer education, such as awareness campaigns, as well as beekeeper education through workshops, which increase their competencies (Kowalczuk, Jeżewska-Zychowicz & Trafiałek, 2017). The awareness campaigns not only contribute positively to society by increasing honey consumption, but also contribute to the overall trend of environmental protection and responsible consumption (Wróblewska & Stawiarz, 2015). These, in turn, are reinforced through novel information technologies. The shift in consumer

demand is also influenced by the technological shift in modern society, in which social media shapes consumer preferences, e.g., with the spread of health consciousness, both in Poland as well as in other countries (Kowalczuk, Jeżewska-Zychowicz & Trafiałek, 2017).

3.4. Technological Factors

Technology may foster the bee hive’s productivity, and thus its profitability. Some support the monitoring of the bee hives and their real-time performance, the health of the colonies (temperature, humidity, the presence of pests, etc.), and the so-called smart hives (Kurdin & Kurdina, 2025), expanded by the quality control mechanisms. It allows to keep the high trust of the consumers in the product and its quality (Kocot *et al.*, 2018).

The honey producers can increase their margin by offering the sale of their produce through new sales channels such as e-commerce, omitting the middlemen, who often take significant compensation for the produce distribution. Such sales channels can further increase the market margins of the apiaries with the further increase of digital literacy in society. The new marketing channels also include social media, allowing small-scale apiaries to increase their market exposure (Nurleli *et al.*, 2023). Market exposure to bee products can be obtained through marketing bee products, such as bee bread, although the cost of certain technologies may not be justified in smaller apiaries (Semkiw & Skubida, 2021).

Table 1. Beekeeping Financing from CAP MFF, 2023–2027

Policy	Description of the Intervention in the Beekeeping Sector	Fiscal Year 2024 (Million Euro)
INVAPI	Technical assistance and support for the modernisation of apiary farms	2.063
	Supporting the fight against varroosis with medicinal products	1.605
PRESBEEHIVES	Aid for the reconstruction and improvement of the utility value of bees	0.699

Source: own study, based on (Ministry of Agriculture and Rural Development, 2024)

The technological factors in Poland are strongly connected to the political ones, as Poland has strongly participated in the CAP apiary projects which enhance the technological development of this industry (Table 1). These were the only two programmes (out of seven) in which Poland has participated. Poland did not participate in other projects, which included, e.g., support for the marketing of bee products and cooperative action among beekeepers (European Commission, 2023).

It also shows the strong dedication of the policymakers to improve the technological side of beekeeping, as well as to diminish the threats to the existing apiaries.

3.5. Legal Factors

According to internationally agreed-upon Codex Alimentarius regulations, honey is a natural substance originating from flowers or other living parts of plants, processed by bees. EU regulations set criteria requiring honey to be pure and to have specific physicochemical properties, such as moisture and diastase activity (Naila *et al.*, 2021), and to be free from additional substances (Calle *et al.*, 2021), such as heavy metals, antibiotics, or pesticide residues with the maximum residue limits, although specific limits for bee products are not fully developed (Gałczyńska *et al.*, 2021; Scripcă & Amariei, 2021; Rodrigues *et al.*, 2024). Besides the honey content rules, the EU encourages the adoption of environmentally friendly practices in beekeeping, offering financial support and outreach programmes, with the goal of industries' financial support and maintenance of the natural environment, besides improving the well-being of the bees (Kazazić & Mehić, 2024), by e.g., limiting the impacts of extreme weather events or invasive species (Kagiali *et al.*, 2023).

The aim of the quality regulations is to protect honey from adulteration, which negatively affects consumer confidence (Kek *et al.*, 2017) as well as the reputation of the sector and thus honey prices (Singh & Singh, 2018; Calle *et al.*, 2021). Adulterated honey is sold at lower prices than unadulterated honey, but affects the honey demand in the long run, causing price fluctuations (Fakhlai *et al.*, 2020). The research of Kędzierska-Matysek *et al.* (2022) shows that the honey from south-eastern Poland passes the required quality tests.

Another relevant legal factor is the zoning law, which establishes where bee hives can be placed, e.g., their distance from residential areas (Ligor, Kowalkowski & Buszewski, 2022), by mitigating potential threats of the bee hives towards people. These laws emerged as an answer to the increasing popularity of urban apiaries, as well as the increasing urbanisation of the EU and the rising trend of urban gardening (Tarapatsky *et al.*, 2021). These hives also require careful safety monitoring, as even in the urban setting, some bees can reach agricultural areas, where pesticides are used, and can impact the quality of honey (Dicks *et al.*, 2012; Kędzierska-Matysek *et al.*, 2022).

3.6. Environmental Factors

The honey industry can be significantly impacted by changing weather conditions, such as the alteration of seasonal patterns. First, it requires beekeepers to adjust their learned management practices (Al-Ghamdi *et al.*, 2017). Second, although mild winters, which occur in Poland in the 21st century, can be beneficial

for beehives, extreme heat, and droughts can impact bees' ability to forage and produce honey, as reported in some research (see: Delgado *et al.*, 2012; Quinlan, Miller & Grozinger, 2023), as well as beehives' productivity (Messerli *et al.*, 2024). According to ReportLinker (2023b), the projected CAGR of natural honey in the years 2024–2028 is to be 1.53%, thus being lower than the overall honey industry growth at 2.04% in the same period. Moreover, bee hives can be affected by heavy rains, limiting the availability of the hive to explore its surroundings, as well as disrupting the plant flowering, thus limiting the ability of the nectar collection (Park & Nieh, 2017; Malagnini *et al.*, 2022).

The potential losses can be mitigated by the implementation of sustainable beekeeping practices, such as feeding the bee hives during the periods lacking an adequate amount of feed, rotating the locations of the bee hives depending on the season and plants, and implementing integrated pest management (Kumsa & Takele, 2014; Taha & Al-Kahtani, 2019; Tarekegn *et al.*, 2022).

4. Discussion

As with any other industry, Polish honey is impacted by political, economic, social, technological, legal, and environmental factors, and none of these is isolated (Fig. 1).

Two other studies have been identified, which analyse their national beekeeping industries: one analysing India (Narang, Kumar & Gupta, 2022) and Ethiopia (Bayissa *et al.*, 2024). Although these countries present a significantly different profile from Poland, the beekeeping industries were compared to identify these differences, and the analysis was performed factor-by-factor.

As per the political factors, Poland benefits from clear EU residue rules and investment aid for apiary modernisation (European Commission, 2023), as well as from the newer national policies (Bieńkowska, Łoś & Węgrzynowicz, 2020), which can support the producers in the times of the times of instability (Maciejczak, Olech & Kalinka, 2024), as a crisis buffer. By contrast, Ethiopia still lacks a dedicated honey-marketing law, hampering quality control (Bayissa *et al.*, 2024). India's National Bee Board (NBB) provides subsidies, but uneven state-level delivery limits impact (Narang, Kumar & Gupta, 2022). Thus, the dedicated legislation accelerates technology diffusion and export readiness; absence or fragmentation stalls value capture.

From the economic perspective, EU-level self-sufficiency hovers below 60%, sustaining premium import demand (Pawłowska-Tyszkowski, Jarka & Olech, 2024), whereas India projects double-digit growth, framing beekeeping as a rural entrepreneurship engine (Narang, Kumar & Gupta, 2022). Ethiopia's cost of modern hives and credit shortages cap productivity despite favourable ecology (Bayissa *et al.*, 2024). Poland's diversified export outlets could hedge against price swings.

The quality harmonisation allows Polish honey to enter demanding Western markets (Bajan, Łukasiewicz & Smutka, 2021), as the consumer confidence in the Polish honey can be high (Dluhošová *et al.*, 2018). Poland imports mainly for price-blend, although even the capacity of the Polish consumers to pay for premium honey products is increasing (Pawłowska-Tyszko, Jarka & Olech, 2024).

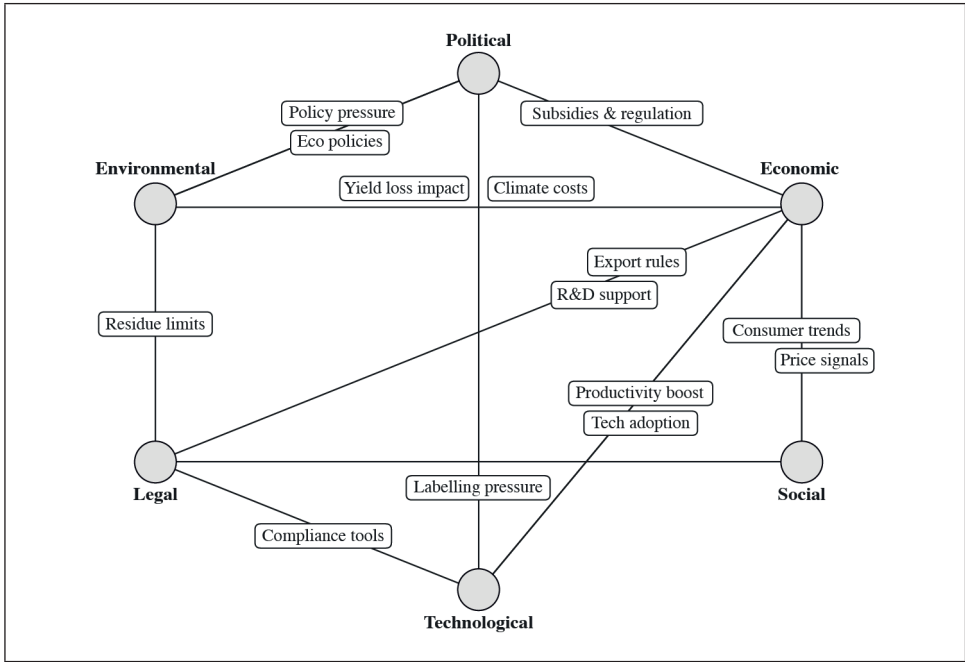


Fig. 1. PESTLE Interdependencies of the Polish Honey Market

Source: own study.

From the social standpoint, consumer trust in origin labelling underpins Poland’s premium honey niche (Gajda *et al.*, 2018). Moreover, the overall consumption is increasing due to the changing consciousness on health (Kowalczyk, Jeżewska-Zychowicz & Trafiałek, 2017) – aside from a significant growth due to the COVID-19 pandemic, but also including it (Olech & Olech, 2024) – as well as growing trends of the responsible consumption (Wróblewska & Stawiarz, 2015). Ethiopian smallholders channel most crude honey into local beverages (the so-called *tej*, or *birz*), limiting value addition (Bayissa *et al.*, 2024). India frames beekeeping as youth employment and women’s empowerment (Narang, Kumar & Gupta, 2022), while Poland’s growth comes from retirees seeking ecological hobbies – both expand keeper numbers but with different labour economics. These rather distant societal factors show how cultural patterns mediate economic outcomes.

Technological solutions are applied differently in the studied countries. Poland channels the highest national envelope of the EU apiculture budget into equipment aid and eco-scheme bonuses for bee forage (European Commission, 2023), as the technological application in apiaries expand within the EU – an EU-wide survey ($n = 844$) states, that 20.9% of keepers use at least one digital monitoring device, with the adoption exceeding 40% among professionals (Verbeke *et al.*, 2024). Worth mentioning are also innovative honey products, e.g., honey bread (Semkiw & Skubida, 2021). In India, the technological development is fostered mainly by the use of digital applications, which support the beekeepers (Narang, Kumar & Gupta, 2022), while the lack of widespread investments in technological solutions hampers the development of the industry in Ethiopia (Bayissa *et al.*, 2024).

Legal uniformity of the EU is significant for the Polish beekeeping industry, as residue-limit directives demand rigorous testing from Polish (e.g., Gałczyńska *et al.*, 2021). India, conversely, has different legal frameworks for the honey industry in different provinces, which is the exact opposite of the EU legal uniformity (Narang, Kumar & Gupta, 2022). Ethiopia again lacks a honey-marketing legal framework, opening space for adulteration and non-certified honey trade (Bayissa *et al.*, 2024).

Environment-induced forage stress is ubiquitous for all of the analysed countries, but regional stressors differ. Ethiopia cites uncontrolled agro-chemical use and predator attacks, as well as the consequences of deforestation. India voices concern over electromagnetic radiation from mobile towers affecting bee navigation (Narang, Kumar & Gupta, 2022), and similarly, as in Ethiopia, its bee colonies suffer from the chemical pesticide use by farmers (Bayissa *et al.*, 2024). In the Polish sources, predominantly the pesticide drift impacts the negatively the honey collection negatively (Kędzierska-Matysek *et al.*, 2022). Thus, the pesticide use may be a widespread problem.

The granular presentation of the PESTLE factors in the studied countries is presented in Table 2.

Table 2. Crucial PESTLE Factors among Different Honey-producing Countries

Studied Country	Political	Economic	Social	Technological	Legal	Environmental
Ethiopia	Favourable investment policy, but no honey-specific statute; governance gaps	Credit cost and scarcity of modern hives depress productivity	Honey is mainly processed for beverages, limiting added value	Modern hive uptake constrained by price; private investors own processing tech	No marketing framework; lack of quality labs fuels informal trade	Deforestation, chemical misuse, and predators shrink yields

Table 2 cont'd

Studied Country	Political	Economic	Social	Technological	Legal	Environmental
India	Long-running policies keep entry barriers low	High domestic market growth, backed by export demand and credit lines	Beekeeping framed as youth & women entrepreneurship	Apps promoted through extension schemes	Local quality assurance; demand for insurance and transport rules	Pesticides, radiation blamed for colony decline
Poland	CAP eco-schemes & investment aid	Moderate growth; imports for price blend	Hobby boom	Potential for sensor hives adoption	Residue limits, vet certification	Pesticide drift around crops

Source: own study.

Table 3. The Comparison of PESTLE Factors between Different Countries Studied

Studied Country	Dominant PESTLE Drivers Reported	Notable Differences from Poland
Ethiopia	Economic (credit cost), technological (modern hive prices), legal (marketing law absence)	Policy voids and credit bottlenecks, unlike in Poland
India	Social (job creation), political (NBB support), environmental (pesticide drift, EM radiation)	Low-cost digital apps; emphasis on rural employment
Poland	Political (CAP eco-schemes, investment aid), technological (accredited labs)	Credit is easier in Ethiopia; stronger consumer trust than in India

Source: own study.

The financial support for the beekeepers allows them to develop their production methods, giving them a comparative advantage, which is further supported by the professional quality assurance services. CAP grants drive 47% of recorded investments, and with the further adoption of technological solutions, political and technological factors foster the development of the Polish beekeeping industry. Where dedicated honey laws exist (EU), technology scale-up is faster; in the absence of laws, plus high credit costs stall progress, as is the case of Ethiopia, while India focuses on the low-cost mobile application technologies, which support its beekeepers. Poland's PESTLE profile aligns with the broader evidence that policy clarity and technology affordability are the key levers for the sector. The EU rigorous residue-limit law restricts the market entry – a pattern Poland already

navigates under identical EU rules – keeping the quality of the honey high. Ethiopia offers the mirror image: high-impact economic constraints (expensive modern hives, scarce credit) and the legal vacuum of a missing honey-marketing act together stall technology diffusion. India confirms that strong state programmes support low-cost digital tools side-by-side (see Table 3).

5. Conclusion and Recommendation

As the EU CAP provides financial support, it also funds environmentally friendly practices and technological advancements. Polish apiculture utilised the majority of these funds (although not as much as nine other countries), meanwhile, such support can in the future cause overdependence of the sector on them. For now, these funds are channelled toward the protection of the bees from stressors, such as extreme weather events or pests, thus contributing to the supply of local honey to the EU market, as well as toward the technological development of this sector, improving its efficiency and ensuring the maintenance of the quality standards. Moreover, the EU provides uniform legal and institutional framework, supporting the stability of the market. The need for high-quality honey is also shaped by the consumer demand for organic, healthy products, creating a feedback loop of social and political demands, shaping the regulatory landscape, thus driving ecological practices, which mould the production economics. Thus, these feedback loops can reinforce or constrain each other, depending on individual features of producers (but also consumers) within the sector.

The factors influencing the Polish honey market have been compared with other studies, which use the PESTLE framework to investigate honey markets of other countries. Overall, there has been a strong reliance on institutional stability and the significant role of the technological development programmes. These programmes can also support the protection of the bee colonies from the factors damaging them, which is a problem for beekeepers around the world. Thus, policy makers should couple CAP equipment grants with performance-based eco-premiums that reward reduced pesticide drift. These payments could be targeted towards both beekeepers, as well as towards the farmers who use chemical protection for their plants. Moreover, Poland (and the EU broadly) could benefit from emulating India's low-cost digital-app roll-outs by negotiating group software licences and bundled training.

The Polish honey sector operates in a macro-environment where policy and technology are decisive leverage points, corroborating our initial hypothesis but only when flanked by supportive economic and social enablers. Cross-country comparisons reveal that dedicated legislation and affordable tech accelerate sector upgrading, whereas credit bottlenecks, weak branding or fragmented governance impede progress. By aligning CAP eco-schemes with digital innovation and

inclusive finance, Poland can convert its moderate production growth into a durable competitive advantage, positioning itself as an EU benchmark for sustainable apiculture. Future research should adopt hybrid analytical frames and real-time sensor datasets to capture dynamic shocks – climate volatility, market swings, regulatory shifts – and safeguard both pollinator ecosystems and rural livelihoods.

Authors' Contribution

The authors' individual contribution is as follows: Igor Olech: conceptualisation, research, analysis. Artur Olech: research, analysis.

Conflict of Interest

The authors declare no conflict of interest.

References

- Al-Ghamdi, A. A., Adgaba, N., Tadesse, Y., Getachew, A., & Al-Maktary, A. A. (2017). Comparative Study on the Dynamics and Performances of Apis Mellifera Jemenitica and Imported Hybrid Honeybee Colonies in Southwestern Saudi Arabia. *Saudi Journal of Biological Sciences*, 24(5), 1086–1093. <https://doi.org/10.1016/j.sjbs.2017.01.008>
- Athari, S. A., Kırıkkaleli, D., Yousaf, I., & Ali, S. (2022). Time and Frequency Co-movement between Economic Policy Uncertainty and Inflation: Evidence from Japan. *Journal of Public Affairs*, 22(S1), e2779. <https://doi.org/10.1002/pa.2779>
- Bajan, B., Łukasiewicz, J., & Smutka, L. (2021). Similarity and Competition of Polish Agri-food Export with the Largest Agricultural Producers in the EU: Analysis of EU, US, and China Market. *AGRIS on-line Papers in Economics and Informatics*, 13(1), 29–47. <https://doi.org/10.7160/aol.2021.130103>
- Bayissa, M., Lauwers, L., Mitiku, F., de Graaf, D. C., & Verbeke, W. (2024). System Mapping of the Production and Value Chain to Explore Beekeeping Potential in Southwest Ethiopia. *Insects*, 15(2), 106. <https://doi.org/10.3390/insects15020106>
- Bieńkowska, M., Łoś, A., & Węgrzynowicz, P. (2020). Honey Bee Queen Replacement: An Analysis of Changes in the Preferences of Polish Beekeepers through Decades. *Insects*, 11(8), 544. <https://doi.org/10.3390/insects11080544>
- Boratyńska, K. (2025). Risk Challenges and Their Impact on the Sustainable Food Security System: Lessons Learned from the COVID-19 Pandemic. *Sustainability*, 17(1), 226. <https://doi.org/10.3390/su17010226>
- Calle, J. L. P., Ferreiro-González, M., Aliaño-González, M. J., Espada-Bellido, E., Palma, M., & Barbero, G. F. (2021). Quality Control of Honey by Visible and Near Infrared Spectroscopy (Vis-NIRS) and Headspace-Ion Mobility Spectrometry (HS-IMS). In: *Proceedings of the 3rd International Electronic Conference on Environmental Research and Public Health* (pp. 11–25). MDPI. <https://doi.org/10.3390/ecerph-3-09079>

- Çevrimli, M., & Sakarya, E. (2019). Economic Analysis of Beekeeping Enterprises in Aegean Region, Turkey. *Ankara Üniversitesi Veteriner Fakültesi Dergisi*, 66(2), 109–115. <https://doi.org/10.33988/auvfd.547464>
- Delgado, D. L., Pérez, M. E., Galindo-Cardona, A., Giray, T., & Restrepo, C. (2012). Forecasting the Influence of Climate Change on Agroecosystem Services: Potential Impacts on Honey Yields in a Small-island Developing State. *Psyche: A Journal of Entomology*, 2012, 951215. <https://doi.org/10.1155/2012/951215>
- Dicks, L. V., Abrahams, A., Atkinson, J., Biesmeijer, J., Bourn, N., Brown, C., Brown, M. J. F., Carvell, C., Connolly, C., Cresswell, J. E., Croft, P., Darvill, B., De Zylva, P., Effingham, P., Fountain, M., Goggin, A., Harding, D., Harding, T., Hartfield, C., ... Sutherland, W. J. (2012). Identifying Key Knowledge Needs for Evidence-based Conservation of Wild Insect Pollinators: A Collaborative Cross-sectoral Exercise. *Insect Conservation and Diversity*, 6(3), 435–446. <https://doi.org/10.1111/j.1752-4598.2012.00221.x>
- Dluhošová, S., Borkovcová, I., Kaniová, L., & Vorlová, L. (2018). Sulfonamide Residues: Honey Quality in the Czech Market. *Journal of Food Quality*, 2018, 2939207. <https://doi.org/10.1155/2018/2939207>
- European Commission. (2023). *Overview of the Annual Performance Report for Apiculture Sectoral Support under CAP Strategic Plans FY 2023*. Retrieved from: https://agriculture.ec.europa.eu/document/download/41cd969f-176f-4dcc-810c-9b617dc53580_en (accessed: 4.03.2025).
- Fakhlai, R., Selamat, J., Khatib, A., Razis, A., Sukor, R., Ahmad, S., & Babadi, A. (2020). The Toxic Impact of Honey Adulteration: A Review. *Foods*, 9(11), 1538. <https://doi.org/10.3390/foods9111538>
- Gajda, A., Antczak, M., Mitrowska, K., & Posyniak, A. (2018). Development, Validation and Application to Real Samples of a Liquid Chromatography with Tandem Mass Spectrometry Method for the Determination of Tetracyclines in Beeswax. *Journal of Separation Science*, 41(20), 3821–3829. <https://doi.org/10.1002/jssc.201800503>
- Gałczyńska, M., Gamrat, R., Bosiacki, M., Sotek, Z., Stasińska, M., & Ochmian, I. (2021). Micro and Macroelements in Honey and Atmospheric Pollution (NW and Central Poland). *Resources*, 10(8), 86. <https://doi.org/10.3390/resources10080086>
- Grecka, K., Kuś, P. M., Worobo, R. W., & Szweda, P. (2018). Study of the Anti-staphylococcal Potential of Honeys Produced in Northern Poland. *Molecules*, 23(2), 260. <https://doi.org/10.3390/molecules23020260>
- Halagarda, M., Groth, S., Popek, S., Rohn, S., & Pedan, V. (2020). Antioxidant Activity and Phenolic Profile of Organic and Conventional Honeys from Poland. *Antioxidants*, 9(1), 44. <https://doi.org/10.3390/antiox9010044>
- Hamzah, E. F. B., & Anggoro, Y. (2023). Revitalizing PT. Sindo Energy: Proposed Scenario Planning to Navigate Coal-regulatory Changes. *International Journal of Current Science Research and Review*, 6(12). <https://doi.org/10.47191/ijcsrr/v6-i12-55>

- Haryadi, T., Ulumuddin, D. I. I., Prabowo, D. P., & Ihwan, A. M. (2022). Adaptasi Digital Marketing berbasis Website untuk Produk UMKM Fatikha Sweet Honey. *Jurnal Informatika Upgris*, 8(1), 52–58. <https://doi.org/10.26877/jiu.v8i1.11524>
- Kagiali, E., Kokoli, M., Vardakas, P., Goras, G., Hatjina, F., & Patalano, S. (2023). Four-Year Overview of Winter Colony Losses in Greece: Citizen Science Evidence That Transitioning to Organic Beekeeping Practices Reduces Colony Losses. *Insects*, 14(2), 193. <https://doi.org/10.3390/insects14020193>
- Kazazić, M., & Mehić, E. (2024). Physicochemical Properties, Total Phenolic Content, and Antioxidant Activity Of Honey Samples from the Herzegovina Region. *Agroзнanje*, 25(1). <https://doi.org/10.7251/agren2401033k>
- Kek, S. P., Chin, N. L., Yusof, Y. A., Tan, S. W., & Chua, L. S. (2017). Classification of Entomological Origin of Honey Based on its Physicochemical and Antioxidant Properties. *International Journal of Food Properties*, 20(sup3), S2723–S2738. <https://doi.org/10.1080/10942912.2017.1359185>
- Kędzierska-Matyssek, M., Teter, A., Skałeczki, P., Topyła, B., Domaradzki, P., Poleszak, E., & Florek, M. (2022). Residues of Pesticides and Heavy Metals in Polish Varietal Honey. *Foods*, 11(15), 2362. <https://doi.org/10.3390/foods11152362>
- Kocot, J., Kiełczykowska, M., Luchowska-Kocot, D., Kurzepa, J., & Musik, I. (2018). Antioxidant Potential of Propolis, Bee Pollen, and Royal Jelly: Possible Medical Applications. *Oxidative Medicine and Cellular Longevity*, 2018, 7074209. <https://doi.org/10.1155/2018/7074209>
- Kowalczuk, I., Jeżewska-Zychowicz, M., & Trafiałek, J. (2017). Conditions of Honey Consumption in Selected Regions of Poland. *Acta Scientiarum Polonorum Technologia Alimentaria*, 16(1), 101–112. <https://doi.org/10.17306/J.AFS.2017.0446>
- Kowalczuk, I., Stangierska, D., Widera, K., Fornal-Pieniak, B., & Latocha, P. (2023). Determinants of Honey Consumption with Special Reference to the Influence of Nutritional Knowledge and Health Status on Consumption Habits. *Applied Sciences*, 13(2), 979. <https://doi.org/10.3390/app13020979>
- Kumsa, T., & Takele, D. (2014). Assessment of the Effect of Seasonal Honeybee Management on Honey Production of Ethiopian Honeybee (*Apis Mellifera*) in Modern Beekeeping in Jimma Zone. *Greener Journal of Plant Breeding and Crop Science*, 2(3), 067–075.
- Kurdin, I., & Kurdina, A. (2025). Internet of Things Smart Beehive Network: Homogeneous Data, Modeling, and Forecasting the Honey Robbing Phenomenon. *Inventions*, 10(2), 23. <https://doi.org/10.3390/inventions10020023>
- Ligor, M., Kowalkowski, T., & Buszewski, B. (2022). Comparative Study of Potentially Toxic and Essential Elements in Honey by Geographic Origin. *Molecules*, 27(17), 5474. <https://doi.org/10.3390/molecules27175474>
- Maciejczak, M., Olech, I., & Kalinka, K. (2023). Functioning of Selected Beekeeping Farms in Poland during COVID-19 Pandemic. *Acta Scientiarum Polonorum Oeconomia*, 22(1), 47–54. <https://doi.org/10.22630/ASPE.2023.22.1.4>

- Majewski, J. (2014). Wartość zapylania sadów jabłoniowych w Polsce – próba szacunku metodą kosztów zastąpienia. *Roczniki Naukowe Ekonomii Rolnictwa i Rozwoju Obszarów Wiejskich*, 101(3), 126–132. <https://doi.org/10.22630/RNR.2014.101.3.39>
- Malagnini, V., Cappellari, A., Marini, L., Zanotelli, L., Zorer, R., Angeli, G., Ioriatti, C., & Fontana, P. (2022). Seasonality and Landscape Composition Drive the Diversity of Pollen Collected by Managed Honey Bees. *Frontiers in Sustainable Food Systems*, 6, 865368. <https://doi.org/10.3389/fsufs.2022.865368>
- Mancuso, T., Croce, L., & Vercelli, M. (2020). Total Brood Removal and Other Biotechniques for Sustainable Control of Varroa Mites in Honey Bee Colonies: Economic Impact in Beekeeping Farm Case Studies in Northwestern Italy. *Sustainability*, 12(6), 2302. <https://doi.org/10.3390/su12062302>
- Messeri, A., Arcidiaco, L., Bianca, E., Tiako, D., Orlandini, S., Messeri, G., & Mancini, M. (2024). Effects of Air Temperatures on Acacia and Chestnut Honey Yields: Case Study in Italy. *Italian Journal of Agrometeorology*, 1, 49–58. <https://doi.org/10.36253/ijam-2296>
- Ministry of Agriculture and Rural Development. (2024). *CAP Strategic Plan 2023–2027*. Retrieved from: <https://www.gov.pl/attachment/71624a74-a08f-4f07-b014-a06fa3ba0e6c> (accessed: 4.03.2025).
- Naila, A., Julika, W. N., Flint, S., Sulaiman, A. Z., Mohamed, A., & Ajit, A. (2021). Analysis of Adulterants in International Honey Available in The Maldives. *ACS Food Science & Technology*, 1(8), 1373–1380. <https://doi.org/10.1021/acfoodscitech.0c00144>
- Narang, A., Kumar, D., & Gupta, G. (2022). Political, Economical, Social, Technological and SWOT Analysis of Beekeeping as a Successful Enterprise in India: An Overview. *Journal of Applied and Natural Science*, 14, 194–202. <https://doi.org/10.31018/jans.v14i1.3312>
- Nurleli, Sri Kuntorini, R., Fauzan, A., Halimatusadiah, E., Oktaroza, M. L., Suhandoyo, R., Utama, G., & Sri Wahyuni, A. (2023). Application of Information Technology (E-commerce) in Increasing MSME Income in Tourism Villages. *KnE Social Sciences*, 8(18), 1420–1427. <https://doi.org/10.18502/kss.v8i18.14346>
- Olech, I., & Olech, A. (2024). Dynamika cen miodu w Polsce w latach 2003–2022. In: *X Ogólnopolska Konferencja Pszczelarstwo a zrównoważony rozwój rolnictwa: Ogólnopolski konkurs Pszczelarz Roku, X Edycja* (pp. 61–81). Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej, Państwowy Instytut Badawczy.
- Park, B., & Nieh, J. C. (2017). Seasonal Trends in Honey Bee Pollen Foraging Revealed through DNA Barcoding of Bee-collected Pollen. *Insectes Sociaux*, 64(3), 425–437. <https://doi.org/10.1007/s00040-017-0565-8>
- Pasimeni, P. (2021). Poland in the European Union Single Market. *Economic and Regional Studies/Studia Ekonomiczne i Regionalne*, 14(3), 265–278. <https://doi.org/10.2478/ers-2021-0019>
- Pawlak, K., & Smutka, L. (2022). Does Poland's Agri-food Industry Gain Comparative Advantage in Trade with Non-EU Countries? Evidence from the Transatlantic Market. *PLoS ONE*, 17(9), e0274692. <https://doi.org/10.1371/journal.pone.0274692>

- Pawłowska-Tyszko, J., Jarka, S., & Olech, I. (2024). Food Self-sufficiency in the Honey Market in Poland. *Sustainability*, 16(21), 9373. <https://doi.org/10.3390/su16219373>
- Pellissery, S., Raja, K., & James, A. (2012). Market Integration for Inclusive Growth: Insights from Sociology of the Market. *Review of Market Integration*, 4(1), 45–69. <https://doi.org/10.1177/097492921200400102>
- Piechowicz, B., Kuliga, A., Kobylarz, D., Koziorowska, A., Zaręba, L., Podbielska, M., Piechowicz, I., & Sadło, S. (2022). A Case Study on the Occurrence of Pyrimethanil, Cyprodinil and Cyflufenamid Residues in Soil and on Apple Leaves, Blossoms and Pollen, and Their Transfer by Worker Bees to the Hive. *Journal of Plant Protection Research*, 62(2), 176–188. <https://doi.org/10.24425/jppr.2022.141355>
- Pisulewski, A., & Marzec, J. (2022). The Impact of Subsidies on Persistent and Transient Technical Inefficiency: Evidence from Polish Dairy Farms. *Journal of Agricultural and Applied Economics*, 54(4), 561–582. <https://doi.org/10.1017/aae.2022.26>
- Puścion-Jakubik, A., Bielecka, J., Grabia, M., Markiewicz-Żukowska, R., Soroczyńska, J., Teper, D., & Socha, K. (2022). Comparative Analysis of Antioxidant Properties of Honey from Poland, Italy, and Spain Based on the Declarations of Producers and Their Results of Melissopalinalogical Analysis. *Nutrients*, 14(13), 2694. <https://doi.org/10.3390/nu14132694>
- Quinlan, G. M., Miller, D. A. W., & Grozinger, C. M. (2023). Examining Spatial and Temporal Drivers of Pollinator Nutritional Resources: Evidence from Five Decades of Honey Bee Colony Productivity Data. *Environmental Research Letters*, 18(11), 114018. <https://doi.org/10.1088/1748-9326/acff0c>
- ReportLinker. (2023a). *Forecast: Honey Production in Poland*. Retrieved from: <https://www.reportlinker.com/dataset/3f6109174343ff7f8ddad95a25e8cf9d695465b3> (accessed: 18.02.2025).
- ReportLinker. (2023b). *Forecast: Natural Honey Production in Poland*. Retrieved from: <https://www.reportlinker.com/dataset/11b0513974e46d34ce7147d54a17d9b1323f5c6c> (accessed: 18.02.2025).
- Rodrigues, H., Leite, M., Oliveira, B., & Freitas, A. (2024). Antibiotics in Honey: A Comprehensive Review on Occurrence and Analytical Methodologies. *Open Research Europe*, 4, 125. <https://doi.org/10.12688/openreseurope.17664.2>
- Scripcă, L. A., & Amariei, S. (2021). Influence of Chemical Contaminants on the Physico-chemical Properties of Unifloral and Multifloral Honey. *Foods*, 10(5), 1039. <https://doi.org/10.3390/foods10051039>
- Semkiw, P., & Skubida, P. (2021). Bee Bread Production – a New Source of Income for Beekeeping Farms? *Agriculture*, 11(6), 468. <https://doi.org/10.3390/agriculture11060468>
- Singh, I., & Singh, S. (2018). Honey Moisture Reduction and Its Quality. *Journal of Food Science and Technology*, 55(10), 3861–3871. <https://doi.org/10.1007/s13197-018-3341-5>
- Singh, V., Jatav, S., & Pasumarti, S. S. (2025). The Path towards Sustainable Hydrogen-based Economy: A Pestle Analysis of India. In: F. Özsungur, M. Chaychi Semsari, H. Küçük Bayraktar (Eds), *Geopolitical Landscapes of Renewable Energy and Urban*

Growth (pp. 185–212). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-8814-3.ch006>

Soares, S., Amaral, J. S., Oliveira, M. B. P. P., & Mafra, I. (2017). A Comprehensive Review on the Main Honey Authentication Issues: Production and Origin. *Comprehensive Reviews in Food Science and Food Safety*, 16(5), 1072–1100. <https://doi.org/10.1111/1541-4337.12278>

Starowicz, M., Hanus, P., Lamparski, G., & Sawicki, T. (2021). Characterizing the Volatile and Sensory Profiles, and Sugar Content of Beeswax, Beebread, Bee Pollen, and Honey. *Molecules*, 26(11), 3410. <https://doi.org/10.3390/molecules26113410>

Suhri, A. G. M. I., & Bahar, I. (2023). Water Content of Stingless Bee Honey Varies by Season. *Jurnal Biologi Tropis*, 23(2), 16–22. <https://doi.org/10.29303/jbt.v23i2.4651>

Szczepaniak, I. (2018). Comparative Advantages in Polish Export to the European Union – Food Products vs Selected Groups of Non-food Products. *Oeconomia Copernicana*, 9(2), 287–308. <https://doi.org/10.24136/oc.2018.015>

Taha, E. K. A., & Al-Kahtani, S. N. (2019). Comparison of the Activity and Productivity of Carniolan (*Apis mellifera carnica* Pollmann) and Yemeni (*Apis mellifera jemenitica* Ruttner) Honey Bee Subspecies under Environmental Conditions of the Al-Ahsa Oasis of Eastern Saudi Arabia. *Saudi Journal of Biological Sciences*, 26(4), 681–687. <https://doi.org/10.1016/j.sjbs.2017.10.009>

Tarapatskyy, M., Sowa, P., Zagała, G., Dżugan, M., & Puchalski, C. (2021). Botanical Origin Assessment of Polish Honeys Based on Physicochemical Properties and Bioactive Components. *Molecules*, 26(16), 4801. <https://doi.org/10.3390/molecules26164801>

Tarekegn, A., Faji, M., Abebe, A., & Bezabeh, A. (2022). Production Performance, Defensive, Hygienic, Swarming, and Foraging Behavior of *Apis Mellifera Scutellata* Bee Race. *Research Square*. <https://doi.org/10.21203/rs.3.rs-1743077/v1>

Thomas, P. J. M., Sandwell, P., Williamson, S. J., & Harper, P. W. (2021). A PESTLE Analysis of Solar Home Systems in Refugee Camps in Rwanda. *Renewable and Sustainable Energy Reviews*, 143, 110872. <https://doi.org/10.1016/j.rser.2021.110872>

Tkachenko, H., Kurhaluk, N., Lukash, O., Yakovenko, O., Opryshko, M., Maryniuk, M., Gyrenko, O., & Buyun, L. (2023). In Vitro Antibacterial Efficacy of Different Natural Linden Honeys against Some Gram-positive and Gram-negative Strains. *Agrobiodiversity for Improving Nutrition Health and Life Quality*, 7(2). <https://doi.org/10.15414/ainhqlq.2023.0018>

Tultabayeva, T., Zhumanova, U., Tultabayev, M., & Shaman, A. (2023). An Econometric Analysis of Price Elasticity and Demand Factors in the Global Honey and Honey-based Beverage Markets. *Economic Annals-XXI*, 202(3–4), 40–51. <https://doi.org/10.21003/ea.V202-04>

Verbeke, W., Diallo, M. A., van Dooremalen, C., Schoonman, M., Williams, J. H., Van Espen, M., D’Haese, M., & de Graaf, D. C. (2024). European Beekeepers’ Interest in Digital Monitoring Technology Adoption for Improved Beehive Management. *Computers and Electronics in Agriculture*, 227, part 1, 109556. <https://doi.org/10.1016/j.compag.2024.109556>

Wróblewska, A., & Stawiarz, E. (2015). Botanical Characteristics of Polish Honeys from Natura 2000 Habitats. *Journal of Apicultural Science*, 59(1), 39–49. <https://doi.org/10.1515/jas-2015-0003>

Zalengera, C., Blanchard, R. E., Eames, P. C., Juma, A. M., Chitawo, M. L., & Gondwe, K. T. (2014). Overview of the Malawi Energy Situation and a PESTLE Analysis for Sustainable Development of Renewable Energy. *Renewable and Sustainable Energy Reviews*, 38, 335–347. <https://doi.org/10.1016/j.rser.2014.05.050>

Żuchowski, I., & Olszewski, T. (2023). The Honey Market in Poland in the Years 2016–2021. *Scientific Journal HE-SS in Ostrołęka*, 3(50), 67–76.

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Privatising Ports: The Key to Enhancing Efficiency and Competitiveness in Global Trade

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ABSTRACT

Objective: To explore the privatisation of ports. This article makes the general case in favour of privatisation, vis-à-vis government ownership is a strong one: efficiency, lower costs, greater flexibility. We apply it to the special case of ocean ports to the same end. If we want more effective harbours, we should move in the direction of privatisation.

Research Design & Methods: We make the case for this public policy based on logic and empirical evidence.

Findings: The case for the privatisation of ports is very strong.

Implications/Recommendations: If our recommendations are followed, the implication is an increase in economic welfare.

Contribution: There are no other studies of this initiative; thus, our contribution is, hopefully, to begin exploration of this initiative.

Article type: original article.

Keywords: privatisation, ports, monopoly, efficiency.

JEL Classification: L33.

1. Introduction

Ports are a fundamental¹ part of the global supply chain due to their role in facilitating the movement of goods between producers and consumers worldwide. With over 80% of goods being transported by sea, global trade relies heavily on maritime shipping and the efficiency of ports (UNCTAD, 2021). Within global trade, ports serve as hubs for importing and exporting raw materials like oil and coal and finished goods such as electronics and textiles. Because of this, ports enable economies of scale by accommodating huge vessels that transport large quantities over long distances, reducing the cost of transportation and making goods more accessible to consumers worldwide. Ultimately, ports are much more than transit points because they allow countries across the globe to connect with each other, helping facilitate global trade and promote economic growth.²

While ports are essential to global trade, as trade volumes increase and the demand for such infrastructure grows, many publicly operated harbours face underinvestment and inefficiency challenges. These inefficiencies will likely lead to an inability to compete within the global trade market. As the economy continues to expand,³ these problems will only become more drastic. In order to keep up with the large increases in volume throughout global trade, port infrastructure must adapt to meet the growing demand for efficient and timely cargo handling. The present article explores the argument that the privatisation of anchorages is essential for

¹ Less so, nowadays, than historically. Then, transport was pretty much limited to human beings carrying goods on their backs; after that to the invention of the wheel and the domestication of pack animals. During those times, transportation by waterways played a far greater role than at present. Now, of course, there are more modern means of transport. But, still, waterways play a vital role.

² According to the old but insightful aphorism, if goods do not cross national borders, armies will.

³ Hopefully. However, if Trump succeeds in building tariff walls, international trade will plummet, and the need for such factors of production will decrease. For the case in favour of free trade, and thus contrary to such interferences, see (Anderson, 1999, 2021; Barron, 2017; Bastiat, 2012, 2018; Block, 2008, ch. 23, 2013, ch. 2; Block, Wirth & Butt, 2018; Block, Horton & Walker, 1998; Boudreaux, 2010, 2016a, 2016b, 2017; Brandly, 2002; Brown, 1987; DiLorenzo, 2018; Ebeling, 2018; Epstein, 2016; Folsom, 1996; Friedman & Friedman, 1997; Gwartney, Lawson & Block, 1996; Hazlitt, 2008, ch. 11; Higgs, 2019; Johnsson, 2004; Krasnozhon, Simpson & Block, 2015; Landsburg, 2008; McGee, 1994a, 1994b; McMaken, 2016; von Mises, 1927; Mullen, 2015; Murphy, 2004; Ricardo, 1821; Roberts, 2016; Rothbard, 2005; Rouanet, 2016; Smith, 1776; Vance, 2016; Wenzel, 2018a, 2018b; Williams, 2017a, 2017b).

modernising infrastructure, boosting efficiency, and maintaining global competitiveness. Despite concerns over monopolies, which can be mitigated within a free market, the benefits of privatisation heavily outweigh any risks. By identifying the drawbacks of publicly operated ports and determining the advantages of privatisation, it can be demonstrated that private investment is essential for shaping the future of global trade.

In section 2, we probe the problems with publicly operated ports. The burden of section 3 is to emphasise the importance of the need for modernisation. Section 4 is dedicated to remarking upon the general advantages of privatisation. The focus of section 5 is to apply privatisation to ports; of section 6 is to allay monopolistic concerns; of section 7 is to consider a case study: privatisation in India. Section 7 is given over to risks in port privatisation, 8 to India's country risk management and privatisation, and section 9 to geopolitical risk and national security. We conclude in section 10.

2. Problems with Publicly Operated Ports

The issues that publicly operated ports face are primarily due to structural inefficiencies, limited resources, and an inability to adopt technological advancements in a timely manner. In an analysis of the container operations at Klang Port Authority and Malaysia's principal port, the World Bank indicated that: "the weaker institutional incentive structure associated with publicly owned and operated ports means that they will be less able to control costs, slower to adopt new technology and management practices, and thus, will generally be less responsive to port users than private port operators" (see Dasgupta & Sinha, 2016, p. 226).

These problems are partially due to the fact that administrators rely on the government for funding. This means that investments are limited due to competing priorities, such as graft, re-election concerns, publicity for politicians, etc. Thus, critical upgrades are more difficult to arrange. Without these investments, ports will have a harder time accommodating larger vessels and higher cargo volumes, which causes ships to experience longer wait times and delayed cargo transfers. This lack of adaptability places additional pressure on public docks and reduces the ability to attract business from major shipping lines. Along with limited financial resources, unlike private entities that can implement strategic changes in a timely manner, government-run ports are often subjected to bureaucratic processes that tend to slow down decision-making and delay necessary investments or policy adjustments.⁴ This ultimately leads to untimely responses to ever-changing market demands.

⁴ All too often, when finally made, these decisions are based not on moving cargo cheaply, quickly and effectively, but on the basis of satisfying constituents and voters such as racial minorities or gender.

3. The Need for Modernisation

Publicly operated ports must undergo significant modernisation in order to remain competitive in the global market. These changes include infrastructure upgrades, adopting modern technologies, and encouraging efficient management practices. However, since modernisation often requires significant financial investments and operational expertise, their bureaucratic managers have difficulty adopting these practices.⁵ Due to this, privatisation is essential for modernising ports, but before discussing the specific benefits of privatisation, it is important to note the general advantages of privatisation.

4. General Advantages of Privatisation

Privatisation, the transfer of ownership or control of public assets to the private sector, offers several advantages and is a widely adopted strategy across many industries. One of the most significant advantages of privatisation is enhanced efficiency. Since private firms are driven by profit and competition, they are more inclined to streamline operations, reduce inefficiencies, and maximise output. This results in better resource allocation and cost-effectiveness when compared to public institutions that are often afflicted by bureaucratic inefficiencies.

For example, within the private sector, efficiency is the number one objective within an industry; however, in the public sector, budgeting decisions “follow a sequential process of negotiations between public managers and political officials in which efficiency may be only one goal” (Duncombe, Miner & Ruggiero, 1997, p. 2). This is at least partly because government-run institutions do not go bankrupt when underperforming, but privately-run institutions do, incentivising efficiency within the private sector. Since private firms must meet shareholder expectations and operate within the constraints of market forces, they are incentivised to deliver results efficiently. So, while private firms make decisions in order to maximise profits, government bureaucracies tend to have personal agendas that value “redistribution to favored interest groups, high wages, and employment levels in particular enterprises or sectors, patronage, and so on” (Vickers & Yarrow, 1991, p. 113). Because of this, public enterprises are often subjected to several contrasting political agendas. Privatisation can help reduce political interference within business operations, decrease corruption, and encourage efficiency: “Dismissing lackadaisical state managers in favor of their private counterparts would usher in more refined forms of managerial control and function” (Davis, 2007, p. 157). By transferring control to private entities, firms can focus on economic performance and market demands rather than political objectives.

⁵ On the negative effects of bureaucracy, see (von Mises, 1944).

Apart from increased efficiency, privatisation tends to result in an influx of private investment, which governments often have difficulty obtaining. These additional funds allow for the modernisation of infrastructure, the development of modern technologies, and the expansion of services, all factors that publicly operated entities have a challenging time obtaining. For example, foreign direct investment (FDI) often flows into privatised industries, further encouraging economic growth (Kalotay & Gabor, 2000). This is also due to the fact that private companies frequently invest in research and development, resulting in innovation and improved products. This allows the private sector to be better equipped to foster technological advancements and maintain a competitive advantage.

Along with the fact that the government has difficulty obtaining funds, privatisation offers financial relief for governments by reducing the need for public funding of certain enterprises or services. The sale of assets would generate immediate fiscal benefit, while ongoing operational costs are transferred to private entities: "By selling the public enterprise, the state can acquire substantial payments that can be immersed into government coffers" (Davis, 2007, p. 155).⁶

Privatisation also encourages competition, which drives innovation, lowers prices, and enhances consumer services. Within the private sector, to remain competitive, private companies tend to have better service quality than public entities so as to meet or exceed customer expectations. Over time, an industry's competitive nature would increase its overall productivity and quality worldwide because each firm would feel more inclined to invest in its services to remain relevant.

Then, too, there is the fact that the dollar vote occurs every day, every hour, every minute, every second. The political ballot takes place only every two or four years. Also, politics is a package deal. Suppose you prefer candidate A on policies 1, 3, 5, 7 and 9, while you favour B in terms of 2, 4, 6, 8 and 10. You are forced to pick one or the other. In the market, in sharp contrast, you can pick and choose without being forced into this type of limitation. Thus, the consumer has far more control over the entrepreneur than does the citizen over the government.

Then, there is the issue of rational ignorance.⁷ If you are contemplating purchasing a motorcycle, it behoves you to learn about this mode of transport. In contrast, the low information voter can be persuaded by the testimonial of a professional athlete or movie star who knows about the issue as little as he does. Further, the most knowledgeable person in the electorate has exactly as many votes as the person who knows little or nothing about the quality and plans of the

⁶ On the other hand, this might constitute a negative of privatisation. Given that government is predicated upon violence (taxes are compulsory, everything in the private sector is entirely voluntary), enabling this institution to have greater funds may not exactly be preferable.

⁷ You pay no penalty, at least no direct one, from being mal or uninformed. See on this (Caplan, 2007).

politicians seeking office. In the market, there are necessarily mutual benefits, at least *ex ante*, in every trade, purchase, sale, investment, employment contract, etc., otherwise it would not have taken place.⁸ In the public sector, there are winners and losers.

In summary, privatisation offers several advantages, including enhanced efficiency, increased investment, technological innovation, improved service quality, and reduced governmental financial burdens. It also encourages competition, increases accountability, and promotes economic growth while minimising political interference. When applied to ports, privatisation would ultimately provide a more efficient and competitive global trade market.

5. Privatisation: Applied to Ports

Now that the advantages of privatisation have been outlined – enhanced efficiency, increased investment, technological innovation, improved service quality, and reduced government financial burdens – they can be applied to ports and their critical role in facilitating global trade.

1. Enhanced efficiency: Privatisation encourages enhanced efficiency by replacing bureaucratic management structures with market-driven, performance-focused models. Since publicly managed ports are often impacted by political interference, outdated procedures, and slower decision-making, they face many inefficiencies in their day-to-day practices. In contrast, private counterparts motivated by profit and competition tend to streamline operations to prioritise cost-effectiveness.⁹

2. Increased investment: One of the most compelling arguments for privatising these amenities is increased investment. Governments have a hard time obtaining the funding for necessary infrastructure upgrades or expansions that would help meet trade demands. However, private investors are incentivised to fund infrastructure development to maintain competitiveness and profitability because inefficient governments cannot go bankrupt, but inefficient private firms can. Ultimately, increased investment is needed to fund the other advantages of privatisation.

3. Technological innovation: Within the rapidly evolving global trade environment, technological advances are critical for these capital goods to stay competitive. Due to increased funding, privatised ports are able to adopt advanced technologies, such as artificial intelligence for predictive maintenance, autonomous vehicles for

⁸ Thus, there is unanimity in this sector of our society.

⁹ There is an entire literature on privatising lighthouses which should be mentioned in this context. To be sure, this is only of historical interest in an era of the GPS, but it has philosophical relevance to our present concerns. See on this for a small part of this discussion: (Barnett & Block, 2007, 2009; Bertrand, 2006, 2009; Block, 2011; Candela & Geloso, 2019; Coase, 1974; Foldvary, 2003; Krause, 2015; van Zandt, 1993).

cargo management, and blockchain for secure and efficient documentation (Stoyanova, 2023). These technologies can revolutionise how ports are run by enabling them to handle larger cargo volumes with improved efficiency. For example, automated container terminals, which are most commonly used in private ports, significantly reduce human error and improve the consistency of operations. Unfortunately, though, automated container terminals only make up 3% of the total, and only a fraction are fully automated (Knatz, Notteboom & Pallis, 2022, p. 538). With their increased investment, such private facilities would allow more container terminals to become automated. This can be seen through research done by Knatz, Notteboom, and Pallis (2022), which shows that 61% of automated ports are owned by “pure stevedores,” who can be defined as independent port terminal operators, which tend to be privately owned.

4. Improved service quality: Competition among private ports would be a driving factor of improved service quality. Unlike those that are publicly managed, where the incentive to enhance services can be diluted by bureaucratic inertia, private operators are directly motivated to provide high-quality service because their profitability depends on attracting new clients and keeping existing ones. This competition encourages innovation and accountability as managers prioritise customer satisfaction in order to remain competitive within the global supply chain. For example, private operators tend to introduce value-added services, such as inventory management, maintaining and repairing containers, electronic customs clearance, and providing live information on cargo shipping and handling (Gurning, 2000, pp. 6–8). Private accommodations set higher service standards by continuously improving service quality to meet or exceed customer expectations, encouraging competition to improve and ultimately leading to an improved global supply chain.

In summary, switching from public to private ownership of ports would alleviate government financial burdens while encouraging an influx of private investment. In turn, the private investment will allow ports to purchase the technology and infrastructure improvements needed to increase efficiency and improve service quality. Competition among privatised ports will also be a driving factor in efficiency due to the objective of remaining competitive within the global market and staying in business. By integrating these advantages, privatised ports have the potential to become hubs of innovation, efficiency, and economic growth.

6. Monopolistic Concerns

While privatisation is beneficial in many ways, it still raises a few concerns. One of the most significant anxieties is the potential for monopolistic control. When private operators gain control of ports, they may begin exploiting their position by raising fees or limiting access to services. The objection is that such actions would prioritise profits over the broader economic needs of those they serve. As a result,

monopolistic practices can lead to increased costs for shipping companies and, by extension, consumers.

While this may seem like a valid concern, it can be argued that within a free market, when a company tries to exploit its position by raising prices and/or reducing quality, it will eventually face competition because high profits will act as a signal for new market participants. As the latter enter the market, they will offer their services for a lower price, and through competition, market forces will eventually bring the price down to equilibrium. While some people may believe that government regulation is needed to decrease monopoly, this will create the same problems that privatisation aims to fix by once again allowing government officials to act in their own self-interest. “For example, if the firm chooses sunk investment expenditures to reduce costs, it runs the risk that the government might opportunistically decide to enforce low prices without allowing the firm to recover its costs” (Vickers & Yarrow, 1991, p. 114).

It is also important to note that some firms achieve a large size,¹⁰ simply because they are the most efficient within an industry. These things can be seen in the rise of Standard Oil and the government’s attempt to break it up. Weinberger points out that in the beginning, Standard Oil made up 4% of the market. However, since J. D. Rockefeller was so focused on improving efficiency and cutting costs through economies of scale and integration, his business grew: “By 1880, it skyrocketed to about 85 percent. Meanwhile, the price of oil plummeted from 30 cents per gallon in 1869 to eight cents in 1885. Put simply, Rockefeller increased production and lowered prices while creating thousands of well-paid jobs along the way. His business was a model of free-market efficiency” (Weinberger, 2018).

While Standard Oil may have lowered prices in some areas to compete with rivals, this ultimately benefited consumers. There is little evidence that Standard Oil engaged in predatory pricing. In fact, the prices of kerosene and other oil products fell consistently under Standard Oil’s control, undermining the charge of predatory price cutting.¹¹ In an interview with the Hepburn Committee, William H. Vanderbilt, an American businessman, was asked, “Can you attribute... the fact of there being one refiner instead of fifty now to any other cause except the larger capital of the Standard Oil Company?”, to which he replied:

¹⁰ Which should not be conflated with monopoly power.

¹¹ For a defense of Standard Oil against the charge of predatory price cutting, see (McGee, 1958). For an Austrian critique of neoclassical monopoly and anti-trust theory which maintains there is no such thing as this type of market failure, see: (Anderson *et al.*, 2001; Armentano, 1972, 1982, 1989, 1999; Barnett, Block & Saliba, 2005, 2007; Baum, 2021; Block, 1977, 1982, 1994; Block & Barnett, 2009; Boudreaux & DiLorenzo, 1992; Costea, 2003; DiLorenzo, 1985, 1996, 1999; DiLorenzo & High, 1988; Henderson, 2013; High, 1984; Hull, 2005; McChesney, 1991; McGee, 1958; Rothbard, 2004; Shugart, 1987; Smith, 1983; Tucker, 1998a, 1998b).

“It is not from their capital alone that they built up this business... There is no question about it but that these men... I think they are smarter fellows than I am, a good deal. They are very enterprising and smart men. I never came in contact with any class of men as smart and as able as they are in their business, and I think that a great deal is to be attributed to that.” He then goes on to say, “I don’t believe that by any legislative enactment or anything else, through any of the States or all the States, you can keep such men down. You cannot do it! They will always be on top” (Montague, 1902, pp. 282–283).

This helps demonstrate that large scale can result from superior innovation or efficiency, which benefits the consumers by offering better products at lower prices. If a single firm dominates a market of voluntary exchanges, it is a sign that it is meeting consumer demands more efficiently than others.

Even on its own terms, the fear that privatised harbours will eventuate in a monopoly¹² is extremely weak. In this view, that type of business format requires a single seller, or, at most, a high concentration ratio, which logically implies but a few members of the industry, or oligopoly. How many major ports are there in this country? “The United States has 208 commercial ports handling at least 250,000 tons per year” (NOAA Office for Coastal Management, 2023). This does not sound exactly like one or at most a few.¹³

7. Risks in Port Privatisation

Port privatisation is often said to improve efficiency, encourage investment, and modernise infrastructure. However, success depends not only on transferring operations to private actors but also on managing several risk factors, including country risks, project risks, and geopolitical risks. These hazards are especially important in capital-intensive industries, such as ports, which require long-term investment, regulatory stability, and coordinated oversight. This section touches on country risks and the importance of political stability.

Country risk refers to the political, legal, and institutional environment in which privatisation is going to occur. The World Bank’s *Port Reform Toolkit* (Module 5) identifies country risk as a primary deterrent to private participation in port infrastructure. This includes factors such as regulatory uncertainty, corruption, political instability, and weak enforcement of commercial contracts (The World Bank, 2007,

¹² This issue is particularly pertinent in the case of the port of Alexandroupolis, a key for NATO, which was provided as a reason to cancel the plans of Greek government to privatise this port.

¹³ Monopoly joke: If a company sells at a higher price, it is guilty of profiteering; at a lower price, predatory price-cutting. The same price as others? Collusion.

pp. 211–214). When these risks are significant, private operators may seek higher returns to compensate or avoid the market altogether.

Political stability is essential for successfully implementing private investment and infrastructure projects because investors are more likely to commit their resources when they perceive a low risk of sudden policy changes or governmental disruptions. Baker, Khater, and Haddad (2019, p. 810) point out that rising political risks in emerging countries dampen investor confidence and prevent private sector participation. This highlights the importance of addressing political risk factors in order to foster a more conducive environment for investment and development. When addressing the importance of political stability through a literature review, Baker, Khater, and Haddad (2019, p. 816) concludes that “political stability lies at the origin of every aspect that determines the quality of the institutions, namely the existence of the rule of law, the quality of regulations, the efficiency and accountability of the government, the control of corruption, and the ability of citizens to voice their choices.” In this context, political stability serves as a foundation for large amounts of investment because it ensures that institutional frameworks are both present and effective. Without it, efforts to attract private participation in infrastructure will likely fall short, regardless of the economic potential.

The International Monetary Fund (2015) also highlights the importance of stable macroeconomic and institutional conditions for infrastructure investment in poor economies. It is important to emphasise that factors such as high and unpredictable inflation and “severe financial sector stresses (...) [are] toxic for longer-term, private investment” while “broad predictability of policy environment [and enforcement] and the protection of property rights (...) reduces costs and uncertainty, thereby boosting investment” (International Monetary Fund, 2015, p. 14). Ultimately, managing country risk is essential for successful port privatisation because a stable and reliable political and economic climate attracts private investment and fosters long-term growth. Without addressing these risks, efforts to enhance efficiency through privatisation may not succeed. Therefore, political stability, a transparent regulatory framework, and clear enforcement mechanisms are essential to create a favourable environment for private participation in the port sector.

8. India’s Country Risk Management and Privatisation

India’s experience with port privatisation helps illustrate how targeted reforms can reduce country risk and build the institutional credibility necessary to attract private investment. Following the 1991 balance of payments crisis, India shifted away from a highly regulated economy and launched broad liberalisation reforms. Many of these reforms can be found in an International Monetary Fund working paper by Panagariya (2004). Some of the reforms include allowing most goods to “be imported without a license or other restrictions,” the gradual reduction of

tariffs, and “the lifting of exchange controls that had served as an extra layer of restrictions on imports” (Panagariya, 2004, p. 24). Additionally, India aimed to liberalise trade in services, which allowed their infrastructure sector to open up to foreign investment through automatic approvals of FDI. This allowed the “automatic approval for foreign equity up to 100 percent (...) in construction and maintenance of ports and harbors” (Panagariya, 2004, p. 26). These policy issues addressed and reduced several key elements of country risk, including policy unpredictability, legal restrictions on foreign ownership, and excessive regulatory barriers. By signalling long-term commitment to open markets and reducing discretionary controls, India created a more stable and predictable environment for infrastructure investment.

The effectiveness of these reforms in regard to ports is highlighted in an article written by Dasgupta and Sinha (2016), where they measure the impact of privatisation through the efficiency of major ports in India. Before the major reforms in the 1990s, all major ports in India were owned and operated by the government, and they “suffered from obsolete technology, low loading rates, chronic congestion and delays, and poor connectivity with the hinterland” (Dasgupta & Sinha, 2016, p. 226). However, following the liberalisation of India’s economy in the 1990s, country risks were decreased, and privatisation became a key focus, leading to overall improved performance. “Indian ports registered an impressive growth from 164.45 million tons in 1990–1991 to 972.61 million tons in 2013–2014” (Dasgupta & Sinha, 2016, p. 226). In their research, these authors highlight that private sector participation introduced modern technology, streamlined operations, and enhanced infrastructure – all previously mentioned benefits of privatisation (Dasgupta & Sinha, 2016, p. 226). Additionally, privatisation fostered competition among ports, encouraging better customer service and cost efficiency (Dasgupta & Sinha, 2016, p. 228). Ultimately, their research concluded that there is a clear correlation between the efficiency of ports and privatisation (Dasgupta & Sinha, 2016, p. 244). These advancements help show how privatisation can transform inefficient, state-controlled ports into productive hubs that contribute to national and global economic growth, providing a compelling real-world example of the potential benefits of port privatisation.¹⁴

Together, these reforms and outcomes demonstrate how reducing country risk through liberalisation, regulatory clarity, and open investment policies can create the institutional foundation necessary for successful privatisation. When applied to ports, this allowed the transformation of inefficient state-run facilities into globally competitive infrastructure assets that contribute to long-term economic growth.

¹⁴ For another case study see (Trujillo & Nombela, 1999).

9. Geopolitical Risk and National Security

Port privatisation also raises concerns related to geopolitical risk and national security. Some arguments raised against foreign ownership of ports, as highlighted by Notteboom and Haralambides (2025), include concerns over market power, cybersecurity concerns over sensitive trade data, and the need to preserve economic surplus. The risk of increased foreign control and influence over nationally strategic assets, such as ports, is of most concern, especially in times of rising geopolitical tension (Notteboom & Haralambides, 2025, pp. 11–12). However, the authors also note that not all opposition to foreign investment is based on legitimate concerns. Noting that “often, such opposition to FDI isn’t but concealed protectionism with the blessings of trade unions, which are in a way also protecting the employment of their members” (Notteboom & Haralambides, 2025, p. 11), but they still acknowledge that these concerns often result in government action. As a result, privatisation must be structured in a way that preserves national security interests without deterring the private capital needed for infrastructure modernisation.

In response to these growing concerns, several governments have implemented investment screening frameworks that allow for case-by-case evaluation of foreign investment, rather than pausing privatisation altogether. For example, in 2020, the Government of India amended its FDI policies, with a new policy framework that is described as “transparent, predictable, and easily comprehensible” (Government of India, 2020, p. 5). One implication was to require prior government approval for any investments originating from countries with which India shares a land border (Government of India, 2020, p. 14). This came as a result of rising geopolitical tensions between China and the need to limit Chinese influence within India’s economy (Sahai & Khurana, 2025). By combining open investment policies with carefully designed safeguards, India created a framework that allows it to attract private capital without compromising its national security.

Rather than rejecting foreign participation altogether, these policy tools offer a framework for controlled openness that allows for the preservation of national security while maintaining access to private capital and investment. As Notteboom and Haralambides (2025) point out, opposition rooted in protectionist motives can corrupt genuine national security interests, so the challenge lies in distinguishing them. When governments adopt a rule-based, transparent system for evaluating FDI in critical infrastructure, they can protect national interests without sacrificing the efficiency gains and modernisation that privatisation makes possible.

10. Conclusion

In conclusion, privatising ports offers a solution to the inefficiencies, under-investment, and congestion that often affect publicly operated accommodations.

As critical parts of the global supply chain, ports require continuous modernisation, technological advancements, and improved management practices to meet the growing demands of international trade. Since it is difficult for many publicly operated entities to keep up with these demands, privatisation offers a way to enhance efficiency, increase investment, provide technological innovation, and improve service quality, all while reducing the financial burden on governments. While concerns over monopolistic practices are present, they are invalid, as examples like Standard Oil demonstrate. Privatisation is not just a financial strategy but a source of economic growth and competitiveness. Through private investment and market-driven incentives, this process can help ports adapt to the ever-changing demands of international trade, allowing for a more efficient global economy. Ultimately, embracing privatisation offers a sustainable path toward long-term economic prosperity.¹⁵

Authors' Contribution

The authors' individual contribution is as follows: Emily Threeton: conceptualisation, investigation, writing – original draft. Walter E. Block: writing – review and editing.

Conflict of Interest

The authors declare no conflict of interest.

References

- Anderson, W. L. (1999). *Tariffs Are Sanctions*. Mises Institute. Retrieved from: <https://mises.org/library/tariffs-are-sanctions> (accessed: 15.05.2026).
- Anderson, W. L. (2021). *Conservatives and the Free Trade Straw Man*. Mises Institute. Retrieved from: <https://mises.org/wire/conservatives-and-free-trade-straw-man> (accessed: 15.05.2026).
- Anderson, W. L., Block, W., DiLorenzo, T. J., Mercer I., Snyman, L., & Westley, C. (2001). The Microsoft Corporation in Collision with Antitrust Law. *The Journal of Social, Political and Economic Studies*, 26(1), 287–302.
- Armentano, D. T. (1972). *The Myths of Antitrust: Economic Theory and Legal Cases*. Arlington House.
- Armentano, D. T. (1982). *Antitrust and Monopoly: Anatomy of a Policy Failure*. Wiley.
- Armentano, D. T. (1989). Antitrust Reform: Predatory Practices and the Competitive Process. *Review of Austrian Economics*, 3, 61–74. Retrieved from: https://www.mises.org/journals/rae/pdf/rae3_1_4.pdf (accessed: 15.05.2026).
- Armentano, D. T. (1999). *Antitrust: The Case for Repeal* (Rev. 2nd ed.). Mises Institute.

¹⁵ For the case in favour of privatising the entire ocean, not merely the harbours adjacent to it, plus other bodies of water such as rivers, lakes, aquifers, etc., see (Block & Nelson, 2015).

- Baker, N. B., Khater, M., & Haddad, C. (2019). Political Stability and the Contribution of Private Investment Commitments in Infrastructure to GDP: An Institutional Perspective. *Public Performance and Management Review*, 42(4), 808–835. <https://doi.org/10.1080/15309576.2018.1523064>
- Barnett, W., II, & Block, W. E. (2007). Coase and Van Zandt on Lighthouses. *Public Finance Review*, 35(6), 710–733. <https://doi.org/10.1177/1091142107302182>
- Barnett, W., II, & Block, W. E. (2009). Coase and Bertrand on Lighthouses. *Public Choice*, 140(1–2), 1–13. <https://doi.org/10.1007/s11127-008-9375-x>
- Barnett, W., II, Block, W. E., & Saliba, M. (2005). Perfect Competition: A Case of “Market-failure”. *Corporate Ownership & Control*, 2(4), 70–75. <https://doi.org/10.22495/cocv2i4p6>
- Barnett, W., II, Block, W. E., & Saliba, M. T. (2007). Predatory Pricing. *Corporate Ownership & Control*, 4(4–3), 397–402. <https://doi.org/10.22495/cocv4i4c3p4>
- Barron, P. (2017). *Two Common Objections to Unilateral Free Trade*. Mises Institute. Retrieved from: <https://mises.org/blog/two-common-objections-unilateral-free-trade> (accessed: 15.05.2026).
- Bastiat, C. F. (2012). *The Balance of Trade*. Mises Institute. (Original work published 1845). Retrieved from: <https://mises.org/library/balance-trade> (accessed: 15.05.2026).
- Bastiat, C. F. (2018). *Must Free Trade Be Reciprocal?* Mises Institute. (Original work published 1845). Retrieved from: <https://mises.org/library/must-free-trade-be-reciprocal> (accessed: 15.05.2026).
- Baum, N. (2021). *Antitrust Regulation Assumes Bureaucrats Know the “Correct” Amount of Competition*. Mises Institute. Retrieved from: <https://mises.org/wire/antitrust-regulation-assumes-bureaucrats-know-correct-amount-competition> (accessed: 15.05.2026).
- Bertrand, E. (2006). The Coasean Analysis of Lighthouse Financing: Myths and Realities. *Cambridge Journal of Economics*, 30(3), 389–402. <https://doi.org/10.1093/cje/bei068>
- Bertrand, E. (2009). Empirical Investigations and Their Normative Interpretations: A Reply to Barnett and Block. *Public Choice*, 140, 15–20. <https://doi.org/10.1007/s11127-009-9437-8>
- Block, W., & Barnett, W., II. (2009). Monopsony Theory. *American Review of Political Economy*, 7(1/2), 67–109. <https://doi.org/10.38024/arpe.107>
- Block, W., Horton, J., & Walker, D. (1998). The Necessity of Free Trade. *Journal of Markets and Morality*, 1(2), 192–200.
- Block, W. E. (1977). Austrian Monopoly Theory – a Critique. *The Journal of Libertarian Studies*, 1(4), 271–279.
- Block, W. E. (1982). *Amending the Combines Investigation Act*. The Fraser Institute.
- Block, W. E. (1994). Total Repeal of Antitrust Legislation: A Critique of Bork, Brozen, and Posner. *Review of Austrian Economics*, 8(1), 35–70. <https://doi.org/10.1007/BF01102316>
- Block, W. E. (2008). *Defending the Undefendable*. The Mises Institute. (Original work published 1976).

Block, W. E. (2011). Rejoinder to Bertrand on Lighthouses. *Romanian Economic and Business Review*, 6(3), 49–67. Retrieved from: <https://www.rebe.rau.ro/REBE%206%203.pdf> (accessed: 15.05.2026).

Block, W. E. (2013). *Defending the Undefendable II: Freedom in All Realms*. Terra Libertas Publishing House.

Block, W. E., Wirth, H. E., & Butt, J. A. (2018). The Case for Punishing Those Responsible for Minimum Wage Laws, Rent Control and Protectionist Tariffs. *Revista Juridica Cesumar – Mestrado*, 18(1), 235–263. <https://doi.org/10.17765/2176-9184.2018v18n1p235-263>

Block, W. E., & Nelson, P. L. (2015). *Water Capitalism: The Case for Privatizing Oceans, Rivers, Lakes, and Aquifers*. Lexington Books.

Boudreaux, D. (2017). Trump's Ignorance Is Matched Only by His Thuggishness. *Economic Policy Journal*, 3 January. Retrieved from: https://www.economicpolicyjournal.com/2017/01/trumps-ignorance-is-matched-only-by-his.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+economicpolicyjournal%2FKp-wH+%28EconomicPolicyJournal.com%29 (accessed: 15.05.2026).

Boudreaux, D. J. (2010). *On Trade and Currency Manipulation*. Foundation of Economic Education. Retrieved from: <https://fee.org/freeman/on-trade-and-currency-manipulation/> (accessed: 15.05.2026).

Boudreaux, D. J. (2016a). On Being Too Rigid & Dogmatic & Inflexible on Free Trade. *Economic Policy Journal*, 19 December. Retrieved from: https://www.economicpolicyjournal.com/2016/12/on-being-too-rigid-dogmatic-inflexible.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+economicpolicyjournal%2FKp-wH+%28EconomicPolicyJournal.com%29 (accessed: 15.05.2026).

Boudreaux, D. J. (2016b). *Should Gates Clean His Own Toilets?* Retrieved from: <https://triblive.com/opinion/donaldboudreaux/10888506-74/workers-gates-wages> (accessed: 15.05.2026).

Boudreaux, D. J., & DiLorenzo, T. J. (1992). The Protectionist Roots of Antitrust. *Review of Austrian Economics*, 6(2), 81–96. <https://doi.org/10.1007/BF00842705>

Brandly, M. (2002). *A Primer on Trade*. Retrieved from: <https://www.mises.org/article.aspx?Id=1084> (accessed: 15.05.2026).

Brown, P. J. (1987). Free Thought and Free Trade: The Analogy Between Scientific and Entrepreneurial Discovery Process. *The Journal of Libertarian Studies*, 8(2), 289–292. Retrieved from: https://www.mises.org/journals/jls/8_2/8_2_8.pdf (accessed: 15.05.2026).

Candela, R. A., & Geloso, V. (2019). Coase and Transaction Costs Reconsidered: The Case of the English Lighthouse System. *European Journal of Law and Economics*, 48, 331–349. <https://doi.org/10.1007/s10657-019-09635-4>

Caplan, B. (2007). *The Myth of the Rational Voter: Why Democracies Choose Bad Policies*. Princeton University Press.

Coase, R. H. (1974). The Lighthouse in Economics. *Journal of Law and Economics*, 17, 357–376.

- Costea, D. (2003). A Critique of Mises's Theory of Monopoly Prices. *The Quarterly Journal of Austrian Economics*, 6(3), 47–62. Retrieved from: https://www.mises.org/journals/qjae/pdf/qjae6_3_3.pdf (accessed: 15.05.2026).
- Dasgupta, M. K., & Sinha, D. (2016). Impact of Privatization of Ports on Relative Efficiency of Major Ports of India. *Foreign Trade Review*, 51(3), 225–247. <https://doi.org/10.1177/0015732516646212>
- Davis, C. (2007). The Politics of Ports: Privatization and the World's Ports. *International Labor and Working-Class History*, 71, 154–161. <https://www.jstor.org/stable/27673075>
- DiLorenzo, T. J. (1985). The Origins of Antitrust: An Interest-group Perspective. *International Review of Law and Economics*, 5, 73–99. Retrieved from: <https://mason.gmu.edu/~trustici/LAW108/The%20Origins%20of%20Antitrust-%20An%20Interest%20Group%20Perspective.pdf> (accessed: 15.05.2026).
- DiLorenzo, T. J. (1996). The Myth of Natural Monopoly. *Review of Austrian Economics*, 9(2), 43–58. Retrieved from: https://www.mises.org/journals/rae/pdf/rae9_2_3.pdf (accessed: 15.05.2026).
- DiLorenzo, T. J. (1999). *The Truth about Sherman*. Mises Institute. Retrieved from: <https://mises.org/library/truth-about-sherman> (accessed: 15.05.2026).
- DiLorenzo, T. J. (2018). *Trade and the Rise of Freedom*. LewRockwell. Retrieved from: <https://www.lewrockwell.com/2018/03/thomas-dilorenzo/trade-and-the-rise-of-freedom/> (accessed: 15.05.2026).
- DiLorenzo, T. J., & High, J. (1988). Antitrust and Competition, Historically Considered. *Economic Inquiry*, 26(3), 423–435. <https://doi.org/10.1111/j.1465-7295.1988.tb01505.x>
- Duncombe, W., Miner, J., & Ruggiero, J. (1997). Empirical Evaluation of Bureaucratic Models of Inefficiency. *Public Choice*, 93(1/2), 1–18. <https://doi.org/10.1023/A:1017910714756>
- Ebeling, R. M. (2018). *Trump's Protectionist Follies Threaten a Trade War*. The Future of Freedom Foundation. Retrieved from: <https://www.fff.org/explore-freedom/article/trumps-protectionist-follies-threaten-trade-war/> (accessed: 15.05.2026).
- Epstein, R. A. (2016). *The Rise of American Protectionism*. Hoover Institution. Retrieved from: <https://www.hoover.org/research/rise-american-protectionism> (accessed: 15.05.2026).
- Foldvary, F. E. (2003). *The Lighthouse as a Private-Sector Collective Good*. The Independent Institute. Retrieved from: <https://www.independent.org/publications/article.asp?id=757> (accessed: 15.05.2026).
- Folsom, B. W., Jr. (Ed.). (1996). *The Industrial Revolution and Free Trade*. Foundation for Economic Education.
- Friedman, M., & Friedman, R. (1997). The Case for Free Trade. *Hoover Digest*, 4. Retrieved from: <http://www.hooverdigest.org/974/friedman.html> (accessed: 15.05.2026).
- Government of India. (2020). *Consolidated FDI Policy (Effective from October 15, 2020)*. Ministry of Commerce & Industry Department of Promotion of Industry and International Trade. Retrieved from: <https://www.mofpi.gov.in/sites/default/files/fdi-policy-circular-2020-28october2020.pdf> (accessed: 7.05.2025).

Gurning, R. O. S. (2000). *Value Added Service Strategy for Jakarta International Container Terminal*. World Maritime University Dissertations. Retrieved from: https://commons.wmu.se/cgi/viewcontent.cgi?article=1100&context=all_dissertations (accessed: 5.12.2024).

Gwartney, J., Lawson, R., & Block, W. E. (1996). *Economic Freedom of the World, 1975–1995*. The Fraser Institute.

Hazlitt, H. (2008). *Economics in One Lesson*. Mises Institute. (Original work published 1946).

Henderson, D. R. (2013). *The Robber Barons: Neither Robbers nor Barons*. Library of Economics and Liberty. Retrieved from: <https://www.econlib.org/cgi-bin/printarticle2.pl?file=Columns/y2013/Hendersonbarons.html> (accessed: 15.05.2026).

High, J. (1984). Bork's Paradox: Static vs. Dynamic Efficiency in Antitrust Analysis. *Contemporary Economic Policy*, 3(2), 21–34. <https://doi.org/10.1111/j.1465-7287.1984.tb00793.x>

Higgs, R. (2019). What is This Mystical Magnetism That Nationalism Exerts on So Many Americans? *Economic Policy Journal*, 4 February. Retrieved from: https://www.economicpolicyjournal.com/2019/02/what-is-this-mystical-magnetism-that.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+economicpolicyjournal%2FKpwH+%28EconomicPolicyJournal.com%29 (accessed: 15.05.2026).

Hull, G. (Ed.). (2005). *The Abolition of Antitrust*. Transaction Publishers.

International Monetary Fund. (2015). *Financing for Development – Revisiting the Monterrey Consensus*. <https://doi.org/10.5089/9781498344449.007>

Johnsson, R. C. B. (2004). *On Ricardo and Free Trade*. Mises Institute. Retrieved from: <https://www.mises.org/article.aspx?Id=1421&> (accessed: 15.05.2026).

Kalotay, K., & Gabor, H. (2000). Privatization and FDI in Central and Eastern Europe. *Transnational Corporations*, 9(1), 39–66. <https://ssrn.com/abstract=878026>

Knatz, G., Notteboom, T., & Pallis, A. (2022). Container Terminal Automation: Revealing Distinctive Terminal Characteristics and Operating Parameters. *Maritime Economy & Logistics*, 24, 537–565. <https://doi.org/10.1057/s41278-022-00240-y>

Krasnozhon, L. A., Simpson, D., & Block, W. E. (2015). Fair Trade: Its Real Impact on the Working Poor. *The Review of Social and Economic Issues (RSEI)*, 1(2), 5–28. Retrieved from: https://rsei.rau.ro/images/V1N2/Articol_1.pdf (accessed: 15.05.2026).

Krause, M. (2015). On Buoys and Beacons in Economics. *Journal of Private Enterprise*, 30(1), 45–59. Retrieved from: https://journal.apee.org/index.php?title=Private.Enterprise.v30.n1.2015.Spring_parte3.pdf (accessed: 15.05.2026).

Landsburg, S. E. (2008). What to Expect When You're Free Trading. *The New York Times*, 16 January. Retrieved from: https://www.nytimes.com/2008/01/16/opinion/16landsburg.html?_r=1&scp=1&sq=Steven+E.+Landsburg&oref=slogin (accessed: 15.05.2026).

McChesney, F. (1991). Antitrust and Regulation: Chicago's Contradictory Views. *Cato Journal*, 10(3), 775–798.

- McGee, J. S. (1958). Predatory Price Cutting: The Standard Oil (New Jersey) Case. *The Journal of Law and Economics*, 1, 137–169. <https://doi.org/10.1086/466547>
- McGee, R. W. (1994a). The Fatal Flaw in NAFTA, GATT and All Other Trade Agreements. *Northwestern Journal of International Law & Business*, 14(3), 549–565.
- McGee, R. W. (1994b). *A Trade Policy for Free Societies: The Case against Protectionism*. Quorum Books.
- McMaken, R. (2016). *To Oppose Free Trade Is to Embrace Violence*. Mises Institute. Retrieved from: <https://mises.org/library/oppose-free-trade-embrace-violence> (accessed: 15.05.2026).
- Montague, G. H. (1902). The Rise and Supremacy of the Standard Oil Company. *The Quarterly Journal of Economics*, 16(2), 265–292. <https://doi.org/10.2307/1882746>
- Mullen, T. (2015). *Trump's Protectionist Fallacies Have Been Refuted by Free Market Economists for Hundreds of Years*. HuffPost. Retrieved from: https://www.huffingtonpost.com/tom-mullen/trumps-protectionist-fall_b_8056400.html (accessed: 15.05.2026).
- Murphy, R. P. (2004). *Can Trade Bring Poverty?* Mises Institute. Retrieved from: <https://www.mises.org/article.aspx?Id=1699> (accessed: 15.05.2026).
- NOAA Office for Coastal Management. (2023). *Ports*. Retrieved from: <https://coast.noaa.gov/states/fast-facts/ports.html> (accessed: December 2025).
- Notteboom, T., & Haralambides, H. (2025). Seaports in a Tense Geopolitical Environment: Key Agents or Sitting Ducks? *Maritime Economics & Logistics*, 27, 1–24. <https://doi.org/10.1057/s41278-025-00313-8>
- Panagariya, A. (2004). *India in the 1980s and 1990s: A Triumph of Reforms* (IMF Working Paper No. WP/04/43). Retrieved from: <https://www.imf.org/external/pubs/ft/wp/2004/wp0443.pdf> (accessed: 7.05.2025).
- Ricardo, D. (1821). *The Principles of Political Economy and Taxation* (3rd ed.). J. M. Dent.
- Roberts, R. (2016). *The Human Side of Trade*. Medium. Retrieved from: <https://medium.com/@russroberts/the-human-side-of-trade-7b8e024e7536#nkypmt8hc> (accessed: 15.05.2026).
- Rothbard, M. N. (2004). *Man, Economy and State*. Scholar's Edition. Mises Institute. (Original work published 1962). Retrieved from: <https://www.mises.org/rothbard/mes.asp> (accessed: 15.05.2026).
- Rothbard, M. N. (2005). *Protectionism and the Destruction of Prosperity*. Mises Institute. Retrieved from: <https://mises.org/rothbard/protectionism.asp> (accessed: 15.05.2026).
- Rouanet, L. (2016). *The Case for Unilateral Free Trade*. Mises Institute. Retrieved from: <https://mises.org/blog/case-unilateral-free-trade> (accessed: 15.05.2026).
- Sahai, D., & Khurana, P. (2025). India's Control of Chinese Investment Inflows: The Way Forward. *India's World: International Affairs*, 23 March. Retrieved from: <https://indiasworld.in/indias-control-of-chinese-investment-inflows-the-way-forward/> (accessed: 8.05.2025).
- Shugart, W. F., II. (1987). Don't Revise the Clayton Act, Scrap It! *Cato Journal*, 6(3), 925–932.

Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*. Liberty Fund. Retrieved from: <https://oll.libertyfund.org/titles/smith-an-inquiry-into-the-nature-and-causes-of-the-wealth-of-nations-cannan-ed-vol-1> (accessed: 15.05.2026).

Smith, F. L., Jr. (1983). Why Not Abolish Antitrust? *Regulation*, January–February, 23–33. Retrieved from: <https://cei.org/op-eds-and-articles/why-not-abolish-antitrust> (accessed: 15.05.2026).

Stoyanova, M. (2023). Innovative Technologies for Enhancing Port Efficiency and Productivity. In: *Digitalizatsiya, golemi danni, izkustven intelekt. Sbornik s dokladi ot nauchen seminar. Ikonomicheski universitet – Varna, 31.03.2023* (pp. 33–38). Varna University Economics Department. Retrieved from: <https://ue-varna.bg/uploads/filemanager/303/publishing-complex/2023/DBDAI-proceedings-2023.pdf#page=33> (accessed: 3.12.2024).

Trujillo, L., & Nombela, G. (1999). *Privatization and Regulation of the Seaport Industry*. (Research Working Paper No. 2181). The World Bank. Retrieved from: <https://documents.worldbank.org/curated/en/973281468740398501> (accessed: 15.05.2026).

Tucker, J. (1998a). Controversy: Are Antitrust Laws Immoral? *Journal of Markets & Morality*, 1(1), 75–82. Retrieved from: https://www.acton.org/publications/mandm/mandm_controversy_35.php (accessed: 15.05.2026).

Tucker, J. (1998b). Controversy: Are Antitrust Laws Immoral? A Response to Kenneth G. Elzinga. *Journal of Markets & Morality*, 1(1), 90–94. Retrieved from: https://www.acton.org/publications/mandm/mandm_controversy_37.php (accessed: 15.05.2026).

UNCTAD. (2021). *Review of Maritime Transport 2021*. United Nations. Retrieved from: <https://unctad.org/publication/review-maritime-transport-2021#main-content> (accessed: 26.10.2024).

van Zandt, D. E. (1993). The Lessons of the Lighthouse: “Government” or “Private” Provision of Goods. *The Journal of Legal Studies*, 22(1), 47–72.

Vance, L. M. (2016). *Free Trade Is Fair Trade*. The Future of Freedom Foundation. Retrieved from: <https://www.fff.org/explore-freedom/article/free-trade-fair-trade/> (accessed: 15.05.2026).

Vickers, J., & Yarrow, G. (1991). Economic Perspectives on Privatization. *The Journal of Economic Perspectives*, 5(2), 111–132. <https://www.jstor.org/stable/1942688>

von Mises, L. (1927). *Liberalism: In the Classical Tradition*. Mises Institute. Retrieved from: <https://mises.org/library/liberalism-classical-tradition> (accessed: 15.05.2026).

von Mises, L. (1944). *Bureaucracy*. Yale University Press.

Weinberger, D. (2018). *The Myth That Standard Oil Was a “Predatory Monopoly”*. Foundation for Economic Education. Retrieved from: <https://fee.org/articles/the-myth-that-standard-oil-was-a-predatory-monopoly/> (accessed: 5.12.2024).

Wenzel, R. (2018a). Most Pro-Tariff and Anti-Tariff Supporters Use the Same Dumb Argument. *Economic Policy Journal*, 9 March. Retrieved from: https://www.economicpolicyjournal.com/2018/03/most-pro-tariff-and-anti-tariff.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+economicpolicyjournal%2FKp-wH+%28EconomicPolicyJournal.com%29 (accessed: 15.05.2026).

Wenzel, R. (2018b). Pat Buchanan: Foundational War Hawk. *Economic Policy Journal*, 8 March. Retrieved from: https://www.economicpolicyjournal.com/2018/03/pat-buchanan-foundational-war-hawk.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+economicpolicyjournal%2FKpwH+%28EconomicPolicyJournal.com%29 (accessed: 15.05.2026).

Williams, W. E. (2017a). *International Trade Thuggery*. LewRockwell. Retrieved from: <https://www.lewrockwell.com/2017/01/walter-e-williams/free-trade-3/> (accessed: 15.05.2026).

Williams, W. E. (2017b). *Trade Ignorance and Demagoguery*. LewRockwell. Retrieved from: <https://www.lewrockwell.com/2017/05/walter-e-williams/the-us-is-protectionist/> (accessed: 15.05.2026).

The World Bank. (2007). *Port Reform Toolkit. Module 5: Financial Implications of Port Reform*. Retrieved from: https://www.ppiaf.org/sites/ppiaf.org/files/documents/toolkits/Portoolkit/Toolkit/pdf/modules/05_TOOLKIT_Module5.pdf (accessed: 7.05.2025).

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The Culture of Excellence in Higher Education: Assessing the Quality of the Measurement Tool and Its Application

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ABSTRACT

Objective: The article aims to present a tool to assess the maturity of a university's culture of excellence (CoE) and the results of its validation.

Research Design & Methods: The respondents were the academic staff, and 363 complete responses/questionnaires were obtained. The questionnaire, available in both Polish and English, was distributed through the university's MS Teams communication platform. The proposed tool consists of 35 items subordinated to seven dimensions.

Findings: Results indicate that the tool is valid and reliable for assessing the culture of excellence in higher education institutions. The maturity level of a CoE at one university has been established.

Implications/Recommendations: The proposed tool can be used to determine individual perceptions of particular CoE dimensions among academic staff, which can help promote the idea of continuous improvement in the workplace.

Contribution: Our contribution to science is to supplement the knowledge about the CoE phenomenon at universities and present the concept of its measurement as a research tool. This tool can be used by other researchers, for example, for cross-cultural studies. The tool can be used to compare universities with each other, e.g., in external peer benchmarking. The CoE diagnostic instrument can be beneficial when the universities are part of an association or federation of universities. This aspect of the research can be regarded as a contribution to practice.

Article type: original article.

Keywords: organisational culture, excellence, assessment, higher education.

JEL Classification: I23, I29.

1. Introduction

Expectations for higher education institutions (HEIs) are increasing, due to several social, political and economic factors (Kromydas, 2017; Handel, 2021; Vergani, 2024). Education in general, and higher education (HE) in particular, is essential for improving people's quality of life and well-being and influences society (Gałat, 2018; Mukherjee *et al.*, 2023). This is particularly relevant in the context of the life-long learning paradigm (Ylonen, 2012), the age of the internationalisation of higher education (Zheng *et al.*, 2020), and most of all, the emphasis on performance excellence in higher public education (Rahman, Voon & Abdullah, 2021). To develop and maintain excellence, HEI must constantly improve service quality. This approach is consistent with Plato's definition of quality, which recognises that quality is only a degree of excellence (Dahlgaard & Anninos, 2022). Moreover, given that excellence is born of culture (Berger, 2003, p. 6), achieving an excellent, above-average level should involve developing a culture of excellence.

This article aims to present a tool to assess the maturity of a university's culture of excellence and the results of its validation. The authors were prompted to undertake the study because there are still too few works in the literature to recognise the essence of a culture of excellence in higher education. Almost no publications mention CoE measurement tools in the HEI. The above research gap was confirmed in the earlier study conducted by the authors of this paper (Wiśniewska & Grudowski, 2024), who, following a systematic review of the literature, proposed seven dimensions of CoE. Based on the above, the CoE assessment tool has been proposed and then subjected to statistical verification. The following research questions were asked: Q1: Is the constructed tool reliable and accurate for

measuring CoE? Q2: If the tool is qualitatively appropriate, what is the level of CoE at the university under study? The survey used the CAWI (computer-assisted web interview) method. The questionnaire was distributed throughout the university's MS Teams communication platform.

2. Literature Background

Excellence is generally defined as an “outstanding merit or quality” or “extremely good, of very high quality” (Mašková, Kučera & Nohavová, 2024). In HEIs, excellence is synonymous with achieving mission/vision, achieving/exceeding benchmarks and internal measures, best practices, and community engagement. Excellence in HE is equivalent to cost-effectiveness; customer/stakeholder satisfaction; dissemination of good practice nationally and internationally; learning outcomes; making optimal use of all resources, financial and human assets, the match between desired and actual perception, positive atmosphere in staff and student environments, integration in teaching and research, quality of teaching and learning and relative to starting point – achieving targets (Hides, Davies & Jackson, 2004). Brusoni *et al.* (2014, p. 20) suggest that excellence in HEIs can be: a) a description of current provision and a goal or aspiration for institutions, academics, and students; b) describing something exceptional, meritocratic, outstanding, and exceeding normal expectations; and c) a relative and an absolute concept. The authors (Brusoni *et al.*, 2014, p. 19) add that “the concept has no meaning if all are excellent and there is no way of distinguishing the performance of individual institutions and departments.” It can be emphasised that excellence in HE is a continuous pursuit for higher and higher levels of quality (Anninos, 2020) and that the pursuit of excellence should be one of the main goals of HEIs, embedded in their development strategy. HE organisations do this, for example, through the implementation of various national, over-national excellence frameworks (e.g., United Kingdom's Research Excellence Framework; the European Commission's HR Excellence in Research programme) or quality management approaches such as TQM (Total Quality Management), Six Sigma, or Lean Management (Sunder & Antony, 2018). As for the national, Polish, and legal context, it can be noted that The Polish Accreditation Commission, expressing its concern for the highest possible quality of education, awards Certificates of Educational Excellence. This procedure is carried out in compliance with Article 250 of the Act of 20 July 2018 (Prawo o szkolnictwie wyższym) Law on Higher Education and Science (i.e., Journal of Laws of 2022, item 574, as amended), § 4(14) and § 9(3)(10) of the Statute of the Polish Accreditation Committee, as well as Annex No. 4 to the Statute. Nevertheless, the described programme is limited only to the sphere of education and learning outcomes (Strugielska, 2020)

However, for these programmes to function effectively, it is necessary to implement and maintain the right culture of excellence. The CoE is part of organisational culture (OC). According to Hofstede, Hofstede and Minkov, OC is “the collective programming of the mind that distinguishes the members of one group or category of people from others” (Hofstede, Hofstede & Minkov, 2010, p. 6). Schein (2004, p. 17) defines OC as “a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration.” As confirmed by different sources (e.g., Rahman, Voon & Firdaus, 2016; Rahman, Voon & Abdullah, 2021; Robertson, 2021; Moradi-Moghadam *et al.*, 2023; Wiśniewska & Grudowski, 2024), over the years, there has been a gradual increase in the number of works devoted to the culture of excellence. It seems clear that the concept is ambiguous and multidimensional. An overview of the definition of a culture of excellence was presented by Rezaei *et al.* (2018). Based on this, among others, one can point out the following definitions and opinions on the CoE: “the totality of the beliefs, norms, and values that switch the actions of persons and groups in a company” (Arasli, 2012, pp. 573–590); “a general culture that appreciates excellence in faculties and universities” (Al Shobaki & Abu Naser, 2017, pp. 135–157). These definitions are the starting point for this article.

According to Drucker, “what gets measured gets managed” (see: Curtis *et al.*, 2021). Therefore, to learn if and at what level the CoE is, it must be assessed. However, before measuring the CoE, it is necessary to consider the dimensions that constitute it. Given the thorough, systematic review of the scientific literature carried out by the authors of this study (Wiśniewska & Grudowski, 2024) the following dimensions were taken for the construction of the CoE measurement tool: 1) leadership oriented to excellence (LOE), 2) clear vision, mission, and goals for excellence (CVMG), 3) employee engagement (EE), 4) human resources management (HRM), 5) meeting and exceeding student and staff expectations (MEE), 6) continuous improvement of processes through innovation and good practices (CI), 7) partnership and teamwork for improvement (PTI).

3. Methodology

The respondents were the academic staff of one of the largest universities in Northern Poland. Obtaining consent for the study was conditional on the anonymity of the institution. Considering the number of people working at the university and assuming a confidence level of $\alpha = 0.95$ and a maximum measurement error of 5%, the required minimum number of respondents in the survey should be 341. In our case, 363 complete responses/questionnaires were obtained. The survey used the CAWI (computer-assisted web interview) method. The questionnaire in Polish and English was distributed throughout the university’s MS Teams communication

platform. Completing the questionnaire was associated with informed consent to participate in the study. Participation was voluntary and anonymous. The research did not interfere with the physical and mental health of the respondents and was conducted with respect for their rights regarding their origin, identity, race, and gender. Before the survey began, potential respondents were informed of its purpose, importance, and the essence of a culture of excellence. It took about 20 minutes to complete the questionnaire. The research was conducted following the principles of scientific ethics, as certified by the relevant university research ethics committee (No. 1000/45/23). The survey questions started from demographic aspects describing the respondents in terms of gender, length of work experience, scientific/professional degree, and holding a management position. The central part of the questionnaire – (CoEATHEI – the Culture of Excellence Assessment Tool for Higher Education Institution) was a set of 35 statements (items) subordinated to seven dimensions: LOE, CVMG, EE, HRM, MEE, CI, and PTI (see Table A.1 in the Appendix). Statements were rated on a 5-point Likert scale, from “strongly disagree” (1) to “strongly agree” (5) with a neutral middle value (3 – “neither yes nor no”).

The STATA SE16 software was used for statistical data analysis. Cronbach’s alpha, Bartlett’s test of sphericity, and Kaiser-Meyer-Olkin measure were used to analyse the quality of the measurement tool. Descriptive statistics and the logical inference method were also used in the study.

4. Results and Discussion

4.1. Characteristics of Respondents

Table 1 presents the quantitative characteristics of the respondents in connection with their division based on four criteria: length of employment at the university, professional/scientific title or degree, managerial position held, and gender.

Table 1. Characteristics of Respondents Based on Four Categories of Their Division ($N = 363$)

Specification	<i>n</i>	%
Scientific or professional degree/title		
BA	5	1.4
MSc	96	26.4
PhD	138	38.0
Associated professor	79	21.8
Full professor	29	8.0
No title/degree	16	4.4

Table 1 cnt'd

Specification	<i>n</i>	%
Managerial position		
Do not hold a managerial position	290	79.9
Head of an administration unit	16	4.4
Head of the team/lab	32	8.8
Head of the department/institute director	18	5.0
Rector/vice-rector/dean/vice-dean	7	1.9
Work experience at the university		
Up to 5 years	90	24.8
6–10 years	65	17.9
11–15 years	47	12.9
16–20 years	40	11
21–25 years	48	13.3
Over 25 years	73	20.1
Gender		
Female	193	53.2
Male	105	28.9
I do not want to answer	65	17.9

Source: own study.

The largest group was represented by those with a doctoral degree and respondents who did not hold a management position. The study group was predominantly women and respondents with up to five years of work experience.

4.2. Assessing the Quality of the Survey Questionnaire

To assess the reliability of the measurement tool, the alpha-Cronbach test was used. The accepted practice is also to calculate the alpha coefficient not only for the entire scale but also if the tool is intended to be multidimensional, for individual subscales (or dimensions) (Panczyk, 2022). This was also done in this study. The second criterion determining the quality of any measurement tool is construct validity. It can be defined as the property that determines whether a tool measures what it was designed to measure. Validity indicates that the interpretation of the results is consistent with the facts. This condition is crucial to draw up adequate conclusions about human traits or characteristics derived from the study conducted

with a given tool (Panczyk, 2022). In this case, we performed Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO).

The results of the statistical analysis are presented in Table 2. They relate to seven dimensions. Table 3 shows the detailed results presenting respondents' attitudes toward these seven dimensions.

Table 2. Factor Analysis

Dimension	Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Bartlett's Test of Sphericity (p -value)	Cronbach's Alpha
The whole questionnaire	0.971	< 0.00001	0.974
LOE	0.888	< 0.00001	0.909
CVMG	0.816	< 0.00001	0.878
EE	0.827	< 0.00001	0.865
HRM	0.863	< 0.00001	0.897
MEE	0.803	< 0.00001	0.861
CI	0.888	< 0.00001	0.929
PTI	0.844	< 0.00001	0.881

Source: own study.

Table 3. Respondents' Attitudes toward Each of the Seven Dimensions

Item (Statement)	Mean	SD	Factor Loading
Dimension 1 – LOE – 2.740			
Q1.1	2.790	1.182	0.892
Q1.2	2.587	1.152	0.857
Q1.3	2.730	1.161	0.882
Q1.4	2.975	1.197	0.812
Q1.5	2.617	1.148	0.842
Cronbach's α	0.909		
Dimension 2 – CVMG – 2.861			
Q2.1	2.937	1.119	0.833
Q2.2	2.860	1.166	0.859
Q2.3	2.823	1.128	0.876
Q2.4	2.785	1.055	0.849
Q2.5	2.901	1.098	0.684
Cronbach's α	0.878		

Table 3 cnt'd

Item (Statement)	Mean	SD	Factor Loading
Dimension 3 – EE – 2.897			
Q3.1	2.884	0.979	0.799
Q3.2	3.028	0.922	0.852
Q3.3	2.890	0.974	0.848
Q3.4	3.256	0.942	0.789
Q3.5	2.427	1.101	0.743
Cronbach's α	0.865		
Dimension 4 – HRM – 2.631			
Q4.1	3.033	1.114	0.799
Q4.2	2.567	1,200	0.884
Q4.3	2.518	1.135	0.861
Q4.4	2.424	1.113	0.837
Q4.5	2.614	1.132	0.828
Cronbach's α	0.897		
Dimension 5 – MEE – 2.866			
Q5.1	3.174	1.069	0.845
Q5.2	2.972	0.916	0.819
Q5.3	3.162	0.916	0.822
Q5.4	2.601	1.162	0.746
Q5.5	2.421	1.162	0.778
Cronbach's α	0.861		
Dimension 6 – CI – 2.804			
Q6.1	2,700	1.034	0.891
Q6.2	3.041	1.020	0.883
Q6.3	2.747	1.055	0.892
Q6.4	2.788	1.083	0.881
Q6.5	2.747	1.131	0.868
Cronbach's α	0.929		
Dimension 7 – PTI – 3.142			
Q 7.1	3.471	0.958	0.835
Q 7.2	3.215	0.982	0.865
Q 7.3	3.369	0.998	0.802
Q7.4	2.862	1.047	0.855
Q7.5	2.796	1.094	0.758
Cronbach's α	0.881		

Source: own study.

Based on the analysis of the data presented in Tables 2 and 3, the CoEATHEI is a reliable, internally consistent, and valid tool (factor loadings values, Cronbach's $\alpha > 0.7$). Thus, the answer to Q1 was obtained.

The answers given by the respondents regarding all proposed dimensions fall within the arithmetic mean range of 3 ± 0.579 , representing the neutral attitude as the dominant one. However, this does not necessarily mean that the average respondent is indifferent to the assessed issue. It is a characteristic effect in a situation where respondents, not having complete knowledge about the phenomenon in question and not knowing whether they are treading on “muddy ground,” choose a neutral point on the Likert scale so that their answers (approving or disapproving) are not interpreted as socially ambiguous or controversial (Nadler, Weston & Voyles, 2015). This fact also demonstrates the need to participate in training courses in which the meaning and idea of improvement based on a developed culture of excellence will be clearly explained.

4.3. Determination of the Maturity Level of the Culture of Excellence

By confirming the reliability and validity of the survey tool, it was possible to measure the CoE, both overall and in each of the seven sub-dimensions (see Table 4).

Table 4. Descriptive Statistics Resulting from All Responses Regarding the Seven Dimensions and the Entire Construct of the Culture of Excellence

Dimension/Construct	Average	Standard Deviation
LOE	2.740	1.001
CVMG	2.861	0.914
EE	2.897	0.791
HRM	2.631	0.959
MEE	2.866	0.836
CI	2.804	0.940
PTI	3.143	0.835
A culture of excellence	2.849	0.788

Source: own study.

As can be seen from Table 4, the average assessment of the CoE as a seven-dimensional construct differs by only 0.151 from position 3 on the Likert scale, which defines a neutral attitude. As argued earlier, this does not necessarily mean the average respondent's pessimistic indifference to the culture of excellence as a complex construct, but rather “social caution” in expressing his/her opinion on a previously unknown issue. Seven CoE dimensions obtained average scores

of 2.631–3.143, proving similar opinions about them among the entire university staff. The overall average CoE level was 2.849, which is not entirely satisfactory. The respondents rated the PTI dimension best, considering the mean scores for each of the seven dimensions. Moreover, out of 35 statements, the highest average score resulting from the respondents' opinions was obtained by the statement "Our university creates a network of cooperation with external partners, allowing us to improve ourselves" (Q7.1 – 3.471). The PTI is, therefore, the strongest pillar for assessing the culture of excellence at the university under study. It was also recognised by the workers, which can be considered a positive sign, especially since, as the researchers argue, CoE cannot develop without vital partnership and teamwork (e.g., Haris, Sultan & Said, 2021; Rahman, Voon & Abdullah, 2021). The partnership for improvement should involve the whole academic community and all its stakeholders (e.g., students, industry representatives, local government, and communities) (Sunder & Antony, 2018). According to the respondents, the weakest dimension of the culture of excellence is HRM when considering the average ratings. Effective HRM should be of concern because, in any organisation, especially in education, the staff is the primary and most important asset (Iyoha & Igbinedion, 2022). The researchers confirm a direct correlation between the role of human resources management and outstanding performance (Arqawi *et al.*, 2018; Faeq, 2020). Bringing the university to an above-average level requires introducing different types of support and motivation and setting an example of personal commitment on the part of the managers (Ogunode, 2023). It is also interesting to note that, considering all 35 statements, Q5.5 – "At our university, the authorities try to take into account the individual needs of their employees" (2.421), belonging to the MEE dimension, was by far the least rated. While this can be explained by the fact that the university under study is a large entity in which it is not easy to identify the individual needs of each employee, it is now more challenging from the perspective of individual departments. Nowadays, due to the progressive development and growth of students' expectations, the needs of employees may concern, for example, personal development, IT, and also psychological support issues (Borges *et al.*, 2023; Zemaitaityte *et al.*, 2023). According to Provance *et al.* (2022), the "people side" of organisations is crucial to forming a culture of excellence. This is particularly important for any HEI, especially one with ambitious goals that require individual employees' daily commitment and effort. Hence, demanding employees without listening to their daily needs may limit achieving the organisation's goals.

It turned out that the dimension related to the issue of leadership (LOE) is the second weakest pillar of the culture of excellence assessed. The results obtained, i.e., the respondents' relatively poor assessment of the current role of university leaders in leading for excellence, are not a positive symptom. All the more so because today's challenges for modern universities place very high demands on

HEI managers (Ballesteros-Rodríguez *et al.*, 2022; Jamali *et al.*, 2022). The university leaders' commitment, genuine concern, and leading by example are critical to the university's success (Osseo-Asare, Longbottom & Murphy, 2005; Ahmad & Ahmed, 2023). The role of rectors or deans has changed over the years (Artzen, 2016). Nowadays, they should not only be managers but leaders of positive change and behaviour models (Amorin, 2021), especially when it comes to transformational change. That requires multi-level leadership with a unified commitment to a shared vision of change and its goals (Klempin & Karp, 2018). The above data and considerations made it possible to get an answer to Q2.

5. Conclusions

This study indicates that:

1. The CoEATHEI is a valid and reliable instrument for assessing the culture of excellence in higher education institutions.

2. The tool can be recommended for further use. It can be applied to measure individual perceptions of particular CoE dimensions among academic staff, which can help promote the idea of continuous improvement in the workplace; a survey of this kind should be repeated systematically.

3. The maturity of a culture of excellence at one university, as an example, has been assessed and represents a level equal to 2.849.

4. The identified level of CoE confirms that there are many areas for improvement, and it was observed that the critical aspects of the university under study, "human resources management" and "leadership oriented to excellence," are among the most vital needs for improvement.

The CoE diagnostic instrument can be beneficial when the universities are part of an association or federation, and when they want to compare themselves in order to create a coherent organisational culture within this federation. Within a given university, the results of a survey using the CoEATHEI tool can help identify the strengths and weaknesses of the existing organisational culture, primarily looking at dimensions such as leadership oriented to excellence; clear vision, mission, and goals for excellence; employee engagement; human resources management; meeting and exceeding student and staff expectations; continuous improvement of processes through innovation and good practices; and partnership and teamwork for improvement. Identifying weaknesses in these dimensions can allow the implementation of appropriate training strategies and improvement programmes. This aspect of the research can be regarded as a contribution to practice. Our contribution to science is to supplement the knowledge about the CoE phenomenon at universities and present the concept of its measurement as a research tool. This tool can be used by other researchers, for example, for cross-cultural studies.

The study is not free of limitations. Due to the design of the questionnaire in the demographic part, the opinion of administrative employees, as a separate one, has not been studied. This implies further research, which should include this particular group of respondents.

Authors' Contribution

The authors' individual contribution is as follows: Małgorzata Zdzisława Wiśniewska: conceptualisation, methodology, writing – original draft preparation, writing – review & editing, formal analysis, supervision. Piotr Grudowski: formal analysis, software. Ewa Malinowska: resources.

Conflict of Interest

The authors declare no conflict of interest.

References

- Ahmad, S., & Ahmed, A. (2023). The Role of Leadership in Effective Implementation of Quality Assurance Mechanisms in Higher Education: An Exploratory Case Study from Pakistan. *Quality Assurance in Education*, 31(2), 230–246. <https://doi.org/10.1108/QAE-02-2022-0037>
- Al Shobaki, M. J., & Abu Naser, S. S. (2017). The Role of the Practice of Excellence Strategies in Education to Achieve Sustainable Competitive Advantage to Institutions of Higher Education – Faculty of Engineering and Information Technology at Al-Azhar University in Gaza a Model. *International Journal of Digital Publication Technology*, 1(2), 135–157.
- Amorin, R. B. (2021). The Influence of Leadership Behaviour on Organizational Culture among the Academic Deans of State Universities and Colleges (SUCs) in Panay Island, Philippines. *Journal of Business and Management Studies*, 3(2), 256–267. <https://doi.org/10.32996/jbms.2021.3.2.27>
- Anninos, L. N. (2020). Overcoming Complacency through Quality Intelligence in Greek Higher Education: The Critical Role of Academic Leadership. In: N. Baporikar, M. Sony (Eds), *Quality Management Principles and Policies in Higher Education* (pp. 121–140). IGI Global Scientific Publishing. <https://doi.org/10.4018/978-1-7998-1017-9.ch007>
- Arasli, H. (2012). Towards Business Excellence in the Hospitality Industry: A Case for 3, 4-, and 5-star Hotels in Iran. *Total Quality Management & Business Excellence*, 23(5–6), 573–590. <https://doi.org/10.1080/14783363.2012.669539>
- Arqawi, S. M., Al Hila, A. A., Abu Naser, S. S., & Al Shobaki, M. J. (2018). The Degree of Employee Awareness of the Reality of Excellence in Performance at the Technical University of Palestine (Kadoorei). *International Journal of Academic Management Science Research*, 2(9), 27–40.
- Artzen, E. (2016). The Changing Role of Deans in Higher Education – from Leader to Manager. *Universal Journal of Educational Research*, 4(9), 2068–2075. <https://doi.org/10.13189/ujer.2016.040918>

- Ballesteros-Rodríguez, J. L., De Saá-Pérez, P., García-Carbonell, N., Martín-Alcázar, F., & Sánchez-Garvey, G. (2022). The Influence of Team Members' Motivation and Leaders' Behaviour on Scientific Knowledge Sharing in Universities. *International Review of Administrative Sciences*, 88(2), 320–336. <https://doi.org/10.1177/0020852320921220>
- Berger, R. (2003). *An Ethic of Excellence: Building a Culture of Craftsmanship with Students*. Heinemann.
- Borges, L. d. O., Motta, G. M. V., Garcia-Primo, G. M., Barros, S. C., & Heleno, C. T. (2023). Working Conditions and Mental Health in a Brazilian University. *International Journal of Environmental Research and Public Health*, 20(2), 1536. <https://doi.org/10.3390/ijerph20021536>
- Brusoni, M., Damian, R., Sauri, J. G., Jackson, S., Kömürçügil, H., Malmedy, M., Matveeva, O., Motova, G., Pisarz, S., Pol, P., Rostlund, A., Soboleva, E. S., Tavares, O., & Zobel, L. (2014). *The Concept of Excellence in Higher Education*. European Association for Quality Assurance in Higher Education. <https://doi.org/10.13140/RG.2.1.2146.7683>
- Curtis, P., Hantias, M., Kourtis, E., & Kourtis, M. (2021). Financial Performance Assessment of Strategy for Building Resilience and Readiness in the Hotel Sector of Greece. *International Journal of Finance, Insurance and Risk Management*, 11(2), 3–27. <https://doi.org/10.35808/ijfirm/253>
- Dahlgaard, J. J., & Anninos, L. N. (2022). Quality, Resilience, Sustainability and Excellence: Understanding LEGO's Journey towards Organizational Excellence. *International Journal of Quality and Service Sciences*, 14(3), 465–485. <https://doi.org/10.1108/IJQSS-12-2021-0183>
- Faeq, M. (2020). Performance Evaluation Criteria Development Process for Academic Staff at Universities. *Black Sea Journal of Management and Marketing*, 1(1), 59–70. <https://doi.org/10.47299/bsjmm.v1i1.17>
- Gałat, W. (2018). Deklaracja społecznej odpowiedzialności uczelni jako wzmocnienie etosu akademickiego. *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie*, 6(978), 137–151. <https://doi.org/10.15678/ZNUEK.2018.0978.0608>
- Handel, J. S. (2021). [Review of the book *Higher Expectations: Can Colleges Teach Students What They Need to Know in the 21st Century?*, by D. Bok]. *College and University*, 96(2), 71–74.
- Haris, H., Sultan, & Said, M. (2021). Building a Culture of Research Excellence to Achieve World Class University. *Proceeding of the International Conference on Science and Advanced Technology (ICSAT)*, 10(1), 16–18.
- Hides, M. T., Davies, J., & Jackson, S. (2004). Implementation of EFQM Excellence Model Self-assessment in the UK Higher Education Sector – Lessons Learned from Other Sectors. *The TQM Magazine*, 16(3), 194–201. <https://doi.org/10.1108/09544780410532936>
- Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and Organizations: Software of the Mind*. McGraw-Hill.

- Iyoha, D. O., & Igbiniedion, V. I. (2022). Knowledge Management: A Strategy for Mentoring Business Educators in Nigerian Universities. *West African Journal of Educational Sciences and Practice*, 1(2), 62–69. <https://doi.org/10.57040/wajesp.v1i2.215>
- Jamali, A. R., Bhutto, A., Khaskhely, M., & Sethar, W. (2022). Impact of Leadership Styles on Faculty Performance: Moderating Role of Organizational Culture in Higher Education. *Management Science Letters*, 12(1), 1–20. <https://doi.org/10.5267/j.msl.2021.8.005>
- Klempin, S., & Karp, M. M. (2018). Leadership for Transformative Change: Lessons from Technology-mediated Reform in Broad-access Colleges. *The Journal of Higher Education*, 89(1), 81–105. <https://doi.org/10.1080/00221546.2017.1341754>
- Kromydas, T. (2017). Rethinking Higher Education and Its Relationship with Social Inequalities: Past Knowledge, Present State and Future Potential. *Palgrave Communications*, 3, 1–12. <https://doi.org/10.1057/s41599-017-0001-8>
- Mašková, I., Kučera, D., & Nohavová, A. (2024). Who Is Really an Excellent University Student and How to Identify Them? A Development of a Comprehensive Framework of Excellence in Higher Education. *European Journal of Psychology of Education*, 39, 4329–4363. <https://doi.org/10.1007/s10212-024-00865-y>
- Moradi-Moghadam, M., Safari, H., Moghadam, M. R. S., & Fathi, M. R. (2023). Re-creation Fundamental Concepts on the Culture of Excellence to Achieve Maturity of Organizational Excellence. *International Journal of Business Excellence*, 30(2), 234–256. <https://doi.org/10.1504/IJBEX.2023.132070>
- Mukherjee, U., Patrick, H. A., Sharieff, M. H., & Gujjar, P. (2023). Measuring the Service Quality of Higher Education: A Critical Review. In: P. Ordóñez de Pablos, X. Zhang, M. N. Almunawar (Eds), *Handbook of Research on Education Institutions, Skills, and Jobs in the Digital Era* (pp. 52–75). IGI Global Scientific Publishing. <https://doi.org/10.4018/978-1-6684-5914-0.ch004>
- Nadler, J. T., Weston, R., & Voyles, E. C. (2015). Stuck in the Middle: The Use and Interpretation of Mid-points in Items on Questionnaires. *The Journal of General Psychology*, 142(2), 71–89. <https://doi.org/10.1080/00221309.2014.994590>
- Ogunode, N. J. (2023). Public Universities in Southwest Geo-political Zone of Nigeria: Problems and Solutions. *International Journal of Business Diplomacy and Economy*, 2(1), 1–12.
- Osseo-Asare, A. E., Longbottom, D., & Murphy, W. D. (2005). Leadership Best Practices for Sustaining Quality in UK Higher Education from the Perspective of the EFQM Excellence Model. *Quality Assurance in Education*, 13(2), 148–170. <https://doi.org/10.1108/09684880510594391>
- Panczyk, M. (2022). Wprowadzenie. In: J. Gotlib, I. Cieślak (Eds), *Przegląd walidowanych, polskojęzycznych kwestionariuszy przeznaczonych do badań naukowych z obszaru nauk o zdrowiu. Kompendium dla studentów uczelni medycznych* (pp. 9–19). Warszawski Uniwersytet Medyczny.

- Provance, T. W., Ramisetty, S. B., Urick, M. J., & Wieczorkowski, K. A. (2022). Building and Evolving a Culture of Excellence: A Conceptual Exploration. *Measuring Business Excellence*, 26(2), 197–209. <https://doi.org/10.1108/MBE-05-2021-0067>
- Rahman, N. A., Voon, B. H., & Abdullah, F. (2021). Culture of Excellence for Better Internal Service Quality in High Education. *Advances in Business Research International Journal*, 7(3), 85–104. <https://doi.org/10.24191/abrij.v7i3.16147>
- Rahman, N. A., Voon, B. H., & Firdaus, A. (2016). Identifying the Dimensions for Culture of Excellence in Higher Education. *Procedia – Social and Behavioral Sciences*, 224, 84–92.
- Rezaei, G., Mardani, A., Senin, A. A., Wong, K. Y., Sadeghi, L., Najmi, M., & Shaharoun, A. M. (2018). Relationship between Culture of Excellence and Organizational Performance in Iranian Manufacturing Companies. *Total Quality Management & Business Excellence*, 29(1–2), 94–115. <https://doi.org/10.1080/14783363.2016.1168692>
- Robertson, J. A. (2021). Culture of Excellence: Entrepreneurial Culture as a Key Element to Gaining Sustainable Competitive Advantage. *Strategic Direction*, 37(11), 24–25. <https://doi.org/10.1108/SD-10-2021-0117>
- Schein, E. H. (2004). *Organizational Culture and Leadership* (3rd ed.). Jossey-Bass.
- Strugielska, A. (2020). Interpretations of the New Quality of Teacher Training in Polish Public Institutes of Higher Education in the Context of a Universal Model of Quality. *Przegląd Badań Edukacyjnych. Educational Studies Review*, 1(30), 193–209. <https://doi.org/10.12775/PBE.2020.011>
- Sunder, M. V., & Antony, J. (2018). A Conceptual Lean Six Sigma Framework for Quality Excellence in Higher Education Institutions. *International Journal of Quality & Reliability Management*, 35(4), 857–874. <https://doi.org/10.1108/IJQRM-01-2017-0002>
- Vergani, F. (2024). Higher Education Institutions as a Microcosm of the Circular Economy. *Journal of Cleaner Production*, 435, 140592. <https://doi.org/10.1016/j.jclepro.2024.140592>
- Wiśniewska, M. Z., & Grudowski, P. (2024). The Culture of Excellence and Its Dimensions in Higher Education. *The TQM Journal*, 36(2), 593–615. <https://doi.org/10.1108/TQM-11-2022-0325>
- Ylonen, A. (2012). Student Ambassador Experience in Higher Education: Skills and Competencies for the Future? *British Educational Research Journal*, 38(5), 801–811. <https://doi.org/10.1080/01411926.2011.583636>
- Zemaitaityte, I., Bardauskiene, R., Pivoriene, J., & Katkonienė, A. (2023). Digital Competences of Future Social Workers: The Art of Education in Uncertain Times. *Social Work Education*, 43(4), 1078–1091. <https://doi.org/10.1080/02615479.2022.2164269>
- Zheng, H., Pirbhai-Illich, F., Martin, F., & Wu, L. (2020). Internationalisation of Higher Education: A Critical Analysis of the Intercultural Dimension of a Visiting Scholar Programme. *British Educational Research Journal*, 46(6), 1371–1390. <https://doi.org/10.1002/berj.3637>

Appendix

Table A.1. The Culture of Excellence Assessment Tool for Higher Education Institution

Item	Statement
Leadership oriented to excellence (LOE)	
Q1.1	Our leaders, managers, and authorities, with their attitude, set an example for others in terms of improving their activities
Q1.2	Our leaders, managers, and authorities apply various incentive and funding systems for performance excellence
Q1.3	Our leaders, managers, and authorities create appropriate working conditions for employees, conducive to the improvement of activities
Q1.4	Our leaders, managers, and authorities actively promote and communicate the idea of continuous improvement
Q1.5	Our leaders, managers, and authorities apply the principle of “the best person in the right place” when recruiting employees
Clear vision, mission, and goals for excellence (CVMG)	
Q2.1	The university authorities create a clear vision and strategy that allows employees to improve
Q2.2	Perfection and improvement of activities are the priority of the functioning of our university
Q2.3	Employees know the improvement goals according to the function they perform
Q2.4	Employees know and understand their role in achieving these goals
Q2.5	Our university uses symbolic artifacts (e.g., brochures, copies of certificates, slogans) to emphasise the role of excellence and improvement
Employee engagement (EE)	
Q3.1	Employees do everything to be a model of excellence in action
Q3.2	Employees actively participate in initiatives for excellence and are interested in their results
Q3.3	At our university, employees willingly submit proposals for improvement solutions
Q3.4	Employees willingly participate in training and report training needs
Q3.5	There is a widespread belief in our university that improvement pays off
Human resources management (HRM)	
Q4.1	At our university, there is a programme for improving the qualifications and skills of employees, allowing them to improve their work
Q4.2	Our university recognises and supports the best employees and their talents
Q4.3	Employees are promoted taking into account the criterion of excellence and above-average performance
Q4.4	Our university cares about the master-student relationship between the employees
Q4.5	At our university, employees are encouraged to report improvements in their workplace

Table A.1 cnt'd

Item	Statement
Meeting and exceeding student and staff expectations (MEE)	
Q5.1	At our university, students' needs are identified and analysed to better meet them
Q5.2	The results of measuring student satisfaction confirm that we meet their requirements better and better
Q5.3	At our university, we engage students in improvement initiatives
Q5.4	Employee satisfaction is measured and evaluated at our university
Q5.5	In our university, the authorities try to take into account the individual needs of their employees
Continuous improvement of processes through innovation and good practices (CI)	
Q6.1	The implemented processes are constantly improved, taking into account the best available models
Q6.2	Our university promotes and introduces innovations in various areas of operation
Q6.3	Our university systematically evaluates the effectiveness of the solutions adopted for improvement
Q6.4	At our university, we collect and share ideas and practices undertaken by employees, aimed at joint improvement
Q6.5	At our university, we are happy to discuss excellent solutions undertaken by other universities
Partnership and teamwork for improvement (PTI)	
Q7.1	Our university creates a network of cooperation with external partners that allows us to improve
Q7.2	Our university knows and implements standards in terms of excellence
Q7.3	Our university is systematically assessed by independent institutions in terms of meeting the standards of excellence
Q7.4	At our university, we create partner and trusted teams whose role is to monitor the direction of our improvement
Q7.5	At our university, employees willingly cooperate and report their willingness to cooperate for improvement

Source: own elaboration.

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Time Preference in Creating Capital to Finance Innovation: Selected Issues

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ABSTRACT

Objective: The main objective of this article is to provide an overview of the Austrian School of Economics on time preference, and to analyse selected determinants of time preference in the creation of capital to finance innovation.

Research Design & Methods: An analysis of the subject literature was conducted and coupled with logical deduction.

Findings: A decline in time preference, expressed in stronger investment activity, belongs – together with technological progress and changes in labour resources – to the main sources of economic growth. Time preference is therefore not limited to long-term growth processes. It also influences shorter-term macroeconomic dynamics, including cyclical fluctuations, changes in economic structure and the way markets operate. In this sense, it becomes one of the factors through which the economic order evolves.

Implications/Recommendations: In a theoretical context, the impact of time preference in creating capital to finance innovation and on the functioning of markets was identified.

Contribution: The economy is moving away from equilibrium, striving to change the structure resulting from the advantage of innovation. Development based on innovation takes place

in conditions of disequilibrium. Observing the determinants of time preference can help to understand the course of economic processes and technological progress in relation to levels of inflation and capital accumulation. This article contributes to the literature by discussions on the true nature of interest and relations to the money market provide a contrast to mainstream economic theories.

Article type: original article.

Keywords: time preference, Austrian School of Economics, capital, interest.

JEL Classification: B13, B25, B53, E22, E21, E43, O10, O43.

1. Introduction

Time preference offers an important analytical framework for explaining both the economic behaviour of individuals and the broader social mechanisms of capitalist economies. In the Austrian School, long-term development is not treated as a linear movement toward equilibrium, but rather as an evolutionary process shaped by repeated waves of innovation. These innovations gradually transform production methods, raise productivity and create conditions for higher living standards.

The innovative activity of enterprises is strongly influenced by supply-side conditions. For this reason, larger firms are often better positioned to introduce new solutions, as they possess greater resources and may seek temporary market dominance as well as above-average returns. In the Austrian perspective, innovation explains both the emergence of such temporary advantages and the continuation of economic change. A firm may gain market power by adopting new technologies earlier than its competitors, but the same process also stimulates further adjustment, imitation and competitive pressure. Thus, innovation is treated as a more dynamic force than price competition alone.

Within this framework, time preference is relevant not only to long-term economic growth, but also to cyclical fluctuations, structural transformation and market coordination. It therefore becomes one of the factors influencing changes in the economic order. The purpose of this article is to examine the role of capital in the creation of innovation and in the course of technological progress. The analysis also considers how capital shortages and insufficient accumulation may restrict the pace and direction of technological change.

2. Literature Review

Capital and Time Preference – a Few Comments

The role of capital in the processes of technological development was presented in a comprehensive manner by economists of the Austrian School, basing their approach on the theory of capital and the concept of time preference.

Every human action contains a category of time preference (von Mises, 1998, p. 293). An acting person is guided by the desire to obtain satisfaction (benefits) from the fulfilment of needs in the future. They will always want to achieve their goals in the near rather than distant future. The realisation of each intention, taking into account time preference, has its consequences in the length of the stages of production and consumption.

In a growing economy, individuals and firms constantly face intertemporal choices concerning the satisfaction of needs. They decide how to divide income between present consumption and accumulation, and whether particular goals should be achieved immediately or deferred. These decisions depend on the expected value of future outcomes, including the degree of satisfaction that may be obtained in later periods.

Von Mises distinguishes two forms of intertemporal choice within the theory of time preference (von Mises, 1998, p. 483). The first refers to ordinary saving, where an economic actor compares the immediate consumption of a given quantity of goods with the consumption of the same quantity at a later date. The second concerns capitalist saving, in which present consumption is given up in exchange for the possibility of consuming a larger quantity of goods in the future, or goods that generate a higher level of satisfaction.

An acting individual seeks to improve his or her situation by choosing alternatives that promise a higher level of satisfaction. This is reflected in a preference for goods that can be obtained sooner rather than later, as well as for goods that offer greater durability compared with those of shorter use.

The use of investment capital is closely related to time preference (Jevons, 1888, p. 7). More advanced and efficient production methods cannot be introduced without investment, while investment itself requires that part of current income be saved beforehand. In this sense, time preference sets limits to the scale of both saving and investment (von Mises, 1998, p. 487). A positive rate of time preference is therefore one of the conditions under which some economic actors decide to postpone consumption and accumulate savings.

The rate of time preference expresses how strongly individuals value goods available in the present compared with goods obtainable only in the future (Hoppe, 2006, p. 33). For this reason, it influences the scale of both saving and investment. Saving means that economic actors limit current consumption in order to redirect

resources toward capital goods that will serve future production. If postponing consumption is expected to bring higher benefits later, the incentive to save becomes stronger. As a result, intertemporal choices may shift toward a lower time preference and a higher level of investment.

When individuals expect their real income to rise, they usually attach relatively greater value to future monetary resources, which is associated with a decline in the rate of time preference (Hoppe, 2006, p. 36). In such circumstances, they are more willing to postpone current benefits and undertake actions whose results will be obtained only after a longer period. This shift in intertemporal orientation also favours investments based on longer, more complex and more capital-intensive production structures.

Lower time preference and the tendency to undertake increasingly complex processes generate a stronger interest in new knowledge, information, and the use of more advanced methods of production. The willingness to implement new ideas, including solutions that are not yet fully known or tested, creates favourable conditions for technological progress.

The willingness to bear higher uncertainty, which accompanies technological change, is linked to the way individuals value present and future outcomes. Time preference shapes this readiness, but the relationship also operates in the opposite direction: Successful technological change may alter intertemporal choices. When new production methods prove effective and generate prospects of future gains, economic actors become more interested in investment. This, in turn, may increase their willingness to postpone current consumption and allocate a larger part of their income to saving.

An additional dimension of time preference is its close connection with attitudes toward uncertainty. It is revealed not only in declared intentions, but above all in the concrete choices made by individuals when allocating resources to investment projects. Since these choices arise from market participants' own assessment of future gains, risks and expected returns, time preference may support technological advancement more effectively than externally imposed interventionist measures.

This is because intervention may weaken both risk-taking and responsibility for achieving economic goals. Under such conditions, the propensity to save does not necessarily increase, time preference does not decline, and the real assessment of future effects becomes limited. As long as there is no intervention in property relations or in the production process, the downward tendency in the rate of time preference, together with the related process of technological progress, can continue (Faber, 1986, p. 68).

Intervention that modifies time preference may therefore affect technological progress in several ways. It can lead to a situation in which the gains generated by innovation are captured by the intervening actor, while production is redirected

toward objectives that do not necessarily reflect market choices. It may also weaken the disciplining role of risk in entrepreneurial decisions, particularly when responsibility for possible losses is partly or entirely shifted away from producers and investors.

3. Universal Time Preference (Measure)

There are many different methods of tracking “temporal fingerprints” (time-related preferences, norms and behaviours). Temporal preference as a preference for intertemporal tradeoffs is usually measured by the discount rate between present and future payoffs through financial flows and surveys that use time-dated consumption/effort (Cohen *et al.*, 2020). The main difficulty in identifying a universal time preference factor is that different methods of measuring time preference vary in the techniques used, scale and number of countries surveyed.

Figure 1 illustrates the distribution of the UP-time variable across 117 regions and countries. The determinants of universal time preference are (Rieger, Wang & Hens, 2021):

- equity risk premium (i.e., the additional return from stocks relative to bonds),
- level of education (measured by the average number of years spent in school),
- overall development of the countries (represented by the Human Development Index),
- credit rating (reflecting the country’s risk of default),
- environmental protection (indicated by the average price of gasoline, as it largely reflects taxes imposed for environmental purposes),
- resilience (proxied by the FM Global Resilience index, incorporating 12 factors related to economic conditions: political risk, oil intensity, urbanisation rate, exposure to natural hazards, natural hazard risk quality, fire risk quality, inherent cyber risk, control of corruption, quality of infrastructure, local supplier quality, supply chain visibility, and productivity).

From the map (Fig. 1), a broad pattern can be identified: Anglo-American countries as well as Central and Northern European countries display very high values, which correspond to low time preference, or relatively patient discounting of time. South and East Asian countries tend to record medium-high values, whereas Southern European, South American, and African countries generally show lower values. More heterogeneous results can be observed in Eastern Europe and the Middle East.

This indicates that cross-country differences in time preference may be shaped not only by economic conditions but also by cultural factors (Rieger, Wang & Hens, 2021). Consequently, explanations based on interest rates, income levels, or macro-economic stability should be supplemented by broader behavioural and cultural determinants.

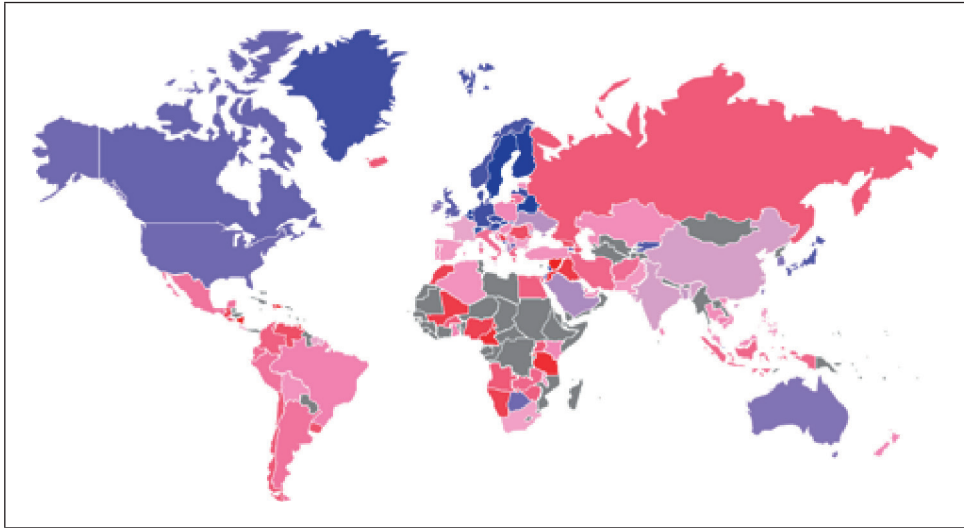


Fig. 1. Global Distribution of Time Preferences

Notes: Countries with high time preference are in red, countries with low time preference are in blue, and grey indicates no data.

Source: Rieger, Wang & Hens (2021, p. 11).

Empirical studies indicate that time preferences may help predict behaviour in situations where individuals or societies face a choice between immediate costs and benefits that appear only in the longer term. At the same time, this relationship may work in both directions. Greater patience can support wealth accumulation, while wealthier countries, benefiting from higher stability and security, may be better able to adopt a more future-oriented perspective.

In view of the growing potential of research and development (R&D) activities and artificial intelligence, it would be worthwhile to expand the UP-time index to include institutional and innovation-related aspects, taking into account, for example, the GII index.

4. Innovation in the Face of Changing Time Preferences

Economic growth may be explained by several interrelated factors: a decline in time preference, which encourages investment, the development of new technologies, and changes in the size of the labour force. If, however, the labour supply is treated as relatively stable and the role of time preference is temporarily set aside, the analysis may concentrate on the impact of technological progress on changes in output.

Technical progress may be interpreted as an improvement in productive capacity, reflected in the ability to generate a larger volume of goods and services within an unchanged temporal structure of production. Such a change is also connected with intertemporal preferences, because higher productivity usually raises average income and may therefore influence the way economic actors value present and future consumption. In the case of “neutral” technical progress, however, neither the interest rate nor the consumption-to-investment ratio is altered (Fillieule, 2005).

When technical progress is investment-oriented, rising income encourages economic actors to allocate a larger part of their resources to saving and investment. This reflects a decline in time preference, since production processes become longer and more capital-intensive. As a consequence, the interest rate tends to fall, while the consumption-to-investment ratio decreases. Economic growth is then generated not only by technical progress itself, but also by the accompanying shift toward lower time preference.

This mechanism is consistent with the endogenous approach to growth, in which internal factors generate subsequent phases of economic expansion. A lower rate of time preference may lead to further declines in later stages, thereby stimulating higher investment and economic growth. However, this process cannot continue indefinitely, since successive reductions in time preference depend on rising production and income. Such a tendency cannot always be sustained in the long run.

In the case of technological progress that favours consumption, the mechanism operates in the opposite direction. As consumers become wealthier as a result of technological change, they may decide to allocate a larger share of income to current consumption, which implies an increase in time preference. Production stages then become shorter, while interest rates and the consumption-to-investment ratio rise.

Economic growth generated in this way is neither as strong nor as stable as growth based on investment-oriented progress. It is also more short-term in character and highly dependent on consumer sentiment. This type of technological progress often accompanies government intervention financed through debt. It is usually associated with incremental improvements rather than radically new production solutions, and reflects a growing consumer desire to acquire an increasing number of goods.

At the same time, rising consumer expenditure linked to intervention reduces the incentive for firms to introduce changes aimed at lowering production costs. Since intervention ensures a continuous inflow of funds, enterprises are less pressured to search for more efficient production methods. In the long run, this may lead to a cyclical pattern of technological change and to higher future burdens on consumers. These burdens, in turn, may increase time preference and weaken the propensity to invest.

The conversion of higher-order goods into lower-order goods creates a sequence of cause and effect that necessarily unfolds over time. As the means of production improve, and especially as technological progress advances, the time separating particular stages of this transformation should tend to decrease. Time, therefore, remains an unavoidable element of production, but the overall production process may become shorter and more concentrated.

Higher-order goods obtain economic relevance because they are linked to needs that will arise only after the completion of the production process, rather than to needs satisfied immediately (Menger, 2007, pp. 71–72). Their value, therefore, depends on the ability to anticipate future demand. The more accurately economic actors understand the causal sequence of production and the more effectively they can control its individual elements, the more reliable their expectations concerning the quantity and quality of the final product become.

This is directly related to uncertainty, which shapes both qualitative and quantitative relations. Uncertainty increases when a larger number of production-related elements cannot be fully understood or controlled (Menger, 2007, p. 74). The satisfaction of needs therefore becomes a process aimed at securing the fulfilment of future expectations, that is, ensuring the availability of goods of sufficient quantity and quality within the time horizon specified by the consumer. Achieving this requires appropriate knowledge.

According to Menger (2007, p. 83), it is necessary to know:

- the expectations of a given individual, i.e., the amount of goods necessary to meet the needs in the period covered by his/her plan,
- the amount of goods he/she has, capable of meeting these expectations.

Lack of the first type of knowledge would result in running a business “blindly” because the goal in terms of the type and amount of needs met would be unknown. In the absence of the second type, the means by which the goal could be achieved would be unknown.

Different types of knowledge are used by those actors who control the relevant means and determine the purposes they are to serve, that is, which values should be treated as more or less important. Thus, only individuals can independently formulate and implement plans aimed at satisfying needs, since only they are able to assess properly what quantity and type of goods they require (Hayek, 2005, p. 81).

Technological change is rooted in the activity of individuals who are able to formulate and pursue their own plans under conditions of open competition. Competition reduces the likelihood that new technologies will become a source of lasting monopoly power. In a statist economy, however, the same processes of technological development may strengthen concentration and support the growth of monopolistic arrangements. A liberal economic order offers a different framework: It protects freedom as a form of social organisation that is not completely absorbed by legal or

institutional control. In this context, economic freedom becomes one of its central components (Godłów-Legiędź, 1992, p. 46).

In such an institutional setting, technological progress can be seen as an outcome of purposeful individual action. Innovation develops as economic actors pursue their own objectives, while its intensity depends partly on time preference and partly on the stock of capital available for productive use. The way capital is accumulated and allocated affects labour productivity, the level of real wages and, more broadly, the material conditions of life.

The way in which capital is employed, as well as the scale of its use, has a direct bearing on the pace and direction of technological change. Technological development then translates into a greater availability of goods by increasing productive capacity. As access to goods and services becomes broader, the conditions of economic activity and the quality of life may improve. The same mechanism applies not only to consumer goods, but also to capital goods used in further production.

The accumulation of capital plays a central role in creating the conditions for technological development. Technical progress requires that the capital goods already available in the economy be used not only to maintain existing productive capacity, but also to generate new capital goods for future production. In this sense, a durable process of accumulation depends on saving and on the relationship between capital and income, provided that specific conditions are satisfied (Reisman, 2015, p. 49).

The first condition concerns the allocation of output. Part of the goods produced must be used to create capital goods, and this part has to be large enough not only to replace the capital consumed during production, but also to expand the productive base. Its size depends on how resources are divided between the production of capital goods and the production of consumer goods, which is reflected in the relation between gross saving and consumption expenditure. The second condition is connected with the problem of diminishing returns. When the stock of capital goods increases without a corresponding rise in labour input, technological progress is needed to prevent productivity gains from weakening. In this way, continued technical improvement becomes necessary for maintaining a lasting increase in the supply of capital goods.

A growing stock of capital goods, combined with continued capital accumulation, creates a basis for a durable rise in living standards. Economies in which the capital-to-income ratio increases are therefore able to benefit more fully from technological progress. They can also transform savings into productive investment more effectively, especially when these savings are directed toward longer, more advanced and more complex production processes.

Consequently, economies with higher levels of saving and capital accumulation possess greater capacity to benefit from technological progress. Higher capital

intensity makes it possible to introduce more complex, advanced, and radical technological solutions.

Technological progress and capital accumulation should be understood as mutually reinforcing processes. Continued accumulation requires improvements in production methods, since technological change helps counteract diminishing returns that may arise as the stock of capital goods grows. At the same time, the creation and implementation of new technologies depend on the prior accumulation of capital, which provides the resources needed to develop more advanced forms of production.

In mainstream economic analysis, the technology used in production is often treated as a function of the available stock of technical knowledge. The Austrian approach places emphasis elsewhere: Even when various methods of production are already known, the possibility of applying them depends on the capital goods that economic actors actually possess at a given moment (Hayek, 2009, p. 48).

For von Mises, the difficulty of adopting new technologies does not usually stem from the absence of technical knowledge itself. The more important limitation is the shortage of capital needed to modernise an obsolete production structure and adapt it to solutions already functioning in more advanced economies. From this perspective, catching-up processes require prior saving and capital formation. Only then can factors of production be shifted into longer, more roundabout and more capital-intensive methods of production.

“Only then could they successively produce the tools required for the construction of those plants which in the further course were to produce the equipment needed for the construction and operation of modern plants, farms, mines, railroads, telegraph lines, and buildings” (von Mises, 1998, p. 493). Capital constraints can be partly overcome by importing or purchasing already existing capital goods from more advanced economies. Access to such goods reduces the need to build the entire capital base domestically from accumulated savings and allows new technologies to be introduced more quickly.

“Increasing the amount of available capital goods makes it possible to achieve more distant goals without having to limit consumption. Reducing them, on the other hand, makes it necessary to refrain from pursuing certain goals that could have been pursued earlier, or to limit consumption. Having capital goods means that, other things being equal, one gains time” (von Mises, 1998, p. 525). Entrepreneurs who command larger capital resources may gain an advantage over rivals because they are better positioned to finance the early adoption of new technologies. Earlier access to such solutions allows them to improve production before competitors are able to respond. As a result, they may temporarily obtain above-average returns resembling a form of “monopoly rent.”

Technical progress, therefore, consists in maintaining and expanding the productive capacity of the economy by increasing the stock of capital goods. This additional capital makes it possible to produce a larger volume of goods and services. The resulting increase in supply tends to put downward pressure on prices, although, as Reisman (2015, p. 56) argues, it does not directly change the rate of profit.

5. Interest as a Condition for Creating Capital That Creates Innovations

Capital is inseparable from the problem of interest, although von Mises rejects the view that interest represents a separate type of income generated by capital goods themselves. From this perspective, the traditional division of income into wages, profit and rent, each attributed respectively to labour, capital and land, is misleading. Interest should instead be explained through the intertemporal valuation of goods rather than as an autonomous return attached to capital as such (Hoppe, 2006, pp. 32–41).

Consumer goods are goods available for present use, while capital goods serve as instruments for producing goods that will become available only in the future. The value of capital, or producer, goods, is therefore derived from the anticipated value of the consumer goods to which they contribute. Since goods available immediately are normally valued more highly than identical goods available later, the present value of capital goods is lower than the value of the future products they are expected to generate. This difference between the value of producer goods and the value of the future consumer goods constitutes interest. Its basis lies in the unequal valuation of present and future goods (von Mises, 1998, p. 530).

Interest should not be treated as a price in the narrow sense. It expresses the relation between goods available in the present and goods obtainable only in the future. In a market economy, this difference in valuation is reflected in the discount applied to future goods. In credit and other financial transactions, the same discount appears as the interest rate.

Originary interest does not arise from the balance between the demand for and supply of money loans on the capital market. In von Mises's view, the loan market performs a different function: It translates the underlying difference in the valuation of present and future goods into money-loan interest rates. Thus, it is this intertemporal valuation gap, rather than conditions on the loan market itself, that determines the level of originary interest (von Mises, 1998, p. 544).

Originary interest influences how entrepreneurs allocate investment across different lines of production. It affects both the time they are willing to wait for returns and the average length of production processes in particular sectors. Through entrepreneurial competition, there is a tendency for this rate to become more uniform across the economy. When the valuation gap between future and

present goods becomes larger in one branch of production, that branch attracts capital and entrepreneurial activity. Sectors in which this gap is narrower become relatively less attractive.

Within the framework of an evenly rotating economy, the movement of capital from one sector to another would tend to eliminate differences in originary interest and lead to a single rate for the whole economy. The interest rate formed in the loan market would, in turn, align with this more fundamental rate. Such convergence, however, can occur only in a theoretical setting that assumes a perfectly regular economy and neutral money. Von Mises questions this assumption, maintaining that money always affects real economic processes and therefore cannot be treated as neutral in practice (von Mises, 2009, p. 311).

When the balance between the supply of money and the demand for money is altered by monetary factors, the effects are transmitted to the prices of goods and services. Monetary expansion, however, does not influence all prices at the same time or in the same way. Its consequences depend on the path by which new money enters the economy and on which groups receive it first. These first recipients increase demand for particular goods according to their own spending patterns, thereby changing relative prices before the effects spread more widely. Thus, an increase in the money supply modifies not only the overall price level but also the structure of prices within the economy. This non-uniform process of monetary transmission is known as the Cantillon effect (von Mises, 1998, p. 544). A related issue can be found in Keynes's analysis of the "diffusion of the price level."

When changes in the money supply affect consumer-goods prices and producer-goods prices to different degrees, they also modify the price relation between present and future goods. This, in turn, may influence the rate of originary interest (von Mises, 2009, p. 323). Monetary changes, therefore, have real consequences. They redistribute income toward the issuer of new money and toward those who receive it first, while later recipients, or those who do not receive it at all, are placed at a disadvantage. Since time preference is linked to individual income and usually falls as income increases, any redistribution of income may change the intertemporal choices of economic actors. In this way, monetary expansion can also affect the overall rate of originary interest in the economy.

According to von Mises, the phenomenon of "forced saving" may contribute to a decline in the rate of originary interest, accompanied by a fall in the purchasing power of money. Forced saving can occur when an additional supply of money first leads to an increase in product prices, while wages rise only after a certain delay. In such a situation, goods prices grow faster than wages, resulting in a redistribution of income in favour of entrepreneurs.

Consumers are then compelled to reduce their purchases because their real wages decline. Since entrepreneurs generally belong to higher-income groups, their

propensity to save is greater, and their time preference is lower, than that of hired workers. Consequently, forced saving may accelerate the process of capital accumulation (von Mises, 1998, p. 547).

Hayek, by contrast, argues that the cause of crisis is not underconsumption, as its proponents maintain, but rather insufficient saving and excessive consumption. In this view, overinvestment is generated by forced saving, while the subsequent collapse occurs because consumption cannot remain at the artificially reduced level produced by that process. The crisis could therefore have been avoided if individuals had not increased their consumption and had instead been encouraged to save more. Under such conditions, extended production processes could have been sustained, since the flow of money and its division between consumption and saving would have corresponded more closely to the structure of production. The only effective solution to cyclical fluctuations is thus the elimination of the elasticity of bank credit and, consequently, the removal of forced saving. In other words, money would have to be neutralised. Neutral money, however, does not imply a stable price level. Rather, it requires a policy of rigid money supply, which may lead both to changes in the general price level and to changes in the structure of relative prices (Garrison, 1986).

In Austrian theory, gross market interest rates include several components that influence their level. Lending money, credit transactions, and deferred payments are never entirely risk-free. Debtors or guarantors may become insolvent, while collateral and mortgages may lose value. In this sense, the creditor effectively becomes a partner of the debtor or of the owner of the mortgaged property. Changes in market conditions, including changes in the value of collateral, may therefore directly affect the creditor's position.

Capital as such does not generate interest automatically. It must be invested in an appropriate way in order to avoid its depletion. Gross interest is earned only by those borrowers whose activities prove successful. If they obtain net interest, it becomes part of their income, although this income consists of more than net interest alone. All types of loans contain an entrepreneurial element, which appears in the form of a premium. This premium constitutes the "entrepreneurial component" of the gross market interest rate and raises its level (von Mises, 1998, p. 549).

Another component of the gross market interest rate is the "price premium." It arises from the existence of deferred payments. Since loan repayments take place in future periods, both the borrower and the lender take expected changes in the purchasing power of money into account when concluding the contract and determining the interest rate. A borrower who expects prices to rise in the future may be willing to accept a higher gross market interest rate than would otherwise be the case. Conversely, a lender who anticipates an increase in prices will demand a higher interest rate.

The price premium can take either a positive or a negative value. In a situation of pronounced deflation, it may offset the whole rate of originary interest and, in extreme cases, push the gross market rate of interest below zero (von Mises, 1998, p. 549). When credit expansion is considered, the adjustment of the net market rate of interest to the rate of originary interest may be disrupted by the introduction of additional fiduciary media into the loan market. Since the supply of additional loans can be expanded only if they are offered at a lower rate, the monetary rate of interest falls below the natural rate, provided that the price premium is assumed to have no effect.

According to von Mises, the analysis should focus only on the case in which banks reduce the money rate below the natural rate. In his view, if a bank acted in the opposite way, by raising the money rate above the natural rate, it would be driven out by competitors offering cheaper loans and would therefore disappear from the market (von Mises, 2009, pp. 307–308).

In the economy, the assessment of whether people have a low or high time preference is relative. In fact, the level of preference results from the orientation of social groups towards the present, and when it is high, a clear increase in consumption can be observed. People prefer immediate gratification and are therefore less inclined to save and invest. In the long run, this translates into a lower dynamics of capital opportunities, technological development and innovation. Societies based on growing consumption *de facto* eliminate their capacity for long-term development based on growing productivity.

Present orientation depends on how individuals perceive and evaluate the future. Some people, such as children, may find it difficult to understand the future as a meaningful time horizon. Others, such as elderly people, may attach less importance to future consumption because they expect that their opportunities to benefit from it will be limited.

By contrast, individuals with relatively low time preference are more future-oriented. They are able to delay gratification and possess a clearer vision of future needs and opportunities. Low time preference encourages saving and the accumulation of financial capital. Savings and investment, in turn, become sources of economic growth not only for the individual but also for society as a whole.

Since consumption cannot disappear entirely, an increase in production requires individuals to abstain from part of their current consumption for a certain period, that is, to save. Once sufficient savings have been accumulated, investment can begin. During the investment process, economic actors rely on previously accumulated savings. Thus, economic growth begins with low time preference and develops through saving and investment. As a result, productivity rises, and technological progress proceeds more rapidly.

Low time preference is also an individual success of people (Mischel & Ebbesen, 1970). Delayed gratification is not an inherent part of every person. A person may not be interested in anything except the present and the immediate future. He/she needs immediate or minimal delayed gratification.

On the other hand, another person can create a constantly growing stock of capital and durable consumer goods to ensure an ever-increasing supply of future goods and an ever-increasing period of supply. This creates opportunities for accumulating financial capital.

Many factors contribute to any form of success. Some are external, such as upbringing, environment, culture, and chance. Others are internal and relate to individual capacities, including risk management, social skills, determination, and intelligence. If all external and internal factors are assumed to be constant and equal, success may depend significantly on time preference. A lower time preference strengthens future orientation, self-discipline, and the ability to postpone immediate gratification. This may also foster a higher degree of creativity, which, at the economic level, translates into more dynamic innovation.

Even individuals with high salaries, or firms with initially sound financial positions, may become poor if they are characterised by high time preference, that is, if they focus primarily on present consumption. Conversely, individuals from disadvantaged backgrounds may achieve wealth if they have low time preference, appropriate skills, and the ability to postpone current consumption in favour of future gains (Leeds, 2022).

Time preference, therefore, contributes to differences in the level of technological development, which in turn affects the rate of GDP growth. The larger the technological gap, the faster growth may proceed. However, as an economy approaches the technological frontier, the techniques being transferred become increasingly complex, while the costs of imitation rise. This slows down the process of diffusion. The absorption of technological progress depends on absorptive capacity, which is shaped by factors such as R&D activity, education, qualifications, the propensity to save, institutional infrastructure, and the degree of economic openness. Another important determinant is the ability to bear the costs of absorption and to use new technologies effectively in the process of economic development. From the perspective of the problem under consideration, the key issue is to identify the nature of technological change embodied in processes and products that arise from the propensity to save.

Technological advancement depends on an economy's ability to generate and apply new technical solutions, which is closely linked to a more future-oriented pattern of behaviour and, therefore, to lower time preference. Its outcomes can be observed in the scale of implemented innovations and in changes in total factor productivity. The innovation process covers a broad sequence of activities, beginning

with basic research and ending with modifications in production methods, although its course varies across sectors and types of production.

Innovation is aimed at strengthening the development potential of firms, industries and the economy as a whole. Expenditure on research and development creates conditions for both product and process innovations. New production methods often reduce costs and, at the same time, lead to changes in the range and structure of goods produced. Conversely, the introduction of new products frequently requires new machinery, equipment and organisational solutions. The technological and information revolution has also contributed to the rise of sectors based on biotechnology, microprocessors and telecommunications, thereby changing the nature of production and entrepreneurship.

Subsequent waves of innovation have transformed relations between producers and consumers, introduced new models of business activity, reshaped quality-control systems and altered the organisation of work teams. One consequence of these changes has been the gradual movement of economic activity away from traditional industry toward services.

6. Conclusions

Understanding time preferences is crucial to how capital is allocated to innovation. Key determinants of time preference in capital formation to finance innovation include: interest rates, technological progress, income, economic stability (inflation), as well as demographic, cultural and social factors, and so forth. In addition, time preferences in innovation funding refer to the choice of appropriate forms of funding depending on the level of R&D expenditure and the nature of the innovation.

In contemporary Austrian economics, innovation and structural transformation are analysed through the lens of intertemporal choice and the organisation of production over time. A central role is assigned to the tendency of individuals to prefer earlier consumption, as well as to the structure of production composed of successive stages, including higher-order goods and more roundabout methods (Faber, 1986). The Austrian perspective, therefore, treats the economy as a vertically organised temporal process, drawing on Menger's distinction between higher- and lower-order goods. Neoclassical theory, in contrast, usually adopts a more horizontal view of economic time. Innovation-led development is thus understood not as movement within static equilibrium, but as a process unfolding under conditions of disequilibrium.

Currently, many economies are experiencing capital erosion caused by permanent inflation and growing private and public debt. The transfer of capital towards durable consumer goods has caused shortages in productive capital. Inflation has affected the size of profits and their increasing taxation. These processes have

directly limited the industrial sector and reduced the possibilities of creating technical progress.

Private productive capital has been very limited, and the funds taken over by governments have been largely consumed or wasted. Additionally, a number of regulations limit the scope of business activities and increase their operating costs, further reducing available capital. Consumption, in turn, is driven by debt and does not constitute a real reflection of product needs.

The acceleration of innovation processes should therefore result from the growth of capital resources, both productive and human. Greater freedom in the disposal of private resources and fewer regulatory constraints will positively influence technological change and create conditions for long-term economic development.

Authors' Contribution

The authors' individual contribution is as follows: Robert Ciborowski: analysis of the Austrian School's contribution to the time preference in creating capital to finance innovation. Karolina Trzaska: analysis of the determinants of time preference and the issue of universal time preference.

Conflict of Interest

The authors declare no conflict of interest.

References

- Cohen, J., Ericson, K. M., Laibson, D., & White, J. M. (2020). Measuring Time Preferences. *Journal of Economic Literature*, 58(2), 299–347. <https://doi.org/10.1257/jel.20191074>
- Faber, M. (Ed.). (1986). *Studies in Austrian Capital Theory, Investment and Time. Lecture Notes in Economics and Mathematical Systems* (Vol. 277). Springer. <https://doi.org/10.1007/978-3-642-51701-3>
- Fillieule, R. (2005). The “Values-Riches” Model: An Alternative to Garrison’s Model in Austrian Macroeconomics of Growth and Cycles. *The Quarterly Journal of Austrian Economics*, 8(2), 3–19. <https://doi.org/10.1007/s12113-005-1019-0>
- Garrison, R. W. (1986). Hayekian Trade Cycle Theory: A Reappraisal. *Cato Journal*, 6(2), 437–459. Retrieved from: <https://webhome.auburn.edu/~garrir/c4refah.htm> (accessed: 2.02.2025).
- Godłów-Legiędź, J. (1992). *Doktryna społeczno-ekonomiczna Friedricha von Hayeka*. Wydawnictwo Naukowe PWN.
- Hayek, F. A. (2005). *The Road to Serfdom. With the Intellectuals and Socialism*. The Institute of Economic Affairs.
- Hayek, F. A. (2009). *The Pure Theory of Capital*. Ludwig von Mises Institute.
- Hoppe, H.-H. (2006). *Demokracja – Bóg, który zawiódł: Ekonomia i polityka demokracji, monarchii i ładu naturalnego*. Fijorr Publishing.

Jevons, W. S. (1888). *The Theory of Political Economy*. Macmillan. Retrieved from: <https://www.econlib.org> (accessed: 2.02.2025).

Leeds, S. (2022). *How a 'Low Time Preference' Made Me a Multimillionaire*. Entrepreneur. Retrieved from: <https://www.entrepreneur.com/growing-a-business/how-a-low-time-preference-made-me-a-multimillionaire/421432> (accessed: 2.02.2025).

Menger, C. (2007). *Principles of Economics*. Macmillan.

Mischel, W., & Ebbesen, E. B. (1970). Attention in Delay of Gratification. *Journal of Personality and Social Psychology*, 16(2), 329–337. <https://doi.org/10.1037/h0029815>

Reisman, G. (2015). *Kapitał i kapitalizm XXI wieku, czyli od błędnej teorii do destrukcyjnych reform Piketty'ego*. Fijorr Publishing.

Rieger, M. O., Wang, M., & Hens, T. (2021). Universal Time Preference. *PLoS One*, 16(2), e0245692. <https://doi.org/10.1371/journal.pone.0245692>

von Mises, L. (1998). *Human Action*. Ludwig von Mises Institute.

von Mises, L. (2009). *The Theory of Money and Credit*. Ludwig von Mises Institute.

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Digital Competitiveness and Its Influence on Logistics Performance in Various Countries

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ABSTRACT

Objective: Examining the relationship between the country's ability to implement digital technologies and its logistics performance.

Research Design & Methods: To examine the relationship between a country's digital competitiveness and its logistics efficiency, Pearson's linear correlation analysis and simple linear regression analysis were used. The Digital Competitiveness obtained by a given country in the IMD World Digital Competitiveness Ranking was adopted as an independent variable, and the score obtained by a given country in the Logistics Performance Index: overall and other logistics performance sub-indices as a dependent variable. The analysis was conducted separately on two research samples from 2017 and 2022.

Findings: The digital competitiveness of a country has a positive impact on the overall efficiency of logistics, as well as on its component variables, such as: the efficiency of administrative services at borders, the quality of logistics infrastructure, the ease of planning competitively priced shipments, the quality of logistics services, the punctuality of parcel delivery, the ability to track and trace shipments.

Implications/Recommendations: An integrated policy for the implementation of Industry 4.0 should be developed, with a special focus on transportation and enterprise logistics. The policy should take into account changes in society, enterprises and government. Company managers should increase investment in the digitisation of logistics processes and take into account the values of digitisation and logistics performance indices in strategic decisions.

Contribution: This study is innovative due to the lack of current research on relationships between digital competitiveness and logistics performance.

Article type: original article.

Keywords: regression model, digitalisation, digital competitiveness, logistics, efficiency.

JEL Classification: M10, L91, L98.

1. Introduction

The digitalisation of businesses associated with the Fourth Industrial Revolution, or Industry 4.0, is taking place all over the world. However, its intensity and success vary between individual countries. The described state of digital transformation and its level of practical implementation in individual countries worldwide is represented by the so-called IMD World Digital Competitiveness Ranking index (IMD World Competitiveness Center, 2018, 2023).

Digitalisation and its practical effects affect both production and everyday life. The questions that arise from its definition are related to the concern about the implementation of digitalisation as part of Industry 4.0 and its impact on micro and macro logistics. It also relates to its quality in terms of securing resources, production itself, and product distribution. Supply chain management and the impact of digitalisation both on the entire supply chain and on its individual elements, are also significant. There may be, and certainly do occur, situations in which part of the chain has successfully implemented digitalisation measures, while another part is

still in the process of implementing digitalisation solutions. This creates bottlenecks in the system's flow.

Since logistics is understood as a flow management system, which is necessary to sell products on the market (Straka, 2019), the impact of its successful digitalisation on logistics can be considered fundamental. According to Kayikci (2018), the focus of digital transformation lies mainly on production. Therefore, terms such as “factory of the future” or “smart factory” are used synonymously with this concept. It follows then that logistics should gain a greater vision to fulfil the requirements of Industry 4.0 as sustainably as possible. This refers both to using appropriate technologies and to enhancing vertical and horizontal integration among the supply chain partners (Kayikci, 2018). Cichosz, Wallenburg, and Knemeyer (2020) state that the rapid advancement of digital technologies has fundamentally changed the competitive dynamics of the logistics service industry and forced logistics service providers to digitalise. However, many logistics service providers struggle to advance their digital transformation (Cichosz, Wallenburg & Knemeyer, 2020). Fusko, Rakyta, and Skokan (2020) state that behind the scenes of the world's leading industrial and manufacturing plants, a deep digital transformation is underway. This is due to new digital (disrupting) technologies, which allow for shortening delivery times, increasing resource utilisation, and maximising product quality (Fusko, Rakyta & Skokan, 2020). According to Gupta *et al.* (2022), logistics plays a very important role in any organisation. It becomes especially important in light of factors that impede the normal flow of goods through transportation systems, such as a pandemic. The use of information technology allows reacting quickly in such situations, so it promotes greater resilience of logistics systems to critical situations. However, in developing countries, digitalisation poses certain challenges (Gupta *et al.*, 2022). Other researchers also express a similar view on the issue in their works (Bartosek & Jurová, 2019; Schneider *et al.*, 2021; Wang & Sarkis, 2021).

Globally, it can be stated that the interest in digitalisation, or digital services is growing in all areas of logistics. However, from the point of view of the sustainability of effective implementation of practical digitalisation, the degree of reaching the desired functional state must be regularly monitored and analysed. A similar opinion is shared by Herold *et al.* (2021), who state that organisation theory researchers do not pay enough attention to the issue of digitalisation in logistics, despite the increasing use of information technology in this area. Hence, more and more authors are using an institutional approach in their work, recognising digitalisation as a social construct (Herold *et al.*, 2021). Lenort *et al.* state that the perceived potentials of digitalisation in logistics can be expected to affect financial, environmental, and social indicators, which still need to be scientifically evaluated (Lenort *et al.*, 2022). According to Parhi *et al.* (2022), sustainable Logistics 4.0, still in the nascent stage, is attracting the favourable attention of practitioners as it

provides an opportunity to improve sustainability aspects of the business through digital intervention. Technology infrastructure, digital solutions, top management's commitment, as well as governmental norms, were found to be the top contributing factors influencing the implementation of sustainable Logistics 4.0 (Parhi *et al.*, 2022). Cichosz states that Industry 4.0 technologies contribute to increasing the value of logistics services for customers, but do not replace them (Cichosz, 2018). Very interesting research findings are presented by Loske and Klumpp (2020), who state that logistics is of central importance in the development of digitalisation of the economy. This is due to the connection between the flow of information and material throughout supply chains. The results of the model indicate that a change in the level of digitalisation entails a loss of the efficiency level in the first stage, which can be compensated for and even surpassed later (Loske & Klumpp, 2020).

Currently, there is no doubt that the Fourth Industrial Revolution, Industry 4.0, and the digitalisation associated with it, also in the field of logistics, are being successfully implemented in practice. But what has been neglected so far is the identification of factors that influence the success of the transformation. Xu *et al.* also address this issue in their work, stating that it is necessary to measure the impact of digitalisation of logistics on the efficiency of natural resource deployment and depletion (Xu *et al.*, 2023). Haidi *et al.* state that the mediating role of customer collaboration between digitalisation of logistics and company performance based on corporate information processing theory must be explored, and the moderating role of government support must be examined (Haidi *et al.*, 2023). Buss, Oberbeck, and Tullius found in their research that ongoing changes should not be interpreted as technology-driven upheaval, but rather as industry-specific developments of systemic rationalisation (Buss, Oberbeck & Tullius, 2022). In order for the next industrial revolution, or Industry 5.0, to develop successfully, several analyses and evaluations of the previous revolution must be carried out. Some authors are currently working on the subject in their research work (De Andres Gonzalez *et al.*, 2021; Luo & Wang, 2023; Yang & Lin, 2024).

Taking into account the results of the above-mentioned research, it was considered appropriate to conduct a study aimed at examining the relationship between the country's ability to implement digital technologies and its logistics performance. This relates to both general terms and individual aspects of logistics, such as the quality of services, punctuality, or the ability to track deliveries.

2. Literature Background

Logistics Performance Index (LPI) is used in studies to assess the area of the economy related to transportation and logistics in various countries (cf. Lo Storto & Evangelista, 2023; Miškić *et al.*, 2023; Oğuz, 2023; Jonasikova & Konecny, 2024; Ju *et al.*, 2024).

Several important factors affect LPI. One is the quality of public management, as shown in a study conducted by Uyar, Fernandes and Kuzey (2021) on a large sample of 677 records, consisting of 144 countries and 5 study years. Another factor related to a country's policies and legal system is the level of corruption, which negatively affects the LPI (Saldanha & DeAngelo, 2022). A study conducted by Friske, Yun and Ozpolat (2025) on a sample of 287 observations from 2010, 2012, 2014, 2016 and 2018, from 92 countries showed a positive impact of the UK legal system, based on precedents, and the level of economic freedom.

Macroeconomic factors also affect the value of the LPI. A study by Ababou and Benomar (2024) found that Foreign Direct Investment (FDI) and trade (the sum of exports and imports) in relation to Gross Domestic Product (GDP) had a significant positive impact. Other studies have found GDP *per capita* and FDI to be statistically significant macroeconomic factors (Larson, 2020; Friske, Yun & Ozpolat, 2025).

Research using the Global Competitiveness Index (GCI) plays an important role in the study of a country's logistics performance factors. Such research was conducted by Kabak, Ekici, and Ülengin (2020) on panel data from 2010, 2012, 2014, 2016 from over 100 countries. Using structural modelling, they extracted the seven most important components of the GCI index affecting LPI: quality of business management, degree of development of financial markets, infrastructure, efficiency of the market for goods and services, education and training, technological readiness, and innovation. A similar study was conducted for the years between 2007 and 2017 by Kálmán and Tóth (2021) on a group of 160 countries. The factors with the strongest direct impact on LPI were the implementation of information and communications technology (ICT) and innovation (Kálmán & Tóth, 2021). Interesting research on the impact of GCI on LPI was also conducted by Chen and Hasan (2023). They proved the significant impact not only of the aforementioned GCI on LPI, but also the impact of shipping connectivity and quality of ports and infrastructure.

A very important factor determining the size of the LPI is the level of digitalisation of the country. Research in this area was conducted by Moldabekova *et al.* (2021). They conducted correlation and regression analyses between the Digital Economy and Society Index (DESI) and the LPI. The data covered the period from 2014 to 2018 and included 28 countries in the European Union. All correlations (except for digital public services) between the components of both indices proved statistically significant. Similarly, regression analysis confirmed a significantly statistical effect of the DESI and its components (except digital public services) on the LPI (Moldabekova *et al.*, 2021).

Also, Mance, Vilke and Debelić (2023) conducted a study on data from 11 countries for the period from 2011 to 2019 and confirmed the positive impact of infrastructure from the ICT area on LPI and access to ICT on LPI.

One of the more interesting studies on LPI factors was conducted by Larson (2020). He proved the direct negative impact of corruption and the negative impact of corruption through the indirect negative impact of gender inequality on LPI. Cultural differences are an equally interesting factor, but are rarely seen in this research area. A study by Kesavan and Deif (2021) found a negative impact of power distance and uncertainty avoidance, and a positive impact of individualism and long-term orientation. Research on the impact of LPI on other variables is equally important, as it highlights the importance of logistics performance for a country and its economy.

As for macroeconomic variables, first of all, there is a positive relationship between LPI and GDP *per capita* (Saini & Hrušecká, 2021; Karabulut & Civelek, 2023). A positive effect of LPI on export value added (Zaninović & Bugarčić, 2023) and on exports (Turna, 2024) has also been proven. Another important effect of logistics performance in the economy is a higher density of new businesses (new business density) and a higher number of patent applications (Friske, Yun & Ozpolat, 2025).

In addition, a country's higher level of LPI contributes to its competitiveness as measured by the GCI (Kalansuriya *et al.*, 2024).

3. Methodology

To examine the relationship between a country's digital competitiveness and its logistics efficiency, Pearson's linear correlation analysis and simple linear regression analysis were used. The Digital Competitiveness (*DC*) score obtained by a given country in the IMD World Digital Competitiveness Ranking was adopted as an independent variable, and the score obtained by a given country in the Logistics Performance Index: Overall (*LPI*) and other logistics performance sub-indices as a dependent variable. The analysis was conducted separately on two research samples from 2017 and 2022. As part of the study, the following hypotheses were formulated:

1. There is a positive correlation between the *DC* score and the *LPI*.
2. There is a positive correlation between the *DC* score and the Customs score (*CS*).
3. There is a positive correlation between the *DC* score and the Infrastructure score (*IS*).
4. There is a positive correlation between the *DC* score and the International Shipments score (*Ish*).
5. There is a positive correlation between the *DC* score and the Logistics Competence and Quality score (*LC&Q*).
6. There is a positive correlation between the *DC* score and the Timeliness score (*TS*).

7. There is a positive correlation between the *DC* score and the Tracking and Tracing score (*T&T*).

The variables were described based on digital competitiveness reports of respective countries for 2018 and 2023, prepared by the IMD World Competitiveness Center, as well as reports on logistics performed by the World Bank. These were the most up-to-date reports that contained both indices. It was not possible to include data for 2018, 2019, 2020, and 2021, because the values of the Logistics Performance Index for these years were not available.

The survey, which is the foundation for calculating the above-mentioned indices was conducted in 2017 and 2022, respectively (Arvis *et al.*, 2018, 2023; IMD World Competitiveness Center, 2018, 2023). The digital competitiveness index ranges from 0 to 100 points (IMD World Competitiveness Center, 2018; 2023). The ranking evaluates the degree to which countries adopt and use digital technologies, as it leads to changes in society, enterprises, and government administration. The ranking consists of three main factors (IMD World Competitiveness Center, 2018, 2023):

- knowledge – application knowledge, which is important in the development and implementation of new technologies,
- technology – factors influencing the development of digital technologies,
- future readiness – the level of the country's openness to digital transformation.

Data to calculate the index came from national, international, and regional statistics, as well as surveys conducted by an international panel of experts (IMD World Competitiveness Center, 2023).

The *LPI* consists of six sub-indices relating to: customs procedures, quality of infrastructure for the implementation of transport processes, price competitiveness of shipping, competence in the provision of logistics services and the quality of these services, ability to supervise shipments, punctuality of deliveries (Arvis *et al.*, 2018, 2023).

To verify the hypotheses, correlation and regression analysis were performed between the independent variable *DC* score and the dependent variables corresponding to *LPI* score and its sub-indices: Customs score, Infrastructure score, International Shipments score, Logistics Competence and Quality score, Timeliness score, Tracking and Tracing score.

4. Results

The research results were presented for 2017 ($n = 63$) and 2022 ($n = 63$). Table 1 shows the correlations between the score for digital competitiveness and the logistics performance index and its components.

The obtained correlation results (see Table 1) are statistically significant at the significance level of $p < 0.05$. They confirm the hypotheses regarding the relationships between the country's digital competitiveness and Logistics Performance

score and its components. Then, regression analysis was performed for individual dependent variables.

Table 1. Pearson’s Linear Correlation Coefficient

Variables	Correlations between <i>DC</i> and Other Variables and <i>p</i> -value	
	2017	2022
<i>LPI</i>	0.83 (<i>p</i> -value = 0.00)	0.47 (<i>p</i> -value = 0.00)
<i>CS</i>	0.86 (<i>p</i> -value = 0.00)	0.53 (<i>p</i> -value = 0.00)
<i>IS</i>	0.84 (<i>p</i> -value = 0.00)	0.59 (<i>p</i> -value = 0.00)
<i>Ish</i>	0.60 (<i>p</i> -value = 0.00)	0.39 (<i>p</i> -value = 0.00)
<i>LC&Q</i>	0.83 (<i>p</i> -value = 0.00)	0.53 (<i>p</i> -value = 0.00)
<i>TS</i>	0.76 (<i>p</i> -value = 0.00)	0.42 (<i>p</i> -value = 0.00)
<i>T&T</i>	0.81 (<i>p</i> -value = 0.00)	0.50 (<i>p</i> -value = 0.00)

Source: own study based on Arvis *et al.* (2018, 2023), IMD World Competitiveness Center (2018, 2023).

The results of the simple linear regression analysis describing the relationship between the independent variable *DC* score and *LPI* score and its sub-indices are presented in Table 2 and Table 3. The analysis was carried out in 2017 and 2022.

Table 2. Results of Regression Analysis between *DC* Score, *LPI* Score, and Its Component Variables for the Year 2017

Statistics	<i>LPI</i>	<i>CS</i>	<i>IS</i>	<i>Ish</i>	<i>LC&Q</i>	<i>TS</i>	<i>T&T</i>
<i>b</i>	0.02	0.03	0.03	0.01	0.02	0.02	0.02
<i>T</i>	11.57	12.94	12.13	5.92	11.82	9.26	10.71
<i>p</i> -value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>R</i> ² (%)	69	73	71	36	70	58	65
St. er. of est.	0.26	0.28	0.32	0.31	0.29	0.27	0.30
<i>F</i>	133.80	167.44	147.04	35.01	139.81	85.67	114.75

Source: own study based on Arvis *et al.* (2018, 2023), IMD World Competitiveness Center (2018, 2023).

For 2017, interpretation of the estimated value of the β_1 parameter allows the conclusion that an increase in the index value for the IMD World Digital Competitiveness Ranking by 1 point increases the *LPI* score value and its component variables in the range of 0.01 to 0.03 points. The value of the *t*-statistic and the corresponding level of significance confirm that the parameter β_1 differs significantly from zero for all dependent variables. Based on the obtained regression

analysis model, it can be concluded that the independent variable explains 69% of the *LPI* score variance. Depending on the dependent variable, the R^2 value ranges from 36% to 73%. So, it is only one case in which the R^2 value is below 50%. It could be caused by specific of *Ish*, which depends more on macroeconomic factors in each country than digital competitiveness. The average difference between the actual values of all dependent variables and the values predicted by the model was in the range of 0.26 to 0.32. The high value of the *F*-statistic for the models of the relationship between *DC* score and *LPI* score (and its component variables), and the corresponding probability level *p* ($p < 0.001$) confirm the statistical significance of the constructed linear models (cf. Mustafy, Rahman & Siddqui, 2024).

Table 3. Results of Regression Analysis between *DC* Score and *LPI* Score and Its Component Variables for the Year 2022

Statistics	<i>LPI</i>	<i>CS</i>	<i>IS</i>	<i>Ish</i>	<i>LC&Q</i>	<i>TS</i>	<i>T&T</i>
<i>b</i>	0.02	0.02	0.02	0.01	0.02	0.02	0.02
<i>T</i>	11.42	12.93	10.88	6.98	9.96	7.38	9.84
<i>p</i> -value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R^2 (%)	68	73	66	44	62	47	61
St. er. of est.	0.24	0.25	0.31	0.29	0.29	0.30	0.30
<i>F</i>	130.35	167.28	118.41	48.72	99.125	54.54	96.93

Source: own study based on Arvis *et al.* (2018, 2023), IMD World Competitiveness Center (2018, 2023).

For 2022, interpretation of the estimated value of the β_1 parameter allows the conclusion that an increase in the index value for the IMD World Digital Competitiveness Ranking by 1 point increases the *LPI* score value and its component variables in the range from 0.01 to 0.02 points. The value of the *t*-statistic and the corresponding level of significance confirm that the parameter β_1 differs significantly from zero for all dependent variables. Based on the obtained regression analysis model, it can be concluded that the independent variable explains 68% of the *LPI* score variance. Depending on the dependent variable, the R^2 value ranges from 44% to 73%. The variance of *Ish* was also explained by digital competitiveness at a level lower than 50%, which confirms earlier explanations. However, the variance in the punctuality of deliveries was explained by digital competitiveness also at a level lower than 50%, which could be caused by supply chain disruptions being an effect of the COVID-19 pandemic. The average difference between the actual values of all dependent variables and the values predicted by the model was in the range from 0.24 to 0.31. The high value of the *F*-statistic for the models of the relationship between *DC* score and *LPI* score and its component variables, and the

corresponding probability level p ($p < 0.001$) confirm the statistical significance of the constructed linear models (cf. Mustafy, Rahman & Siddqui, 2024).

5. Conclusion

The conducted research allowed achieving the assumed goal, which was to investigate the relationship between a country's digital competitiveness and logistics performance, both in general and individual aspects of logistics, which are sub-indices of the Logistics Performance Index.

The study confirmed the hypotheses, so it can be stated that:

1. The country's digital competitiveness has a positive impact on logistics performance in general, which is consistent with previous research on various digital technologies in logistics.

2. The country's digital competitiveness has a positive impact on the efficiency of administrative services at borders, which is consistent with the concept of sustainable Logistics 4.0 (Parhi *et al.*, 2022).

3. The country's digital competitiveness has a positive impact on the quality of logistics infrastructure, which also confirms the conclusions from research on the concept of sustainable Logistics 4.0 (Parhi *et al.*, 2022).

4. The country's digital competitiveness has a positive impact on the ease of planning competitively priced shipments.

5. The country's digital competitiveness has a positive impact on the quality of logistics services that are digitalised (Cichosz, Wallenburg & Knemeyer, 2020).

6. The country's digital competitiveness has a positive impact on the punctuality of parcel delivery, which is consistent with research that indicates an improvement in the timeliness of processes thanks to digitalisation (Fusko, Rakyta & Skokan, 2020).

7. The country's digital competitiveness has a positive impact on the ability to track and trace shipments because logistics itself is a flow management system (Straka, 2019). This means that the implementation of digitalisation in logistics is fundamental.

Pearson's linear correlation coefficients suggest a strong positive correlation between digital competitiveness and the parameters examined. The regression analysis performed for the analysed data showed that there is a positive relationship between digital competitiveness and the growth of other variables. The best fit of the model was obtained when comparing the *DC* score and the *CS*, which was confirmed by the values of Pearson's linear correlation coefficients (a strong positive correlation at $r = 0.86$). Based on the above, it can be concluded that this variable can be taken into account as a potential predictor when modelling the studied connections. This is because these variables are strong, and the analysis suggests that there is a strong relationship between digital competitiveness and the country's

logistic efficiency. This knowledge could be useful in developing economic development strategies and activities aimed at improving the competitiveness of a country in the international arena.

Please note that the described relationships turned out to be statistically significant in both analysed periods, i.e. 2017 and 2022. This was true despite significant events such as the COVID-19 pandemic, which took place between the analysed periods and had a significant impact on logistics, also in 2022. This indicates the permanence of the examined relationships. However, due to the multidimensional nature of these phenomena (some of the R^2 values are below 50%), further research on the impact of digitalisation on logistics performance is required.

6. Recommendations

Among researchers of LPI determinants, Friske, Yun and Ozolpat (2025) point out that economic policy makers can use LPI as a benchmark. Businesses, too, should take this indicator into account when making decisions about supply chain structure. This is especially important for companies that supply their products to many countries around the world. Small companies, on the other hand, according to these authors, should cooperate with companies supplying goods to countries with high LPI (Friske, Yun & Ozolpat, 2025).

In contrast, Lo Storto and Evangelista (2023) emphasise that in addition to the LPI, measures relating to sustainable development should be incorporated into a country's transportation policy. According to Azwardi, Fuadah and Syathiri (2024), transportation policies should use environmentally friendly development strategies based on assumptions such as environmentally friendly technologies used in the expansion of transportation infrastructure and investment in renewable energy sources. These authors also point to the need to invest in the digitalisation of logistics through the development of specialised digital platforms, the implementation of information and communication technologies, the Internet of Things and blockchain technologies.

On the other hand, Chen and Hasan (2023) advocate increasing the competitiveness of the port sector through greater participation of private enterprises and better management of port infrastructure. Kesavan and Deif (2021), on the other hand, highlight the role of human relations and communication in culturally diverse environments when implementing international logistics processes. This is important for both policymakers and logistics managers (Kesavan & Deif, 2021).

Taking into account the recommendations of other authors and the results of the research contained in this article, the following recommendations can be proposed:

1. An integrated policy for the implementation of Industry 4.0 should be developed with a special focus on the area of transportation and enterprise logistics,

which should take into account changes in society, enterprises and government administration.

2. Investment by transportation enterprises in digital technologies should be increased.

3. Initiatives involving cooperation between the public and private sectors for the digitalisation of public transportation and the digitalisation of logistics processes in enterprises should be established.

4. The LPI and IMD Digital Competitive Indices should be used in the development of digitisation and transportation policies at the national and international levels.

5. Strategic decisions in enterprises should be made based on data from logistics and digitisation indices and research in this area.

Given the dynamic nature of the phenomena examined in this article, further research is needed on the digitisation of international logistics processes. In recent years, the stability of global supply chains has become increasingly critical, underscoring the importance of thoroughly investigating the role of emerging information technologies, including AI, in enabling rapid decision-making within the logistics sector.

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Authors' Contribution

The authors' individual contribution is as follows: Paweł Łukasik: conceptualisation (lead), formal analysis (lead), methodology (lead), writing – original draft preparation (lead), writing – review & editing (lead). Martin Straka: conceptualisation (equal), methodology (equal), supervision (lead), writing – original draft preparation (equal). Renata Winkler: conceptualisation (equal), funding acquisition (lead), methodology (support), project administration (lead), writing – original draft preparation (equal), writing – review & editing (equal). Paweł Turek: conceptualisation (support), formal analysis (equal), methodology (equal), writing – original draft preparation (equal). Jerzy Szakiel: conceptualisation (support), formal analysis (equal), methodology (equal), writing – original draft preparation (equal).

Conflict of Interest

The authors declare no conflict of interest.

References

Ababou, M., & Benomar, I. (2024). Insights into the Interplay between Macroeconomic Factors and Logistics Performance Index. *Journal of Namibian Studies: History Politics Culture*, 40, 413–435.

Arvis, J.-F., Ojala, L., Shepherd, B., Ulybina, D., & Wiederer, C. (2023). *Connecting to Compete 2023: Trade Logistics in the Global Economy – The Logistics Performance Index and Its Indicators*. International Bank for Reconstruction and Development/The World Bank. Retrieved from: <https://documents1.worldbank.org/curated/en/099042123145531599/pdf/P17146804a6a570ac0a4f80895e320dda1e.pdf> (accessed: 6.04.2024).

Arvis, J.-F., Ojala, L., Wiederer, C., Shepherd, B., Raj, A., Diarabayeva, K., & Kiiski, T. (2018). *Connecting to Compete 2018: Trade Logistics in the Global Economy – The Logistics Performance Index and Its Indicators*. The International Bank for Reconstruction and Development/The World Bank. Retrieved from: <https://documents1.worldbank.org/curated/en/576061531492034646/pdf/Connecting-to-compete-2018-trade-logistics-in-the-global-economy-the-logistics-performance-index-and-its-indicators.pdf> (accessed: 6.04.2024).

Azwardi, A., Fuadah, L. L., & Syathiri, A. (2024). Competitiveness and Logistics Performance Index: How Does the Infrastructure Pillar Perform in ASEAN Countries? *Jurnal Perspektif Pembiayaan dan Pembangunan Daerah*, 12(1), 91–106. <https://doi.org/10.22437/ppd.v12i1.31408>

Bartosek, V., & Jurová, M. (2019). Digitalization of Logistic Processes by Customer Services. In: M. Kordoš (Ed.), *Proceedings of the International Scientific Conference on the Impact of Industry 4.0 on Job Creation* (pp. 34–39). Alexander Dubcek University.

Buss, K.-P., Oberbeck, H., & Tullius, K. (2022). Systemische Rationalisierung 4.0. Wie Wettbewerb und Geschäftsmodelle die Digitalisierung in Handel, Logistik und Finanzdienstleistungen prägen. *Berliner Journal für Soziologie*, 32, 35–68. <https://doi.org/10.1007/s11609-021-00459-1>

Chen, Y. C., & Hasan, M. K. (2023). Impacts of Liner Shipping Connectivity and Global Competitiveness on Logistics Performance: The Mediating Role of the Quality of Port and Infrastructure. *Transport*, 38(2), 87–104. <https://doi.org/10.3846/transport.2023.19372>

Cichosz, M. (2018). Digitalization and Competitiveness in the Logistics Service Industry. *e-mentor*, 5(77), 73–82. <https://doi.org/10.15219/em77.1392>

Cichosz, M., Wallenburg, C. M., & Knemeyer, A. M. (2020). Digital Transformation at Logistics Service Providers: Barriers, Success Factors and Leading Practices. *The International Journal of Logistics Management*, 31(2), 209–238. <https://doi.org/10.1108/IJLM-08-2019-0229>

De Andres Gonzalez, O., Koivisto, H., Mustonen, J. M., & Keinänen-Toivola, M. M. (2021). Digitalization in Just-in-Time Approach as a Sustainable Solution for Maritime Logistics in the Baltic Sea Region. *Sustainability*, 13(3), 1–24. <https://doi.org/10.3390/su13031173>

Friske, W., Yun, G., & Ozpolat, K. (2025). The Underappreciated Role of Logistics in National Systems of Entrepreneurship. *Journal of Research in Marketing and Entrepreneurship*, 27(1), 83–109. <https://doi.org/10.1108/JRME-05-2024-0134>

Fusko, M., Rakyta, M., & Skokan, R. (2020). How Digitisation Is Disrupting and Transforming Industry. *Acta Technologia*, 6(1), 25–30. <https://doi.org/10.22306/atec.v6i1.75>

Gupta, H., Yadav, A. K., Kusi-Sarpong, S., Khan, S. A., & Sharma, S. C. (2022). Strategies to Overcome Barriers to Innovative Digitalisation Technologies for Supply Chain Logistics

Resilience during Pandemic. *Technology in Society*, 69, 101970. <https://doi.org/10.1016/j.techsoc.2022.101970>

Haidi, Z., Qiang, W., Liang, W., Xiande, Z., & Gengzhong, F. (2023). Digitalization and Third-Party Logistics Performance: Exploring the Roles of Customer Collaboration and Government Support. *International Journal of Physical Distribution and Logistics Management*, 53(4), 467–488.

Herold, D. M., Ćwiklicki, M., Pilch, K., & Mik, J. (2021). The Emergence and Adoption of Digitalization in the Logistics and Supply Chain Industry: An Institutional Perspective. *Journal of Enterprise Information Management*, 34(6), 1917–1938. <https://doi.org/10.1108/JEIM-09-2020-0382>

IMD World Competitiveness Center. (2018). *The 2018 IMD World Digital Competitiveness Ranking*. Retrieved from: <https://cedakenticomedia.blob.core.windows.net/cedamediacontainer/kentico/media/general/publication/pdfs/wcydigitalranking2018.pdf> (accessed: 5.04.2024).

IMD World Competitiveness Center. (2023). *World Digital Competitiveness Ranking 2023*. Retrieved from: <https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-digital-competitiveness-ranking/> (accessed: 5.04.2024).

Jonasikova, D., & Konecny, V. (2024). Research of Individual Logistics Performance Index Indicators in European Union Countries. *Economic & Managerial Spectrum/Ekonomicko-manážerske Spektrum*, 18(1), 121–133. <https://doi.org/10.26552/ems.2024.1.121-133>

Ju, M., Mirović, I., Petrović, V., Erceg, Ž., & Stević, Ž. (2024). A Novel Approach for the Assessment of Logistics Performance Index of EU Countries. *Economics*, 18(1), 20220074. <https://doi.org/10.1515/econ-2022-0074>

Kabak, Ö., Ekici, Ş. Ö., & Ülengin, F. (2020). Analyzing Two-Way Interaction between the Competitiveness and Logistics Performance of Countries. *Transport Policy*, 98, 238–246. <https://doi.org/10.1016/j.tranpol.2019.10.007>

Kalansuriya, N., De Silva, S., Perera, N., Wanigarathna, B., Jayathilaka, R., Paranavitana, P., & Arachchige, S. C. (2024). Analysing the Influence of Logistics, Corruption, FDI and GDP on Global Competitiveness: A Cross-Sectional Study. *Journal of the Knowledge Economy*, 15, 13532–13551. <https://doi.org/10.1007/s13132-023-01615-z>

Kálmán, B., & Tóth, A. (2021). Links between the Economy Competitiveness and Logistics Performance in the Visegrád Group Countries: Empirical Evidence for the Years 2007–2018. *Entrepreneurial Business and Economics Review*, 9(3), 169–190. <https://doi.org/10.15678/EBER.2021.090311>

Karabulut, C., & Civelek, M. E. (2023). The Mediator Role of Starting New Business in the Relationship between Logistics Performance and Growth. *Journal of International Trade, Logistics and Law*, 9(1), 143–150.

Kayikci, Y. (2018). Sustainability Impact of Digitization in Logistics. *Procedia Manufacturing*, 21, 782–789. <https://doi.org/10.1016/j.promfg.2018.02.184>

- Kesavan, D. P., & Deif, A. M. (2021). Exploring National Culture Impact on Logistics Performance. *Transportation Journal*, 60(1), 20–42. <https://doi.org/10.5325/transportationj.60.1.0020>
- Larson, P. D. (2020). Corruption, Gender Inequality and Logistics Performance. *The International Journal of Logistics Management*, 31(2), 381–397. <https://doi.org/10.1108/IJLM-02-2019-0062>
- Lenort, R., Wicher, P., Samolejova, A., Zsifkovits, H., Raith, C., Miklautsch, P., & Pelikanova, J. (2022). Selecting Sustainability Key Performance Indicators for Smart Logistics Assessment. *Acta Logistica*, 9(4), 467–478. <https://doi.org/10.22306/al.v9i4.350>
- Lo Storto, C., & Evangelista, P. (2023). Infrastructure Efficiency, Logistics Quality and Environmental Impact of Land Logistics Systems in the EU: A DEA-Based Dynamic Mapping. *Research in Transportation Business & Management*, 46, 100814. <https://doi.org/10.1016/j.rtbm.2022.100814>
- Loske, D., & Klumpp, M. (2020). Verifying the Effects of Digitalisation in Retail Logistics: An Efficiency-Centred Approach. *International Journal of Logistics Research and Application*, 25(2), 203–227. <https://doi.org/10.1080/13675567.2020.1815681>
- Luo, R., & Wang, Q. M. (2023). Does Digitalization Promote the Green and High-Quality Development of Logistics Industry in the Yellow River Basin of China? *Polish Journal of Environmental Studies*, 32(3), 2749–2761. <https://doi.org/10.15244/pjoes/161513>
- Mance, D., Vilke, S., & Debelić, B. (2023). Impact of ICT on Regional Supply Chains in CEECs. *Ekonomski vjesnik/Econviews-Review of Contemporary Business, Entrepreneurship and Economic Issues*, 36(2), 373–384. <https://doi.org/10.51680/ev.36.2.12>
- Miškić, S., Stević, Ž., Tadić, S., Alkhayyat, A., & Krstić, M. (2023). Assessment of the LPI of the EU Countries Using MCDM Model with an Emphasis on the Importance of Criteria. *World Review of Intermodal Transportation Research*, 11(3), 258–279. <https://doi.org/10.1504/WRITR.2023.132501>
- Moldabekova, A., Philipp, R., Reimers, H. E., & Alikozhayev, B. (2021). Digital Technologies for Improving Logistics Performance of Countries. *Transport and Telecommunication Journal*, 22(2), 207–216. <https://doi.org/10.2478/ttj-2021-0016>
- Mustafy, T., Rahman, T., & Siddqui, N. (2024). *Engineering Data Analysis with MATLAB®*. Taylor & Francis Group, CRC Press.
- Oğuz, S. (2023). Evaluation of Customs, Infrastructure and Logistics Services with Multi-Criteria Decision-Making Methods: A Comparative Analysis for the Top 10 Countries in the Logistics Performance Index. *Journal of Management Marketing and Logistics*, 10(4), 167–178. <https://doi.org/10.17261/Pressacademia.2023.1837>
- Parhi, S., Joshi, K., Gunasekaran, A., & Sethuraman, K. (2022). Reflecting on an Empirical Study of the Digitalization Initiatives for Sustainability on Logistics: The Concept of Sustainable Logistics 4.0. *Cleaner Logistics and Supply Chain*, 4, 1–13. <https://doi.org/10.1016/j.clscn.2022.100058>
- Saini, M., & Hrušecká, D. (2021). Comparative Impact of Logistics Performance Index, Ease of Doing Business and Logistics Cost on Economic Development: A Fuzzy QCA

Analysis. *Journal of Business Economics and Management*, 22(6), 1577–1592. <https://doi.org/10.3846/jbem.2021.15586>

Saldanha, J., & DeAngelo, G. (2022). Regulatory Bark and Legal Bite: How Corruption and Country Institutional Environments Influence International Logistics Performance. *The International Journal of Logistics Management*, 33(3), 1069–1089. <https://doi.org/10.1108/IJLM-07-2021-0367>

Schneider, P., Ganesch, F., Schmierl, K., & Struck, O. (2021). Digitalisation and Job Quality in Transport Logistics Qualitative Findings from Germany. *Soziale Welt*, 72(4), 483–513.

Straka, M. (2019). *Distribution and Supply Logistics*. Cambridge Scholars Publishing, Lady Stephenson Library.

Turna, Y. (2024). Impact of Countries' Logistics Performance on Their Exports: The Case of G-8 Countries. *Journal of Transportation and Logistics*, 9(1), 60–67. <https://doi.org/10.26650/JTL.2024.1353603>

Uyar, A., Fernandes, V., & Kuzey, C. (2021). The Mediating Role of Corporate Governance between Public Governance and Logistics Performance: International Evidence. *Transport Policy*, 109, 37–47. <https://doi.org/10.1016/j.tranpol.2021.05.023>

Wang, Y., & Sarkis, J. (2021). Emerging Digitalization Technologies in Freight Transport and Logistics: Current Trends and Future Directions. *Transportation Research Part E: Logistics and Transportation Review*, 148, 102291. <https://doi.org/10.1016/j.tre.2021.102291>

Xu, A., Qian, F., Ding, H., & Zhang, X. (2023). Digitalization of Logistics for Transition to a Resource-Efficient and Circular Economy. *Resources Policy*, 83, 103616. <https://doi.org/10.1016/j.resourpol.2023.103616>

Yang, C.-S., & Lin, M. S. M. (2024). The Impact of Digitalization and Digital Logistics Platform Adoption on Organizational Performance in Maritime Logistics of Taiwan. *Maritime Policy Management*, 51(8), 1884–1901. <https://doi.org/10.1080/03088839.2023.2234911>

Zaninović, P. A., & Bugarčić, F. Ž. (2023). The Effects of International Logistics in Global Value Chain Trade. *Journal of Business Economics and Management*, 24(5), 841–856. <https://doi.org/10.3846/jbem.2023.20443>

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Heterogeneous Impact of Inflation on Firms

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ABSTRACT

Objective: The article aims to examine the relationship between inflation and the structure of the business sector, or how inflation affects different companies.

Research Design & Methods: The paper is mainly theoretical, but considerations presented are illustrated by relevant empirical data.

Findings: Inflation has a heterogeneous impact on companies. Because inflation does not affect all firms in the same way, it redistributes income and wealth among companies and affects the structure of prices and production.

Implications/Recommendations: The presented analysis supports the arguments that money is not neutral, even in the long run. What is important is that the new structure of prices and production will be suboptimal, to the detriment of the proper functioning of the price mechanism and the productivity of the economy. It strengthens arguments against expansionary monetary policy. The findings of this study emphasise the need for further research.

Contribution: This study contributes to our understanding of the nature and consequences of inflation and enriches the debate on the redistributive effects of inflation. It adds to the existing literature, which focuses on the effects of inflation on households, by presenting an analysis of the heterogeneous effects of inflation on firms.

Article type: original article.

Keywords: firms, inflation, non-neutrality of money, income and wealth redistribution, structure of prices, structure of production.

JEL Classification: E31, E51, L11.

1. Introduction

Economists are increasingly studying the heterogeneous impact that inflation has on economic agents. However, researchers focus on households (Ferreira *et al.*, 2023; Kiss & Strasser, 2024), concentrating mainly on analysing differences in expenditure patterns and inflation across income quintiles (Brainard, 2022; Klick & Stockburger, 2022; Corsello & Riggi, 2023; Jayashankar & Murphy, 2023). This is a valuable strand of research, although it ignores many aspects of inflation, which entails distributional effects through more channels than just diverse structures of expenditures within households (Sieroń, 2017a, 2019).

In this article, I focus on the heterogeneous impact of inflation on firms, which is not a sufficiently explored theme in the mainstream literature. There are a few papers on this topic, but they focus on the impact of the increase in energy prices (Guerrieri *et al.*, 2023; Weber *et al.*, 2024) or on the distinct response to increasing costs by firms of different sizes and productivity (Andrés & Burriel, 2018). The only exception I am aware of is the article by Belanová (2023), who found that the impact of inflation on businesses is heterogeneous, because, *inter alia*, the ability to pass on higher costs to customers differs among companies.

The article also contributes to the achievements of the Austrian School, which has always focused on the non-neutrality of money, the Cantillon effect, the structure of production and the heterogeneity of capital (von Mises, 1953, 1998; Skousen, 1990; Hayek, 2008; Rothbard, 2009; Cantillon, 2010). However, even within the Austrian literature, I have not come across a publication dealing entirely with the impact of inflation on different types of firms, apart from rather macroeconomic texts on the impact of credit expansion on the structure of production – this paper tries to fill this gap.

The remainder of the article is organised as follows. Section 2 starts with the analysis of the effects of uniform inflation. Section 3 examines the Cantillon effect and its consequences for the firms. Section 4 focuses on the role of firms' different structures of expenditures and assets in the process of inflation. Section 5 is devoted to how inflation affects the structure of companies in terms of selected parameters, such as size, sector, etc. Section 6 concludes.

2. Effects of Uniform Inflation on Firms

I shall begin my analysis of the impact of inflation on firms with a thought experiment in which the new money is evenly distributed in the economy, i.e., all market actors receive the new money at the same time and in proportion to their cash balances, and it leads to a proportional increase in prices. Even in such an unrealistic case, inflation may contribute to the redistribution of income and wealth among companies and to the changes in the structure of the business sector.

First, inflation has a different impact on the fiscal obligations of companies. Inflation decreases the real value of lump-sum taxes (and subsidies). The firms which pay poll or per-unit taxes (like excise taxes) will have a lower burden in real terms than firms paying income taxes (as a percentage of income). Moreover, in countries with progressive corporate income taxes, inflation leads to the so-called bracket creep (Wilson, 1982). And if the limits of tax deductions are not properly adjusted for inflation, the real burden of taxation increases.

Second, inflation reduces the real value of cash and cash equivalents. Hence, firm which hold more cash – such as retail companies, service companies, rather than manufacturing companies, and companies operating within the informal economy – are hurt more strongly by inflation.¹ Literature on households suggests that wealthier people hold a lower fraction of wealth in cash and its equivalents, and that they are more able to economise on cash and hedge against inflation (Kennickell & Starr-McCluer, 1996; Mulligan & Sala-i-Martin, 2000; Erosa & Ventura, 2002). The same logic applies to companies, i.e., larger entities are better equipped to protect themselves against inflation, as their wealth is less in cash in percentage terms, and they face a lower per-unit cost of financial services and credit purchases (Magerakis *et al.*, 2020).

Third, inflation distorts business accounting. This is because inputs and capital goods are normally included in the accounts at their acquisition price. In an inflationary environment, the prices of products increase, so when companies sell them, they record extra profits. However, these gains are illusory, as firms will have to replace capital goods, inventories or inputs at higher prices as well. In other words, the problem is that when companies do not make inflationary provisions, the capital is consumed (von Mises, 1953, pp. 203–206; 1998, pp. 545–547; Baxter, 1955, p. 99). The key point here is that firms are to varying degrees susceptible to the inflationary accounting illusion. A lot will depend on the experience of owners and accountants, but also on the nature of the business. Companies that relatively slowly turn over their assets through sales, or firms with a greater proportion of capital equipment to product, seem to be more sensitive to inaccurate accounting for inflation (Rothbard, 2009, pp. 989–994).

¹ Here and elsewhere in the paper, I make statements of this kind using a *ceteris paribus* clause.

Fourth, inflation entails menu costs, which are costs that firms incur due to changing their prices. These costs and related frequency of price changes vary across companies (Bils & Klenow, 2004). For example, e-commerce companies have smaller menu costs than brick-and-mortar firms, and airline prices are more flexible than prices of postage stamps (Golosov & Lucas, 2007; Hillen & Fedoseeva, 2021).

Fifth, inflation depreciates currency.² The decrease in the exchange rate will be relatively supportive for net exporters, while harmful for net importers.³ The net exporters include larger rather than smaller firms – or larger firms tend to export a higher share of their output (Hirsch & Adar, 1974; OECD, 2013) – and companies operating in the manufacturing sector rather than in the service sector (Eurostat, 2024).

Sixth, even if the money supply were to increase uniformly, the structure of demand would change. When the money supply increases, people will value each unit of money less, but not necessarily by the same percentage by which the money supply has increased. But even if such a scenario materialised, it would not mean that people would spend money on all goods in their pre-inflation basket in the same proportion. Thus, the structure of expenditures will change, which will modify the structure of prices and production (von Mises, 1953, p. 141).

In other words, even if one assumes that the price level rises proportionately to the increase in the money supply, the demand and prices of some goods will relatively increase, while the demand and prices of others will relatively decrease compared to the pre-inflation equilibrium. It means that inflation leads not only to a higher price level, but also to a different structure of relative prices, which supports a completely different structure of the business sector. What is important is that this new structure emerges not in response to endogenous market factors, but rather to exogenous increases in the money supply, which means that inflation distorts the structure of prices and production.

Last but not least, the theory about the proportional increase of prices in response to the rise in the money supply does not explain how this is actually happening, i.e., how prices actually go up in response to monetary impulses (Cantillon, 2010). In reality, companies set prices given the supply and demand conditions. Firms have different capacities to raise prices, without significantly worsening their situation (and, for example, without a negative effect on revenues). It means that even if there

² I included this effect in the section devoted to uniform inflation, although it should be noted that monetary impulses are reflected relatively quickly in the foreign exchange market (von Mises, 1998, pp. 452–453; Greszta *et al.*, 2023).

³ I wrote “relatively,” as it can be argued that beneficial effect for net exporters is illusory, resulting from the inflationary distortions of accounting and consumption of capital (von Mises, 1953, pp. 205–206).

is a uniform increase in the money supply, the prices will not rise proportionately, because different companies will increase the prices of their products by a dissimilar percentage, even in response to the same increase in costs.⁴ Bruine de Bruin *et al.* (2023) estimated a rate of cost-price pass-through in the range of 60% for the representative firm over 2022–2023, but with significant heterogeneity in this number across firms (some companies reported a pass-through greater than one).

Firms with larger pricing power – which depends partially on the changes in the demand in response to inflation – will be in a relatively better position during inflation, and the increase of input prices. Conceptually, faced with rising costs, companies can either raise the prices of their products, with unchanged profit margin, or look for cost savings elsewhere, or increase sales, or accept a fall in profits. Firms that have more potential for these actions – for example, larger companies that are able to implement cost-reducing technologies – will be in a better position. Cevik, Fan and Naik (2024) found that the heterogeneous impact of inflation on firms is related to companies' ability in input substitution, which seems to be greater for firms in tradable sectors (as less labour-intensive) relative to non-tradable sectors.

3. Inflation, Cantillon Effect, and Firms

The effects listed in the previous section are important, but the major problem of inflation is that prices do not rise in a uniform way. This means that inflation affects the structure of prices, which leads to changes in the structure of production. This allocation effect implies that inflation has a differential impact on the firms. I shall now discuss the further channels through which inflation affects firms.

First, there is the Cantillon effect, which is defined as “the non-neutral effect of money resulting from the fact that newly created money is neither evenly nor simultaneously distributed among the population” (Sieroń, 2017a, p. 639) or as “a distribution effect resulting from uneven changes in money supply” (Sieroń, 2019, p. 15). The idea is simple: Changes in money supply occur through changes in the cash balances of certain economic agents. They – and only they – enjoy larger cash balances at their disposal with prices still unchanged. As these entities have more money, they will value each monetary unit less. As a result, their spending will increase, as well as the prices of the goods purchased by them. This effect

⁴ Please note that models often assume that companies use cost-plus (markup) pricing. However, they do not explain how the costs, which are also prices (but of inputs) respond to inflation in the first instance. Instead, they assume that increase in costs is the cause of inflation, which is far from being satisfactory. After all, inflation is the rise in generally all prices, including the prices of inputs, and the rise in the prices of inputs is also something that theory of inflation should be able to explain. Moreover, from the economic point of view, costs are not externally given or fixed variables, to which prices must adjust, but rather factors that themselves conform to prices (Rothbard, 2009, pp. 588–600).

implies the redistribution of income and wealth from the late recipients of newly created money, who get the money only when prices have already increased, to the first recipients, who have enlarged cash balances with prices unchanged yet (Sieroń, 2019).

An important question in the context of the business sector is which firms are the early and which are the late recipients of new money. To provide an answer, it is necessary to point out earlier that, in the contemporary monetary system, the money supply is mostly created through the process of credit expansion (McLeay, Radia & Thomas, 2014). The implications of this fact are as follows.

First, financial markets are among the very first recipients of new money supply. This is because money is created when banks grant loans (or buy securities) or when the central bank purchases securities. This effect partially explains why the share of the financial sector of GDP has grown in virtually all developed countries over the last few decades. For example, the share of the financial sector in the American GDP increased from 4.9% in 1980 to 7.9% in 2007, while the stock market capitalisation increased from 50% to 141% GDP (Greenwood & Scharfstein, 2012). Thus, firms operating in this sector (or firms which have access to funding from this sector) can relatively benefit from inflation. Another relatively winning sector could be construction and real estate, as most loans granted by banks in modern economies are mortgages (Sieroń, 2021).

Second, banks prefer to grant loans to the most creditworthy firms first. What is important here is that creditworthiness is a function of wealth and the value of collateral (Balac, 2008). It has significant consequences for the allocation of capital. The logic of credit expansion supports relatively larger companies, which have more valuable collaterals and are more creditworthy, while some small companies may not even have collaterals and access to bank credit at all (Nguyen & Qian, 2012).

However, firms that can offer appropriate collateral (e.g., firms that have the right assets from the perspective of creditors) are not necessarily the most productive firms. Cecchetti and Kharroubi (2015) find that financial-sector growth disproportionately benefits high-collateral/low-productivity projects, which misallocates resources into activities whose output is easy to pledge as collateral and reduces growth in total factor productivity. Thus, the credit expansion changes the structure of production in a way that is not economically optimal.

Third, credit expansion lowers the interest rate, because the new money enters the economy through the credit market (Hayek, 2008). The decrease in the interest rate relatively supports firms that are net debtors, and firms that are operating in sectors sensitive to the interest rate changes, or that have such assets. Durable goods manufacturing and construction sectors are believed to be the most interest-sensitive sectors (Willis & Cao, 2015).

Fourth, according to the Austrian business cycle theory, credit expansion and lowering of interest rates encourage entrepreneurs to invest in processes that generate consumer goods in a far more distant future than consumers would like, or in capital goods for more roundabout, longer processes of production (von Mises, 1998; Garrison, 2001; Huerta de Soto, 2006; Hayek, 2008; Rothbard, 2009). In other words, according to the Austrian School, if the new money is injected into the economy through the credit expansion, the profitability of investment in stages of production farther from consumption rises, which encourages entrepreneurs to reorganise their spending more into producing capital goods rather than consumption goods. There is a relative rise in prices of the former goods and of turnover at the stages of production more distant from consumption. When the credit expansion halts or even slows down, these shifts in the structure of relative prices and of production reverse. However, the process of credit expansion supports companies operating relatively far from the consumer sector. It is, of course, not possible to match industry-level data to the conceptual structure of production, but it seems that most researchers would agree that mining and logging, construction, and manufacturing represent stages of production relatively distant from consumption (Foldvary, 2015; Schaffer, 2017).

4. Inflation and Firms' Structure of Expenditures and Assets

An increase in the money supply practically never entails uniform price inflation, partially because of the unequal distribution of new money, i.e., the Cantillon effect, analysed above.⁵ The changes in the structure of relative prices lead to modifications in the structure of production and to further alterations in income distribution due to the fact that firms have a different structure of expenditure and assets.

First, monetary inflation entails redistribution of income from firms that buy goods and services at prices increasing faster than the prices of the goods and services they sell, to companies that sell goods and services at prices increasing faster than the prices of goods and services they buy, or from companies that buy more of the goods and services whose prices increase relatively. In other words, the structure of expenditures will be an important factor contributing to the heterogeneous impact of inflation on firms.⁶ It seems that energy intensity is of particularly great importance here. This is because the prices of energy inputs are very volatile

⁵ In theory, we can imagine a situation in which people who were the first to receive new money decided in solidarity to destroy it, or that through some strange coincidence, the structure of expenditures in the society following an increase in the money supply, together with its distribution consequences, would be identical to the structure prior to the increase. However, in practice, we can disregard such cases of neutrality of money (uniform price inflation) as highly unrealistic.

⁶ However, if all prices changed at the same time in the same proportion, the structure of expenditure would not matter.

(Belanová, 2023).⁷ Indeed, the energy prices rose the most during the post-pandemic recovery among the components of the Producer Price Index for final demand in the US, as the Figure 1 shows. Thus, companies with higher energy intensity could experience recent inflation more strongly.

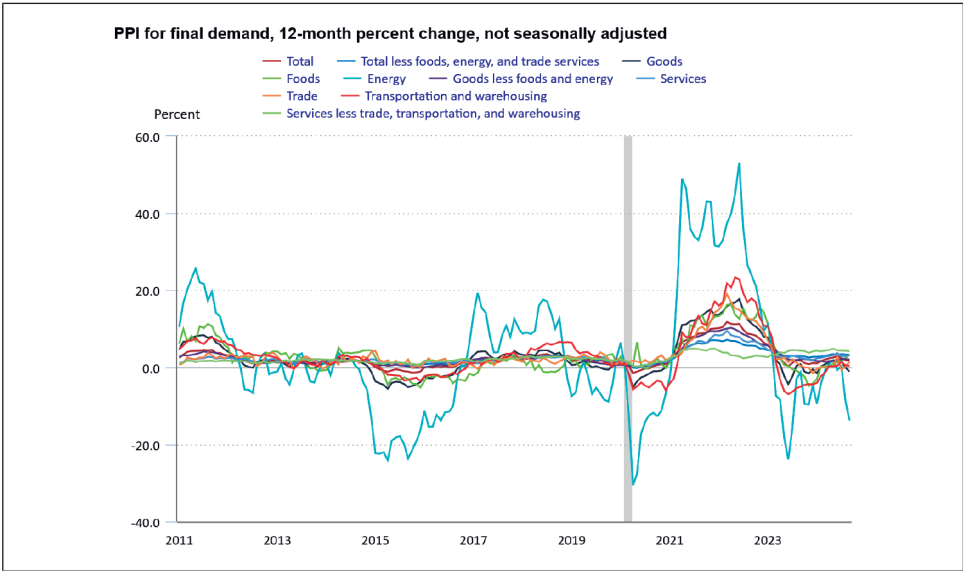


Fig. 1. Components of US PPI for Final Demand, 12-month % Change, Not Seasonally Adjusted
Source: U.S. Bureau of Labor Statistics (2024).

The example of French manufacturing firms in the period from Q1 2021 to Q2 2022 can be illustrative. Lafrogne-Joussier, Martin and Mejean (2023) found an important heterogeneity among these companies’ exposure to an increase in the prices of imported inputs and energy. For the median firm, these shocks lifted output prices by around 0.54 and 0.37 percentage points, respectively. However, for the one per cent most exposed companies to each of these shocks, the numbers were 7.1 and 6.7 percentage points, respectively. The most affected industries were chemicals, metals, paper, and textiles (Lafrogne-Joussier, Martin & Mejean, 2023).

The labour-intensity will be also of great importance, as labour costs are one of the largest parts of the total business costs (Paycor, 2022). However, during the post-pandemic inflation, the increase in prices of services in the euro area has been stronger in services sectors that are less-labour intensive and more intensive in non-labour inputs (Lane, 2022).

⁷ Also the extent to which long-term contracts are used relative to spot markets will be important for the impact of inflation on firms.

Second, monetary inflation entails the redistribution of wealth from companies whose assets increase more slowly in price as a result of inflation to those whose assets rise more rapidly in price. In other words, not only the structure of expenditures, but also the structure of assets is important. The crucial fact here is that the larger firms typically have smaller holdings of cash and greater holdings of inflation-resistant assets than smaller companies.

The structure of assets can actually be generalised into the composition of the balance sheet. After all, an important channel of redistribution is from creditors to debtors. Some prices cannot be quickly adjusted because they are fixed. Because inflation reduces the real value of nominal liabilities, creditors, that is, debt-holders, suffer from inflation for the benefit of debtors (Fisher, 1933). Small companies rely more on internal funds (Berger & Udell, 1998; World Bank, 2019), while larger firms have a higher proportion of debt (Upneja, Hyunjoon & Singh, 2000; Chatterjee & Eyigungor, 2023).

5. Inflation and Types of Companies

Now that we know the different redistributive mechanisms of inflation in the business sector, we can analyse how inflation affects various firms, in terms of size, sector, or the nature of the goods offered.

First, inflation affects companies of different sizes differently. It seems that inflation is relatively harmful for smaller companies. For example, in a survey of 1,000 businesses around the UK in June 2023, it turned out that 77% of the total businesses and 84% of micro-businesses (companies with less than 10 employees) reported that the rising inflation rates in the country have had a negative impact on their businesses (Amphunan, 2023).

This is because smaller firms are less indebted and have fewer long-term contracts for inputs. They have weaker access to bank credit and fewer assets that could serve as an inflation hedge or collateral. They have lower profit margins and are generally less able to protect themselves against inflation. Small companies are concentrated in the service sector (Exploring Business, 2016), which seems to benefit less from credit expansion and inflation (compared to, for example, the construction sector).⁸

Second, inflation affects companies in various sectors differently. Firms producing capital goods (or extracting natural resources) seem to relatively benefit from credit expansion as they operate in stages of production farther from consumption. Financial and construction sectors also seem to relatively benefit as early

⁸ On the other hand, smaller and less productive companies have stronger cost pass-through than larger and more productive firms, whose initial response of output prices is smaller, and it takes longer for them to fully adjust to the cost shock (Andrés & Burriel, 2018).

recipients of new money. The fact that the value of the US main stock market index and house price index rose much more than CPI during the post-pandemic recovery is illustrated in the Figure 2. The financial and construction sectors can also benefit because certain financial assets and real estate are considered to be good inflation hedges or good assets in low-interest rates environment. The construction sector is also sensitive to the lowering of the interest rates.

When it comes to firms operating in services and goods sectors, the former have lower energy intensity (Ritchie, Rosado & Roser, 2023), so they will suffer less in inflation episodes during which energy prices substantially rise.⁹ They are also smaller companies within the services sector, so the heterogeneous impact of inflation on firms in terms of size will affect different sectors accordingly.

On the other hand, it seems that productivity improvements in services are harder to achieve than in goods-producing industries, which means that a firm operating in the latter sector could have more room to absorb cost increases (Baumol, 1967). Indeed, the price decreases are more prevalent in the goods sector, as Figures 3 and 4 show (for the US and the euro area, respectively). However, these charts also present that the price of goods increased much higher than the price of services in the aftermath of the pandemic, as there was a shift in the structure of consumer spending from services to goods due to the health restrictions and social-distancing measures (Gros, 2020).

There is also a question of the impact of inflation on firms with more and less market power. It seems that firms operating in competitive markets have less room to increase prices in response to rising costs. In one survey, about 70% of companies reported that competition limited their potential to adjust prices (Gödl-Hanisch & Menkhoff, 2023). Thus, cost pass-through may be larger within concentrated markets (Brauning, Fillat & Joaquim, 2022). However, companies with market power may also try to gain market share over their competitors by not (fully) adjusting product prices in a period of rising costs (Amiti, Itskhoki & Konings, 2019).

Third, when it comes to the nature of goods, inflation makes the production of cheaper goods of lower quality more profitable. Firms can substitute the expensive inputs with cheaper ones or shrink the size or volume of the product instead of increasing the nominal price (Sieroń, 2017b). Moreover, the price elasticity of demand for luxury goods is higher than for necessities, so the demand should shift into basic goods. On the other hand, production of high-margin goods is more resilient to inflation, and production of luxury goods seems to yield higher margins. Also, strong brands and companies selling products to relatively richer consumers seem to have more room for price increases.

⁹ The services sector seems to have higher labour intensity, so companies operating within this sector should suffer more in inflation episodes during which wages substantially rise.

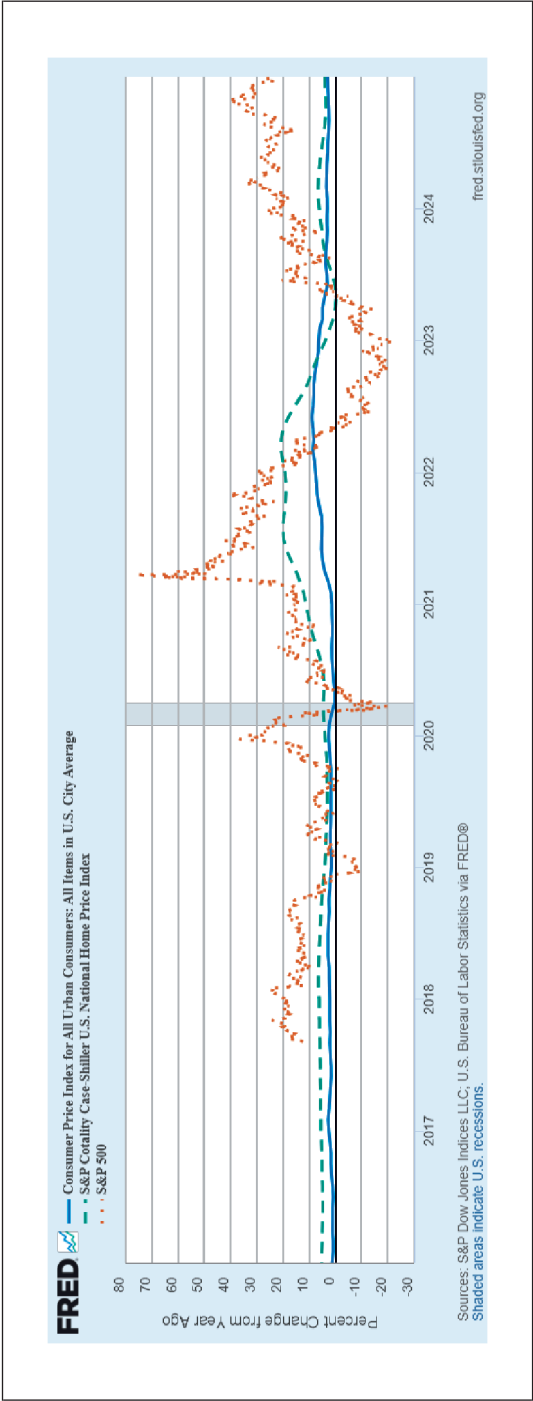


Fig. 2. US Consumer Price Index, S&P Case-Shiller US National Home Price Index, and S&P 500 Index in 2016–2024
Source: Federal Reserve Bank of St. Louis (2024).

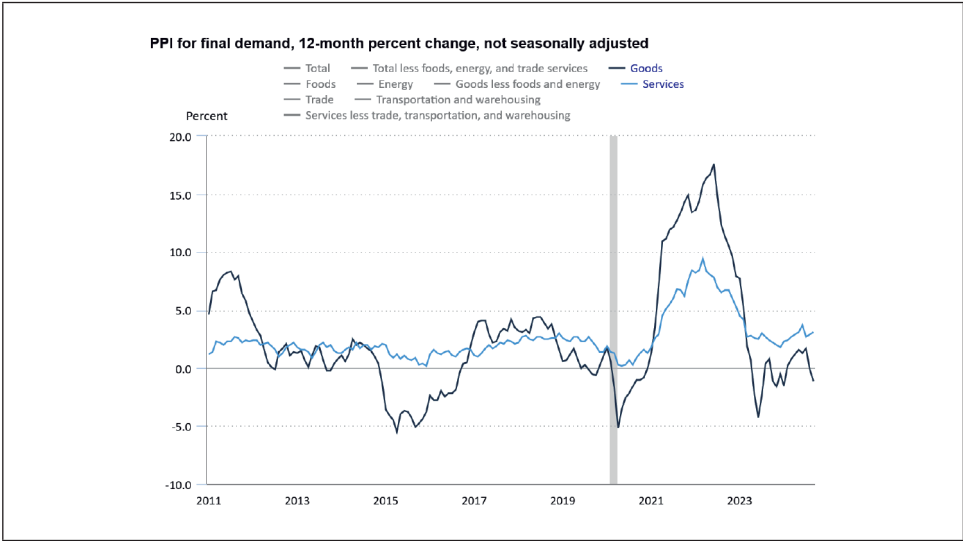


Fig. 3. Components of US PPI for Final Demand, 12-month % Change, Not Seasonally Adjusted

Source: U.S. Bureau of Labor Statistics (2024).

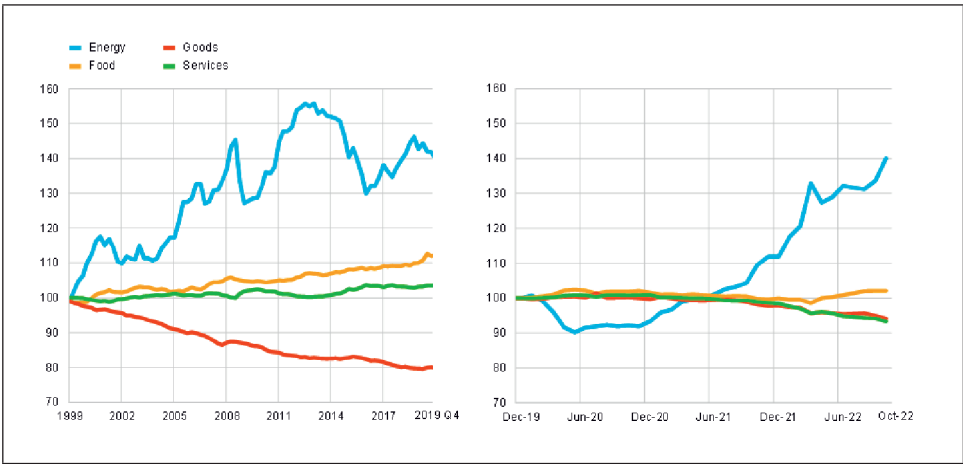


Fig. 4. Price Developments Relative to HICP for Different Subcomponents (Left – Index: 1998 Q4 = 100, Right – Index: December 2019 = 100)

Source: Lane (2022).

According to some research, the post-pandemic inflation was accompanied by “cheapflation,” i.e., “a faster rise in prices of cheaper goods relative to prices of more expensive varieties of the same good” (Cavallo & Kryvtsov, 2024, p. 1). Cavallo and Kryvtsov (2024) mention a few mechanisms that could explain this phenomenon, including the increase in relative demand for cheaper products as substitutes or the quicker cost pass-through to consumer prices due to lower profit margins of such products. It might also be the consequence of the absolute increase in some costs – when we add the same number to the lower and higher prices, the relative price of the cheaper good increases, making it relatively less attractive. In any case, if the prices of cheaper products increase faster than their more expensive counterparts, there is a price compression, which seems to be detrimental to producers of relatively cheaper goods purchased by relatively poor households.

6. Conclusions

In this article, I have offered an analysis of the heterogeneous effects of inflation on firms. I demonstrated that even uniform monetary inflation entails income and wealth redistribution and affects the structure of the business sector, because companies differ in terms of their cash holdings, fiscal obligations, menu costs, inflationary adjustments of financial statements, or sensitivity to the depreciation of the exchange rate.

In reality, however, the new money supply never enters the economy evenly, and prices do not change in a uniform way. This means that monetary inflation always entails redistribution of income and wealth (the Cantillon effect). Generally, such redistribution goes from companies whose incomes rise more slowly as a result of inflation (i.e., creditors, late recipients of new money) to firms whose incomes rise more rapidly (i.e., debtors, early recipients of newly created money). The former businesses include also those who observe prices of their assets and offered goods rising more slowly, while the prices of purchased goods increase faster. Meanwhile, the latter companies include those who observe prices of their assets and offered goods at rising prices, while the prices of purchased goods increase more slowly.

As the new money enters the economy through the process of credit expansion, there will be also redistribution of income and wealth from firms that operate in stages of production closer to consumption, insensitive to interest rates, and without access to credit to those with such an access to companies that in stages of production farther from consumption, sensitive to interest rates, and with high creditworthiness.

It seems that inflationary redistribution of income and wealth occurs from smaller to larger companies. This is because the former firms are less credit-worthy,

operate in the services sector and stages of production closer to consumption, and generally have less ability to protect themselves against inflation than larger firms.

The presented analysis supports the arguments that money is not neutral, even in the long run.¹⁰ This is because inflation does not affect all firms in the same way, which means that it affects the structure of prices and production. What is important is that the new structure of production and allocation of capital will be suboptimal – it would emerge with inflation, which adds noise to the signals conveyed by the price mechanism – to the detriment of the productivity of the economy (Hayek, 1948; Lucas, 1972; Friedman, 1977; Adam, Alexandrov & Weber, 2024).

This paper contributes to our understanding of the nature and consequences of inflation also in other ways. It shows that inflation is not simply a matter of the relation between aggregate demand and capacity utilisation, but that it can occur together with under-utilisation of resources. This is because the increase in the money supply has inflationary effects even if some of the resources are not fully used. What is important here is that inflation always distorts the structure of relative prices and production and has a heterogeneous impact on the business sector, which means that inflation and structural problems can occur together.

The article enriches the debate on the redistributive effects of inflation. The literature focuses on the redistribution of income and wealth between households, but inflation also affects the income and wealth of companies. It is an important phenomenon on its own, especially for the economics of inflation, as well as for the economics of firms and inequality between them (Loecker, Obermeier & van Reenen, 2024). However, it can also increase our understanding of inequality between households, because divergence in business performance can contribute to wage inequality and because firms are ultimately owned by households (OECD, 2021). What is important is that inflation leads to the structure of production and income (and wealth) that is not justified fully by real or market factors – it means that some incomes will be of an inflationary nature rather than earned – but that is partially distorted by monetary factors. It weakens the signalling, coordinating, allocative, and rewarding functions of the price mechanism, and it creates winners and losers in an arbitrary, random way.¹¹

¹⁰ The long-run is commonly defined as the period when the economy has already achieved the equilibrium after the monetary impulse, while the short run as temporary period when the real sphere has been disrupted and not yet returned to the equilibrium (Fisher, 1922). The article does not deny the equilibrium trend in the economy, but it strengthens the argument that, after the monetary disturbance, the economy will not return to its original equilibrium (or equilibrium path) with only nominal variables changed.

¹¹ What is more, if firms make some irreversible investments that are profitable during inflation, they could be more willing to support inflationary policies, making inflation more persistent. See: Acemoglu, Johnson and Robinson (2001) who make such an argument but about institutional persistence.

What are the policy implications of this article? I believe that the redistributive impact of inflation on the structure of the business sector strengthens arguments against expansionary monetary policy, which could unintentionally lead to income and wealth redistribution between firms, and to changes in the structure of production, despite the lack of legitimacy of central banks to redistribute income and wealth among society, and to allocate capital. It is worth mentioning here that if inflation hits smaller firms harder, it can lead to higher market concentration, which is often associated with reduced competition and higher prices for consumers (Aznar, 2024).

The article is by no means exhaustive, and its findings emphasise the need for further research. Empirical studies showing the behaviour of prices and profits indicators in different companies during inflation, as well as papers investigating the process of price formation, would be particularly fruitful.

Conflict of Interest

The author declares no conflict of interest.

References

- Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review*, 9(15), 1369–1401. <https://doi.org/10.1257/aer.91.5.1369>
- Adam, K., Alexandrov, A., & Weber, H. (2024). *Inflation Distorts Relative Prices: Theory and Evidence* (Deutsche Bundesbank Discussion Paper No. 23/2024). Deutsche Bundesbank. Retrieved from: <https://ssrn.com/abstract=4886066> (accessed: 14.08.2024).
- Amiti, M., Itskhoki, O., & Konings, J. (2019). International Shocks, Variable Markups, and Domestic Prices. *The Review of Economic Studies*, 86(6), 2356–2402. <https://doi.org/10.1093/restud/rdz005>
- Amphunan, K. (2023). *Do Small Businesses Suffer the Most from Rising Inflation?* Savanta. Retrieved from: <https://savanta.com/knowledge-centre/view/do-small-businesses-suffer-the-most-from-rising-inflation/> (accessed: 8.10.2024).
- Andrés, J., & Burriel, P. (2018). Inflation and Optimal Monetary Policy in a Model with Firm Heterogeneity and Bertrand Competition. *European Economic Review*, 103, 18–38. <https://doi.org/10.1016/j.eurocorev.2017.12.009>
- Aznar, P. (2024). The Moderating Effect of Seasonality in the Hotel Industry. Does Market Concentration Favour Tacit Collusion? *European Journal of Tourism Research*, 37, 3711. <https://doi.org/10.54055/ejtr.v37i.3515>
- Balac, Z. (2008). Monetary Inflation's Effect on Wealth Inequality: An Austrian Analysis. *Quarterly Journal of Austrian Economics*, 11(1), 1–17. <https://doi.org/10.1007/s12113-008-9028-4>

- Baumol, W. J. (1967). Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crises. *American Economic Review*, 57(3), 415–426.
- Baxter, W. T. (1955). The Accountant's Contribution to the Trade Cycle. *Economica. New Series*, 22(86), 99–112. <https://doi.org/10.2307/2626845>
- Belanová, K. (2023). How Increased Inflation Affects Businesses. *SAR Journal-Science and Research*, 6(1), 3–8. <https://doi.org/10.18421/SAR62-01>
- Berger, A., & Udell, G. F. (1998). The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle. *Journal of Banking & Finance*, 22(6–8), 613–673. [https://doi.org/10.1016/S0378-4266\(98\)00038-7](https://doi.org/10.1016/S0378-4266(98)00038-7)
- Bils, M., & Klenow, P. J. (2004). Some Evidence on the Importance of Sticky Prices. *Journal of Political Economy*, 112(5), 947–985. <https://doi.org/10.1086/422559>
- Brainard, L. (2022). *Variation in the Inflation Experiences of Households*. Speech at the Spring 2022 Institute Research Conference, Opportunity and Inclusive Growth Institute, Federal Reserve Bank of Minneapolis, Minneapolis, Minnesota, 5 April, 2022. Board of the Governors of the Federal Reserve System. Retrieved from: <https://www.federalreserve.gov/newsevents/speech/brainard20220405a.htm> (accessed: 13.08.2024).
- Brauning, F., Fillat, J., & Joaquim, G. (2022). *Cost-Price Relationships in a Concentrated Economy*. Federal Reserve Bank of Boston Current Policy Perspectives, 23 May.
- Bruine de Bruin, W., Dogra, K., Heise, S., Knotek, E. S., II, Meyer, B. H., Rich, R. W., Schoenle, R. S., Topa, G., & van der Klaauw, W. (2023). How Do Firms Adjust Prices in a High Inflation Environment? *Liberty Street Economics*, 2 June. Retrieved from: <https://libertystreeteconomics.newyorkfed.org/2023/06/how-do-firms-adjust-prices-in-a-high-inflation-environment/> (accessed: 13.08.2024).
- Cantillon, R. (2010). *Essay on the Nature of Trade in General*. Ludwig von Mises Institute. (Original work published 1755).
- Cavallo, A., & Kryvtsov, O. (2024). Price Discounts and Cheapflation during the Post-pandemic Inflation Surge. *Journal of Monetary Economics*, 148(Supplement), 103644. <https://doi.org/10.1016/j.jmoneco.2024.103644>
- Cecchetti, S., & Kharroubi, E. (2015). *Why Does Financial Sector Growth Crowd out Real Economic Growth?* (BIS Working Papers No. 490). Bank for International Settlements.
- Cevik, S., Fan, A., & Naik, S. (2024). *Is Inflation Good for Business? The Firm-level Impact of Inflation Shocks in the Baltics, 1997–2021* (IMF Working Paper No. 24/43). International Monetary Fund. <https://doi.org/10.5089/9798400269059.001>
- Chatterjee, S., & Eyigungor, B. (2023). The Firm Size-leverage Relationship and Its Implications for Entry and Business Concentration. *Review of Economic Dynamics*, 48, 132–157. <https://doi.org/10.1016/j.red.2022.04.002>
- Corsello, F., & Riggi, M. (2023). *Inflation Is Not Equal for All: The Heterogenous Effects of Energy Shocks* (Banca D'Italia Working Paper No. 1429). Banca D'Italia. <https://doi.org/10.32057/0.TD.2023.1429>

Erosa, A., & Ventura, G. (2002). On Inflation as a Regressive Tax. *Journal of Monetary Economics*, 49(4), 761–795. [https://doi.org/10.1016/S0304-3932\(02\)00115-0](https://doi.org/10.1016/S0304-3932(02)00115-0)

Eurostat. (2024). *World Trade in Services, Statistics Explained*. Retrieved from: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=World_trade_in_services (accessed: 9.10.2024).

Exploring Business. (2016). *Section 5.3: What Industries Are Small Businesses in?* University of Minnesota. Retrieved from: <https://open.lib.umn.edu/exploringbusiness/chapter/5-3-what-industries-are-small-businesses-in/> (accessed: 17.10.2024).

Federal Reserve Bank of St. Louis. (2024). *Consumer Price Index for All Urban Consumers: All Items in U.S. City Average*. Retrieved from: <https://fred.stlouisfed.org/series/CPIAUCSL> (accessed: 17.10.2024).

Ferreira, C., Leiva, J. M., Nuño, G., Ortiz, A., Rodrigo, T., & Vazquez, S. (2023). *The Heterogeneous Impact of Inflation on Households Balance Sheets* (BIS Working Paper No. 1152). Bank for International Settlements.

Fisher, I. (1922). *The Purchasing Power of Money, Its Determination and Relation to Credit, Interest and Crises*. Macmillan.

Fisher, I. (1933). The Debt-Deflation Theory of Great Depressions. *Econometrica*, 1(4), 337–357. <https://doi.org/10.2307/1907327>

Foldvary, F. E. (2015). The Austrian Theory of the Business Cycle. *American Journal of Economics and Sociology*, 74(2), 278–297. <https://doi.org/10.1111/ajes.12098>

Friedman, M. (1977). Nobel Lecture: Inflation and Unemployment. *Journal of Political Economy*, 85(3), 451–472. <https://doi.org/10.1086/260579>

Garrison, R. W. (2001). *Time and Money: Macroeconomics of Capital Structure*. Routledge.

Gödl-Hanisch, I., & Menkhoff, M. (2023). *Firms' Pass-Through Dynamics: A Survey Approach* (CESifo Working Paper Series No. 10520). CESifo.

Golosov, M., & Lucas, R. E., Jr. (2007). Menu Costs and Phillips Curves. *Journal of Political Economy*, 115(2), 171–199. <https://doi.org/10.1086/512625>

Greenwood, R., & Scharfstein, D. (2012). *The Growth of Modern Finance* (Social Science Research Network Working Paper). Retrieved from: <https://ssrn.com/abstract=2162179> (accessed: 23.10.2024).

Greszta, M., Humanicki, M., Kapuściński, M., Kleszcz, T., Kocięcki, A., Kotłowski, J., Ledóchowski, M., Łesyk, M., Łyziak, T., Pipień, M., Popowski, P., Stanisławska, E., Szafranek, K., Szafranski, G., Ścibisz, D., Wesołowski, G., & Wróbel, E. (2023). *Monetary Policy Transmission Mechanism in Poland. What Do We Know in 2023?* (NBP Working Paper No. 365). Narodowy Bank Polski.

Gros, D. (2020). Europe and the COVID-19 Crisis: The Challenges Ahead. *CEPS Policy Insights*, 20 September. Retrieved from: https://www.ceps.eu/wp-content/uploads/2020/09/PI2020-20_Europe-and-the-Covid-19-crisis.pdf (accessed: 5.10.2021).

- Guerrieri, V., Marcussen, M., Reichlin, L., & Tenreyro, S. (2023). *Geneva 26: The Art and Science of Patience: Relative Prices and Inflation*. CEPR Press. Retrieved from: <https://cepr.org/publications/books-and-reports/geneva-26-art-and-science-patience-relative-prices-and-inflation> (accessed: 13.08.2024).
- Hayek, F. A. (1948). The Use of Knowledge in Society. In: F. A. Hayek (Ed.), *Individualism and Economic Order* (pp. 77–91). University of Chicago Press.
- Hayek, F. A. (2008). Prices and Production. In: J. Salerno (Ed.), *Prices and Production and Other Works: F. A. Hayek on Money, the Business Cycle, and the Gold Standard* (pp. 189–329). Ludwig von Mises Institute. (Original work published 1935).
- Hillen, J., & Fedoseeva, S. (2021). E-commerce and the End of Price Rigidity? *Journal of Business Research*, 125, 63–73. <https://doi.org/10.1016/j.jbusres.2020.11.052>
- Hirsch, S., & Adar, Z. (1974). Firm Size and Export Performance. *World Development*, 2(7), 41–46. [https://doi.org/10.1016/0305-750X\(74\)90046-1](https://doi.org/10.1016/0305-750X(74)90046-1)
- Huerta de Soto, J. (2006). *Money, Bank Credit, and Economic Cycles*. Ludwig von Mises Institute.
- Jayashankar, A., & Murphy, A. (2023). *High Inflation Disproportionately Hurts Low-Income Households*. Federal Reserve Bank of Dallas. Retrieved from: <https://www.dallasfed.org/research/economics/2023/0110> (accessed: 13.08.2024).
- Kennickell, A. B., & Starr-McCluer, M. (1996). *Household Savings and Portfolio Change: Evidence from the 1983–89* (SCF Panel Finance and Economics Discussion Series No. 18). Federal Reserve Board of Governors.
- Kiss, R., & Strasser, G. (2024). *Inflation Heterogeneity across Households* (ECB Working Paper No. 2898). European Central Bank. <https://doi.org/10.2866/531182>
- Klick, J., & Stockburger, A. (2022). *Inflation Experiences for Lower and Higher Income Households. Spotlight on Statistics*. U.S. Bureau of Labor Statistics. Retrieved from: <https://www.bls.gov/spotlight/2022/inflation-experiences-for-lower-and-higher-income-households/home.htm> (accessed: 13.08.2024).
- Lafrogne-Joussier, R., Martin, J., & Mejean, I. (2023). *Cost Pass-Through and the Rise of Inflation* (Documents de Travail de l'Insee – INSEE Working Papers No. 2023-13). Institut National de la Statistique et des Etudes Economiques.
- Lane, P. R. (2022). *Inflation Diagnostics*. The ECB Blog, 25 November. Retrieved from: <https://www.ecb.europa.eu/press/blog/date/2022/html/ecb.blog221125~d34babdf3e.en.html> (accessed: 23.10.2024).
- Loecker, J. D., Obermeier, T., & van Reenen, J. (2024). Firms and Inequality. *Oxford Open Economics*, 3(Supplement 1), i962–i982. <https://doi.org/10.1093/ooec/odad097>
- Lucas, R. E., Jr. (1972). Expectations and the Neutrality of Money. *Journal of Economic Theory*, 4(2), 103–124.
- Magerakis, E., Gkillas, K., Tsagkanos, A., & Siriopoulos, C. (2020). Firm Size Does Matter: New Evidence on the Determinants of Cash Holdings. *Journal of Risk and Financial Management*, 13(8), 163. <https://doi.org/10.3390/jrfm13080163>

- McLeay, M., Radia, A., & Thomas, R. (2014). Money Creation in the Modern Economy. *Bank of England Quarterly Bulletin*, Q1, 14–27.
- Mulligan, C. B., & Sala-i-Martin, X. (2000). Extensive Margins and the Demand for Money at Low Interest Rates. *Journal of Political Economy*, 108(5), 961–991. <https://doi.org/10.1086/317676>
- Nguyen, H. M., & Qian, R. (2012). *Why Are Small Firms Less Likely to Pledge Collateral for Formal Loans than Large Firms?* World Bank Blogs. Retrieved from: <https://blogs.worldbank.org/en/developmenttalk/why-are-small-firms-less-likely-to-pledge-collateral-for-formal-loans-than-large-firms> (accessed: 10.10.2024).
- OECD. (2013). Exports by Enterprise Size Class. In: *Entrepreneurship at a Glance*. OECD Publishing. https://doi.org/10.1787/entrepreneur_aag-2013-11-en
- OECD. (2021). *The Role of Firms in Wage Inequality: Policy Lessons from a Large Scale Cross-Country Study*. OECD Publishing. <https://doi.org/10.1787/7d9b2208-en>
- Paycor. (2022). The Biggest Cost of Doing Business: A Closer Look at Labor Costs. *The Business Journals*, 1 May. Retrieved from: <https://www.bizjournals.com/bizjournals/news/2022/05/01/the-biggest-cost-of-doing-business.html> (accessed: 10.10.2024).
- Ritchie, H., Rosado, P., & Roser, M. (2023). *Energy*. OurWorldinData.org. Retrieved from: <https://ourworldindata.org/energy> (accessed: 17.10.2024).
- Rothbard, M. N. (2009). *Man, Economy, and State with Power and Market* (Scholar's ed.). Ludwig von Mises Institute.
- Schaffer, M. (2017). Labor Market Effects in the Austrian Business Cycle Theory. *The Quarterly Journal of Austrian Economics*, 20(3), 224–254.
- Sieroń, A. (2017a). Inflation and Income Inequality. *Prague Economic Papers*, 26(6), 633–645. <https://doi.org/10.18267/j.pep.630>
- Sieroń, A. (2017b). The Non-Price Effects of Monetary Inflation. *Quarterly Journal of Austrian Economics*, 20(2), 146–163.
- Sieroń, A. (2019). *Money, Inflation and Business Cycles. The Cantillon Effect and the Economy*. Routledge.
- Sieroń, A. (2021). *Monetary Policy after the Great Recession. The Role of Interest Rates*. Routledge.
- Skousen, M. (1990). *The Structure of Production*. New York University Press.
- Upneja, A., Hyunjoon, K., & Singh, A. (2000). Differences in Financial Characteristics between Small and Large Firms: An Empirical Examination of the Casino Industry. *The Journal of Hospitality Financial Management*, 8(1), 23–35. <https://doi.org/10.1080/10913211.2000.10653733>
- U.S. Bureau of Labor Statistics. (2024). *PPI for Final Demand, 12-Month Percent Change, Not Seasonally Adjusted*. Retrieved from: <https://www.bls.gov/charts/producer-price-index/final-demand-12-month-percent-change.htm> (accessed: 17.10.2024).

von Mises, L. (1953). *The Theory of Money and Credit*. Yale University Press. (Original work published 1912).

von Mises, L. (1998). *Human Action: A Treatise on Economics* (Scholar's ed.). Ludwig von Mises Institute. (Original work published 1949).

Weber, I. M., Jauregui, J. L., Teixeira, L., & Pires, L. N. (2024). Inflation in Times of Overlapping Emergencies: Systemically Significant Prices from an Input–Output Perspective. *Industrial and Corporate Change*, 33(2), 297–341. <https://doi.org/10.1093/icc/dtad080>

Willis, J. L., & Cao, G. (2015). Has the U.S. Economy Become Less Interest Rate Sensitive? *Macro Bulletin*, July, 1–3. Federal Reserve Bank of Kansas City.

Wilson, G. (1982). *Inflation: Causes, Consequences and Cures*. Indiana University Press.

World Bank. (2019). *Small and Medium Enterprises (SMEs) Finance*. Retrieved from: <https://www.worldbank.org/en/topic/sme/finance> (accessed: 10.10.2024).

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Market Research of Developing Crafts Based on the Example of Services Provided by Chinese Shoemakers and Tailors

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ABSTRACT

Objective: The article focuses on the presentation and comparison of two Chinese crafts – shoemaking and tailoring from the point of view of the service sector market.

Research Design & Methods: The paper presents an analysis of documents indexed in the Web of Science and Scopus databases and not indexed – published on the Internet in Chinese, including materials based on interviews with Chinese craftsmen and industry reports.

Findings: The development trajectory of shoemaker services remains uncertain, but their evolution is closely tied to stages in the footwear industry. Chinese tailoring has grown by targeting international markets, leveraging e-commerce, emphasising cultural heritage, and focusing on prestigious clientele, thereby fostering the creation of Chinese brands. Sustainable practices in the craft emphasise environmental responsibility and preserving cultural heritage to ensure its promotion and continuation.

Implications/Recommendations: The shift toward service-oriented, quality- and brand-focused activities implies that stakeholders should support skill development, digitalisation, and branding while balancing commercialisation with the preservation of cultural heritage and environmental responsibility.

Contribution: Due to the inconsiderable representation of the chosen topic in scientific databases, the article aims to fill the research gap and contribute to the promotion and sustainability of craftsmanship.

Article type: original article.

Keywords: Chinese craft, service sector, development of crafts, sustainable development, economic culture.

JEL Classification: L84, N75, O14, Z10.

1. Introduction

Among the three sectors of the national economy: agriculture, industry and services, the second was treated for many years as a priority in the People's Republic of China (PRC). The average growth rate of services in this country from 1952 to 1978 was significantly lower than that of industry and construction. During this period, it was the lowest in the years 1958–1962 (−0.7%), and at the highest in the period of 1963–1965 (15.5%) (Cieślak, 2017). After the introduction of reforms and China's opening up to the world, the economic growth model introduced focused on exports, which was supported primarily by the manufacturing sector, but with weak employment growth. Over time, the decision to change from capital-intensive to labour-intensive production and focus on service activities was made. The more intensive development of the Chinese service sector was coupled with China's involvement in the World Trade Organization (WTO). In 2001, the PRC committed to the WTO to open up its services sector (Saxena & Sharma, 2017). In 2007, the third sector of the economy accounted for 39.1% of the net material product (PWN, 2024), and in 2015, the share of the service sector had already exceeded 50% of China's gross domestic product (GDP) (Ministerstwo Rozwoju, 2020). The introduced change in the structure of national income towards increasing the share of domestic consumption and the service sector is treated as a Chinese strategic goal (Halizak, 2015/2016). This priority aims to make China independent of exports from highly developed countries. The development of services took into account various socio-demographic changes, emphasising the need to offer benefits for the elderly and the society becoming richer – a population which is interested in tourism, public and financial services (Sulmicka, 2015). The services were also unavailable to foreign investors for a number of years. This took place, due to the applicable legislation and state monopoly in such areas as: telecommunications, railways, finance, health care and education (Ostrowska, 2015). In 2017, China exported and imported services worth about USD 700bn (Ministerstwo Rozwoju, 2020). After the period

related to the COVID-19 pandemic, higher economic growth was driven mainly by the service sector (CEO, 2023).

The contribution of crafts in individual sectors is very difficult to assess. Craftsmanship is defined as a non-agricultural economic activity. In addition, as the earliest form of manufacturing activity related to specialised production aimed at sales and carried out from start to finish by one person, with no environmental and social nuisance typical of industrial activity (Kaliński, 2024). Due to this, it is combined with the industrial sector and employs almost 18% of China's workforce (Kowalczyk, 2023), while generating about 1/3 of the input from this sector. However, craftsmanship is not only an activity related to industry. It is also closely related to the area of service activity related to meeting people's needs – generating a "useful material product" (Ilnicki, 2009). Therefore, it is a socially useful activity aimed at generating profit and related to the repair of household appliances, alteration or modification of existing products and specialist services. According to Pewiński (2019), the industrialisation of production processes and services has caused craftsmanship to be "in retreat." Despite this, some craft professions, such as shoemakers and barbers, are currently experiencing a renaissance (Pewiński, 2019). Representatives of specialist services include shoemakers and tailors, who deal with crafts which the literature on the subject does not devote too much attention to.

Due to the existing gap devoted to Chinese shoemakers and tailors, this article aims to extend this literature with information related to the market of both crafts within the context of their development. The above is aimed at specifying the direction of development of Chinese crafts in the context of contemporary economic and cultural challenges. The texts of Chinese journalists were analysed based on interviews with Chinese craftsmen in the service sector and industry reports.

2. Literature Review

As part of the WoS and Scopus databases, only 13 texts on Chinese shoemaking and two texts on Chinese tailors can be found. No publications were found in both databases with the entries "Chinese shoemaker" and "Chinese tailoring." These texts appeared in print during the years 1993–2022 ("Chinese shoemakers") and 2007–2022 ("Chinese tailors"). They represent different subject areas, whereas only one text is assigned to the economic sciences.

Out of three texts thematically related to economic sciences, two concern shoe-making and one tailoring. The first of them, by Dai and Li (2010), focuses on the reasons for the low level of development of small footwear enterprises. The second text, written by Liang (2007), presents an analysis of the history (including three phases of migration) and experiences of the Chinese community in Calcutta, among which representatives of the shoemaking industry can be mentioned (Liang, 2007).

The last of the texts by Lee (2023) shows two different ways of integration with the local population of Hong Kong tailors who emigrated from Shanghai and Guangzhou after World War II. Figure 1 presents the cloud of words that most often appear in the titles and abstracts of indexed materials.



Fig. 1. Clouds of Words Appearing in the Texts

Source: own study.

Texts not indexed in these databases focus primarily on craft-related issues, which are mainly devoted to tailoring and include the Chinese fashion history. In 1980, the first Chinese fashion magazine *Shi Zhuang* was founded, the purpose of which, in addition to showing trends, was also to educate people on how to adapt fashionable clothes (Xu & Ge, 2016). In the book by Finnane (2008), information that hand sewing has long been the basis of Chinese tailoring, both in domestic and commercial contexts, can be found. To this day, some craftsmen still sew by hand, e.g., *qipao/cheongsam* – a traditional Chinese garment for women (Finnane, 2008). A tailor-made *qipao* requires 24 measurements, at least some hand-made and the use of a special pressing technique that gives a three-dimensional form. So it is not just a “cutting and sewing process” but a process of creating a work of Chinese art (Yang, 2007). Due to the above, a *qipao* has a high price. However, they are worn in China mainly during traditional weddings, as part of the uniforms in restaurants and hotels, and by more affluent people, including celebrities (Huang, 2011). Therefore, nowadays *qipao* are becoming more popular among foreigners

than among the Chinese (Von Pezold, 2019). By contrast, dress changes in China, as in politics, progressed at a rate of two steps forward and one step back (Finnane, 2008). The second theme is related to the Chinese diaspora, built by craftsmen (also tailors) who immigrated from China (Itchikawa, 2006).

The third strand of issues concerns the latest trends, focuses on innovation and sustainable development, and is associated with reducing the amount of waste. Despite China's long tradition of tailoring services, over the past 20 years, altering and modifying clothes has become less and less popular in the PRC. Currently, there is a renewed trend combined with the Internet and digital technology – the creation of websites such as “eTailor,” providing door-to-door services, and taking into account the limits of generated waste (CNTAC, 2020). Also in the design area, the direction of thoughtful, sustainable design and combining it with craftsmanship related to high-quality materials is chosen (Lindgren, 2013).

In the context of shoemaking, information can be found mainly relating to industrial production and trends in footwear production. In 2004, China was responsible for the production of almost 58% of the world's footwear, from among others, the provinces of Guangdong, Fujian and Zhejiang (Clothier, 2005). An analysis of the international competitiveness of the Chinese footwear industry shows the changes taking place within this manufacturing sector, mainly due to the economic crisis, the revaluation of the renminbi (RMB – the official currency of the People's Republic of China), and the rising prices of raw materials and labour. In 2009, China had four main shoe bases in Guangzhou, Wenzhou, Quanzhou and Chengdu employing more than 4 million workers and connecting 30 thousand shoe manufacturers. This included the production of rubber, canvas, leather, and plastic shoes. In 2005, China exported 6.9bn pairs (export value was then USD 18.4bn). In 2006 – 7.6bn pairs (USD 21m), in 2007 – 8.17bn pairs (USD 24.14bn), and in 2008 – 8.53bn pairs (export volume USD 29.66bn). Changes noted included an increase in the prices of rubber, used as the sole material, and bovine, sheep and pigskin leather. The number of people employed in the footwear and hat industry was then estimated at a total of about 2 million people. Chinese footwear was also directed to the domestic market, which in 2008 absorbed 2.5bn pairs. The number of enterprises in the industry was described as large. Within the Chinese footwear industry, the strategy of low-price competition was implemented (Li, 2009). In contrast, in the luxury footwear industry, it is very important to apply innovation in craftsmanship and to use digital tools to attract both new and loyal customers (Wimmer, 2020). However, the key to balancing tradition and innovation is, for crafts in general, to make many small changes instead of a few big ones (Shafi *et al.*, 2022).

3. Methodology

The study focuses on the analysis of materials by Chinese journalists available on the Internet. Two main research objectives were set:

RO1: Determining whether Chinese shoemaking and tailoring can be defined as developing crafts.

RO2: An indication of the elements showing the activities aimed at sustainable development in the area of these crafts.

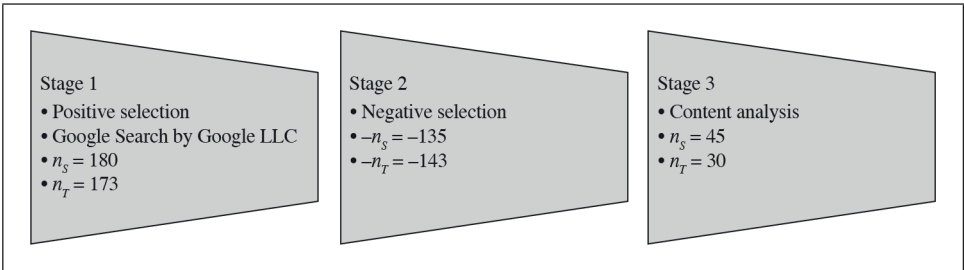


Fig. 2. Research Process

Source: own study.

The first stage of the research process took place in July 2023 using the Google search engine. It focused on finding texts that Google identified as the most relevant for Chinese shoemaking/Chinese shoemaker and Chinese tailoring/Chinese tailor. As part of Google’s algorithms, the results of texts identified as similar were omitted. As a consequence, 180 results for shoemaking (n_s) and 173 materials for tailoring (n_t) were identified. The next stage focused on negative selection, the rejection of texts that did not concern the subject under study, with 278 materials being rejected this way. They concerned the following issues: films dedicated to children, stories unrelated to crafts, photo essays of workshops, advertisements, articles on equipment, texts about non-Chinese crafts, sewing tools, analyses of global industries, and inactive websites. As part of the texts which qualified for the study, the content of 75 materials was analysed. Figure 2 shows the research process, which resulted in the analysis of 45 materials on Chinese shoemakers (S) and 30 materials on Chinese tailors (T).

4. Results and Discussion

4.1. Shoemakers

The publications devoted to the industrial production of footwear began in 2003, however, the text devoted to shoemaking was published in 2016. Within all

the analysed texts, only four were directly related to the craft, and the names of craftsmen appeared in their content – Y. J. Zhou and Y. Wang. Two articles were related to the Chinese-American-Malaysian shoemaker and designer of women's shoes, J. Choo. The next two texts are devoted to the former skater of the Chinese national team, who, due to injuries, retrained and started the production of ice skates. He established Changchun Bainingdun Sports Equipment Co., Ltd., which supplies its products to Chinese Olympic athletes. These texts did not focus on economic activity, but only presented the profiles of craftsmen recognised in the media. Other materials were devoted to the Chinese footwear industry, so they contained information on the area of economic sciences and allowed to outline the situation and background of professionally active shoemakers.

The earliest texts (from 2003–2007) focus on emphasising the implementation of the cost-leader strategy and the lack of a brand strategy oriented towards the European market, as well as the importance of focusing on design, and research and development (Xie & Wan, 2005), and thus, the transition from “made in China” to “created in China.” Within the labour-intensive footwear industry, production capacity is migrating to regions/countries with low labour costs. This shows the following direction: Italy, Spain → Japan, Taiwan, South Korea (1980s) → China (1990s), Vietnam, India, and Pakistan. Between 1985 and 1995, the Chinese footwear industry experienced rapid development and, consequently, an increase in Chinese exports. In 2006, China was the main footwear hub, producing 60% of the world's footwear – 6bn pairs a year, with 20 thousand stores of Chinese leather enterprises and 1.6 million employees. The combined factories created leather, rubber, canvas and plastic shoes, which were 85% low and medium class. The greatest purchasing power for footwear products was shown by the inhabitants of Beijing, Shanghai and cities of the south-eastern coast. Four main bases of the shoe industry were established. The base in Guangdong (Guangzhou and Dongwan) produced shoes for the middle and high classes. The Zhejiang (Wenzhou and Tazhou) base mainly produced low- and middle-class shoes. In the western base (Chongqing and Chengdu) – women's shoes were made, while in the Fujian base (Quanzhou and Jinjiang), sports shoes were made (Lián shāng wǎng, 2006). This period is also associated with observations related to the need to introduce changes – preparation of a new global image strategy.

The second thematic thread concerns the dissatisfaction of Chinese producers of leather footwear related to the introduction of anti-dumping measures in the European Union. The texts indicate the possibility of looking for markets other than the EU or filing lawsuits with the European Court of Justice. In 2006, Chinese products accounted for around 35% of the EU leather footwear market. The average price of Chinese leather shoes was EUR 8 per pair. After the introduction of anti-dumping duties, the price of imported shoes should have increased by

more than 1 euro. Anti-dumping measures will affect employment opportunities for 70 thousand Chinese workers (Cheng, 2006), including shoemakers. The EU has undertaken to test nine footwear companies in China in the context of the European Commission's anti-dumping investigation of footwear products originating in China (*Ōuméng jiāng...*, 2005), while Aokang Group on the Chinese side filed an anti-dumping lawsuit (The Central People's Government of the People's Republic of China, 2006).

The years 2008–2011 are associated with the publication of texts devoted to the crisis in the footwear industry related to the closing of over a thousand shoe companies per year, and looking for a solution, a way out of the crisis. They emphasised the hitherto contribution of the footwear industry to the income obtained from exports and the expected difficulties in the next few years (*Héběi 3554 xiéyè*, 2010). In 2010, the annual production of shoes in China amounted to 13bn pairs, and the labour cost was USD 1.3–1.5 per hour (*Nánfāng rìbào*, 2011).

In the following years (2013–2015), there was a further migration of production capacity, this time to Africa (among others, to Ethiopia). This was associated with further attempts to return to the world market as a footwear powerhouse. The impediments included: the development of emerging economies, rising labour prices, scarcity of labour resources, rising prices of raw materials and land resources, appreciation of the RMB, and international trade barriers. The articles contained further analyses of the market situation and development plans for the promotion of the footwear industry, which were described. Other solutions for a company with a high innovative capacity and strong standardisation were also indicated, taking the direction of modernisation and industrial transformation. In Dongguan, an international base for processing high-end footwear was established, similarly in Heshan, for men's shoes, and in Chaozhou and Jieyang, which is a base for processing and exporting craft shoes. The new suggestions included: those related to directing production to the increasingly absorptive domestic market and the development of marketing channels.

Since 2016, texts by Chinese journalists have been presenting the effects of earlier plans, e.g., focus on the brand, the global environment and the production of high-end footwear. This coverage by the media has improved the competitiveness of the Chinese footwear industry and pointed to the need for further technological transformation and implementation of smart production.

In 2019, 13.5bn pairs of shoes were produced in China (*Zhì xié zàixiàn*, 2021). In 2020, the footwear industry in China entered a new phase, and the footwear that was produced was defined as more valuable (China Trade Remedies Information, 2020). In 2021, there were over 4 thousand footwear manufacturing companies (*Zhì yán zīxún*, 2022) and gradually, the benefits of the industrial cluster effect began to be felt – namely, shoe bases. The total profit of the Chinese footwear

industry was RMB 37.5tn (Sohu, 2023). The annual consumption of shoes in the home market was 1.7 pairs per person. Forecasts, however, indicate an increasing trend towards 3–4 pairs per person (Zhōnghuá wǎng, 2021). Moreover, the Chinese shoe and clothing industry became increasingly aware of the importance of craftsmanship.

As well as following established trends, craftsmen, as W. K. Cai emphasises, have focused on the importance of following new trends, such as creating footwear for younger customers adorned with, among others, the image of Hello Kitty and Angry Birds (Kuweit Times, 2018).

The texts created in the last of the analysed periods (2022–2023) emphasise, among others, the continued need to invest in scientific and technological innovations (mainly regarding equipment for the production of footwear). The Dongguan base has been called the “factory of the world” with 1,150 footwear companies located there (with a production of over 600m pairs per year and a workplace for 2 million production workers) (Shi, 2022). Wenzhou, on the other hand, has been hailed as the “Chinese capital of footwear,” which has focused on building a national brand by obtaining the highest honour in footwear. Chengdu, on the other hand, has been associated with shoemaker’s workshops located on Jiangxi Street for over a century, and currently produces 100 million pairs of leather shoes a year (production value over RMB 7bn). The Jinjiang footwear industry continues to focus on the production of sports shoes, bringing together over 3,000 footwear companies and employing over 500 thousand employees (WWTQ, 2021). The major listed companies in the footwear industry include Aokang International, Anta Sports, Li Ning, and Red Dragonfly (Zhou, 2022). The production of shoes for foreign markets involves the production of shoes in larger sizes (including women’s shoes above number 40). However, the leading companies are moving their production to Vietnam (Wang, 2022). The decline in exports is also underlined (China Council for the Promotion of International Trade, Zhejiang Provincial Committee, 2022). This takes place due to trade frictions between China and the US and the increasing minimum wage in the cities (2001 – RMB 380; 2022 – RMB 2,300) (Chen, 2022; Liánhé zǎobào, 2022). The 14th Five-year Plan for 2021–2025 (national governmental programme) specifies long-term goals for 2035 and takes into account the transformation and modernisation of traditional industries, high-quality products and an emphasis on environmental protection and emission reduction (Zhōngguó xié dǒu, 2023).

An interesting topic was also the topic of the footwear industry entering the “era of culture” following the “era of quantity” – quantitative expansion and the “era of quality” associated with the intensive management improvement of quality. Product competition has been replaced by brand competition whose “soul is culture.” The above is also related to the publication of the Dictionary of Chinese Footwear

Culture (Zhōngguó xié wǎng, 2023) and the organisation of International Shoe Culture Week in Wenzhou.

4.2. Tailors

Texts devoted to Chinese tailoring were published between 2005 and 2023. Most of the materials contain the personal details of well-known tailors in the media, including: Mr. Lin, a Hong Kong-based tailor specialising in tailoring suits and emphasising that Chinese craftsmanship rivals that of Italian suit shops; X. D. Shao and H. R. Wang, educated outside the PRC by Italian tailors; C. J. Zhou, a tailor from Zhejiang province, president of Shanghai Meters/Bonwe Co., Ltd., highlighting his transformation from “Chinese tailor” to “world tailor” (Zhou, 2010); H. L. Di, a tailor in the city of Yinchuan in the autonomous region Ningxia; T. J. Jin and Q. Ye, representatives of the “old” and “new” generation of Shanghai tailors (Teng, 2017); T. Wang, a tailor and designer with international experience, creator of the Taoray Wang brand; Y. M. Quan, a Chinese-Korean dressmaker from the province of Heilongjiang, working in London at Welsh & Jefferies, creating, among others, custom school uniforms, military uniforms for the British royal family, and high-end bespoke clothing for China; J. P. Bi, the winner of the Italian tailoring competition Forbici D’ORO Italian “Golden Scissors” Tailor Grand Prix, a tailor from Shaanxi Province, and owner of a personalisation workshop – making tailor-made suits in Chengdu; G. Y. Yi, a craftsman offering professional tailoring services in Shanghai’s exclusive shopping malls; S. Y. Zhang, one of the first Chinese tailors who immigrated from Ningbo to Japan; Y. Zhang, the founder of the Sancun Shengjing brand; H. Y. Song, a tailor from Ningbo, who runs a workshop in Shanghai, producing, among others, Chinese tunics, suits and jackets, *qipaos* and coats.

Some texts show the development of tailoring in China since the Qing dynasty (1644–1912). At that time, many Western traders flocked to China, some of whom were involved in the production of clothing. They employed Chinese tailors whom they trained in advanced Western tailoring techniques. Chinese tailors, over time, were divided into two cliques: “origin” – *ben bang* and “red clique” tailors – *hongbang caifeng*. The first group consisted of traditional craftsmen, creating in the Chinese style for native customers. The second group provided services to foreigners, then associated with red hair. In 1949, the word “tailor” was used more often than the word “designer.” Earlier consumer demands focused mainly on the functionality of clothing, and professional tailoring services were used, among others, in the context of weddings and funerals, and tailors provided primarily services aimed at the imperial court. The first generation of tailor-fashion designers was formed in the city of immigrants – Shanghai, which attracted tailors from Ningbo, Yangzhou and Suzhou (Teng, 2017). Shanghai’s fashion industry marked

an important step in China's industrialisation, where modern fashion is a mix of Chinese and foreign styles, as well as the ability to be both distinctive and repeatable (Brasó-Broggi, 2015). Until the 1980s, most Chinese relied on local tailors. *Hongbang* suit shops and boutiques have become important intermediaries in introducing Chinese clothing into the international fashion system. They are divided according to the price of the products and services offered, location and consumer groups, distinguishing wealthy businessmen and the working-economic class, as well as domestic and foreign clients (Liu, 2008).

Hongbang tailors came mainly from Ningbo, which in the late 1990s obtained the title "hometown of Chinese clothes." Other well-known tailor cities with this title include Qianjiang, where it was decided to develop clusters of the textile and clothing industry, thus associating 200 companies in this industry (Gōngyè yòng shì wǎng, 2023).

Along with the enrichment of the Chinese moderate wealth class (middle class), the preferences of the recipients of this craft have changed – a group of stylish customers interested in the created brands has developed. Well-known Chinese fashion brands include: Shanghai Tang, Ochirly, Meters/Bonwe, Bosideng, Septwolves, Gujin, Zhou Shande, Mystyle, and Li-Ning. Changes in the preferences of the demand side include a greater focus on the consumption of sportswear intended for running, cycling, yoga, golfing and horseback riding. The boundaries between professional and recreational sports and fashion-related sports has started to blur, constituting the direction for the tailoring industry, however, this aspect is associated with the need to invest in the field of research and development.

The path of development of Chinese tailoring is associated with opportunities and emerging threats. The opportunities are related to the development of marketing tools and employing slogan specialists. An example is the company C. J. Zhou, which bet on the slogan "Confidence is strength" in 1995, and in 2001 on the slogan "Do not follow the usual path" (Zhou, 2010). As well as the creation of the Meters/Bonwe name, in which the character's beauty, uniqueness, country and prestige appear. In addition, with the development of the e-commerce platform Banggou.com (Lu, 2021), all of which are just a few examples of the development of marketing in Chinese footwear. The topic of prestige and marketing is also related to the strategy of G. Y. Yi, who moved his factory initially to office buildings and then to exclusive shopping centres in order to make convenient and professional tailoring services, heritage and tailoring ingenuity available to more consumers.

The tailors emphasise the importance of craftsmen opening up to the world, gaining international experience and broader publicity for Chinese craftsmanship. For example, the masters of Beijing tailoring from the Yaxiu market in Sanlitun provided services in hotels where the American Dream Team 8 players stayed, thus showing the world Chinese craftsmanship (Tan, 2008). Other examples involve

building an international career, such as dressmaker-designer T. Wang, founder of Taoray Wang brand and Y. Zhang, described as a tailor-designer disseminating intangible cultural heritage in the national style by using Chinese stories as the core of their designs and disseminating Chinese aesthetics by creating fashionable postures and silhouettes.

The concerns of craftsmen, the heroes of the analysed texts, are related to the dark side of modernisation that could engulf traditional handicrafts. It is observed that the declining demand for tailoring services appears in opinions such as: "It's not like before. Fewer and fewer people come to tailors to order clothes." The reforms introduced in China, which were conducive to an opening up to the world and the development of a market economy, contributed to the development of the clothing industry, where cost leadership strategies forced some tailors to retrain or work in clothing factories. As part of this trend, the problem of handicraft inheritance was shown in times when few young people want to learn this craft because they prefer to become factory workers doing simple and relatively repetitive work. Learning the highly skilled craft of hand-making *qipao* can be a lifelong learning experience. *Qipao*-making is about preserving elements of the intangible cultural heritage of China, where the value of tailoring is measured by the cultivation of culture.

5. Conclusions

Nowadays, craftsmanship has been transformed in terms of technology into a service sector of small and medium-sized industries (Noworol, Bondyra & Dziekanowska, 2021). In particular, the topic of the industry is visible in the search results for topics devoted to shoemaking and in the concerns of tailors about their prospects and the future of traditional Chinese crafts.

The article enriches the literature with information related to the Chinese shoe-making and tailoring market, however, based on the conducted research, it is impossible to determine the path of development of the market of services offered by shoemakers. However, it is possible to indicate the previous stages within the footwear industry, with which these craftsmen are strongly associated. These include: the implementation of the cost leader strategy; migration of production capacity to countries with relatively low labour costs; focus on the export of footwear; creating a database of the footwear industry; developing a global image strategy; increase in labour costs in China, followed by migration of production capacity to countries with relatively low labour costs (outside China); choosing a strategy focused on quality and branding; technological transformation; concentration on the domestic market; emphasis on environmental protection, including emission reduction.

As part of the topic of Chinese tailoring, the services provided by craftsmen were accompanied by: directing their services to foreigners; gaining international

experience; discovering the power of marketing; using e-commerce platforms; focusing on “prestigious” services, and using the elements of cultural heritage.

The last of these components is directly related to Chinese culture – the carriers of traditions and customs, with the rich heritage of previous generations of Chinese tailors. On the one hand, these activities are undertaken to develop the business and generate profit, but on the other hand, they contribute to the preservation of this legacy and the promotion of Chinese crafts.

Based on the analysis of the selected articles by Chinese journalists, Chinese tailoring can be defined as a craft developing towards services addressed to prestigious clients, including the creation of Chinese brands. On the other hand, activities aimed at the sustainable development of crafts include: strengthening environmental responsibility in industrial production and the use of elements of cultural heritage for the purpose of its preservation and further promotion.

One of the significant limitations of this article is the subjective choice of keywords. For this reason, it is advisable to conduct research in the future, by using synonyms of the words “shoemaker” and “craftsman,” such as, e.g., *ben bang* or red clique/*hongbang*. Another limitation is focusing on one Google search engine, whose matching algorithms may differ from those used by Chinese search engines, and can significantly expand the researched area.

Conflict of Interest

The author declares no conflict of interest.

References

Brasó-Broggi, C. (2015). The Weft of Shanghai Fashion: Economic Networks in Shanghai's Modern Fashion Industry. *China Perspectives*, 3, 5–11. <https://doi.org/10.4000/chinaperspectives.6768>

The Central People's Government of the People's Republic of China. (2006). *Zhōngguó zuìdà mínyíng zhì xié qǐyè xuānbù duì ōuméng tíqǐ fǎnqīngxiāo sùsòng* [China's Largest Private Shoemaker Announces Anti-dumping Lawsuit against EU]. Retrieved from: https://www.gov.cn/jrzq/2006-10/23/content_421186.htm (accessed: 12.12.2024).

CEO. (2023). *Ożywienie konsumpcji w Chinach – nierówne, głównie krajowe, z największym impulsem w I półroczu*. Retrieved from: <https://ceo.com.pl/ozywienie-konsumpcji-w-chinach-nerowne-glownie-krajowe-z-najwiekszym-impulsem-w-i-polroczu-61487> (accessed: 12.12.2024).

Chen, P. J. (2022). *Zhì xié chǎnyè wàiyí dōngnán yàotǒngjì: Zhōngguó qīnián chūkǒu jiǎnshǎosì qiānsān bǎiyìyuán* [Statistics on the Relocation of the Shoemaking Industry to Southeast Asia: China's Exports Have Decreased by 430 Billion Yuan in Seven Years].

Cheng, G. (2006). *Zhōngguó zhì xié láodòng lìchéngběn 1.5 Měiyuán/xiǎoshí yǒushì shàngnán qǔdài* [China's Shoemaking Labour Cost Is 1.5 US Dollars per Hour, and Its

Advantages Are Still Difficult to Replace]. Retrieved from: https://zqb.cyol.com/content/2006-10/10/content_1532451.htm (accessed: 11.12.2024).

China Council for the Promotion of International Trade, Zhejiang Provincial Committee. (2022). *Zhège hang yè chūkǒu shǎole 4300 yì! Shéi qiǎngzǒule zhōngguó de dìngdān?* [This Industry's Exports Have Lost 430 Billion! Who Stole the Orders from China?]. Retrieved from: https://www.ccpitzj.gov.cn/art/2022/1/13/art_1229557691_21772.html (accessed: 12.12.2024).

China Trade Remedies Information. (2020). *Zhōngguó xié yào gèng zhíqián* [Chinese Shoes Are More Valuable]. Retrieved from: <https://www.cacs.mofcom.gov.cn/cacscms/article/cgal?articleId=166787&type> (accessed: 12.12.2024).

Cieślak, E. (2017). Rozwój gospodarki chińskiej w okresie realnego socjalizmu – analiza podstawowych wskaźników makroekonomicznych. *Gdańskie Studia Azji Wschodniej*, 11, 59–82.

Clothier, A. (2005). *The Chinese Footwear Industry and Its Influence on the World Trade*. United Nations Industrial Development Organization, 15th Meeting of the UNIDO Leather Panel, León, Mexico, 10–14 September 2005. Retrieved from: <https://cn.fashionnetwork.com/news/zhong-guo-cai-feng-ye---lao-shou-yi-zhong-xian-sheng-ji-nan-yan-chuan-cheng-kun-rao,545275.html> (accessed: 10.12.2024).

CNTAC. (2020). *Make Fashion Circular: Outlook for a New Textiles Economy in China*. Office for Social Responsibilities of the China National Textile and Apparel Council.

Dai, Q. H., & Li, S. (2010). *Research on Bottleneck in the Development of Small-scaled Shoemaking Enterprises with Interpretative Structural Modeling Method*. 2010 CMSA Overall United Planning Symposium (OUPS 2010), Beijing, PRC.

Finnane, A. (2008). *Changing Clothes in China: Fashion, History, Nation*. Columbia University Press.

Gōngyè yòng shì wǎng. (2023). “Cáiféng zhī xiāng” zhuàngdà fǎngzhī fúzhuāng chǎnyè jíqún [“Hometown of Tailors” Strengthens the Textile and Clothing Industry Cluster]. Retrieved from: <https://www.oxfordfabrics.com/index.php/post/21877.html> (accessed: 11.12.2024).

Halizak, E. (2015/2016). Gospodarka Chin między rynkiem a państwem autorytarnym. *Rocznik Strategiczny*, 21, 291–303. <https://doi.org/10.7366/2300265420152115>

Héběi 3554 xiéyè. (2010). *Zhōngguó zhì xié yè xiànzhuàng jí fāzhǎn qūshì yùcè* [Current Situation and Development Trend Forecast of China's Footwear Industry]. Retrieved from: <https://www.hb3554.com/news/html/?8.html> (accessed: 11.12.2024).

Huang, C.-Y. (2011). *The Integration of Chinese Historical Costumes and Contemporary Women's Fashion: With Special Reference to the Shuitianyi*. PhD thesis. Birmingham Institute of Art and Design, Birmingham City University.

Ilnicki, D. (2009). *Przestrzenne zróżnicowanie poziomu rozwoju usług w Polsce. Teoretyczne i praktyczne uwarunkowania badań*. Instytut Geografii i Rozwoju Regionalnego Uniwersytetu Wrocławskiego.

- Itchikawa, T. (2006). Chinese in Papua New Guinea: Strategic Practices in Sojourning. *Journal of Chinese Overseas*, 2(1), 111–132. <https://doi.org/10.1353/jco.2006.0005>
- Kaliński, K. (2024). *Kryteria podziału i funkcje przemysłu*. Zintegrowana Platforma Edukacyjna, Ministerstwo Edukacji i Nauki. Retrieved from: <https://zpe.gov.pl/> (accessed: 12.12.2024).
- Kowalczyk, G. (2023). “Wielka niespodzianka” w Chinach. Dane z gospodarki niepokoją władze. Business Insider. Retrieved from: <https://businessinsider.com.pl/finanse/makro-ekonomia/wielka-niespodzianka-w-chinach-dane-z-gospodarki-niepokoja-wladze/308pfx6> (accessed: 12.12.2024).
- Kuweit Times. (2018). *Made in China since the Qing Dynasty: Beijing Shoemaker Taps into the Future*. Retrieved from: <https://www.kuwaittimes.com/made-in-china-since-the-qing-dynasty-beijing-shoemaker-taps-into-the-future/> (accessed: 12.12.2024).
- Lee, K. (2023). Identity Pride and Exclusiveness: Cross-border Craftsmanship and Chinese Tailors in Post-war Hong Kong. *Asian Ethnicity*, 24(4), 571–587. <https://doi.org/10.1080/14631369.2022.2132911>
- Li, J. X. (2009). Jīyú bō tè lǐlùn de zhōngguó zhì xié yè guójiā jìngzhēng lì yánjiū [Research on the International Competitiveness of China's Footwear Industry Based on Porter's Theory]. *Zhèjiāng kējì xuéyuàn xuébào* [Journal of Zhejiang University of Science and Technology], 21(4), 361–364.
- Lián shāng wǎng. (2006). *Zhōngguó zhì xié hángyè fāzhǎn fēnxī bàogào* [China's Footwear Industry Development Analysis Report]. Retrieved from: <https://www.linkshop.com/news/200660274.shtml> (accessed: 12.12.2024).
- Liang, J. (2007). Migration Patterns and Occupational Specialisations of Kolkata Chinese: An Insider's History. *China Report*, 43(4), 397–410. <https://doi.org/10.1177/000944550704300402>
- Liánhé zǎobao. (2022). Zhì xié chǎnyè dà qiǎnxǐ zhōngguó chūkǒu sǔnshī 4300 yì rén-mínbì [The Great Migration of the Shoe Industry Has Caused China's Export Losses of 430 Billion Yuan]. Retrieved from: <https://www.kzaobao.com/shiju/20220111/108376.html> (accessed: 10.12.2024).
- Lindgren, T. (2013). *Fashion in Shanghai: The Designers of a New Economy Style*. PhD thesis. A.R.C. Centre of Excellence for Creative Industries and Innovation, Queensland University of Technology.
- Liu, Y. H. (2008). Lùn hóngbāng zài zhōngguó jìndài fúshì zhuǎnxíng shíqī de yǐnlǐng zuòyòng [On the Leading Role of the Hongbang in the Transformation of Modern Chinese Clothing]. *Zhèjiāng fǎngzhī fúzhuāng zhīyè jìshù xuéyuàn xuébào* [Journal of Zhejiang Textile and Fashion Vocational Technical College], 3, 47–50.
- Lu, H. Z. (2021). *Zhuānfǎng měi tè sī bāng wēi dòngshì zhǎng zhōuchéngjiàn: Wǒ yīdù wàngjì zìjǐ shìgè “cáiféng”* [Interview with Metersbonwe Chairman Zhou Chengjian: I Once Forgot That I Was a “Tailor”]. Retrieved from: <https://www.xiaohus.com/newsDetails/429055> (accessed: 12.12.2024).

Ministerstwo Rozwoju. (2020). *Chińska Republika Ludowa*. Retrieved from: <https://www.gov.pl/attachment/cc2516ad-a630-4c09-82a7-74122eddbdf85> (accessed: 12.12.2024).

Nánfāng rìbào. (2011). *Zhōngguó zhì xié láodònglì chéngběn 1.5 měiyuán/xiǎoshí yǒushì shàng nán qǔdài* [China's Shoemaking Labour Cost of 1.5 US Dollars per Hour Is Still Difficult to Replace]. Retrieved from: <http://news.sohu.com/20111213/n328814167.shtml> (accessed: 9.12.2024).

Noworol, C., Bondyra, K., & Dziekanowska, M. (2021). Crafts: Between Archetype and Marketing. *Journal for Perspectives of Economic Political and Social Integration*, 27(2), 47–68. <https://doi.org/10.18290/pepsi-2021-0007>

Ostrowska, M. (2015). Uwarunkowania i specyfika chińskiego modelu rozwoju społeczno-gospodarczego. *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, 213, 130–141.

Ōuméng jiāng chōuyàng diàochá zhōngguó 9 jiāzhìxié qǐyè [EU to Conduct Random Survey on Nine Chinese Shoe-making Enterprises]. (2005). Retrieved from: https://fzggw.cq.gov.cn/zwx/bmdt/202002/t20200212_5199153_wap.html (accessed: 12.12.2024).

Pewiński, S. (2019). Dawne zawody w nowych odsłonach. *W Podróż*, 6(25), 60–62.

PWN. (2024). *Chiny. Gospodarka*. Encyklopedia PWN. Retrieved from: <https://encyklopedia.pwn.pl/haslo/Chiny-Gospodarka;4573913.html> (accessed: 12.12.2024).

Saxena, M., & Sharma, S. (2017). Growth of Service Sector in China: An Empirical Analysis. *International Journal of Applied Business and Economic Research*, 15(17), 119–127.

Shafi, M., Szopik-Decpczyńska, K., Cheba, K., Ciliberto, C., Decpczyński, R., & Ioppolo, G. (2022). Innovation in Traditional Handicraft Companies towards Sustainable Development. A Systematic Literature Review. *Technological and Economic Development of Economy*, 28(6), 1589–1621. <https://doi.org/10.3846/tede.2022.17085>

Shi, K. (2022). *Wài qiān shí nián hòu, zhōngguó xié fú zhìzào yè zài cì zhàn dào shízìlù kǒu* [Ten Years after Relocation, China's Footwear and Apparel Manufacturing Industry Is Once Again at a Crossroads]. Retrieved from: <https://36kr.com/p/2001456293949957> (accessed: 12.12.2024).

Sohu. (2023). *2023–2028 Nián zhōngguó zhì xié chǎnyè fāzhǎn yùcè jí tóuzī fēnxī bàogào* [2023–2028 China's Footwear Industry Development Forecast and Investment Analysis Report]. Retrieved from: https://www.sohu.com/a/674728135_121430853 (accessed: 12.12.2024).

Sulmicka, M. (2015). Polityka rozwoju po kryzysie: Przypadek Chin. *Prace i Materiały Instytutu Rozwoju Gospodarczego SGH*, 95, 41–71.

Tan, L. Y. (2008). *Zhōngguó cáiféng wèi mèng bā jùxīng cái yīlǐ dé yī kǒuqì zuò liù tài xīzhuāng* [Chinese Tailors Make Clothes for Dream Eight Superstars, Reed Makes Six Suits in One Go]. Retrieved from: <https://2008.sohu.com/20080815/n258874903.shtml> (accessed: 12.12.2024).

Teng. (2017). *Jiědú: Zhōngguó zuì hǎo de cáiféng wèishéme dàduō zài shànghǎi?* [Interpretation: Why Are Most of the Best Tailors in China in Shanghai?]. Retrieved from: <https://www.htt.hk/?p=38543> (accessed: 11.12.2024).

Von Pezold, J. (2019). “It is Good to Have Something Different”: Mutual Fashion Adaptation in the Context of Chinese Migration to Mozambique. *Asia Pacific Perspectives*, 16(1), 34–64.

Wang, H. (2022). *Chūkǒu sǔnshī 4300 yì, zhì xié chǎnyè kuàguó “dàqiānxǐ”* [Export Loss of 430 Billion Yuan, the Footwear Industry Cross-border “Migration”]. Retrieved from: <https://www.cbndata.com/information/231460> (accessed: 12.12.2024).

Wimmer, A. J. (2020). *Fashion is Letting the Shoemaker’s Children Go Barefoot!* Dissertation. Universidade Católica Portuguesa, Lisbon.

WWTQ. (2021). *Wǒguó zhì xié shèbèi hángyè chǎnpǐn shēngjí zàijí bùduàn yǒu shìjiè dì yī xié yè dàguó xiàng zhì xié qiángguó mǎijìn* [My Country’s Shoemaking Equipment Industry Is about to Upgrade Its Products and Is Moving from the World’s Largest Shoemaking Country to a Shoemaking Power]. Retrieved from: <https://www.chinabaogao.com/detail/597484.html> (accessed: 12.12.2024).

Xie, J. L., & Wan, X. H. (2005). *Zhuā shèjì, zhòng yánfā, chuàng pǐnpái, nǚlì shíxiàn zhōngguó xié yè fāzhǎn xīn túpò* [Focus on Design, Research and Development, Create Brands, and Strive to Achieve New Breakthroughs in the Development of China’s Footwear Industry]. Retrieved from: <https://www.semanticscholar.org/paper/> (accessed: 12.12.2024).

Xu, L., & Ge, M. F. (2016). Urban Feminine Fashion in China from 1987 to Now. *International Journal of Arts and Commerce*, 5(7), 30–37.

Yang, C. C. (2007). *The Meanings of Qipao as Traditional Dress: Chinese and Taiwanese Perspectives*. PhD Thesis. Iowa State University, Iowa.

Zhì xié zàixiàn. (2021). *2021 Nián zhōngguó zhì xié hángyè chǎnxiāo xiànzhuàng yǔ jìn chūkǒu mǎoyì fēnxī hángyè fāzhǎn liánghǎo* [Analysis of the Production and Sales Status and Import and Export Trade of China’s Footwear Industry in 2021, the Industry Is Developing Well]. Retrieved from: <https://www.chinashoemaking.com/post/13303> (accessed: 12.12.2024).

Zhì yán zīxún. (2022). *2021 Nián zhōngguó zhì xié hángyè xiāoshòu shōurù, lǐrùn zǒng’é jí lǐrùn lǜ qíngkuàng fēnxī* [Analysis of Sales Revenue, Total Profit and Profit Margin of China’s Footwear Industry in 2021]. Retrieved from: <https://www.chyxx.com/industry/1109956.html> (accessed: 12.12.2024).

Zhōngguó xié dōu. (2023). *Yīwén shēndù liǎojiě 2023 nián quánguó jí gèshěng shì zhì xié hángyè zhèngcè huìzǒng, jiědú jí fāzhǎn mùbiāo* [A Comprehensive Overview of the National and Provincial Footwear Industry Policies, Interpretations, and Development Goals for 2023]. Retrieved from: <https://m.cnxz.cn/home/390186.html> (accessed: 10.12.2024).

Zhōngguó xié wǎng. (2023). *Zhōngguó zhì xié yè jìnrù “wénhuà shídài”* [China’s Footwear Industry Enters the “Cultural Era”]. Retrieved from: <https://www.jincao.com/s/s0207.10.01.htm> (accessed: 10.12.2024).

Zhōnghuá wǎng. (2021). *Xié yè gǎigé xīn shídài fújiàn shǒu bù xié yè yán jiù yuàn děng qǐyè qiǎorán juéqǐ* [In the New Era of Footwear Industry Reform, Enterprises Such as Fujian Shoubu Footwear Research Institute Have Quietly Emerged]. Retrieved from: https://life.china.com/2021-08/24/content_67795.html (accessed: 12.12.2024).

Zhou, C. J. (2010). *Zhōuchéngjiàn: Shìjiè de cáiféng* [Zhou Chengjian: Tailor of the World]. Retrieved from: <https://www.daonong.com/qyjyc/gd/46530.html> (accessed: 13.12.2024).

Zhou, X. S. (2022). *Nián zhōngguó zhì xié hángyè jìn chūkǒu shìchǎng xiànzhuàng fēnxī xié lèi chūkǒu guīmó yuǎn chāo jìnkǒu* [Analysis of the Current Situation of China's Shoemaking Industry Import and Export Market in 2018: The Scale of Shoe Exports Far Exceeds the Imports]. Retrieved from: <https://www.qianzhan.com/analyst/detail/220/220414-108d2ca9.html> (accessed: 10.12.2024).

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The Role of Diversity and Inclusion Value Signalling in Job Advertisements: A Survey-based Study on Employer Attractiveness

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ABSTRACT

Objective: This study investigates the impact of diversity and inclusion (D&I) value signalling in job advertisements on employer attractiveness, focusing on Generation Z job seekers' responses to explicit D&I messaging.

Research Design & Methods: A survey was conducted with Generation Z participants in Poland. Respondents were presented with two job advertisements for an HR specialist position, differing only in their emphasis on D&I values. Responses were analysed using descriptive statistics, correlation analysis, and regression to determine the influence of D&I signalling on job attractiveness.

Findings: Results indicated that the majority of respondents preferred the advertisement with D&I signalling, showing a significant relationship between positive perceptions of D&I values and employer attractiveness. Regression analysis revealed that D&I initiatives and company culture were significant factors in job attractiveness for respondents choosing the D&I advertisement, while those selecting the non-D&I advertisement prioritised traditional elements like work-life balance.

Implications/Recommendations: Organisations aiming to attract talent should consider incorporating clear D&I signals in their recruitment materials. Emphasising inclusivity not only appeals to job seekers valuing D&I but also enhances organisational image as a supportive employer. Furthermore, aligning D&I messaging with internal policies and practices can strengthen long-term employer attractiveness.

Contribution: This study adds to the understanding of how D&I value signalling influences employer attractiveness, particularly for Generation Z. It underscores the growing importance of person-organisation fit in recruitment strategies and provides insights for organisations to effectively target a values-driven generation through strategic communication of inclusivity.

Article type: original article.

Keywords: diversity, inclusion, signalling, job advertisements, employer attractiveness.

JEL Classification: M12, M14, O15.

1. Introduction

The importance of diversity in contemporary organisations is constantly growing, as organisations across the globe have come to realise the significant benefits of a diverse workforce (Hunt *et al.*, 2023). Diversity has been recognised as a key resource in enabling organisations to achieve a high-performing work culture that empowers all members to contribute to their fullest potential (Cox, 2001).

Diversity in the workplace encompasses not just differences in race, gender, and cultural background, but also differences in age, experience, and perspectives. As the global workforce becomes increasingly interconnected, organisations that embrace diversity and inclusion are better positioned to innovate and meet the diverse needs of their customer base (Shen *et al.*, 2009). Several studies have suggested a positive relationship between diversity and the individuals' perception of the organisation (Brammer, Millington & Pavelin, 2009). Furthermore, diversity and inclusion are perceived as desired values not only by the organisation but also by employees and potential employees, who are attracted to organisations that promote diversity and inclusion (Iseke & Pull, 2019). Consequently, Schäpers *et al.* (2021) argued that organisational diversity increases organisational attractiveness. What is significant is the fact that the positive perception of inclusive workplaces extends beyond the targeted beneficiary groups (e.g., women, the elderly, disabled)

to the general workforce (Dauth *et al.*, 2023; Satzger & Vogel, 2023). Employees generally appreciate inclusive environments, which leads to favourable evaluations and referrals for their employers (Satzger & Vogel, 2023). Diversity and inclusion significantly influence employer attractiveness, particularly for job seekers who value organisational justice and equitable treatment (Iseke & Pull, 2019).

One way of reaching potential employees with the information that an organisation values diversity and inclusion is through the organisation's recruiting process and especially through job advertisements (Wofford & Smith, 2022). They are an important communication tool that can be used to convey an organisation's commitment to certain values, and they can signal the organisational culture (Story, Castanheira & Hartig, 2016). The shift in recruitment practices and job candidates' preferences has led to a predominantly online hiring process, driving the search for increasingly innovative methods to attract and recruit employees (Sidorkiewicz & Tokarz-Kocik, 2017; Branowska, 2021). An analysis of job advertisements in Poland reveals that discriminatory language still occasionally appears (Kędziora, Śmiszek & Zima, 2009; Kamińska, 2015), highlighting the importance of examining how an organisation's commitment to diversity and inclusion in job advertisements influences job candidates' perception of the employer. This is especially important, since research has shown that there is a positive relationship between employer branding and a streamlined recruitment process, suggesting that a well-regarded employer brand positively influences candidates' intentions to apply for a job and that this relationship is strongest among the youngest job applicants (Mikołajczyk-Szewczyk & Waligóra, 2019).

Given that, the following article aims to explore the extent to which potential employees consider an organisation's commitment to diversity and inclusion in job advertisements when deciding whether to apply, and how this influences their perception of the organisation as an employer. For this purpose the concept of diversity value signalling (DVS) has been used, which has been defined as "the use of inclusive language and terms in public organisational communication such as job advertisements, press releases, media advertisements, diversity statements, mission statements (mission, vision, and values), and the like which reflect a strategic intention to value diversity and inclusion across the organisational stakeholders" (Cole, Haun & Silvera, 2022, p. 2). We believe that, through the use of DVS, job seekers assess their fit with the organisation and the organisational values, and based on that, they decide whether to apply for a position in the organisation or not. For this purpose, we conducted a survey, using a dedicated job advertisement, and we asked respondents to indicate which job advertisement was more attractive to them: the one which promotes diversity and inclusion or the one including a more homogeneous (thus non-diversity) content.

2. Literature Review

Job seekers often have limited insight into what the job they apply for will actually be like. Due to that, they rely on signals provided in job advertisements to form their expectations about the possible job experience (Drewery, Pretti & Church, 2022). The signalling theory originates in economics and was first used to analyse how job applicants convey their skills to potential employers via the language used in job applications (Spence, 1973). Since then, it has also been used to explain organisational behaviour and how organisations signal their values to potential employees (Stiglitz, 2000). When assessing opportunities and the way their identities will be affirmed within organisations, job seekers use signals – available information, including job advertisements (Schmidt, Chapman & Jones, 2015). Job seekers interpret these signals to form perceptions about the organisation and its culture (Van Hove *et al.*, 2013). They analyse job advertisements and interpret information cues about what it might be like to work in a certain organisation (Sievert, Vogel & Feeney, 2022).

Signalling theory has been used to analyse how corporate social responsibility (CSR) influences talent management, particularly in attracting potential employees (Story, Castanheira & Hartig, 2016). Research has shown that through an active promotion of CSR practices, sending positive signals to job seekers about organisational values and commitment to social and environmental issues, organisations can enhance their attractiveness as an employer (Story, Castanheira & Hartig, 2016). CSR practices signal that an organisation is reputable, more attractive and a desirable place to work (Story, Castanheira & Hartig, 2016).

Signalling theory has also been used to analyse signals of (in)equalities and power in internship advertisements (Wofford & Smith, 2022). Using signalling theory, Wofford and Smith (2022) found that certain linguistic elements, like pronouns, can convey gendered or racialised power dynamics within the organisation. In their study, Wofford and Smith (2022) established that although many advertisements acknowledge diversity values, they do so using vague cues rather than acknowledging specific actions or the commitment to diversity and inclusion. Cole, Haun and Silvera (2022) found that organisations using DVS tend to perform better in terms of organisational performance, attracting a diverse workforce and customer experience compared to those, who do not utilise DVS. Diversity and inclusion signalling can rely on instrumental and symbolic signals. White *et al.* (2019) argue that job seekers rely on those signals when they form judgements about the organisation's value systems. They interpret, i.e. symbolic diversity signals, as the personnel displayed on the organisation's website to determine their chances to get hired (White *et al.*, 2019). Cole, Haun and Silvera (2022) analysed actual job advertisements and assessed the inclusion of DSV language using words like

“diversity,” “diverse,” “inclusion” and “equity.” On the other hand, White *et al.* (2019) also analysed visual cues as signals promoting diversity. They focused, however, on websites of organisations.

Given that the following hypothesis was developed:

H1: The likelihood that job seekers are going to apply for a position increases if job advertisements include signals and/or statements regarding diversity and inclusion.

Studies have also shown that job seekers are more likely to apply for jobs that signal a high- quality experience (Drewery, Pretti & Church, 2022). Because of the importance of aligning organisational values with those of potential employees, job advertisements should clearly communicate those work details, to attract individuals who share those values and are inspired by the organisation (Ganesan, Antony & George, 2018). Research conducted by Ganesan, Antony and George (2018) has shown, that the key dimensions of job advertisements, that influence job seekers application intentions include the job and work characteristics, the aesthetics appeal of the advertisement, employee testimonials and images of current employees, corporate image statements, organisational culture statements, especially when they help to understand the work environment and values and finally human resource offerings.

Given that, the following hypothesis has been developed:

H2: Job seekers who choose advertisements with diversity and inclusion signals will exhibit different preferences regarding job attractiveness elements – such as compensation and benefits packages, career growth and advancement opportunities, company culture and values, work-life balance, alignment of job responsibilities with their skills and interests, and the importance of diversity and inclusion initiatives – compared to those who choose job offers without diversity and inclusion signals.

Aligning organisational values with job seekers’ preferences is crucial, emphasising the importance of perceived person-organisation fit – the alignment of a job seeker’s skills, values, and goals with those of the organisation (Drewery, Pretti & Church, 2022). This concept suggests individuals are drawn to organisations that reflect their values, culture, and personality (Kristof, 1996; Kristof-Brown, Reeves & Follmer, 2013). Job advertisements play a vital role by signalling values, influencing perceptions of fit and belonging, especially for minority groups (Wofford & Smith, 2022). Communicating organisational culture and values effectively helps candidates assess their fit (Deeter-Schmelz *et al.*, 2020). Schneider’s (1987) ASA model shows applicants self-select based on perceived value alignment, with evidence linking organisational image to engagement intentions (Gatewood, Gowan & Lautenschlager, 1993; Ryan *et al.*, 2000). Aligning values aids in attracting,

hiring, and retaining well-fitting candidates (Kristof-Brown, Reeves & Follmer, 2013) and drives organisational appeal (Herold & Roedenbeck, 2025).

Given that, we developed the following hypothesis:

H3: Job seekers are more inclined to apply for positions which include diversity-related signals in their job advertisements if they believe diversity and inclusion programmes are significant.

The literature emphasises the importance of showcasing diversity to enhance attractiveness to a broad range of potential employees (White *et al.*, 2019). Scholars have found strong evidence linking inclusive workplace policies and employer attractiveness (Satzger & Vogel, 2023). Satzger and Vogel (2023) found that employees who rated their organisations highly on inclusiveness were more likely to recommend their workplace to others, indicating that inclusivity enhances employer attractiveness. Therefore in order to verify this and test the developed hypothesis a survey-based study was conducted.

3. Methodology

To test the developed hypotheses, we decided to conduct a survey among potential job seekers. We limited our study to the representatives of Generation Z, which following the literature (Ng *et al.*, 2021) we defined as born after 1997. However, we acknowledge that there are differences in defining time frames for individual generations (e.g., Kozłowski, 2024; Michałkiewicz, 2024; Żarczyńska-Dobiesz, Janiak-Rejno & Chomątowska, 2024). Research on determinants of employer attractiveness for Generation Z is crucial as this cohort enters the workforce with distinct preferences. Studies show that different generations have different values, which influence their preferences and expectations in the workplace (Różańska-Bińczyk, 2022). Furthermore, studies indicate that Gen Z values workplace flexibility, work-life balance, and meaningful tasks (Hofer *et al.*, 2024). Previous research has also shown that Gen Z values CSR in their employer choice (Maj & Kasperek, 2020). Scholars have also found that Gen Z prioritises growth and learning opportunities more than millennials (Kunal, Philip & Pooja, 2022). Given that, we believe that the focus on Gen Z is justified and helps fill the gap in the generational perspective on employer attractiveness.

For the purpose of the research artificial intelligence (AI) tools on a Bing.com website were used to generate visuals for two advertisements for a position of an HR specialist. Ads' visuals and wording differed in terms of diversity and inclusion emphasis: Figure 1 presents the ad that promotes diversity and inclusion, while Figure 2 has a more homogeneous content. These two different recruitment advertisements were presented to the participants, followed by an online questionnaire. Both the survey and the ad that formed an integral part of it (Fig. 1 and Fig. 2) were designed in English.

Using AI for creating job advertisements pursued several goals. Firstly, it allowed for ads to be accurate and relatively comparable to real-world hiring advertisements, avoiding diversity and inclusion overstatement. The goal of the survey alternatives was to have subtle rather than overt differences in inclusion and diversity description. Secondly, the AI tool and the prompts used ensured that the two adverts were as similar as possible, notwithstanding variations in inclusive content. Lastly, AI-generated visuals created a modern and innovative survey look, making it more appealing for the target audience to participate in.



Fig. 1. Job 1 – Diversity and Inclusion-based Job Advertisement

Source: own elaboration using Bing Image Creator.

Fig. 2. Job 2 – Non-diversity and Inclusion-based Job Advertisement

Source: own elaboration using Bing Image Creator.

Primary data was collected from May to June 2024, using online surveys posted through social media platforms Facebook and LinkedIn, as the most popular platforms for job search in Poland according to the latest industry research (Marszycki, 2023). The survey targeted young adults from Generation Z, individuals born after 1997, residing in Poland and other countries. It was conducted in Poland in 2024 and gathered 79 responses. Table 1 provides information about the demographic structure of the sample.

Table 1. Structure of the Sample

Metric Categories	Metric Variables	Number of Respondents	Share of Respondents (%)
Gender	male	21	26.6
	female	56	70.9
	other	2	2.5
Education	primary	34	43
	higher	43	54
	vocational	2	3
Place of residence	up to 50,000 inhabitants	35	44
	50,001 to 100,000 inhabitants	5	6
	100,001 to 500,000 inhabitants	10	13
	over 500,000 inhabitants	29	37
Country of origin	Poland	72	91
	Belarus	2	3
	Belgium	1	1
	Germany	1	1
	India	1	1
	Ukraine	2	3

Source: own study.

Gender, place of residence, and country of origin were treated as control variables, and statistical analysis revealed no statistically significant influence of these variables on the results.

4. Results

The analysis of the respondents' answers showed that 66% of them preferred the hiring ad message that clearly communicated diversity and inclusion (D&I) characteristics of the organisation and the offered job. We also compared the respondents' answers who chose offer 1 and offer 2 about the likelihood of them choosing the advertisement based on the D&I statements in their descriptions. Those preferring offer 1 scored on average 3.75, while those preferring offer 2 scored 3.33. As both distributions were identified as non-normal via the Shapiro-Wilk test, we used the non-parametric Mann-Whitney *U* test (Nunan, Birks & Malhotra, 2020) to confirm that there is a significant difference between the two groups (those who chose job 1 vs. those who chose job 2) regarding their likelihood to apply for jobs that include D&I statements (see Table 2).

Table 2. The Difference between the Likelihood to Apply for a Job with a D&I Emphasis in the Message across Two Groups

Job Advertisement Choice	Mean Likelihood	SD	Shapiro-Wilk W	Shapiro-Wilk p-value	Mann-Whitney U Statistics	Mann-Whitney p-value
Offer 1	3.75	0.926	0.845	0.0282	6,241.0	0.0
Offer 2	3.33	0.92	0.893	0.0460	N/A	N/A

Notes: N/A – not applicable.

Source: own study.

The above findings therefore support hypothesis H1, stating that Gen Z individuals are more likely to apply for a job when diversity and inclusion are emphasised in the job advertisement.

To verify hypotheses H2 and H3, we analysed the answers to the following question:

Choose to what extent you agree with the following statements for offer 1 (for offer 2). Please rate the following aspects on a scale of 1 to 5, where 1 is “not important” and 5 is “very important”:

- *compensation and benefits package,*
- *career growth and advancement opportunities,*
- *company culture and values,*
- *work-life balance,*
- *job responsibilities and role alignment with skills and interests,*
- *the importance of diversity and inclusion initiatives.*

Based on the obtained results, we analysed descriptive statistics (Table 3), ran a non-parametric ANOVA correlation analysis with Kruskal-Wallis test (Table 4), and conducted regression analysis (Tables 5 and 6) (Nunan, Birks & Malhotra, 2020).

The descriptive statistics for offer 1 (which includes D&I signalling) and offer 2 (which does not), provided in Table 3, show that for most elements there is no significant difference in the levels of importance across respondents. However, a noticeable difference exists between the two groups for two EVP elements – D&I initiatives and career growth. Respondents rated the “value of diversity and inclusion initiatives” higher for offer 1 (mean = 3.43, median = 4) than for offer 2 (mean = 3.03, median = 3), suggesting that those who chose the D&I-signalling ad (offer 1) tend to prioritise D&I more highly than those who chose offer 2.

The Kruskal-Wallis test results provide additional evidence regarding differences in job attractiveness elements for offer 1. The results in Table 4 present the outcomes of Kruskal-Wallis tests, where the independent variable is the respondents’ preference towards the job offers (offer 1 and offer 2) and the dependent variable is

the candidates' preferences for specific EVP elements. Significant differences were observed for career growth and advancement opportunities ($p = 0.007$) and professional responsibilities and role matching to skills ($p = 0.041$), suggesting that these elements may play a role in assessing job attractiveness for the respondents, who preferred offer 1. For offer 2, the Kruskal-Wallis test did not identify any statistically significant differences.

Table 3. Descriptive Statistics for Candidates' Preferences towards EVP Elements for Two Offers

Category	<i>N</i>	Missing	Mean	Median	<i>SD</i>	Minimum	Maximum
Offer 1 (compensation and benefits package)	79	2,907	3.85	4	1.21	1	5
Offer 1 (career growth and advancement opportunities)	79	2,907	3.86	4	1.14	1	5
Offer 1 (company culture and values)	79	2,907	3.69	4	1.2	1	5
Offer 1 (work-life balance)	79	2,907	3.96	4	1.18	1	5
Offer 1 (professional responsibilities and role matching to skills)	79	2,907	3.85	4	1.25	1	5
Offer 1 (the value of diversity and inclusion initiatives)	79	2,907	3.43	4	1.34	1	5
Offer 2 (compensation and benefits package)	79	2,907	3.86	4	1.12	1	5
Offer 2 (career development and promotion opportunities)	79	2,907	3.42	4	1.24	1	5
Offer 2 (company culture and values)	79	2,907	3.48	4	1.12	1	5
Offer 2 (work-life balance)	79	2,907	3.96	4	1.18	1	5
Offer 2 (professional responsibilities and role matching to skills)	79	2,907	3.66	4	1.2	1	5
Offer 2 (the value of diversity and inclusion initiatives)	79	2,907	3.03	3	1.24	1	5

Notes: Numbers in bold denote the EVP element directly related to the experimental manipulation, namely the presence or absence of D&I signalling in the job offer.

Source: own study.

Table 4. Correlation Analysis of Candidates' Preferences towards EVP Elements for Two Offers

Category	χ^2	<i>df</i>	<i>p</i>
Offer 1 (compensation and benefits package)	1.51	1	0.219
Offer 1 (career growth and advancement opportunities)	7.317	1	0.007
Offer 1 (company culture and values)	1.685	1	0.194

Table 4 cnt'd

Category	χ^2	<i>df</i>	<i>p</i>
Offer 1 (work-life balance)	3.267	1	0.071
Offer 1 (professional responsibilities and role matching to skills)	4.17	1	0.041
Offer 1 (the value of diversity and inclusion initiatives)	0.812	1	0.368
Offer 2 (compensation and benefits package)	0.0004656	1	0.983
Offer 2 (career development and promotion opportunities)	2.5293	1	0.112
Offer 2 (company culture and values)	0.2174	1	0.641
Offer 2 (work-life balance)	3.1356	1	0.077
Offer 2 (professional responsibilities and role matching to skills)	1.2064	1	0.272
Offer 2 (the value of diversity and inclusion initiatives)	0.0386	1	0.844

Source: own elaboration.

Tables 5 and 6 present results for the regression analysis, conducted to check hypotheses H2 and H3. The regression analysis for offer 1 with a clear D&I signaling (Table 5) indicates that the model shows a statistically significant baseline preference for offer 1 (intercept estimate = 1.6661, $SE = 0.617$, $t = 2.701$, $p = 0.009$). While the intercept reflects the overall attractiveness of offer 1 when other factors are controlled, given that D&I initiatives are a defining characteristic of this offer, it is reasonable to infer that they contribute to its appeal. Additionally, company culture and values (estimate = 0.5229, $p < 0.001$) play a significant role in respondents' job attractiveness evaluation.

Table 5. Linear Regression for Offer 1

Model	<i>R</i>	<i>R</i> ²		
1	0.494	0.244		
Predictor	Estimate	<i>SE</i>	<i>t</i>	<i>p</i>
Intercept	1.6861	0.617	2.701	0.009
Which job advertisement did you ultimately choose to apply for? (Chosen job offer: 1 = offer 2, 0 = offer 1)	-0.0753	0.283	-0.266	0.791
Offer 1 (compensation and benefits package)	-0.202	0.198	-1.116	0.27
Offer 1 (career growth and advancement opportunities)	0.1486	0.181	0.821	0.414
Offer 1 (company culture and values)	-0.5229	0.139	-3.765	0.001
Offer 1 (work-life balance)	-0.0491	0.208	-0.236	0.814
Offer 1 (professional responsibilities and role matching to skills)	0.0712	0.171	0.418	0.677

Source: own elaboration.

For offer 2 (see Table 6), the last of the two elements also turned out to have a significant effect (estimate = 0.5615, $SE = 0.109$, $t = 5.175$, $p < 0.001$) together with the work-life balance (estimate = 0.5965, $SE = 0.143$, $t = 4.181$, $p < 0.001$).

Table 6. Linear Regression for Offer 2

Model	R	R^2		
1	0.764	0.584		
Predictor	Estimate	SE	t	p
Intercept	0.2466	0.375	0.658	0.513
Which job advertisement did you ultimately choose to apply for? (Chosen job offer: 1 = offer 2, 0 = offer 1)	-0.1088	0.209	-0.521	0.604
Offer 2 (compensation and benefits package)	-0.3234	0.124	-2.599	0.011
Offer 2 (career growth and advancement opportunities)	-0.094	0.125	-0.753	0.454
Offer 2 (company culture and values)	0.5615	0.105	5.365	0.001
Offer 2 (work-life balance)	0.5965	0.143	4.181	0.001
Offer 2 (professional responsibilities and role matching to skills)	0.0955	0.118	0.812	0.42

Source: own elaboration.

Therefore, the results support the hypothesis H2 that job seekers who choose ads with clear communication of D&I will have different preferences compared to those choosing ads without clear D&I signalling. However, both groups tend to value company culture and values.

Moreover, regression analysis revealed no significant effect of the D&I initiatives on applicants' decision to apply for offer 2 (estimate = 0.2466, $SE = 0.375$, $t = 0.658$, $p = 0.513$). Hence, together with the corresponding data for offer 1, described above, we can accept hypothesis H3 and conclude that job seekers are more inclined to apply for the position which includes D&I signals if they believe in the importance of diversity initiatives.

5. Discussion

The presented research reveals that Generation Z job seekers are particularly drawn to job advertisements that signal diversity and inclusion, aligning with Maj and Kasperek's (2020) findings that this generation values CSR when selecting employers. This study supports and builds on Satzger and Vogel's (2023) research, emphasising the need to target diversity, equity, and inclusion (DEI) initiatives toward both millennials and Gen Z. Brammer, Millington and Pavelin (2009) also found a positive link between organisational diversity and individuals' perceptions

of the organisation. Furthermore, Iseke and Pull (2019) highlighted that employers visibly committed to inclusive practices attract both current employees and job candidates. Schäpers *et al.* (2021) argued that promoting diversity enhances employer attractiveness, and Ng, Schweitzer and Lyons (2010) noted that millennials advocate for DEI policies. This study confirms that Gen Z responds strongly to DEI-focused job advertisements, underscoring the importance of these values in shaping employer attractiveness and influencing job-seeking behaviour.

The findings indicate that job seekers drawn to ads emphasising diversity and inclusion differ in preferences from those choosing ads without explicit D&I messaging, though both value company culture and values. This highlights the importance of signalling organisational culture, supporting Pacelli, Shi and Zou (2022), who found that emphasising corporate culture, especially after movements like Black Lives Matter, attracts more applicants. They argue that organisations should effectively communicate cultural values in job advertisements to appeal to job seekers.

The findings presented in this paper are also in line with the study conducted by Mauger (2024) and Hicklenton *et al.* (2021), who found that personal values also influence job preferences, with individuals seeking organisations that align with their values. As stated by Ng and Burke (2005) the person-organisation fit is of importance also when job seekers consider if the value they put into diversity or representing a minority group fits the organisations' actions in this area. The findings of the presented study indicate that job seekers are more inclined to apply for positions that include clear diversity and inclusion signals when they personally value diversity initiative, thus actively looking to maximise the person-organisation fit.

The presented findings have important practical implications. Firstly, the findings show that organisations should put greater emphasis on diversity management and inclusion practices to attract and retain talents. Investing in inclusivity can serve as a strategic lever for organisations to improve their attractiveness, helping them to effectively compete for talent. To enhance the diversity and inclusion signalling, organisations should reinforce the signals in job advertisements and beyond, developing a coherent communication strategy. According to the Diversity Barometer survey (Forum Odpowiedzialnego Biznesu, 2021) in Poland, the recruitment area demonstrated the worst results among the diversity management actions. Although present in the job offerings of some of the diversity leaders in Poland (e.g., using foreign languages for the job offering page by Biedronka, avoiding wording that discourages applicants over 50 years by Accenture) (Forum Odpowiedzialnego Biznesu, 2024), diversity and inclusion signalling is still limited. Organisations could ensure that diversity and inclusion signalling is present also on their web page, in their internal communications and actions or for example by obtaining relevant

certifications and rewards, that could demonstrate their commitment to D&I and enhance their message. Also, in light of the presented findings, it becomes clear that organisations should develop internal and external branding strategies that will communicate their commitment to inclusion and diversity. As suggested by Satzger and Vogel (2023), clear signals of inclusiveness can help in creating an image of the organisation as a caring employer that values equal treatment. It is also of importance to align diversity signals and statements with organisational actions, as misalignments between the signals and actual actions lead to a negative perception of employer attractiveness (Windscheid *et al.*, 2016). Organisations could also develop proactive communication strategies, which could include sharing success stories, diversity metrics or initiatives they undertook, to foster an inclusive work environment (Dauth *et al.*, 2023).

The conducted research is not free from limitations. First and foremost, we recognise that the very limited and not representative sample resulted from the constrained time frame allocated for data collection, which does not allow for generalisability. Sample limitations related to the disproportionate representation of individuals without higher education and unclear relevance of the respondents' education to the HR field suggests uncertainty about the alignment with HR qualifications which could influence their responses. Moreover, a high share of small town residents (44%) could have shaped their preferences and perspectives due to the differences in socio-economic and labour market conditions compared to large urban areas. These limitations highlight the importance of interpreting results with caution. Also, the fact that we used AI-developed job advertisements limited the possibility to look for diversity and inclusion signalling in other places. As job seekers will probably not rely only on the job advertisement but also look at the organisation's side for further information, an additional source confirming diversity and inclusion signalling was left out.

Future research should therefore not only be conducted on a representative sample, but it could also include a longitudinal study, which could show the effectiveness of diversity initiatives over time, thus going beyond mere diversity and inclusion signalling in job advertisements. Future research could also compare the effectiveness of diversity and inclusion signalling across different cultures and generations. In further research, we plan to analyse actual job advertisements from popular platforms to examine how they emphasise values such as diversity and inclusivity, which would address the limitations of using artificially generated ads and provide more practical insights. Also, a study which would differentiate between internal and external diversity and inclusion practices and their influence on employer attractiveness should be undertaken. This could provide deeper insights into how a holistic diversity and inclusion-based employer attractiveness can be developed. Also, a broader focus on talent management, including talent

management strategies, employee retention and employee engagement could provide a more comprehensive understanding of how diversity and inclusion influence the overall employee experience.

6. Conclusion

Young job seekers show an increasing interest in and place increasing importance on diversity and inclusion in their professional lives and choices. For example, the “woke” movement and changing political landscape demonstrate how younger generations are more open-minded and value diverse perspectives more than their predecessors. As the latest generation to enter the workforce, they are known to be the “most technically literate, educated and ethnically diverse generation in history” (Shaw & Fairhurst, 2008, p. 367). This has important implications for organisations seeking to attract, retain, and develop this talent pool, especially in times of the war for talent. The conducted research showed that emphasising diversity and inclusion in job advertisements can attract young job seekers, showing the importance of diversity and inclusion signalling. Because job seekers look for the optimal person-organisation fit, information on the organisation’s values, culture and commitment towards diversity and inclusion can be a key differentiator. The presented research showed that job seekers are going to apply for a job offer with a higher likelihood if the communication of this offer uses clear and concise D&I signalling. Furthermore, if they choose advertisements including D&I signalling, they will probably have different preferences regarding what constitutes job attractiveness. The data suggest that applicants drawn to D&I-signalling ads value cultural and D&I-related factors more, while those opting for non-D&I-signalling ads may focus more on traditional benefits like compensation. The conducted research also showed that applicants who believe in the significance of the D&I initiatives tend to prefer positions that explicitly signal D&I for those who prioritise these values. However, due to the exploratory nature of the presented study, the issue of diversity and inclusion signalling on employer attractiveness requires further research.

Authors’ Contribution

The authors’ individual contribution is as follows: Katarzyna Podrózna: conceptualisation, methodology, data collection and formal analysis. Olga Voropai: writing of the manuscript. Jolanta Maj: conceptualisation, writing of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

References

- Brammer, S., Millington, A., & Pavelin, S. (2009). Corporate Reputation and Women on the Board. *British Journal of Management*, 20(1), 17–29. <https://doi.org/10.1111/j.1467-8551.2008.00600.x>
- Branowska, A. (2021). Proces doboru pracowników w przedsiębiorstwach – przegląd nowoczesnych i tradycyjnych metod selekcji. *Zeszyty Naukowe Politechniki Poznańskiej. Organizacja i Zarządzanie*, 83, 9–24. <https://doi.org/10.21008/j.0239-9415.2021.083.01>
- Cole, A. B., Haun, C. N., & Silvera, G. A. (2022). Mixed Signals: An Analysis of Diversity Value Signaling in Leading U.S. Hospitals. *Journal of Hospital Management and Health Policy*, 6(27), 1–10. <https://doi.org/10.21037/jhmhp-21-68>
- Cox, T., Jr. (2001). *Creating the Multicultural Organization: A Strategy for Capturing the Power of Diversity* (Vol. 6). John Wiley & Sons.
- Dauth, T., Schmid, S., Baldermann, S., & Orban, F. (2023). Attracting Talent through Diversity at the Top: The Impact of TMT Diversity and Firms' Efforts to Promote Diversity on Employer Attractiveness. *European Management Journal*, 41(1), 9–20. <https://doi.org/10.1016/j.emj.2021.10.007>
- Deeter-Schmelz, D. R., Dixon, A. L., Erffmeyer, R. C., Kim, K., Agnihotri, R., Krush, M. T., & Bolman Pullins, E. (2020). Attracting Students to Sales Positions: The Case of Effective Salesperson Recruitment Ads. *Journal of Marketing Education*, 42(2), 170–190. <https://doi.org/10.1177/0273475318810335>
- Drewery, D. W., Pretti, T. J., & Church, D. (2022). Signaling 'Student-oriented' Job Opportunities Enhances Job Attractiveness in Work-integrated Learning Programs. *Higher Education Research & Development*, 41(2), 346–359. <https://doi.org/10.1080/07294360.2020.1857346>
- Forum Odpowiedzialnego Biznesu. (2021). *Dojrzałość w zarządzaniu różnorodnością i inkluzją w miejscu pracy w Polsce*. Raport z I edycji badania Diversity IN Check. Retrieved from: https://odpowiedzialnybiznes.pl/wp-content/uploads/2021/12/Diversity-IN-Check_raport_Dojrzalosc-w-zarzadzaniu.pdf (accessed: 7.01.2025).
- Forum Odpowiedzialnego Biznesu. (2024). *Diversity IN Check: Raport z badania – 4. edycja*. Retrieved from: <https://odpowiedzialnybiznes.pl/diversity-in-check/> (accessed: 7.01.2025).
- Ganesan, M., Antony, S. P., & George, E. P. (2018). Dimensions of Job Advertisement as Signals for Achieving Job Seeker's Application Intention. *Journal of Management Development*, 37(5), 425–438. <https://doi.org/10.1108/JMD-02-2017-0055>
- Gatewood, R., Gowan, M. A., & Lautenschlager, G. (1993). Corporate Image, Recruitment Image and Initial Job Choice Decision. *Academy of Management Journal*, 36(2), 414–427. <https://doi.org/10.2307/256530>
- Herold, M., & Roedenbeck, M. (2025). Cultural Values and the P-O Fit: Comparative NLP Analysis of German Online Job Advertisements. *Evidence-based HRM: A Global Forum for Empirical Scholarship*, 13(2), 230–245. <https://doi.org/10.1108/EBHRM-05-2023-0120>

- Hicklenton, C., Hine, D. W., Driver, A. B., & Loi, N. M. (2021). How Personal Values Shape Job Seeker Preference: A Policy Capturing Study. *PLoS ONE*, 16(7), e0254646. <https://doi.org/10.1371/journal.pone.0254646>
- Hofer, T., Spiess, T., Ploder, C., & Bernstein, R. (2024). Understanding Employer Attractiveness for Generation Z in the IT Industry. *European Journal of Management Issues*, 32(1), 21–29. <https://doi.org/10.15421/192403>
- Hunt, D. V., Dixon-Fyle, S., Huber, C., Martínez, M. D., Prince, S., & Thomas, A. (2023). *Diversity Matters Even More: The Case for Holistic Impact*. McKinsey & Company. Retrieved from: <https://www.mckinsey.com/featured-insights/diversity-and-inclusion/diversity-matters-even-more-the-case-for-holistic-impact#/> (accessed: 13.11.2024).
- Iseke, A., & Pull, K. (2019). Female Executives and Perceived Employer Attractiveness: On the Potentially Adverse Signal of Having a Female CHRO Rather Than a Female CFO. *Journal of Business Ethics*, 156, 1113–1133. <https://doi.org/10.1007/s10551-017-3640-1>
- Kamińska, B. (2015). Dyskryminacja jako patologia zarządzania zasobami pracy. *Zarządzanie Innowacyjne w Gospodarce i Biznesie*, 1(20), 97–110.
- Kędziora, K., Śmiszek, K., & Zima, M. (Eds). (2009). *Równe traktowanie w zatrudnieniu. Przepisy a rzeczywistość*. Polskie Towarzystwo Prawa Antydyskryminacyjnego.
- Kozłowski, W. (2024). Buying Behaviour of Generation Z with Reference to Cause-related Marketing. *Krakow Review of Economics and Management / Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie*, 3(1005), 63–81. <https://doi.org/10.15678/krem.14672>
- Kristof, A. L. (1996). Person-Organization Fit: An Integrative Review of Its Conceptualizations, Measurement, and Implications. *Personnel Psychology*, 49(1), 1–49. <https://doi.org/10.1111/j.1744-6570.1996.tb01790.x>
- Kristof-Brown, A. L., Reeves, C. J., & Follmer, E. H. (2013). The Goldilocks Pursuit during Organizational Entry: Applicants' and Recruiters' Search for the "Perfect Fit". In: D. M. Cable, K. Y. T. Yu (Eds), *The Oxford Handbook of Recruitment* (pp. 437–453). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199756094.013.0024>
- Kunal, K. R., Philip, C., & Pooja, S. (2022) Employer Attractiveness: Generation Z Employment Expectations in India. *Cardiometry*, 23, 433–443. <https://doi.org/10.18137/cardiometry.2022.23.433443>
- Maj, J., & Kasperek, N. (2020). The Influence of Corporate Social Responsibility on the Attractiveness of Employers in the Perception of Generation Z. In: A. Michałkiewicz, W. Mierzejewska (Eds), *Contemporary Organisation and Management: Challenges and Trends* (pp. 241–251). Wydawnictwo Uniwersytetu Łódzkiego. <https://doi.org/10.18778/8220-333-2.14>
- Marszycki, M. (2023). *3/4 specjalistów korzysta z mediów społecznościowych podczas poszukiwania pracy*. ITwiz. Retrieved from: <https://itwiz.pl/3-4-specjalistow-korzysta-z-mediow-spoecznościowych-podczas-poszukiwania-pracy/> (accessed: 7.01.2025).
- Mauger, Y. (2024). Values Matter: Exploring How Job Seekers' Personal Values Influence Organization Attractiveness. *AIMS International Journal of Management*, 18(1), 1–10. <https://doi.org/10.26573/2024.18.1.1>

- Michałkiewicz, A. (2024). Generation Z's Expectations of a Remote Team Manager. *Krakow Review of Economics and Management / Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie*, 1(1003), 65–82. <https://doi.org/10.15678/KREM.2024.1003.0104>
- Mikołajczyk-Szewczyk, A., & Waligóra, E. (2019). Zróżnicowanie czynników wpływających na wybór oferty pracy w zależności od wieku kandydata. In: *Nauka, badania i doniesienia naukowe 2019: Nauki społeczne i humanistyczne* (Vol. 2, pp. 94–102). Idea Knowledge Future.
- Ng, E. S. W., & Burke, R. J. (2005). Person–organization Fit and the War for Talent: Does Diversity Management Make a Difference? *The International Journal of Human Resource Management*, 16(7), 1195–1210. <https://doi.org/10.1080/09585190500144038>
- Ng, E. S. W., Schweitzer, L., & Lyons, S. T. (2010). New Generation, Great Expectations: A Field Study of the Millennial Generation. *Journal of Business and Psychology*, 25, 281–292. <https://doi.org/10.1007/s10869-010-9159-4>
- Ng, S. I., Ho, J. A., Lim, X. J., Chong, K. L., & Latiff, K. (2021). Mirror, Mirror on the Wall, Are We Ready for Gen-Z in Marketplace? A Study of Smart Retailing Technology in Malaysia. *Young Consumers: Insight and Ideas for Responsible Marketers*, 22(1), 68–89. <https://doi.org/10.1108/YC-06-2019-1006>
- Nunan, D., Birks, D. F., & Malhotra, N. K. (2020). *Marketing Research: Applied Insight*. Pearson Education Limited.
- Pacelli, J., Shi, T., & Zou, Y. (2022). *Communicating Corporate Culture in Labor Markets: Evidence from Job Postings* (Working Paper).
- Różańska-Bińczyk, I. (2022). Oczekiwania przedstawicieli pokolenia Z (C) wobec firm co do ich działalności proekologicznej – wyniki badań własnych. *Zarządzanie Zasobami Ludzkimi*, 145(2), 47–64. <https://doi.org/10.5604/01.3001.0015.8336>
- Ryan, A. M., Sacco, J. M., McFarland, L. A., & Kriska, S. D. (2000). Applicant Self-selection: Correlates of Withdrawal from a Multiple Hurdle Process. *Journal of Applied Psychology*, 85(2), 163–179. <https://doi.org/10.1037/0021-9010.85.2.163>
- Satzger, M., & Vogel, R. (2023). Do Inclusive Workplace Policies Foster Employer Attractiveness? Comparative Evidence from an Online Employer Review Platform. *Public Personnel Management*, 52(4), 566–589. <https://doi.org/10.1177/00910260231187536>
- Schäpers, P., Windscheid, L., Mazei, J., Thielsch, M. T., & Hertel, G. (2021). “Like Will to Like” or “Opposites Attract”? Management Board Diversity Affects Employer Attractiveness. *Gender in Management*, 36(5), 569–590. <https://doi.org/10.1108/GM-10-2019-0182>
- Schmidt, J. A., Chapman, D. S., & Jones, D. A. (2015). Does Emphasizing Different Types of Person–Environment Fit in Online Job Ads Influence Application Behavior and Applicant Quality? Evidence from a Field Experiment. *Journal of Business and Psychology*, 30, 267–282. <https://doi.org/10.1007/s10869-014-9353-x>
- Schneider, B. (1987). The People Make the Place. *Personnel Psychology*, 40(3), 437–453. <https://doi.org/10.1111/j.1744-6570.1987.tb00609.x>
- Shaw, S., & Fairhurst, D. (2008). Engaging a New Generation of Graduates. *Education + Training*, 50(5), 366–378. <https://doi.org/10.1108/00400910810889057>

- Shen, J., Chanda, A., D'netto, B., & Monga, M. (2009). Managing Diversity through Human Resource Management: An International Perspective and Conceptual Framework. *The International Journal of Human Resource Management*, 20(2), 235–251. <https://doi.org/10.1080/09585190802670516>
- Sidorkiewicz, M., & Tokarz-Kocik, A. (2017). Analiza internetowych ofert pracy oraz poszukiwanych kwalifikacji w hotelarstwie na przykładzie województwa zachodniopomorskiego. *Folia Turistica*, 42, 87–102.
- Sievert, M., Vogel, D., & Feeney, M. K. (2022). Formalization and Administrative Burden as Obstacles to Employee Recruitment: Consequences for the Public Sector. *Review of Public Personnel Administration*, 42(1), 3–30. <https://doi.org/10.1177/0734371X20932997>
- Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics*, 87(3), 355–374. <https://doi.org/10.2307/1882010>
- Stiglitz, J. E. (2000). The Contributions of the Economics of Information to Twentieth Century Economics. *The Quarterly Journal of Economics*, 115(4), 1441–1478. <https://doi.org/10.1162/003355300555015>
- Story, J., Castanheira, F., & Hartig, S. (2016). Corporate Social Responsibility and Organizational Attractiveness: Implications for Talent Management. *Social Responsibility Journal*, 12(3), 484–505. <https://doi.org/10.1108/SRJ-07-2015-0095>
- Van Hove, G., Bas, T., Cromheecke, S., & Lievens, F. (2013). The Instrumental and Symbolic Dimensions of Organisations' Image as an Employer: A Large-scale Field Study on Employer Branding in Turkey. *Applied Psychology*, 62(4), 543–557. <https://doi.org/10.1111/j.1464-0597.2012.00495.x>
- White, K., McCoy, M., Love, K., Kwak, E. J., Bruce, E., & Grable, J. (2019). The Role of Signaling When Promoting Diversity and Inclusion at the Firm Level: A Financial Advisory Professional Case Study. *Advances in Business Research*, 9(1), 1–16.
- Windscheid, L., Bowes-Sperry, L., Kidder, D. L., Cheung, H. K., Morner, M., & Lievens, F. (2016). Actions Speak Louder Than Words: Outsiders' Perceptions of Diversity Mixed Messages. *Journal of Applied Psychology*, 101(9), 1329–1341. <https://doi.org/10.1037/apl0000107>
- Wofford, A. M., & Smith, K. N. (2022). Analyzing Signals of (In)Equity and Power in Engineering College Internship Advertisements. *Journal of Women and Minorities in Science and Engineering*, 28(4), 25–49. <https://doi.org/10.1615/JWomenMinorScienEng.2021037923>
- Żarczyńska-Dobiesz, A., Janiak-Rejno, I., & Chomętowska, B. (2024). Gen Y in Uncertain Times of Remote Working: From the Employees' Perspective. *Krakow Review of Economics and Management / Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie*, 2(1004), 81–102. <https://doi.org/10.15678/KREM.2024.1004.0205>

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Is the Subjective Financial Well-being of Polish Households Changing with Time? An Empirical Study Based on Constrained Latent Markov Models

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ABSTRACT

Objective: According to the most recent available Eurostat data from 2018, Poles' satisfaction with their financial situation stood at 6.3 points, which was below the EU average. We focus on how households' behaviours have evolved over the past 15 years and their impact on perceived financial well-being.

Research Design & Methods: To comprehensively assess the financial situation of Polish households, this study leverages the Social Diagnosis panel research, a longitudinal dataset spanning eight waves from 2000 to 2015. We employ latent Markov models with varying numbers of latent structures, incorporating survey weights and different sets of transition matrix constraints to analyse the dynamics of financial behaviours and identify potential shifts over time. We consider a heterogeneous transition matrix (not constrained) where the transitions are allowed to vary freely across time points, and partial-homogeneity, allowing some transition probabilities to vary while others remain stable across time.

Findings: Through these models, we find three latent states of Poles with similar level of income perception and describe the process of changing opinion in the analysed period of time. We demonstrate the self-reported financial satisfaction in each round of the national longitudinal Polish survey with a particular interest in financial behaviours before and after the financial crisis. Our analysis reveals a distinct pattern following the peak of the financial crisis: Individuals exhibited a higher probability of remaining in the unsatisfied group, a lower probability of maintaining full satisfaction, and reduced likelihood of transitioning from dissatisfaction to general satisfaction, particularly during the two waves immediately following the crisis.

Implications/Recommendations: Our findings underscore the critical role of financial well-being in shaping individual behaviour and societal outcomes. These insights can inform policymakers as they allocate public funds, emphasising the need to prioritise policies that support financial stability and resilience. Moreover, the proposed approach could be extended to examine respondent behaviour before and after other significant global events, such as the EU accession (2004), the COVID-19 pandemic, or the Russia-Ukraine war.

Contribution: A key contribution of this approach is our conceptualisation of self-reported income satisfaction as a latent, discrete variable, which we analyse using a particular latent variable modelling techniques. This research addresses a critical gap in understanding the evolving dynamics of households' behaviour and the impact of economic downturns on financial perceptions in developing countries like Poland. Moreover, compared to the most recent studies on financial well-being that also cover other national surveys, we demonstrate changes in attitudes across society by analysing all waves of the national longitudinal survey, accounting for the heterogeneous structure of the data and incorporating survey weights.

Article type: original article.

Keywords: constrained latent Markov model, financial well-being, homogeneity, transition matrix.

JEL Classification: C33, C52, D19, I31.

1. Introduction

The assessment of the income situation of households, their physical equipment, standard of living and the perceptions of the economic situation of households themselves is an important part of the social survey research. The most frequent subject of research interest is the income differentiation of the population with emphasis on households at the risk of poverty, households with the lowest income, the relation of the income group to the household segmentation in social, age, educational and regional categories (Sirovátka & Mareš, 2009).

To assess the income situation of households, most frequently, objective indicators of wealth (for example, level of income, asset allocation) are considered. This paper examines subjective well-being as a rising indicator of societal advancement, potentially offering a more direct assessment of household prosperity than

traditional income metrics (Binder, 2014). First, household income is a difficult or sensitive question for many respondents, and it tends to have a high proportion of missing responses. The use of alternative measures should minimise the effect of unreliable household income data, a significant risk considering well-known difficulties measuring household incomes in many parts of the world (Diego-Rosell, Tortora & Bird, 2018). The second reason is that the subjective material well-being variables are likely to account for most of the variance resulting from direct income effects, as well as indirect effects such as relative income (Clark *et al.*, 2005).

Many authors emphasise that non-monetary factors of financial satisfaction can transcend the limitations of income-based measures, enabling researchers to delve into the determinants of material well-being, social welfare, and quality of life (Betti *et al.*, 2001; Białowolski & Weziak-Białowolska, 2014; Białowolski, 2018). Furthermore, it is widely recognised that perceptions of household income significantly influence subjective well-being. Diego-Rosell, Tortora and Bird (2018) demonstrated that material well-being is a primary driver of subjective well-being across all 153 analysed geopolitical regions.

Poland, a nation situated in Central and Eastern Europe, has recently undergone a period of structural and economic transformation. Despite relatively robust economic growth, income inequality has remained relatively modest compared to neighbouring countries like Ukraine, Lithuania, Latvia, and Russia. Nevertheless, Poles often express dissatisfaction with their financial circumstances.

According to the most recent available Eurostat data from 2018 (Eurostat, 2019), Poles' satisfaction with their financial situation stood at 6.3 points (on a 0–10 scale), which was below the EU average of 6.6 points. These data represent the most recent comprehensive and internationally comparable Eurostat evidence specifically concerning subjective financial well-being across EU countries. Although more recent data on overall life satisfaction are available for 2023, with Poland ranking relatively highly (Eurostat, 2024), similarly detailed cross-country data focusing specifically on satisfaction with one's financial situation have not been included in more recent Eurostat publications.

In this study, we address a critical methodological question: How do relevant constraints imposed on the latent part of the Latent Markov (LM) models improve the measure of fit and facilitate the interpretation of socio-economic issues concerning the self-reported material well-being of Poles observed at different points in time? This research question guides our investigation into the optimal modelling approach for longitudinal data on subjective financial satisfaction. By comparing models with different types of constraints, we aim to demonstrate how appropriate restrictions can enhance both statistical performance and substantive interpretability when analysing temporal patterns in Poles' financial well-being perceptions. This question is particularly relevant given the challenges of analysing

subjective economic assessments across different economic cycles and social contexts. The question of the changing households' behaviours and the effects of economic downturn on the perception of the financial position for a developing country like Poland is still understudied. This article fills this gap.

To assess the financial situation of Polish households, our study employs the Social Diagnosis (2015) panel research, encompassing all eight waves conducted between 2000 and 2015. Focusing on individual responses from household heads, we investigate the evolution of subjective financial satisfaction in Poland. Our analysis examines self-reported income positions across survey waves, with particular attention to pre- and post-economic crisis behaviour. To capture the evolving dynamics of Polish households, we employ dynamic discrete latent variable models (Bartolucci, Pandolfi & Pennoni, 2022) that allow for transitions between latent classes (states) over time. We adopt especially LM models (Bartolucci, Farcomeni & Pennoni, 2013), incorporating survey weights often overlooked in previous research. By comparing models with varying numbers of latent structures, constraints, and temporal transitions, we gain insights into the changing financial attitudes of Polish households.

The paper proceeds as follows: In section 2, we review the relevant literature describing the most important studies concerning the subjective assessment of financial situation among the Polish society. Then, we outline the adopted latent variable models, namely LM models with different types of constraints (section 3). The data and main results are presented in section 4, whereas some conclusions are given in section 5.

2. Literature Review

In the following, we describe relevant contributions concerning the perceived income satisfaction of households, in particular in connection with the Polish data and studies based on the other national surveys, so as to clarify which are the novelties of the approach we propose.

Gasiorowska (2015) investigated the influence of money attitudes on the relationship between income and financial satisfaction. The study concerning the Polish households' economic well-being in 2013 was based on the hierarchical regression analysis in the group of 356 Polish internet users. The results showed that the level of households' income was only modestly correlated with subjective economic well-being. However, the author notes that the current income may be an inadequate measure of objective wealth, as it does not necessarily represent all economic resources that contribute to a sense of financial satisfaction.

Zalega (2012) examined the subjective assessment of the material condition and the allocation of monetary resources based on questionnaire interviews with 1,896 households of the 10 biggest Polish cities in the year 2011. In that year, only a few

respondents assessed the financial situation of their household as very good (2.9%), while 70% of respondents were dissatisfied with the current disposable income. The author, by means of correlation analysis evaluated the relationship between the self-assessment of financial condition and the other variables, such as age, education, gender and income, in the selected group of households.

Hanusik and Łangowska-Szcześniak (2013) examined the correlation between Polish households' subjective perceptions of their material circumstances and their income, expenses, and the educational attainment of the household head. The econometric analysis based on probit models showed that there is a strong dependence between self-assessment of the material situation and household income, expenses and a clear differentiation of this assessment depending on the level of education of the head of household. The author presented the results for the cross-sectional data budgets of households carried out by the Statistics Poland (GUS) in 2011.

Wałęga (2015) also analysed subjective material situation of young people's households in Poland based on Statistics Poland household surveys in the years 2000–2012. The results, relying mainly on structure analysis shown that the material situation of young people's households is more favourable than that of other households (with a head of the household older than 35 years). A noticeable general improvement in the subjective assessment of the financial situation was especially observed for young people until 2008. However, in 2012, its deterioration, as a result of the financial crisis, was noted.

Gasińska (2016) discussed the most characteristic subjective opinions and assessments concerning the Poles' income situation. The author emphasised that in recent years there has been a clear improvement in the self-assessment of the material situation of households in Poland. The share of very good grades increased significantly, and at the same time, there was a relatively small decrease in the share of negative grades. In all socio-occupational groups, the number of respondents with low and very low ratings of their situation decreased, and at the same time, though at a different pace, the number of good and very good grades increased. The results are based mainly on Social Diagnosis (2015) data in 2000–2015, however the statistical analysis is limited to the regular summary statistics tables.

Kalinowski and Kozera-Kowalska (2017) analysed the correlation between subjectively perceived income levels and demographic factors such as gender, age, education, household structure, and geographic region among rural residents in Poland. The obtained results based on the 1,067 rural respondents, questioned in 2013, indicated that the factors influencing the positive assessment are education and subjectively assessed household's well-being.

Existing studies based on other national surveys (Verbič & Stanovnik, 2006; Popova & Pishniak, 2017; Brzozowski & Spotton Visano, 2019) are limited by their cross-sectional design, providing an incomplete understanding of subjective

financial positions in the analysed societies. Researchers such as Chzhen (2016) and Mahdzan *et al.* (2019) acknowledge the shortcomings of these studies and advocate for the use of national longitudinal surveys to effectively evaluate changes in participant behaviour over time.

Note that the assumption of many of the statistical procedures is the homogeneity of the analysed data. In most of the studies regarding the issue of self-reported income position, it is simply supposed (without prior verification) that the analysed data set is homogeneous and the statistical methods are applied. The problem of heterogeneity of the data is very important, especially when responses are observed on each subject repeatedly over time. Relating to the available studies, one of the important contributions of the provided approach is that we perceive the self-reported income satisfaction as a latent, discrete variable that we analyse by a suitable latent variable model. Compared to the author's previous study (Genge, 2021), we conceive the unobserved heterogeneity dynamically at the same time. The respondents can change the membership of the identified structures (which are referred to as states) over time. A key challenge in this research is model selection, involving the determination of both the number of latent structures (states) and the specific constraints within the LM model. We note that, although the first relevant piece of literature which is specifically devoted to LM models for longitudinal data, is the book by Wiggins (1973), due to technological advancements, these models continue to be developed in modern times (Tullio & Bartolucci, 2022; Brusa, Bartolucci & Pennoni, 2023). The primary advantage of LM models lies in their ability to analyse the evolution of behaviours or phenomena over time. Although prior studies have utilised selected waves and survey weights in their longitudinal analyses (Pennoni & Genge, 2018, 2020), to our knowledge, this is the first study to examine changing households' behaviours using all available waves of a national panel survey while incorporating sample weights. Populations that are oversampled in national data sets have a smaller weight value (Thomas & Heck, 2001). Therefore, incorporating weights into empirical analyses is essential to address the unequal probability of selection, nonresponse, noncoverage, and poststratification. This approach, often referred to as weighting, is a straightforward method for handling disproportionate sampling (Kalton, 1989; Stapleton, 2002).

3. Methodology

3.1. Basic Latent Markov Model

In our investigation, we examine a categorical outcome variable $X^{(t)}$, measured at each time point t , with $t = 1, \dots, T$ ($T = 8$ in our study). The outcome variable $X^{(t)}$ is meant to evaluate the financial well-being of Polish households and includes l_j categories, where l_j represents the number of possible responses for j -th variable,

labelled from 0 to $l_j - 1$. We define the vector of outcomes for individual i at time points t as $\mathbf{X} (X^{(1)}, \dots, X^{(T)})$, which represents repeated observations on the same respondents over time.

It is important to note that we perceive the perception of a household's income as an unobservable, latent characteristic, assessed through questionnaire items. LM models allow us to conceptualise self-reported income position as a time-varying latent variable, denoted as $\mathbf{S} = S^{(1)}, \dots, S^{(T)}$, which is considered to be a hidden stochastic process of the first order with u latent states.

A fundamental assumption of the LM model is that the response vectors $X^{(1)}, \dots, X^{(T)}$, are conditionally independent when considering the latent process $\mathbf{S}$. Furthermore, the elements $X^{(t)}$ of $\mathbf{X}$ are conditionally independent when considering $S^{(t)}$.

The LM model is characterised by various types of parameters that describe:

– the measurement component of the model – the conditional probability distribution of the outcome variable, given the latent states:

$$\phi_{x|s} = p(X^{(t)} = x | S^{(t)} = s), \quad t = 1, \dots, T, \quad s = 1, \dots, u, \quad x = 0, \dots, l_{j-1}.$$

– the latent component of the model – the initial π_s and the transition $\pi_{s|\bar{s}}^{(t)}$ probabilities, expressed by the formulas below:

$$\pi_s = p(S^{(1)} = s), \quad s = 1, \dots, u,$$

$$\pi_{s|\bar{s}}^{(t)} = p(S^{(t)} = s | S^{(t-1)} = \bar{s}), \quad t = 2, \dots, T, \quad \bar{s}, s = 1, \dots, u,$$

where s is a realisation of $S^{(t)}$ and $\bar{s}$ is a realisation of $S^{(t-1)}$.

Given the parameters outlined above, the probability mass function of $\mathbf{S}$ is defined as follows:

$$p(\mathbf{S} = \mathbf{s}) = \pi_{s^{(1)}} \prod_{t=2}^T \pi_{s^{(t)}|s^{(t-1)}}^{(t)}, \quad s = 1, \dots, u, \quad (1)$$

where $\mathbf{s}$ represents a realisation of $\mathbf{S}$, including elements $s^{(1)}, \dots, s^{(T)}$. Moreover, the conditional distribution of $\mathbf{X}$ given $\mathbf{S}$ is computed as:

$$p(\mathbf{X} = \mathbf{x} | \mathbf{S} = \mathbf{s}) = \prod_{t=1}^T \phi_{x^{(t)}|s^{(t)}}, \quad (2)$$

for any realisation $\mathbf{x}$ of $\mathbf{X}$.

The manifest distribution of the response variables in the basic LM model is defined as:

$$p(\mathbf{X} = \mathbf{x}) = \sum_s \pi_{s^{(1)}} \pi_{s^{(2)}|s^{(1)}}^{(2)} \dots \pi_{s^{(T)}|s^{(T-1)}}^{(T)} \times \phi_{x^{(1)}|s^{(1)}}^{(1)} \dots \phi_{x^{(T)}|s^{(T)}}^{(T)}. \quad (3)$$

It is important to note that the basic version of the model does not incorporate individual covariates. This framework presumes a uniform latent model for all units and a consistent measurement model across time. Moreover, this version of the model imposes no restrictions on either conditional probabilities or initial and transition probabilities.

To illustrate the progression of the phenomenon of interest, the marginal distribution of each variable $S^{(t)}$ very often are presented in a figure (especially if there are many transition matrices to be analysed). Furthermore, based on the above probabilities the marginal distribution of $X^{(t)}$ may be computed as:

$$p(X^{(t)} = x) = \sum_{s=1}^u p(S^{(t)} = s) \phi_{x|s}, \quad x = 0, \dots, l_j - 1. \quad (4)$$

3.2. Constrained Latent Markov Model

In the subsequent phase of our analysis, we explore various formulations of the LM model proposed by Bartolucci, Farcomeni and Pennoni (2013) that incorporate constraints related to specific hypotheses of interest. These constraints can pertain to the distribution of the latent process, such as the initial or transition probabilities of the model. Depending on the research objectives, an LM model can also be formulated by imposing constraints on both components.

The following constraint on the initial probabilities may be considered:

$$\pi_s = 1/u, \quad s = 1, \dots, u.$$

This means that, at the beginning of the period of observation, each latent state includes the same proportion of subjects.

Another approach involves imposing constraints on the transition probabilities, which can significantly reduce the model's parameter count. To represent these constraints succinctly, let denote the transition probability matrix with elements $\pi_{s|\bar{s}}^{(t)}$, $s = 1, \dots, u$, arranged in a row ($\bar{s}$) by column (s) format.

The most basic constraint on the latent component of the LM model is:

$$\Pi^{(t)} = \Pi, \quad t = 1, \dots, T, \quad (5)$$

where Π is a common transition matrix with elements $\pi_{s|\bar{s}}, \bar{s}, s = 1, \dots, u$. This aligns with the hypothesis of a time-invariant Markov chain.

A weaker version of the above constraint is:

$$\Pi^{(t)} = \begin{cases} \Pi^{*(1)}, & t = 2, \dots, T^* \\ \Pi^{*(2)}, & t = T^* + 1, \dots, T, \end{cases} \quad (6)$$

with T^* between 2 and $T - 1$ and $\Pi^{*(1)}$ and $\Pi^{*(2)}$ being separate transition matrices, with elements $\pi_{s|\bar{s}}^{*(1)}$ and $\pi_{s|\bar{s}}^{*(2)}$, respectively. This aligns with the hypothesis of partial time homogeneity, characterised by two distinct transition matrices: the first applicable until occasion T^* , and the second governing transitions subsequent to this occasion (Bartolucci, 2007).

As far as the estimation process is concerned, our study incorporates individual longitudinal sampling weights, denoted as $w_i, i = 1, \dots, n$, by maximising a weighted log-likelihood using the Expectation-Maximisation (EM) algorithm (Baum *et al.*, 1970; Dempster, Laird & Rubin, 1977). The EM algorithm is applied

to estimate the models with latent variables since it is based on the concept of complete data, which is related to the value of every latent variable, further to the response variables (see Bartolucci, Farcomeni & Pennoni, 2013, chapter 3, for more information). Given that the latent configuration is unknown for each respondent, the EM algorithm maximises the observed data log-likelihood by alternating the expectation and maximisation steps until convergence. To prevent convergence to local maxima and comprehensively explore the parameter space, we employ diverse initialisation strategies for the EM algorithm, incorporating both deterministic and random values. To estimate the model, we utilise a specialised function within the LMest package (Bartolucci, Pandolfi & Pennoni, 2017) designed for the software R (The R Core Team, 2025). This function enables the use of multiple initialisations for the EM algorithm.

An essential point in using discrete latent variable whether in basic or advanced forms, is the selection of the number of latent structures (clusters, states, or the number of categories of the discrete latent variable). Following a common rule, initially, we fit the LM model for progressively larger values of u , continuing until we identify the minimum BIC (Schwarz, 1978) and AIC (Akaike, 1973) indices. Subsequently, we attempt to simplify this model by applying various constraints, continuing until further reductions in BIC and AIC are no longer feasible while maintaining the previously determined number of latent states.

To evaluate the quality of the LM model, we also consider the index $\tilde{S}$, a classification quality metric proposed by Bartolucci, Lupporelli and Montanari (2009):

$$\tilde{S} = \frac{\sum_{i=1}^n \sum_{t=1}^T [\hat{f}^{*(t)}(\mathbf{x}) - 1/u]}{(1 - 1/u)nT}, \quad (7)$$

where $\hat{f}^{*(t)}(\mathbf{x})$ is the maximum of the posteriori probabilities, with respect to s ($s = 1, \dots, u$). Note that this measure is based on the entropy index illustrated by Bacci, Pandolfi and Pennoni (2014). The index $\tilde{S}$ ranges from 0 to 1, with a value of 1 indicating perfect classification accuracy and clearly distinguishable latent states. On the other hand, when states are not well separated, most of the probabilities $\hat{f}^{*(t)}(\mathbf{x})$ are close to $1/u$ and then $\tilde{S}$ attains value close to its minimum, which is equal to 0.

4. Data and Results

4.1. Data

In the empirical part of the paper, we analyse data concerning self-reported financial status coming from the largest household panel, the Social Diagnosis survey (Social Diagnosis, 2015). Social Diagnosis is a 15-year observational longitudinal study aimed at presenting the well-being, living conditions (financial, societal,

cultural) and health issues of the Polish population. To date, data have been collected up until 2015, which is the last issue available. Our analysis centres on the survey question “Is it easy to make ends meet?” which features the following ordered responses: “with great difficulty” (0), “with difficulty” (1), “with some difficulty” (2), “rather easily” (3), “easily” (4). These responses were collected in each wave of the longitudinal survey¹ conducted in 2000, 2003, 2005, 2007, 2009, 2011, 2013, and 2015. The analysed complete data concerns $n = 2,768$ (346 complete observations at each point in time).

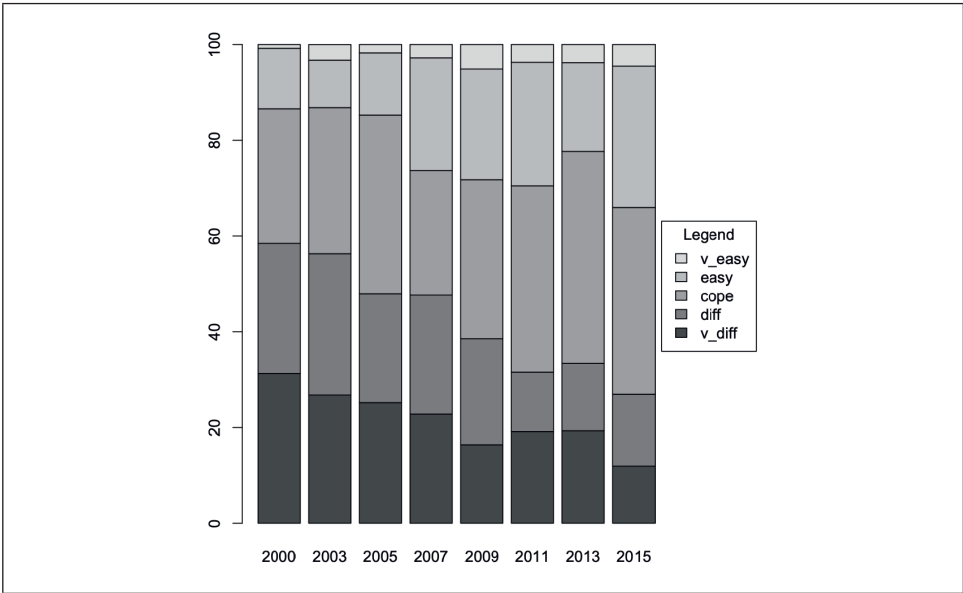


Fig. 1. Distribution of Responses by Year (Including Survey Weights %)

Source: own study.

Figure 1 illustrates the distribution of responses across survey waves, incorporating survey weights to maintain the sample’s representativeness (Ernst, 1989; Verma, Betti & Ghellini, 2007). We note the highest concentration in the middle category (to cope with a certain difficulty). There is a clear difference in the distribution of the responses between the first and the last year of the survey. While the percentage of Poles declaring the worst position is over 30% at the very beginning of the survey and is decreasing with years, for the last category, there is less than 1% in the first round and close to 5% of households reporting the highest financial status in the last round of the survey. We denote the increasing tendency of reporting the

¹ See the data set and its complete documentation in Social Diagnosis (2015) database.

best material position over the years (the increasing share of the highest scored categories), showing the improving financial situation of Polish households in the period of time considered. Our findings align with the research of Panek and Czapiński (2015a, 2015b). However, their study relied solely on summary statistics from the final two survey waves. We also remark that the distribution of the responses has not dramatically changed with the occurrence of the economic crisis. More details and figures representing the analysed data can also be found in the author's previous work (Genge, 2019).

4.2. Empirical Study

In this section, we describe the results obtained from applying latent Markov models to the dataset concerning the material position of Polish households (presented in section 4.1) using the R package LMest (Bartolucci, Pandolfi & Pennoni, 2017). In the initial phase of our analysis, we determined the optimal number of latent states and subsequently explored model simplification through the application of various parameter constraints (see Table 5).

4.2.1. Results for Basic Latent Markov Model

At the first stage, we compared the results for the basic LM models (with heterogeneous transitions) with varying number of latent states. Given that the minimum BIC index value was 6,353.216, a three-state latent structure ($s = 3$) was determined to be the optimal number of latent components. When $s = 3$, we also observed a high classification quality index $\tilde{S} = 0.845$, supporting the presence of well-defined latent structures within the analysed dataset. The estimates of the parameters under the selected LM model with $s = 3$, denoted as *LM-hetero*, are given in Tables 1–3.

The conditional response probabilities under model *LM-hetero* presented in Table 1 enable to characterise Polish households in terms of their perceived financial condition. The first latent state refers to the households with the worst self-reported material well-being, the third state to the households with the highest income perception and the second to those generally satisfied with their material situation. As the number of latent states rises, the likelihood of belonging to the initial category ($x = 0$) diminishes, while the probability of being assigned to the final category ($x = 4$) grows. Respondents assigned to the initial latent state are highly likely to indicate the most challenging financial circumstances $\phi_{x|s} = 0.57$ as opposed to those reporting the same feeling concerning present income belonging to the third state ($\phi_{x|s} = 0.07$). Furthermore, the class-specific scores ϕ_s presented in Table 1 show that the identified latent states are increasing in order. The findings presented here largely align with previous research on LC models (Genge, 2021). However, the latent component of the LM model provides a more nuanced exploration of opinion evolution over time.

Table 1. The Estimates of the Parameters Describing the Measurement Part of the Latent Markov Model with Three States and Heterogeneous Transitions (*LM-hetero*)

$\hat{\phi}_{x s}$						
s	$x = 0$	$x = 1$	$x = 2$	$x = 3$	$x = 4$	$\hat{\phi}_s$
1	0.5666	0.3174	0.1096	0.0045	0.0020	1.5582
2	0.0236	0.2111	0.6338	0.1315	0.0000	2.8732
3	0.0069	0.0129	0.1487	0.6752	0.1563	3.9611

Source: own study.

Table 2 demonstrates that the first latent state was the predominant grouping for the majority of households at the study's outset. Then, Table 3 provides a longitudinal perspective on the phenomenon being studied, focusing on the temporal dynamics of self-reported income classification. We observe that the third latent state is characterised by a strong tendency toward persistence, implying that individuals who report the highest levels of financial satisfaction are unlikely to experience a decline in their perceived financial well-being. Note that, between years 2009 and 2011 ($t = 6$), respondents are much more stable with their negative opinion ($\pi_{11} = 0.90$) and less prone to switch to the generally satisfied group of Poles ($\pi_{12} = 0.10$), compared to the previous transition matrix (characterised by the high probability to switch to the second group). Moreover, the highest chance to switch from the best situated group of Poles to the second, generally satisfied respondents ($\pi_{32} = 0.19$) is observed between the years 2011 and 2013. We might try to explain this behaviour as a slightly worse general economic perception corresponding to the economic crisis.

Table 2. Estimates of the Initial Probabilities $\hat{\pi}_s$ for the Three-state, Heterogeneous Latent Markov Model (*LM-hetero*)

s	$\hat{\pi}_s$
1	0.5772
2	0.3406
3	0.1021

Source: own study.

Beginning with the second-to-last wave, namely 2013 (see Table 3 for $t = 8$), an intriguing pattern emerges, i.e., subjects in the first latent state are much less evident compared to other years. Moreover, in this period we can observe the highest transitions from the first to the second ($\pi_{12} = 0.3153$) and from the second

to the third latent state ($\pi_{23} = 0.2098$), revealing the tendency to improve in their behaviour in recent years of the study.

Table 3. Calculated Transition Probabilities $\hat{\pi}_{s|s}^{(t)}$ for the Three-state Latent Markov Model with Heterogeneous Transitions (*LM-hetero*)

$\hat{\pi}_{s s}^{(t)}$				
t	s	$s = 1$	$s = 2$	$s = 3$
2	1	0.9018	0.0951	0.0031
	2	0.0199	0.9023	0.0777
	3	0.0000	0.1166	0.8834
3	1	0.8017	0.1798	0.0185
	2	0.0000	0.9880	0.0120
	3	0.0000	0.0000	1.0000
4	1	0.9311	0.0676	0.0013
	2	0.0456	0.7989	0.1556
	3	0.0000	0.0000	1.0000
5	1	0.7285	0.2458	0.0257
	2	0.0000	0.9124	0.0876
	3	0.0000	0.0000	1.0000
6	1	0.8980	0.1020	0.0000
	2	0.0137	0.9450	0.0413
	3	0.0000	0.0026	0.9974
7	1	0.9991	0.0000	0.0009
	2	0.0000	1.0000	0.0000
	3	0.0000	0.1957	0.8043
8	1	0.6847	0.3153	0.0000
	2	0.0000	0.7902	0.2098
	3	0.0000	0.0079	0.9921

Source: own study.

To enhance the clarity of our findings, we present the marginal distribution (4) of the latent states $S^{(t)}$ for each time point t , derived from the initial and transition probabilities outlined in Tables 2 and 3. Specifically, for each survey wave, we calculate the marginal distribution. It is clear from the depicted marginal probabilities (Fig. 2) that the negative opinions are decreasing with years. Actually, a systematic decline in the probability of the first state is observed, accompanied by a corresponding increase in the probability of the third state.

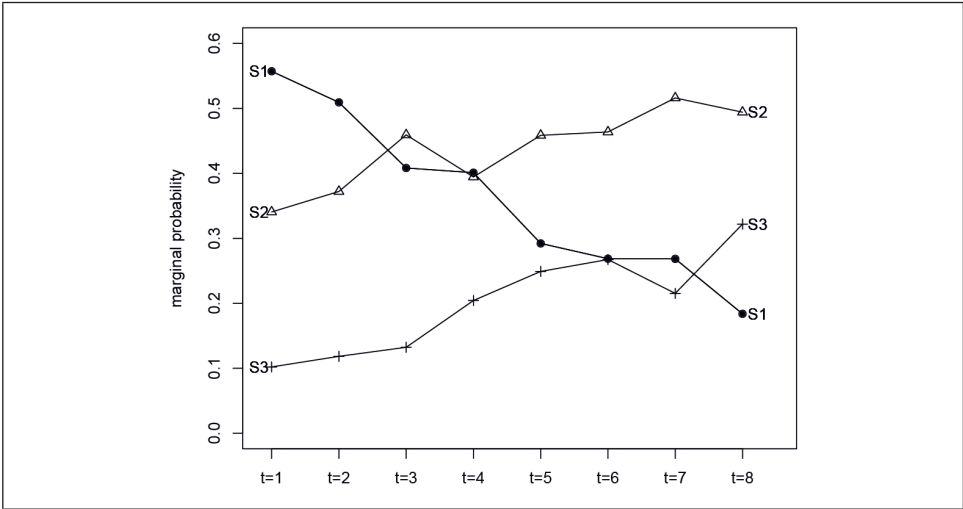


Fig. 2. Calculated Marginal Probabilities $p(X^{(t)} = x)$ for the Three-state Latent Markov Model with Heterogeneous Transitions (*LM-hetero*)

Source: own study.

4.2.2. Results for Constrained Latent Markov Model

The multiplicity of transition matrices (see Table 3) might complicate the straightforward interpretation of their individual elements. Therefore, we subsequently examine a model where transition probabilities exhibit partial time homogeneity, as specified in equation (6), for different values of T^* between $t = 2$ and $t = 8$. This model is identified as *LM-part-hetero*. The outcomes for LM with $s = 3$ and different values of T^* are given in Table 4. For each of these models we present: log-likelihood values ($\hat{l}$), number of parameters ($\#par$) *AIC*, *BIC* criteria and $\hat{S}$ index classification of quality.

Table 4 indicates that the *LM-part-hetero* model with $T^* = 6$ achieves the lowest BIC value (the number in bold). This model posits that individuals transition between latent states differently during the initial five waves compared to subsequent periods.

These results seem to be especially interesting to compare the respondents' behaviour in waves preceding (2000, 2003, 2005, 2007, 2009) and following (2011, 2013, 2015) economic crisis. It is noteworthy that the BIC values for both *LM-hetero* (equal to 6,353.217) and *LM-part-hetero* with $T^* = 6$ (equal to 6,221.312) are superior to the BIC value associated with the traditional LC model (Genge, 2021, p. 13, Table 7).

The conditional probabilities depicted in Figure 3 align closely with the interpretations of latent states as indicators of various Polish financial satisfaction types, as

suggested by the estimates in Table 1. In class one, the tallest bars (representing the highest conditional probabilities) were observed for categories 0 and 1, in class two, the final bar was observed for category 2, and in class 3, bar ejections were observed for categories 3 and 4. Consequently, we can retain the previously proposed labels, i.e., S_1 – households with the lowest perceived income, S_2 – households exhibiting general satisfaction, and S_3 – households reporting the highest financial standing.

Table 4. The Selection of Latent Markov Models Ranging from Unconstrained (*hetero*) to Partially Constrained (*part-hetero*) Transition Matrices

s	$\hat{l}$	#par	AIC	BIC	$\bar{S}$
LM (<i>hetero</i>)	-3,015.576	56	6,143.152	6,353.217	0.846
LM (<i>part-hetero</i>) $T^* = 2$	-3,038.272	26	6,128.543	6,226.073	0.841
LM (<i>part-hetero</i>) $T^* = 3$	-3,037.493	26	6,126.986	6,224.517	0.842
LM (<i>part-hetero</i>) $T^* = 4$	-3,037.204	26	6,126.409	6,223.939	0.840
LM (<i>part-hetero</i>) $T^* = 5$	-3,035.919	26	6,123.837	6,221.367	0.841
LM (<i>part-hetero</i>) $T^* = 6$	-3,035.891	26	6,123.782	6,221.312	0.843
LM (<i>part-hetero</i>) $T^* = 7$	-3,036.210	26	6,124.419	6,221.949	0.837

Source: own study.

However, the estimates of the initial probabilities presented also for each state in Figure 3 are slightly different with respect to those obtained under the LM model with all heterogeneous matrices (see Table 2). Specifically, within the *LM-part-hetero* model, we observe a higher concentration of individuals in the initial (most negative) latent state and a lower prevalence in the final (most positive) latent state at the study's outset.

Examining the estimated transition probabilities in Table 5, we observe distinct patterns between the first five waves and the subsequent waves. Notably, the initial transition matrix (pre-crisis) reveals a significantly higher level of persistence in the third, most positive latent state compared to the second transition matrix. Following the economic crisis, respondents demonstrate a greater tendency to remain within the unsatisfied and moderately satisfied groups (S_1 and S_2) and to transition from the highest satisfaction state to the intermediate satisfaction state (with a probability of $\hat{\pi}_{3|2}^{(t)} = 0.09$). These findings suggest a subtle decline in Polish sentiment, potentially reflecting the broader impact of the economic crisis. This observation aligns with previous research by Helliwell, Huang and Wang (2014) and Chzhen (2016), who identified a decrease in subjective well-being in heavily affected EU countries during the 2008–2011 period (i.e., Greece, Ireland, Italy, Portugal, and Spain). Our results further imply that the crisis may have influenced Polish households in ways beyond mere budgetary constraints.

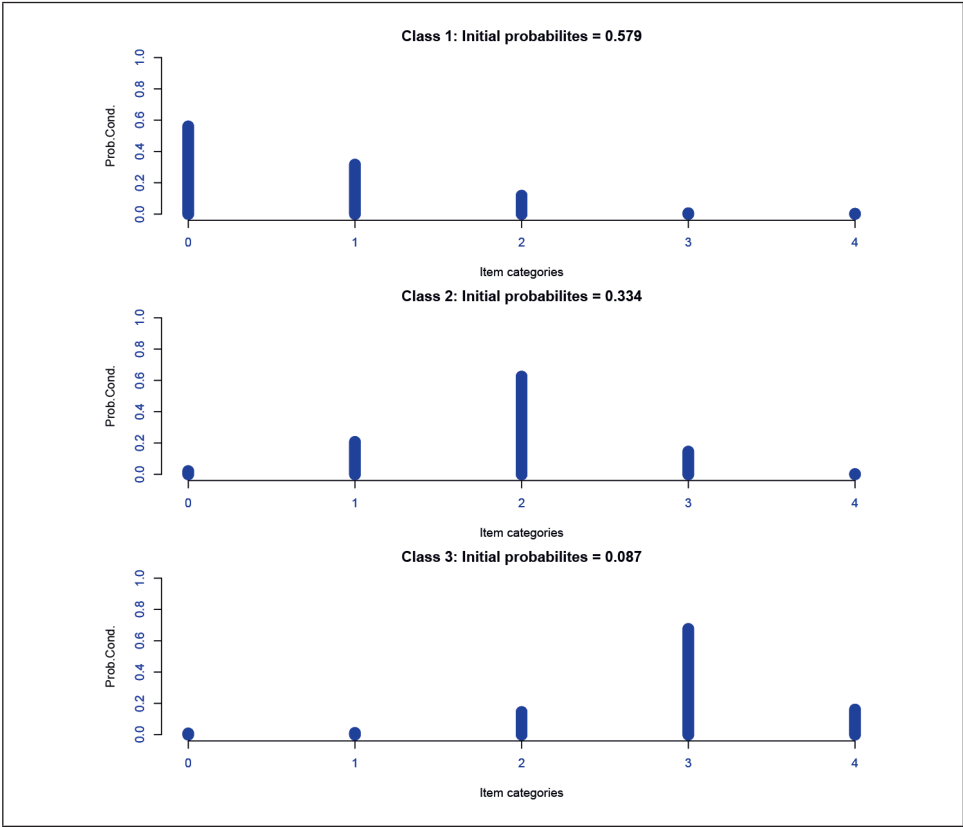


Fig. 3. Conditional Probabilities $\phi_{jx|s}$ for the Latent Markov Model with Three States and Partially Heterogeneous Transitions (*LM-part-hetero*) and $T^* = 6$
Source: own study, using the R package LMest (Bartolucci, Pandolfi & Pennoni, 2017).

Table 5. Calculated Transition Probabilities $\hat{\pi}_{s|s}^{(t)}$ for the Three-state Latent Markov Model with Partial Heterogeneous Transitions (*LM-part-hetero*) for $T^* = 6$

		$\hat{\pi}_{s s}^{(t)}$		
T^*	s	$s = 1$	$s = 2$	$s = 3$
$I(t = 1, \dots, 5)$	1	0.8503	0.1438	0.0059
	2	0.0124	0.9095	0.0781
	3	0.0000	0.0000	1.0000
$II(t = 6, \dots, 8)$	1	0.8771	0.1229	0.0000
	2	0.0000	0.9456	0.0544
	3	0.0000	0.0923	0.9077

Source: own study.

5. Discussion and Conclusions

This study analyses the evolving patterns of subjective economic well-being among Polish households from 2000 to 2015. Employing LM models with various constraints, we examine the dynamic changes in the financial circumstances of Polish households over this 15-year period, encompassing the global economic crisis. Our study allows us to model the probability of individual household changes over time, identify more adequate structures in the analysed data set than the more popular latent class model (see Genge, 2021). Besides, the LM model with constraints posed on the parameters of the latent process (especially for $T^* = 6$), shows the best measure of fit, sensible pattern behaviour of Polish households, as well as facilitates the interpretation of the analysed data at issue. A notable advantage of our approach is its ability to incorporate survey weights, thereby enabling a more accurate analysis of data from complex social surveys, a practice often overlooked in longitudinal studies.

Even though Poland occupies a lower position in the EU regarding subjective financial well-being based on Eurostat data, we have not witnessed substantial changes in Polish public sentiment following the economic downturn. The analysis of marginal and transition probabilities provided for each point in time shows the increasing tendency of positive self-reporting income position among the Polish households. However, even if Poland is one of the countries that did not suffer a lot in the global economic crisis (Gradzewicz *et al.*, 2014; Helliwell, Huang & Wang, 2014; Chzhen, 2016; Gomułka, 2016), we note slightly higher chance to switch from those declaring the worse financial situation to those mostly satisfied in the years preceding, and especially at the very beginning of the economic crisis, compared to years following this economic event. These results are in agreement with the figures presented in the work of Panek and Czapiński (2013) as well as with the studies of Wałęga (2015) and Zalega (2012). As expected, the deterioration of Polish sentiment is observed with some delay. We notice the higher probability of remaining in the unsatisfied group, lower probability of remaining in the fully satisfied group and lower chance to switch from those unsatisfied to those generally satisfied, especially in the first two waves following the peak of the financial crisis.

We remark that most of the studies concerning subjective assessment of the financial situation in Poland are carried out on the specified subsamples of Poles (for example, young people's households, biggest Polish cities), showing the results for questionnaire response variables in one or few years of the survey, based on summary statistics tables or different regression techniques, assuming the homogeneity of the analysed data. Moreover, compared to the most recent works illustrated also for the other national surveys (see i.e., Chzhen, 2016; Popova & Pishniak, 2017; Brzozowski & Spotton Visano, 2019; Mahdzan *et al.*, 2019), we show the changes

of attitudes among the society, presented for all waves of the national longitudinal survey, accounting for heterogenous structure of the data, and including survey weights. We confirmed also that constraints imposed on the transition matrix of the LM model gives better measure of fit and facilitate the interpretation of the socio-economic issue regarding self-reported material well-being of Poles analysed at different points in time. Consequently, our findings can inform policymakers as they allocate public funds, emphasising the importance of considering financial well-being. In a subsequent study (Genge, 2023), we compare our results with a homogeneous LM model that incorporates time-varying covariates, enabling a more nuanced understanding of evolving households' behaviours. This approach aids in identifying specific types of households (characterised by varying socio-economic factors) that may require enhanced social protection.

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Conflict of Interest

The author declares no conflict of interest.

References

- Akaike, H. (1973). Information Theory as an Extension of the Maximum Likelihood Principle. In: B. N. Petrov, F. Csaki (Eds), *Proceedings of the 2nd International Symposium on Information Theory* (pp. 267–281). Akademiai Kiado.
- Bacci, S., Pandolfi, S., & Pennoni, F. (2014). A Comparison of Some Criteria for States Selection in the Latent Markov Model for Longitudinal Data. *Advances in Data Analysis and Classification*, 8, 125–145. <https://doi.org/10.1007/s11634-013-0154-2>
- Bartolucci, F. (2007). A Class of Multidimensional IRT Models for Testing Unidimensionality and Clustering Items. *Psychometrika*, 72, 141–157. <https://doi.org/10.1007/s11336-005-1376-9>
- Bartolucci, F., Farcomeni, A., & Pennoni, F. (2013). *Latent Markov Models for Longitudinal Data*. Chapman and Hall/CRC.
- Bartolucci, F., Lupparelli, M., & Montanari, G. E. (2009). Latent Markov Model for Longitudinal Binary Data: An Application to the Performance Evaluation of Nursing Homes. *Annals of Applied Statistics*, 3(2), 611–636. <https://doi.org/10.1214/08-AOAS230>
- Bartolucci, F., Pandolfi, S., & Pennoni, F. (2017). LMest: An R Package for Latent Markov Models for Longitudinal Categorical Data. *Journal of Statistical Software*, 81(4), 971–985. <https://doi.org/10.18637/jss.v081.i04>

- Bartolucci, F., Pandolfi, S., & Pennoni, F. (2022). Discrete Latent Variable Models. *Annual Review of Statistics*, 9, 425–452. <https://doi.org/10.1146/annurev-statistics-040220-091910>
- Baum, L. E., Petrie, T., Soules, G., & Weiss, N. (1970). A Maximization Technique Occurring in the Statistical Analysis of Probabilistic Functions of Markov Chains. *Annals of Mathematical Statistics*, 41(1), 164–171. <https://doi.org/10.1214/aoms/1177697196>
- Betti, G., Dourmashkin, N., Rossi, M., Verma, V., & Yin, Y. P. (2001). *Study of the Problem of Consumer Indebtedness: Statistical Aspects Final Report*. Report to the Commission of the European Communities. Directorate-General for Health and Consumer Protection, Commission of the European Communities. ORC Macro.
- Bialowolski, P., & Weziak-Bialowolska, D. (2014). The Index of Household Financial Condition, Combining Subjective and Objective Indicators: An Appraisal of Italian Households. *Social Indicators Research*, 118(1), 365–385. <https://doi.org/10.1007/s11205-013-0401-0>
- Białowolski, P. (2018). Hard Times! How Do Households Cope with Financial Difficulties? Evidence from the Swiss Household Panel. *Social Indicators Research*, 139(1), 147–161. <https://doi.org/10.1007/s11205-017-1711-4>
- Binder, M. (2014). Subjective Well-being Capabilities: Bridging the Gap Between the Capability Approach and Subjective Well-being Research. *Journal of Happiness*, 15, 1197–1217. <https://doi.org/10.1007/s10902-013-9471-6>
- Brusa, L., Bartolucci, F., & Pennoni, F. (2023). Tempered Expectation-maximization Algorithm for the Estimation of Discrete Latent Variable Models. *Computational Statistics*, 38, 1391–1424. <https://doi.org/10.1007/s00180-022-01276-7>
- Brzozowski, M., & Spotton Visano, B. (2019). “Havin’ Money’s Not Everything, Not Havin’ It Is”: The Importance of Financial Satisfaction for Life Satisfaction in Financially Stressed Households. *Journal of Happiness Studies*, 21, 573–591. <https://doi.org/10.1007/s10902-019-00091-0>
- Chzhen, Y. (2016). Perceptions of the Economic Crisis in Europe: Do Adults in Households with Children Feel a Greater Impact? *Social Indicators Research*, 127, 341–360. <https://doi.org/10.1007/s11205-015-0956-z>
- Clark, A., Etilé, F., Postel-Vinay, F., Senik, C., & Van der Straeten, K. (2005). Heterogeneity in Reported Well-being: Evidence from Twelve European Countries. *The Economic Journal*, 115(502), 118–132. <https://doi.org/10.1111/j.0013-0133.2005.00983.x>
- Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum Likelihood from Incomplete Data via the EM Algorithm (with Discussion). *Journal of the Royal Statistical Society: Series B (Methodological)*, 39(1), 1–38. <https://doi.org/10.1111/j.2517-6161.1977.tb01600.x>
- Diego-Rosell, P., Tortora, R., & Bird, J. (2018). International Determinants of Subjective Well-being: Living in a Subjectively Material World. *Journal of Happiness*, 19, 123–143. <https://doi.org/10.1007/s10902-016-9812-3>
- Ernst, L. (1989). Weighting Issues for Longitudinal Household and Family Estimates. In: D. Kasprzyk, G. Duncan, G. Kalton, M. P. Singh (Eds), *Panel Surveys* (pp. 139–159). Wiley.

Eurostat. (2019). *Subjective Well-being – Statistics*. Retrieved from: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Subjective_well-being_-_statistics (accessed: 1.08.2025).

Eurostat. (2024). *Quality of Life Indicators – Overall Experience of Life*. Retrieved from: https://ec.europa.eu/eurostat/statistics-explained/index.php/Quality_of_life_indicators_-_overall_experience_of_life (accessed: 1.08.2025).

Gasińska, M. (2016). Dochody gospodarstw domowych w Polsce – wybrane obiektywne i subiektywne ujęcia i dane. *Zeszyty Naukowe Uczelni Vistula*, 50(5), 100–142.

Gasiorowska, A. (2015). The Impact of Money Attitudes on the Relationship between Income and Financial Satisfaction. *Polish Psychological Bulletin*, 46(2), 197–208. <https://doi.org/10.1515/ppb-2015-0026>

Genge, E. (2019). Graphical Tools of Discrete Longitudinal Data Presentation in R. *Econometrics. Advances in Applied Data Analysis*, 23(3), 26–39. <https://doi.org/10.15611/eada.2019.3.03>

Genge, E. (2021). LC and LC-IRT Models in the Identification of Polish Households with Similar Perception of Financial Position. *Sustainability*, 13(8), 4130. <https://doi.org/10.3390/su13084130>

Genge, E. (2023). An Evaluation of Self-reported Material Well-being Using Latent Markov Models with Covariates. *Longitudinal and Life Course Studies*, 14(4), 514–541. <https://doi.org/10.1332/175795921X16719290621875>

Gomułka, S. (2016). Poland's Economic and Social Transformation 1989–2014 and Contemporary Challenges. *Central Bank Review*, 16(1), 19–23. <https://doi.org/10.1016/j.cbrev.2016.03.005>

Gradzewicz, M., Growiec, J., Kolasa, M., Postek, Ł., & Strzelecki, P. (2014). *Poland's Exceptional Performance during the World Economic Crisis: New Growth Accounting Evidence* (NBP Working Paper No. 186). Narodowy Bank Polski.

Hanusik, K., & Łangowska-Szcześniak, U. (2013). Uwarunkowania samooceny sytuacji materialnej gospodarstw domowych w Polsce w 2011 r. *Konsumpcja i Rozwój*, 1(4), 83–98.

Helliwell, J. F., Huang, H., & Wang, S. (2014). Social Capital and Well-being in Times of Crisis. *Journal of Happiness Studies*, 15, 145–162. <https://doi.org/10.1007/s10902-013-9441-z>

Kalinowski, S., & Kozera-Kowalska, M. (2017). Samoocena sytuacji dochodowej ludności wiejskiej o niepewnych dochodach. *Handel Wewnętrzny*, 4(369), 110–121.

Kalton, G. (1989). Modeling Considerations: Discussion from a Survey Sampling Perspective. In: D. Kasprzyk, G. Duncan, G. Kalton, M. P. Singh (Eds), *Panel Surveys* (pp. 575–585). Wiley.

Mahdzan, N. S., Zainudin, R., Sukor, M. E. A., Zanir, F., & Ahmad, W. M. W. (2019). Determinants of Subjective Financial Well-being Across Three Different Household Income Groups in Malaysia. *Social Indicators Research*, 146, 699–726. <https://doi.org/10.1007/s11205-019-02138-4>

Panek, T., & Czapiński, J. (2013). Warunki życia gospodarstw domowych. Dochody i sposób gospodarowania dochodami. *Diagnoza Społeczna 2013. Warunki i jakość życia Polaków – Raport (Special issue)*. *Contemporary Economics*, 7, 40–53. <https://doi.org/10.5709/ce.1897-9254.97>

Panek, T., & Czapiński, J. (2015a). Household Living Conditions. Income and Income Management. In: J. Czapiński, T. Panek (Eds), *Social Diagnosis 2015. The Objective and Subjective Quality of Life in Poland* (pp. 34–47). The Councing for Social Monitoring.

Panek, T., & Czapiński, J. (2015b). Warunki życia gospodarstw domowych. Dochody i sposób gospodarowania dochodami. In: J. Czapiński, T. Panek (Eds), *Diagnoza społeczna 2015. Warunki i jakość życia Polaków* (pp. 36–50). Rada Monitoringu Społecznego.

Pennoni, F., & Genge, E. (2018). *Predicting Trends of Institutional Confidence through a Hidden Markov Model with Survey Weights and Missing Responses*. ERCIM WG on Computational and Methodological Statistics 11th International Conference of the ERCIM WG on Computational and Methodological Statistics, 12th International Conference on Computational and Financial Econometrics, University of Pisa, 14–16 December.

Pennoni, F., & Genge, E. (2020). Analysing the Course of Public Trust via hidden Markov Models: A Focus on the Polish Society. *Statistical Methods and Applications*, 29, 399–425. <https://doi.org/10.1007/s10260-019-00483-9>

Popova, D., & Pishniak, A. (2017). Measuring Individual Material Well-being Using Multi-dimensional Indices: An Application Using the Gender and Generation Survey for Russia. *Social Indicators Research*, 130, 883–910. <https://doi.org/10.1007/s11205-016-1231-7>

The R Core Team. (2025). *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing.

Schwarz, G. (1978). Estimating the Dimension of a Model. *The Annals of Statistic*, 6(2), 461–464. <https://doi.org/10.1214/aos/1176344136>

Sirovátka, T., & Mareš, P. (2009). Poverty, Deprivation and Social Exclusion: The Unemployed and the Working Poor. In: M. C. Fournier, C. S. Mercier (Eds), *Economics of Employment and Unemployment* (pp. 1–32). Nova Science Publishers.

Social Diagnosis. (2015). *Objective and Subjective Quality of Live in Poland*. J. Czapinski, T. Panek (Eds). Council for Social Monitoring. <http://www.diagnoza.com/index-en.html> (accessed: 15.10.2016).

Stapleton, L. M. (2002). The Incorporation of Sample Weights into Multilevel Structural Equation Models. *Structural Equation Modeling: A Multidisciplinary Journal*, 9(4), 475–502. https://doi.org/10.1207/S15328007SEM0904_2

Thomas, S. L., & Heck, R. H. (2001). Analysis of Large-scale Secondary Data in Higher Education Research: Potential Perils Associated with Complex Sampling Designs. *Research in Higher Education*, 42, 517–540. <https://doi.org/10.1023/A:1011098109834>

Tullio, F., & Bartolucci, F. (2022). Causal Inference for Time-varying Treatments in Latent Markov Models: An Application to the Effects of Remittances on Poverty Dynamics. *Annals of Applied Statistics*, 16(3), 1962–1985. <https://doi.org/10.1214/21-AOAS1578>

Wałęga, A. (2015). Sytuacja materialna a konsumpcja gospodarstw domowych ludzi młodych w Polsce. *Konsumpcja i Rozwój*, 2(11), 61–73.

Wiggins, L. M. (1973), *Panel Analysis: Latent Probability Models for Attitude and Behavior Processes*. Elsevier.

Verbič, M., & Stanovnik, T. (2006). Analysis of Subjective Economic Well-being in Slovenia. *Eastern European Economics*, 44(2), 60–70.

Verma, V., Betti, G., & Ghellini, G. (2007) Cross-sectional and Longitudinal Weighting in a Rotational Household Panel: Applications to EU-SILC. *Statistics in Transition*, 8(1), 5–50.

Zalega, T. (2012). Diagnoza sytuacji materialnej polskich gospodarstw domowych w okresie kryzysu finansowo-ekonomicznego. *Management and Business Administration. Central Europe*, 20(5), 50–82. <https://www.doi.org/10.7206/mba.ce.2084-3356.29>

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Polish Consumer Preferences and Awareness about Products Containing Caffeine

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ABSTRACT

Objective: The main objective of this article was the recognition of food choices, consumption of products containing caffeine and purchasing habits regarding products containing caffeine on the Polish market. The article characterises Polish consumers' preferences toward caffeine-containing beverages (CCBs) such as coffee, tea, yerba mate and energy drinks.

Research Design & Methods: The research was conducted by means of CAWI (computer-assisted web interview) and a personal interview. A closed ended questionnaire was used during the research, and there were 400 respondents of both genders. The Pearson chi-square test of independence was applied to assess the association between categorical variables.

Findings: The research demonstrated that CCBs, such as coffee and tea, are the most preferred sources of caffeine. Significant differences related to age and gender of respondents when it comes to preference for caffeine in coffee and tea were determined. Respondents most frequently chose beans coffee, and leaf tea in bags, which was related to the age and education or the place of residence. The majority of respondents qualified coffee, yerba mate and tea as pro-health products.

Implications/Recommendations: The indication of recommendations when it comes to the increase of consumer awareness about the influence that coffee has on the human body and its diversified amount in CCBs, which has an impact on rational consumption. Main actions in this area should be focused on providing reliable information on product labels by food producers in order to ensure food safety and customer satisfaction with the reliable identification of purchased products.

Contribution: The main source of caffeine coming from CCBs is coffee, recognised as a drink demonstrating pro-health properties, and its frequency of consumption increases with age. The research proves high awareness of consumers when it comes to CCBs properties. The problem which arises is their increasing consumption.

Article type: original article.

Keywords: products containing caffeine, quality of products, consumer study, consumer preferences.

JEL Classification: D1, D12, E21.

1. Introduction

The economies of highly industrialised countries very often use the psychoactive substance caffeine, not only to increase income, but also in the social area to activate society in its productive and post-productive age. Nevertheless, the excessive and irrational consumption of caffeine contained in caffeine-containing beverages (CCBs) has a huge impact on the quality of life and the dysfunction of ecosystems.

For these reasons, in-depth quality control of CCBs offered by the market and other measures to promote knowledge about them become justified.

The main objective of this article was the recognition of the current food choices, consumption of products containing caffeine and purchasing habits regarding products containing caffeine on the Polish market. The paper characterises Polish consumers' preferences toward CCBs such as coffee, tea, yerba mate and energy drinks.

In this article, attention is drawn to environmental (ecosystem) protection issues in the context of their yearly increasing consumption. In addition, the study addresses the safety of this type of CCBs, which is of great importance to consumers and producers.

2. Literature Review

Caffeine is a methylxanthine alkaloid occurring in nature in 60 plant species in the world (Barone & Roberts, 1984). The most popular sources of it are coffee beans (cocoa fruits), tea leaves, yerba mate, cocoa beans and kola nuts (Buerge *et al.*, 2003; Frary, Johnson & Wang, 2005; Cruz *et al.*, 2016). The interest in caffeine and its

most common source, namely coffee, is currently very high. Almost 50,000 articles cover this topic (as of 10 August 2021) (Abalo, 2021). This substance is classified as of the most frequently consumed psychoactive substances by people and its global consumption increases mainly due to population growth (Quadra *et al.*, 2020). Most frequently consumed products containing caffeine, according to FAO data compiled by Reyes and Cornelis (2018) for 90 countries, are coffee and tea. Nevertheless, coffee is indicated as the main source of its consumption in the world, estimated at around 70% of total caffeine consumption. The cocoa tree is grown in around 80 countries and main producers are Brazil, Columbia and Vietnam. The mentioned countries produce altogether around half of the world's production.

In 2022 the consumption of coffee increased to 178.5 million sacks (60 kg each) (Fig. 1).

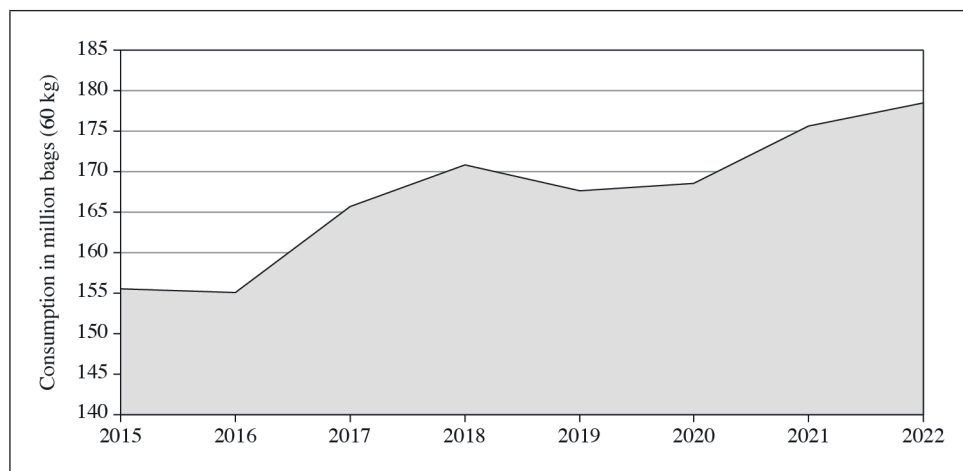


Fig. 1. Total of Coffee Consumption between 2015 and 2022

Source: own study based on International Coffee Organization (2023, 2024).

Between 2015 and 2022, the consumption increased by over 23 million sacks. In 2019 and 2020, the decrease in the consumption of coffee was observed due to the outbreak of the COVID-19 pandemic, but already in 2021 the consumption started to increase significantly (Fig. 1).

According to the current research, caffeine coming from coffee constitutes its main source of consumption among others in Brazil (Mendes *et al.*, 2020) and Switzerland (Rochat *et al.*, 2019). The latest data demonstrate that the consumption of coffee in Poland has been showing an upward trend and between 2010 and 2020 increased by around 80% (Surma *et al.*, 2020). The upward trend of caffeine/coffee consumption per resident was also observed in Italy, Brazil and Ethiopia (Quadra *et al.*, 2020). Moreover, in European countries importing coffee, there is a high

positive correlation between coffee consumption per resident and human development index (HDI) and gross domestic product (GDP). However, the opposite trend (high negative correlation) was observed in certain African countries exporting coffee (Quadra *et al.*, 2020).

Several research papers confirm that the consumption of coffee is very beneficial for our health (Sanchez, 2017; Gökçen & Şanlıer, 2019; Antwerpes *et al.*, 2020; Herden & Weissert, 2020; Nowaczewska, Wiciński & Kaźmierczak, 2020; Abalo, 2021; Saud & Salamatullah, 2021; Ding, Xu & Lau, 2023). However, more and more often, the correlation between health benefits stemming from the consumption of coffee and the amount and frequency of its consumption is indicated (Sanchez, 2017).

A serious problem seems to be the progressive increase in caffeine consumption, which contributes to the increase of its emission into the natural environment. To some extent, the stability of caffeine in different environmental conditions and high solubility in water (13.0 g/l) foster this situation (Cruz *et al.*, 2016). The human organism effectively metabolises this substance, but 0.5% to 10% is excreted in urine (Ferreira, 2005; Cruz *et al.*, 2016). This is, however, not the only source of its emission into the natural environment; others include all fluid and solid waste, mainly the result of the preparation of such beverages as coffee and tea. Caffeine was discovered in water matrices all over the world; it is thus justified to relate the consumption of coffee in time to the increase of caffeine concentration in the environment (Cruz *et al.*, 2016). Growing consumption of coffee leads to the fact that we deal with the continuous transmission of caffeine and other methylxanthines to the environment. The abovementioned fact may have a significant impact on the organisms present therein (Cruz *et al.*, 2016). It was proven that in concentrations significant for the environment, caffeine influences the increase of oxidative stress in mussels (Almeida *et al.*, 2015; Álvarez-Muñoz *et al.*, 2015). The World Health Organization acknowledged the fact that the increase in caffeine concentration in the environment constitutes a real problem requiring immediate measures, such as research on potential sources of emission and environmental controls (Montagner *et al.*, 2014; Quadra *et al.*, 2020).

Coffee consumption rates are correlated with the rate of social development and gross domestic product. It is, thus, a very important ingredient of products, the consumption of which determines the level of socio-economic development. The increase in caffeine consumption enhances its influence on the environment and contributes to its excessive accumulation in ecosystems. More and more often, its negative effects on certain aquatic organisms are indicated as a factor generating oxidative stress. The discovery of caffeine in different aquatic environments led to the suggestion that caffeine may be the so-called indicator of anthropogenic pollution (Cruz *et al.*, 2016).

Poland is listed among countries exhibiting average consumption of coffee in the range between 2.13 and 3.95 kg per person per year (an average of 1 to 2 cups

of coffee daily or 5 grams of ground coffee beans per 200 ml cup). The biggest consumers of coffee are Germans, Norwegians, Swedes, Finns and Danes who consume between 7.36 and 21.54 kg per person per year (Quadra *et al.*, 2020).

High ratio of coffee consumption amounting to 3.95–7.36 kg per person per year was observed also in Brazil, the USA and countries of Southern Europe.

This article also covers essential social and economic issues connected with the dynamic increase in the consumption of caffeine on the basis of a literature overview, but also our own study (surveys). The issues discussed in the article cover both the topic related to caffeine consumption concerning mostly shaping consumers' attitudes toward the most frequently consumed products containing caffeine (CCBs) but also pro-health aspects referring to the consumption of the mentioned sources of food. The presented research also covers current issues connected with the safety of food containing caffeine and the impact that particular alkaloid has on the natural environment and market. The consumption volume of such products as coffee and tea was considered a key indicator of caffeine consumption, which is in accordance with the frequency and scale of their consumption (Reyes & Cornelis, 2018).

The questionnaire survey presented in the article was conducted between September 2023 and November 2023 on a balanced representative sample of 400 respondents, constituting 50% females and 50% males across all age ranges.

Bioactivity and Pro-health Influence of Caffeine

Nowadays, people use numerous active substances occurring in nature, which may influence their longevity and which demonstrate many pro-health functions. One of them is caffeine stemming from many plant sources (Barone & Roberts, 1984).

This alkaloid, due to its ability to stimulate the central nervous system, is commonly used in formulas of many medications all over the world (Mustard, 2014; Cappelletti *et al.*, 2015). There are multiple reports confirming the beneficial influence of coffee and caffeine on the human body.

Recent research has demonstrated that beneficial biological functions of coffee consumption include, among others, lowering of sugar level in blood, protection of liver and nerves, mainly by such constituents as alkaloids, phenolic acids, flavonoids and terpenoids (Gökçen & Şanlıer, 2019).

Recent research has also proved that coffee extracts and their active constituents counteract the development of cancers (including colon cancer, leukaemia and breast cancer), cataract and glaucoma and also certain brain diseases, pathogenic infections, hepatic fibrosis (Saud & Salamatullah, 2021) and support the treatment of arthritis (Ding, Xu & Lau, 2023).

For people suffering from migraines, it was proven that maintaining a constant daily intake of caffeine not exceeding 200 g (Nowaczewska, Wiciński & Kaźmierczak, 2020) helps them to avoid the headache caused by withdrawal

effects. Research by Hong, Chan and Bai (2020) demonstrated that caffeine lowers the risks and progression of Parkinson's disease. The increased consumption of coffee may have neuroprotective effects in case of hepatitis C, which was proved by Antwerpes *et al.* (2020). Neuroprotective effects of caffeine are particularly complex and related to gender and age (Jee *et al.*, 2020). Caffeine improves reaction time in memory tasks (Zhang & Madan, 2021), what is more the caffeine source may significantly change the memorisation processes. It was also observed that the reaction time to caffeine is related to gender and age (Nowaczewska, Wiciński & Kaźmierczak, 2020).

Quality Characteristics of Beverages Containing Caffeine and Coffee Consumption

The most common food sources of caffeine are beverages, namely coffee, tea, alcoholic and non-alcoholic beverages, energy drinks (Zucconi *et al.*, 2013), food products such as chocolate, cacao or guarana, supplements, but also medications (Abalo, 2021). Caffeine isolated from plants is also used as an additive to food and cosmetic products (Balawejder-Biśto & Pyka-Pająk, 2022). In natural products containing caffeine, there are many ingredients which may be both favourable for our health (polyphenols, diterpenes, chlorogenic acids, melanoids, microelements, fibre) but also unfavourable, such as for instance acrylamide and furans resulting from coffee beans roasting (Abalo, 2021; Strocchi *et al.*, 2022). The reason for the occurrence of undesired compounds such as acrylamide or furans is the roasting (Schouten, Tappi & Romani, 2020). Maximum permitted levels of acrylamide ($\mu\text{g/g}$) in food were provided in EU regulation UE 2017/2158. For coffee they are respectively 400 $\mu\text{g/kg}$ in case of roasted coffee and 850 $\mu\text{g/kg}$ for instant coffee (EUR-Lex, 2023).

The dominant source of caffeine in people's diet is the so-called beverages containing caffeine (CCBs), which are characterised by unique nutritional values (McLellan & Lieberman, 2012; Mitchell *et al.*, 2015). CCBs are rich in various compounds which are beneficial but at the same time may pose a danger to human life. It is thus extremely important to take into consideration the source of caffeine consumption (McLellan & Lieberman, 2012; Mitchell *et al.*, 2015; Da Silveira *et al.*, 2017). Among CCBs coffee comes first, taking into account the amount consumed, then comes tea, the consumption of which is significantly lower (Reyes & Cornelis, 2018). Consumption habits are mostly influenced by such factors as geographical origin, culture, lifestyle, social behaviours and economic status (Reyes & Cornelis, 2018). Methods of coffee brewing differ in particular regions of the world, and this is the basic factor determining the amount of caffeine in a given beverage (Reyes & Cornelis, 2018; *Caffeine in Coffee*, 2023). Drip filter coffee belongs to the most popular methods of coffee brewing all over the world, whereas coffee from

automated coffee pressure machines is dominant in Southern Europe. Turkish-style coffee is popular in the Middle East, in Greece, Turkey and Eastern Europe, whereas espresso and moka are the most popular in Italy, Spain and Portugal (Lopez-Garcia *et al.*, 2014; Sousa & da Costa, 2015; Bagdas *et al.*, 2020).

Beverages such as coffee and tea belong to the most frequently consumed products containing caffeine (Fig. 2). In Poland, an average consumer consumes from 1 to 2 cups of coffee daily (5 grams of ground coffee beans per 200 ml cup), which, when converted into coffee beans, gives an annual consumption at the level of 3.65 kg/year.

On average, coffee beans include around 1–3% caffeine, however during the preparation of the brew around 75% to 100% of caffeine from beans is preserved in them (Wierzejska, 2012). A cup of ground coffee (volume 160 ml) may contain around 100 mg caffeine (O’Keefe, DiNicolantonio & Lavie, 2018). Coffee prepared Turkish-style and espresso contain the highest amounts of caffeine, while low-caffeine coffees include, among others, manual drip and infusion bag coffee (40–60 mg/100 ml). Because of the abovementioned and other reasons, it is difficult to estimate the unit’s daily consumption level. Nevertheless, the emission of caffeine coming from coffee consumption to the environment is the biggest among all CCBs (Cruz *et al.*, 2016).

3. Materials and Methods

This research concerns consumer preferences as far as products containing caffeine are concerned, namely CCBs, such as coffee, tea, yerba mate and energy drinks. The assessment of these beverages was conducted in the areas of acceptance for these caffeine sources, frequency of their intake, distinguishing features determining their quality and pro-health properties.

The research was conducted by means of computer assisted online interviews (computer-assisted web interview – CAWI) and a personal interview, from September and November 2023 among Polish consumers. A closed-ended question questionnaire was used during the research, and there were 400 respondents of both genders at the age of 18 and over, 200 females and 200 males respectively (Table 1). The most important criteria for the selection of the research sample were the declaration of consumption of products containing caffeine and the age of the respondents (100 people in each age group). A representative sample was selected in a balanced way, as it was assumed that gender and age affect the choice of products containing caffeine. Therefore, in the present article, the sample consisted of the same percentage of consumers from each age group.

Literature data demonstrate that sociodemographic factors are essential when it comes to the selection of products containing caffeine (Reyes & Cornelis, 2018).

Table 1. Sociodemographic Characteristics of the Study Population ($n = 400$)

Category	Data	Percentage of Respondents
Gender	Female	49.75
	Male	50.25
Age	18–20	25
	21–30	25
	31–40	25
	41 and above	25
Education	Primary	3.75
	Secondary	47.25
	High	40.50
	Vocational	8.50
Place of residence	Rural area	27.50
	City with up to 20,000 residents	14.00
	City with over 20,000 and below 100,000 residents	12.50
	City with over 100,000 and below 500,000 residents	14.25
	City with over 500,000 residents	31.75

Source: own study.

Each questionnaire response was assigned four distinguishing features describing a given respondent, namely gender, age, education and place of residence. The Pearson chi-square test of independence (at the significance level of $\alpha = 0.05$) was performed using the Statistica software package to assess the association between nominal variables.

4. Results and Discussion

4.1. Caffeine Consumption among Respondents

Conducted research indicates significant differences when it comes to the preference for caffeine coming from such products as coffee, tea, yerba mate, energy drinks, which are related to respondents' age and gender (chi-square test, p -value $< \alpha$, assumed level of significance $\alpha = 0.05$) (Table 2). The research also demonstrates that among four different types of CCBs (tea, coffee, energy drinks and yerba mate), the majority of respondents (68%) prefer coffee. Among that respondent group, there were 52% females and 48% males. The second preferred source of caffeine, according to the respondents (21%), was tea, in similar proportions, 51% females and 49% males.

Table 2. Percentage of Respondents' Answers Regarding the Most Frequently Selected Caffeinated Products and Their Assortment (Pearson Chi-square Independence Test, Significant Differences at the Significance Level $\alpha \leq 0.05$)

Question	Criterium		Answer (%)				Total %	p-value
			Tea	Coffee	Energy drinks	Yerba mate		
Which of the following sources of caffeine do you prefer most?	Gender	Female	22.11	71.36	4.52	2.01	100	0.00032
		Male	20.90	65.17	1.49	12.44	100	
	Age	18–20	29.0	57.0	5.00	9.00	100	
		21–30	16.0	64.0	6.00	14.0	100	
		31–40	22.0	74.0	1.00	3.00	100	
		41 and above	19.0	78.0	0.00	3.00	100	
Question	Criterium		Answer (%)				p-value	
			Bean coffee	Ground coffee	Instant coffee	I don't drink coffee		Chicory coffee
Which coffee type do you prefer the most?	Age	18–20	29.0	21.0	32.0	16.0	2.0	0.00000
		21–30	50.0	16.0	14.0	15.0	5.0	
		31–40	56.0	27.0	9.0	6.0	2.0	
		41 and above	50.0	25.0	23.0	0.0	2.0	
	Education	Higher	58.02	19.14	11.73	7.41	3.70	0.00026
		Secondary	39.68	21.16	25.40	11.64	2.12	
		Vocational	41.18	41.18	11.76	2.94	2.94	
		Primary	13.33	26.67	46.67	13.33	0.0	

Table 2 cont'd

Question	Criterium		Answer (%)					p-value
			Express tea	Leaf tea – loose	Leaf tea – in bags	I don't drink tea	Instant tea	
Which tea type do you prefer the most?	Age	18–20	15.0	24.0	49.0	2.00	10.0	0.00651
		21–30	14.0	40.0	39.0	6.00	1.00	
		31–40	21.0	34.0	39.0	4.00	2.00	
		41 and above	22.0	33.0	42.0	0.0	3.00	
	Education	Higher	15.43	39.51	38.89	4.32	1.85	0.00881
		Secondary	18.52	30.69	43.39	2.12	5.29	
		Vocational	32.35	26.47	38.24	0.0	2.94	
		Primary	6.67	0.0	73.33	6.67	13.33	
	Place of residence	Rural area	24.55	29.09	40.0	1.82	4.55	0.03217
		City with up to 20,000 residents	32.14	26.79	33.93	0.00	7.14	
		City with over 20,000 and below 100,000 residents	10.0	36.0	44.0	4.00	6.00	
		City with over 100,000 and below 500,000 residents	14.04	42.11	36.84	3.51	3.51	
		City with over 500,000 residents	11.02	33.07	49.61	4.72	1.57	

Notes: $p \leq \alpha$ – null hypothesis (H_0) is rejected in favour of alternative hypothesis (H_A), $\alpha = 0.05$ (it means that there is a statistically significant association between the variables under study).
Source: own study.

The declaration of the youngest respondents, namely people between the ages of 18 and 20, constituted 21% as far as coffee preference is concerned, and people at the age of 41 and over constituted 29%.

The research also demonstrates that the choice of coffee by consumers in favour of other beverages increases with age of respondents ($p < \alpha$, the assumed level of significance $\alpha = 0.05$). Respondents, regardless of gender, consume more coffee with age, declaring its consumption even a few times a day (Fig. 2).

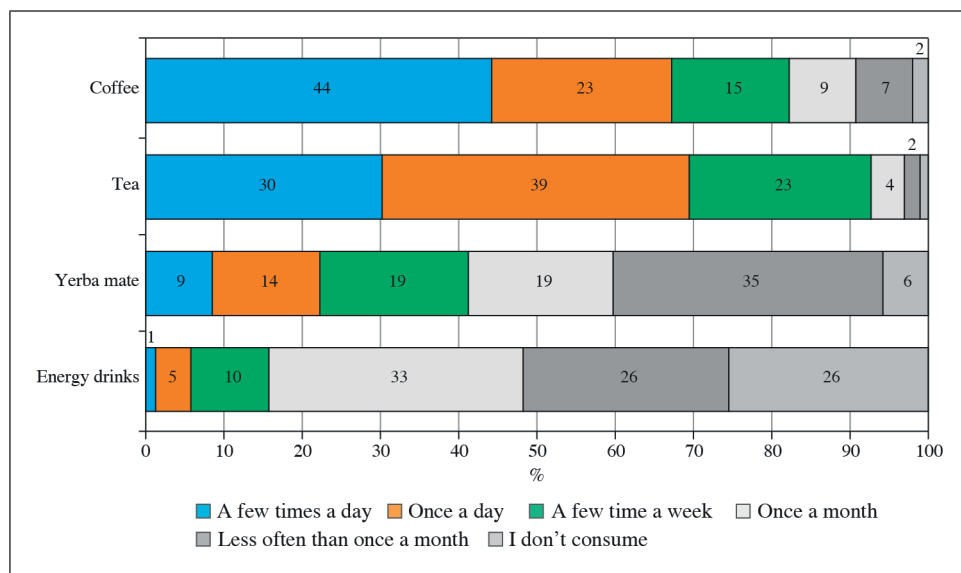


Fig. 2. The Frequency of CCBs Consumption by Respondents

Source: own study.

Most frequently, the respondents declared that they consume coffee a few times a day (over 44% of respondents) – see Figure 2. Those were mainly people from two age ranges: 31–40 and 41 and older. The frequency of coffee consumption depends on the gender or age ($p < \alpha$) (Table 3). In the case of tea, respondents most frequently (39%) declared that they consume it once a day, then (30% of respondents) a few times a day (Fig. 2). Interestingly enough, the highest percentage (36%) of tea consumption a few times a day was observed among respondents at the age 20 and under, which was connected not only with age but also with gender. The percentage of females consuming tea a few times a day amounted to 60%, and in the case of males, 39%.

The research indicates that beverages such as yerba mate are not as popular among consumers as tea or coffee because only 9% of respondents confirmed its consumption a few times a day, and a slightly higher percentage of respondents (14%)

declared that they consume the abovementioned beverages once a day. The highest percentage of respondents declared that they consume yerba mate less frequently than once a month (35% of respondents, Fig. 2), and those were mainly females (65%) under 20 (30%), most frequently from cities having more than 500,000 residents (40%) or rural areas (26%). Respondents aged 31–40 and 41 years and older declared that they consume yerba mate a few times a week and their percentage amounted to 68%. Respondents from this age group declared mainly secondary education (55%) or higher education (34%). Sociodemographic factors significantly influence the frequency of yerba mate consumption (Table 3).

Table 3. The Influence of Sociodemographic Factors on the Frequency of Consumption of Caffeinated Products (Pearson Chi-square Independence Test, Significant Differences at the Significance Level $\alpha \leq 0.05$)

Question: Please Provide the Frequency of Consumption	Answer	Criterion	<i>p</i> -value
Coffee	– a few times a day – once a day – a few times a week – once a month – less often than once a month – I don't consume / question	Age	0.0000
Tea		Gender	0.00253
		Age	0.01472
Yerba mate		Gender	0.00001
		Age	0.02693
		Education	0.02445
Energy drinks		Place of residence	0.02849
		Age	0.00000
		Education	0.00262
		Place of residence	0.00204

Notes: $p \leq \alpha$ – null hypothesis (H_0) is rejected in favour of alternative hypothesis (H_A), $\alpha = 0.05$ (it means that there is a statistically significant association between the variables under study).

Source: own study.

In the case of energy drinks, the majority of respondents (60%) declared that they consume these beverages once a month or even less frequently. These respondents were aged between 18 and 30, had secondary education (52%) or higher education (38%), and resided in rural areas or cities with more than 500,000 inhabitants. The frequency of energy drinks consumption depended on the age, education and place of residence (Table 3).

4.2. Consumption Habits When It Comes to the Choice of Products Containing Caffeine

Coffee beans contain around 1–3% of caffeine, however, depending on the preparation method, from 75% to even 100% of caffeine coming from beans remain in them (Wierzejska, 2012). Therefore, literature data confirm that the way the coffee extract is prepared constitutes a key factor determining the caffeine consumption (Da Silveira *et al.*, 2017).

The results of the conducted research demonstrate that respondents most often choose bean coffee (46%), then ground coffee (22%) and finally instant coffee (20%). Respondents having a preference for bean coffee most frequently declared higher education (51%), ground coffee or instant coffee – secondary education (respectively 45% and 62%). It was also stated that the consumption of different coffee types (ground, instant or bean) is significantly connected with age and education of respondents (chi-square test, value $p < \alpha$, at the assumed significance level $\alpha = 0.05$, Table 2). The consumers of instant coffee are mainly people under 20 with secondary education, and respondents from other age ranges prefer bean coffee.

People declaring higher education most frequently selected bean coffee (58%), then ground coffee (19%) or instant coffee (11%) (Table 2). Likewise, respondents with secondary education most frequently selected bean coffee (39%), then instant coffee (25%) or ground coffee (21%). By contrast, people with vocational education to the same extent preferred bean coffee (41%) and ground coffee (41%) and less frequently instant coffee (12%) (Table 2). The selection of coffee types by consumers is not connected with gender ($p \geq \alpha$, assumed level $\alpha = 0.05$). Females and males consume almost equally bean, ground or instant coffee.

Young people under 20 most frequently chose instant coffee, followed by bean coffee, and finally ground coffee. Respondents in the remaining age ranges chose bean coffee. In these age groups, the percentage of people preferring bean coffee amounted to 50% (56% in the 31–40 age group, see Table 2).

Among different tea types, respondents most frequently preferred leaf tea in bags, followed by leaf tea sold loose, and finally express tea (Table 2). This choice to a great extent depends on the age, educational background and place of residence. Young people, under 20 years, most frequently chose leaf tea in bags (49%), then the one sold loose (24%) and finally express tea (15%). Respondents aged 21–30 selected leaf tea sold loose (40%) or in bags (39%), then express tea (14%). In the age range of 31–40 years, slightly more people declared the choice of leaf tea in bags (39%) than the one sold loose (34%) or express tea (21%). In the age group of 41 years and over most frequently the respondents selected leaf tea in bags (42%) and sold loose (33%). The majority of respondents declared the choice of leaf tea in bags, among which the people with higher education constituted 39%, with secondary education 43%, with vocational education 38% and with primary education 73% (Table 2).

At the same time, leaf tea sold loose was chosen in second place, and the highest percentage of respondents were those with higher education (39%), then secondary education (30%), while 26% had vocational education.

Respondents who mostly preferred leaf tea lived in big cities having over 500,000 residents (on average 34% of people) or rural areas (on average 24% of people).

4.3. Awareness of Consumers When It Comes to Pro-health Characteristics of the Products under Study

The research demonstrates that the majority of respondents, namely 58%, indicated properly that coffee has pro-health properties. A high percentage of respondents (42%) were not sure about coffee possessing pro-health properties, rather indicating that coffee has no pro-health properties. Gender, age and education in this case did not constitute a significant criterium of the consumers' knowledge about pro-health properties of coffee ($p \geq \alpha$, assumed level $\alpha = 0.05$).

In the case of consumers' awareness as to the pro-health properties of tea and yerba mate, the majority of them (respectively 80% and 62%) confirmed the beneficial influence of these products on our health, the others were not sure about it. Gender, education or place of residence did not influence the consumers' knowledge when it comes to pro-health properties of tea ($p \geq \alpha$, assumed level $\alpha = 0.05$). The only factor determining the correctness of answers given was the age (Table 4). Most frequently, young people under 20 answered correctly, indicating the pro-health properties of tea. In this age group, there were the fewest wrong answers that tea does not have such properties (12%). From the answers given by the respondents, it follows that energy drinks do not have a good reputation among consumers, since 98% of respondents acknowledged that these beverages are not healthy.

In this work, the assessment of consumers' knowledge about the influence of caffeine on our health was also conducted. Numerous literature reports cover, among others, the subject of lowering the risk of Alzheimer's and Parkinson's diseases occurrence (Hong, Chan & Bai, 2020; Nowaczewska, Wiciński & Kaźmierczak, 2020). Own study shows that fewer than 40% of respondents knew that caffeine lowers the risk of Alzheimer's and Parkinson's diseases while the majority of respondents (60.5%) had no such knowledge and indicated the wrong answer (Fig. 3). The knowledge of respondents in this regard depends on the age and education ($p < \alpha$, assumed level $\alpha = 0.05$, Table 4). The majority of people between the age 18 and 30 (59.5%) did not know the correct answer. Those were mainly people with secondary education (30%) or higher education (23%). The correct answer was marked by respondents at the age over 31 (64%). Among the respondents knowing the correct answer (fewer than 40%), the majority declared higher education (17.5%) or secondary education (17%).

Table 4. The Influence of Sociodemographic Factors on Consumer Awareness of Health-promoting Properties of Products (Pearson Chi-square Independence Test, Significant Differences at the Significance Level $\alpha \leq 0.05$)

Question	Answer	Criterion	<i>p</i> -value
Please indicate the scale of the pro-healthy value of coffee	1 – the healthiest	Place of residence	0.01999
Please indicate the scale of the pro-healthy value of tea	2 – healthy	Age	0.00079
	3 – less healthy		
	4 – least healthy		
Please indicate the scale of the pro-healthy value of yerba mate		Age	0.00236
		Place of residence	0.04548
Caffeine lowers the risk of Alzheimer's and Parkinson's diseases occurrence	– true	Age	0.00003
	– false	Education	0.00586
Caffeine increases concentration and lowers the feeling of fatigue		Gender	0.02302
		Age	0.01720
Substance physiologically neutral for the human body		Age	0.00054
		Education	0.00939

Notes: $p \leq \alpha$ – null hypothesis (H_0) is rejected in favour of alternative hypothesis (H_A), $\alpha = 0.05$ (it means that there is a statistically significant association between the variables under study).

Source: own study.

The next question about the influence of caffeine on the human nervous system referred to the influence of caffeine on the increase in concentration and the decrease in the feeling of fatigue. The research demonstrated that 76% of respondents knew about the psychostimulatory activity of caffeine (Fig. 3), and their knowledge depended on gender and age ($p < \alpha$, assumed level $\alpha = 0.05$, Table 4). In this group, male respondents dominated (40%), followed by female respondents (35%). Basically, in each age range the similar percentage of respondents knowing the correct answer, between 16% and 20%, was observed. Incorrect answers were given by 24% people, including mainly female respondents (14%), and the biggest percentage of people not knowing the correct answers was visible among young people under 20 (9%), whereas the smallest was among people over 41.

The majority of respondents are aware of the influence caffeine has on the nervous system. It is confirmed by the correctness of answers given by respondents (72%) concerning the question whether the cessation of regular consumption may lead to the withdrawal effect manifested by headache, fatigue, irritation or muscle pain (Fig. 3). The knowledge of respondents in this regard did not depend on socio-demographic factors ($p \geq \alpha$, assumed level $\alpha = 0.05$).

Respondents are familiar with the effects caffeine has on the human body, indicating that caffeine does not lower blood pressure (94% of correct answers) but it

increases concentration and lowers the feeling of fatigue (76% of correct answers) (Fig. 3).

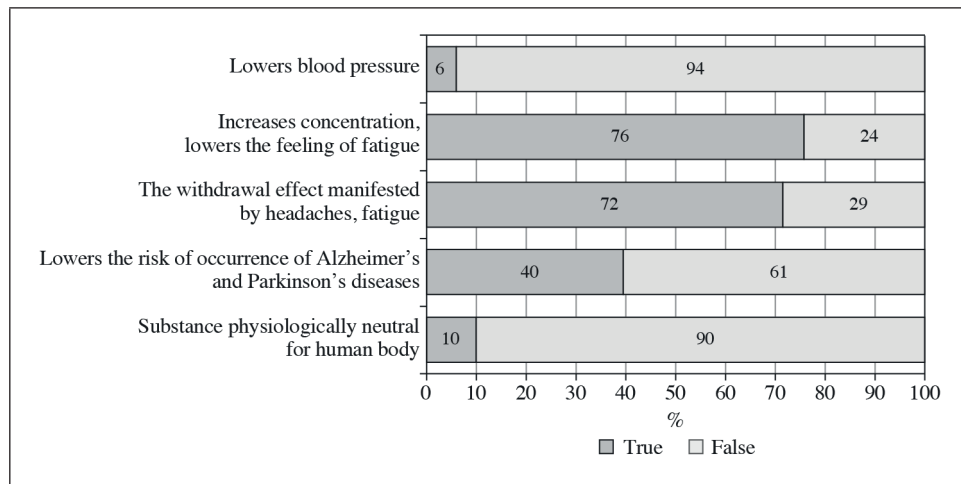


Fig. 3. The Knowledge of Respondents about the Influence of Caffeine on Health

Source: own study.

The study also analysed the factors determining the choice of CCBs. Main factors influencing the choice of products containing caffeine were taste and smell values, along with the brand and price (Fig. 4).

The third factor which can be listed is the content of caffeine in CCBs. Respondents also indicated the packaging type and pro-health properties of products containing caffeine. (Fig. 4). The research also demonstrates that advertisement and consumer references do not significantly influence their choice of products containing caffeine.

5. Conclusions

Literature data proved that caffeine consumption mostly from such sources as CCBs has an upward trend (McLellan & Lieberman, 2012). Coffee and tea are the products which have the biggest share in caffeine consumption all over the world, with the significant advantage of coffee over tea (Reyes & Cornelis, 2018).

Presented study confirmed that CCBs, such as coffee and tea, are the most frequently selected caffeine sources, whereby coffee is mostly preferred, which is confirmed by 70% of respondents. It also shows that there are significant differences in preferences for caffeine coming from coffee, tea, yerba mate or energy drinks, as well as significant associations between these preferences and respondents' age and gender.

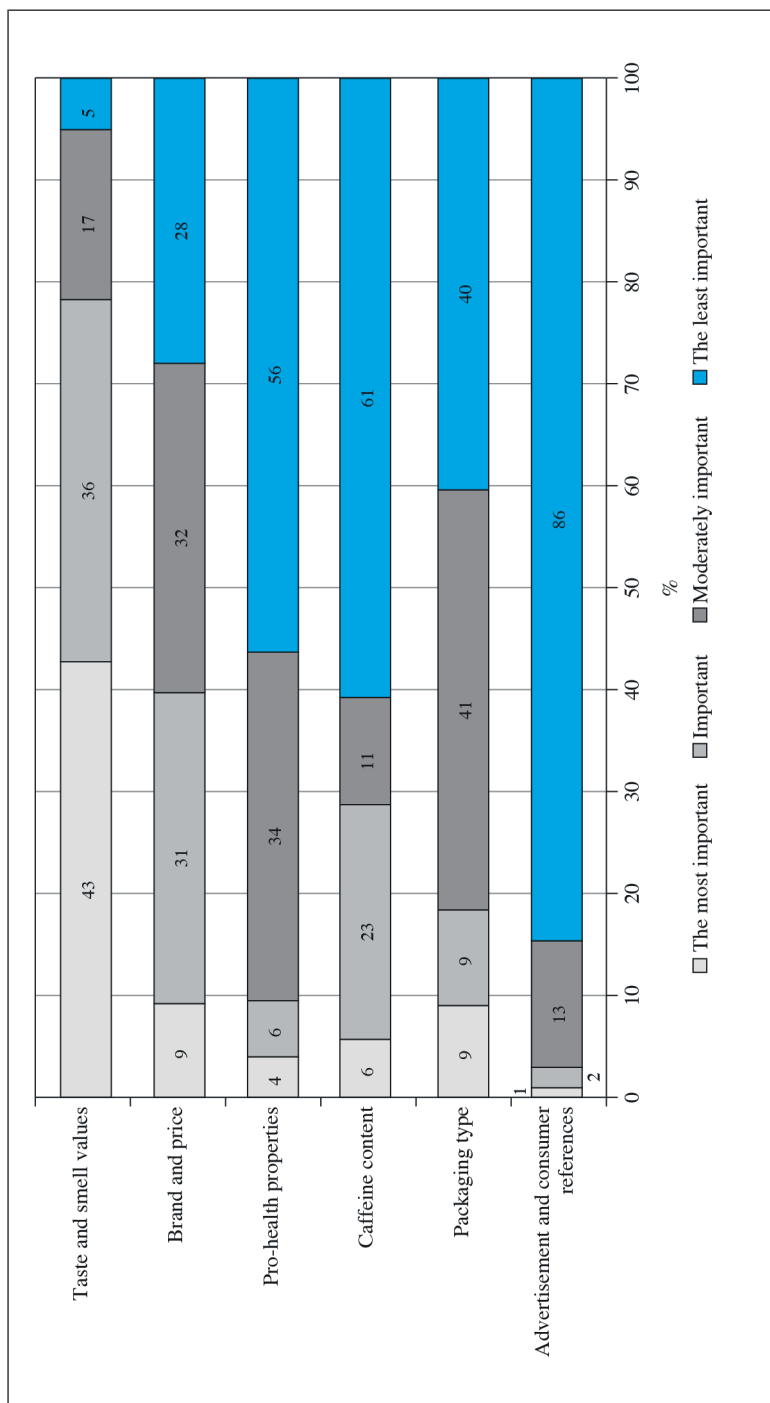


Fig. 4. Main Factors Influencing the Choice of Products Containing Caffeine

Source: own study.

Consumer preferences when it comes to coffee vary with age of respondents and demonstrate an upward trend from 57% for the youngest group of respondents to 78% for respondents aged 41 and over.

The consumption of tested coffee types (ground, instant and bean) is significantly related to the age and education of respondents. The most frequently preferred type is bean coffee, the consumption of which was declared mainly by respondents with higher education, whereas the consumption of ground and instant coffee was declared by respondents with secondary education. The consumers of instant coffee are mainly young people under 20 years old, while in other age groups most frequently selected type is bean coffee.

The frequency of CCBs consumption in particular age groups, which demonstrates an upward trend with the age of respondents, whereas for the remaining beverages under study a downward trend with increasing age, regardless of respondents' gender, is very interesting. Respondents, along with increasing age, consume more coffee, declaring its consumption a few times a day. Consumers declared that they consume coffee most frequently once a day.

By contrast, the frequency of consumption of less popular CCBs, such as yerba mate and energy drinks, is generally dependant on the majority of analysed socio-demographic factors.

In the case of pro-health properties of CCBs, the respondents despite declaring the most frequent consumption of coffee, recognised tea as the healthiest, followed by yerba mate and, finally, coffee. Energy drinks were recognised as lacking pro-health properties. The issues concerning pro-health properties of caffeine, such as its psychostimulants and negative effects of consumption cessation, called withdrawal effect, are well known to the respondents, whereas its preventive properties against Alzheimer's and Parkinson's diseases are known to only 40% of respondents.

In purchasing decisions related to CCBs, consumers value the organoleptic qualities (taste and smell) of these products most highly, but the brand and price also seem to be crucial.

The study provides the following recommendations for both consumers and manufacturers:

- Due to the increasing consumption of coffee, preference for high-waste bean and ground coffees and the associated increase in caffeine emissions to the environment, an increase in market share and marketing activities popularising low-caffeine and low-waste coffees and the inclusion of information when it comes to caffeine content on labels is required.

- It may be convenient for consumers to include information on the health-promoting properties of CCBs and their environmental impact, which could make it easier for buyers to decide whether to purchase the product. The consumer

decision-making process related to the purchase and consumption of food involves a search for information by the consumer. The point that should guide the retailer should be the content and the reliability of the information, as well as the user-friendly way in which it is communicated on the product labels.

- Information on the effects of caffeine on the human body should be taken into account when creating coffee package labels, promotional materials and advertisements. The content provided must be understandable to the potential recipient. This is all the more important as the majority of respondents declare low relevance of caffeine content in the choice of products containing it and have insufficient knowledge when it comes to its pro-health and negative effects.

- Consumers should rationalise their coffee consumption (other sources of CCBs as well) by limiting the consumption of highly caffeinated coffees, i.e., espresso or Turkish-brewed, and use decaffeinated and low-caffeinated coffee varieties for frequent consumption.

- The common point, however, should be the content and reliability of the information, as well as the accessible way of conveying it. With regard to the composition and content of information materials, the assumptions underlying the labels can be implemented.

Authors' Contribution

The authors' individual contribution is as follows: Katarzyna Mikołajczyk-Bator: conceptualisation, methodology, investigation statistical analysis, data curation, writing – original draft preparation, reviewing and editing. Dariusz Kikut-Ligaj: conceptualisation, methodology, investigation questionnaire, data curation, writing – original draft preparation.

Conflict of Interest

The authors declare no conflict of interest.

References

- Abalo, R. (2021). Coffee and Caffeine Consumption for Human Health. *Nutrients*, 13(9), 2918. <https://doi.org/10.3390/nu13092918>
- Almeida, Â., Freitas, R., Calisto, V., Esteves, V. I., Schneider, R. J., Soares, A. M., & Figueira, E. (2015). Chronic Toxicity of the Antiepileptic Carbamazepine on the Clam *Ruditapes Philippinarum*. *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology*, 172–173, 26–35. <https://doi.org/10.1016/j.cbpc.2015.04.004>
- Álvarez-Muñoz, D., Rodríguez-Mozaz, S., Maulvault, A. L., Tediosi, A., Fernández-Tejedor, M., Van den Heuvel, F., Kotterman, M., Marques, A., & Barceló, D. (2015). Occurrence of Pharmaceuticals and Endocrine Disrupting Compounds in Macroalgae, Bivalves, and Fish from Coastal Areas in Europe. *Environmental Research*, 143(B), 56–64. <https://doi.org/10.1016/j.envres.2015.09.018>

- Antwerpes, S., Protopopescu, C., Morlat, P., Marcellin, F., Wittkop, L., Di Beo, V., Salmon-Céron, D., Sogni, P., Michel, L., & Carrieri, M. P., & the ANRS CO13 HEPACVIH Study Group. (2020). Coffee Intake and Neurocognitive Performance in HIV/HCV Coinfected Patients (ANRS CO13 HEPACVIH). *Nutrients*, 12(9), 2532. <https://doi.org/10.3390/nu12092532>
- Bagdas, D., Gul, Z., Meade, J. A., Cam, B., Cinkilic, N., & Gurun, M. S. (2020). Pharmacologic Overview of Chlorogenic Acid and Its Metabolites in Chronic Pain and Inflammation. *Current Neuropsychopharmacology*, 18(3), 216–228. <https://doi.org/10.2174/1570159X17666191021111809>
- Balawejder-Biśto, A., & Pyka-Pająk, A. (2022). Kofeina – substancja znana czy poznawana. *Farmakognozja*, 78(8), 430–441. <https://doi.org/10.32383/farmopol/155158>
- Barone, J. J., & Roberts, H. (1984). Human Consumption of Caffeine. In: P. B. Dews (Ed.), *Caffeine* (pp. 59–73). Springer. https://doi.org/10.1007/978-3-642-69823-1_4
- Buerge, I. I., Poiger, T., Müller, M. D., & Buser, H.-R. (2003). Caffeine, an Anthropogenic Marker for Wastewater Contamination of Surface Waters. *Environmental Science & Technology*, 37(4), 691–700. <https://doi.org/10.1021/es020125z>
- Caffeine in Coffee*. (2023). Retrieved from: https://robslink.com/SAS/democd59/coffee_caffeine.htm (accessed: 22.11.2023).
- Cappelletti, S., Piacentino, D., Sani, G., & Aromatario, M. (2015). Caffeine: Cognitive and Physical Performance Enhancer or Psychoactive Drug? *Current Neuropsychopharmacology*, 13(1), 71–88. <https://doi.org/10.2174/1570159X13666141210215655>
- Cruz, D., Almeida, Â., Calisto, V., Esteves, V. I., Schneider, R. J., Wrona, F. J., Soares, A. M., Figueira, E., & Freitas, R. (2016). Caffeine Impacts in the Clam *Ruditapes Philippinarum*: Alterations on Energy Reserves, Metabolic Activity and Oxidative Stress Biomarkers. *Chemosphere*, 160, 95–103. <https://doi.org/10.1016/j.chemosphere.2016.06.068>
- Da Silveira, T. F. F., Meinhart, A. D., de Souza, T. C. L., Cunha, E. C. E., de Moraes, M. R., & Godoy, H. T. (2017). Chlorogenic Acids and Flavonoid Extraction during the Preparation of Yerba Mate Based Beverages. *Food Research International*, 102, 348–354. <https://doi.org/10.1016/j.foodres.2017.09.098>
- Ding, Q., Xu, Y.-M., & Lau, A. T. Y. (2023). The Epigenetic Effects of Coffee. *Molecules*, 28(4), 1770. <https://doi.org/10.3390/molecules28041770>
- EUR-Lex. (2023). *Ograniczanie obecności akryloamidu w żywności*. Retrieved from: <https://eur-lex.europa.eu/legal-content/PL/TXT/HTML/?uri=LEGISSUM:4324370> (accessed: 24.11.2023).
- Ferreira, A. P. (2005). Caffeine as an Environmental Indicator for Assessing Urban Aquatic Ecosystems. *Cadernos de Saúde Pública*, 21(6), 1884–1892. <https://doi.org/10.1590/s0102-311x2005000600038>
- Frary, C. D., Johnson, R. K., & Wang, M. Q. (2005). Food Sources and Intakes of Caffeine in the Diets of Persons in the United States. *Journal of the American Dietetic Association*, 105(1), 110–113. <https://doi.org/10.1016/j.jada.2004.10.027>

Gökçen, B. B., & Şanlıer, N. (2019). Coffee Consumption and Disease Correlations. *Critical Reviews in Food Science and Nutrition*, 59(2), 336–348. <https://doi.org/10.1080/10408398.2017.1369391>

Herden, L., & Weissert, R. (2020). The Effect of Coffee and Caffeine Consumption on Patients with Multiple Sclerosis-related Fatigue. *Nutrients*, 12(8), 2262. <https://doi.org/10.3390/nu12082262>

Hong, C. T., Chan, L., & Bai, C.-H. (2020). The Effect of Caffeine on the Risk and Progression of Parkinson's Disease: A Meta-analysis. *Nutrients*, 12(6), 1860. <https://doi.org/10.3390/nu12061860>

International Coffee Organization. (2023). *Monthly Coffee Market Report – September 2017*. Retrieved from: <https://www.ico.org/documents/cy2016-17/cmr-0917-e.pdf> (accessed: 18.10.2023).

International Coffee Organization. (2024). *Monthly Coffee Market Report (2023/24)*. Retrieved from: <https://www.ico.org/Market-Report-23-24-e.asp> (accessed: 11.02.2024).

Jee, H. J., Lee, S. G., Bormate, K. J., & Jung, Y.-S. (2020). Effect of Caffeine Consumption on the Risk for Neurological and Psychiatric Disorders: Gender Differences in Human. *Nutrients*, 12(10), 3080. <https://doi.org/10.3390/nu12103080>

Lopez-Garcia, E., Guallar-Castillon, P., Leon-Muñoz, L., Graciani, A., & Rodriguez-Artalejo, F. (2014). Coffee Consumption and Health-related Quality of Life. *Clinical Nutrition*, 33(1), 143–149. <https://doi.org/10.1016/j.clnu.2013.04.004>

McLellan, T. M., & Lieberman, H. R. (2012). Do Energy Drinks Contain Active Components Other Than Caffeine? *Nutrition Reviews*, 70(12), 730–744. <https://doi.org/10.1111/j.1753-4887.2012.00525.x>

Mendes, G. F., Reis, C. E. G., Nakano, E. Y., da Costa, T. H. M., Saunders, B., & Zandonadi, R. P. (2020). Translation and Validation of the Caffeine Expectancy Questionnaire in Brazil (CaffEQ-BR). *Nutrients*, 12(8), 2248. <https://doi.org/10.3390/nu12082248>

Mitchell, D. C., Hockenberry, J., Teplansky, R., & Hartman, T. J. (2015). Assessing Dietary Exposure to Caffeine from Beverages in the US Population Using Brand-specific versus Category-specific Caffeine Values. *Food and Chemical Toxicology*, 80, 247–252. <https://doi.org/10.1016/j.fct.2015.03.024>

Montagner, C. C., Umbuzeiro, G. A., Pasquini, C., & Jardim, W. F. (2014). Caffeine as an Indicator of Estrogenic Activity in Source Water. *Environmental Science: Processes & Impacts*, 16(8), 1866–1869. <https://doi.org/10.1039/c4em00058g>

Mustard, J. A. (2014). The Buzz on Caffeine in Invertebrates: Effects on Behavior and Molecular Mechanisms. *Cellular and Molecular Life Sciences (CMLS)*, 71(8), 1375–1382. <https://doi.org/10.1007/s00018-013-1497-8>

Nowaczewska, M., Wiciński, M., & Kaźmierczak, W. (2020). The Ambiguous Role of Caffeine in Migraine Headache: From Trigger to Treatment. *Nutrients*, 12(8), 2259. <https://doi.org/10.3390/nu12082259>

- O'Keefe, J. H., DiNicolantonio, J. J., & Lavie, C. J. (2018). Coffee for Cardioprotection and Longevity. *Progress in Cardiovascular Diseases*, 61(1), 38–42. <https://doi.org/10.1016/j.pcad.2018.02.002>
- Quadra, G. R., Paranaíba, J. R., Vilas-Boas, J., Roland, F., Amado, A. M., Barros, N., Dias, R. J. P., & Cardoso, S. J. (2020). A Global Trend of Caffeine Consumption over Time and Related-environmental Impacts. *Environmental Pollution*, 256, 113343. <https://doi.org/10.1016/j.envpol.2019.113343>
- Reyes, C. M., & Cornelis, M. C. (2018). Caffeine in the Diet: Country-level Consumption and Guidelines. *Nutrients*, 10(11), 1772. <https://doi.org/10.3390/nu10111772>
- Rochat, C., Eap, C. B., Bochud, M., & Chatelan, A. (2019). Caffeine Consumption in Switzerland: Results from the First National Nutrition Survey MenuCH. *Nutrients*, 12(1), 28. <https://doi.org/10.3390/nu12010028>
- Sanchez, J. M. (2017). Methylxanthine Content in Commonly Consumed Foods in Spain and Determination of Its Intake during Consumption. *Foods*, 6(12), 109. <https://doi.org/10.3390/foods6120109>
- Saud, S., & Salamatullah, A. M. (2021). Relationship between the Chemical Composition and the Biological Functions of Coffee. *Molecules*, 26(24), 7634. <https://doi.org/10.3390/molecules26247634>
- Schouten, M. A., Tappi, S., & Romani, S. (2020). Acrylamide in Coffee: Formation and Possible Mitigation Strategies – a Review. *Critical Reviews in Food Science and Nutrition*, 60(22), 3807–3821. <https://doi.org/10.1080/10408398.2019.1708264>
- Sousa, A. G., & da Costa, T. H. M. (2015). Usual Coffee Intake in Brazil: Results from the National Dietary Survey 2008–9. *British Journal of Nutrition*, 113(10), 1615–1620. <https://doi.org/10.1017/S0007114515000835>
- Strocchi, G., Rubiolo, P., Cordero, C., Bicchi, C., & Liberto, E. (2022). Acrylamide in Coffee: What Is Known and What Still Needs to Be Explored. A Review. *Food Chemistry*, 393, 133406. <https://doi.org/10.1016/j.foodchem.2022.133406>
- Surma, S., Romańczyk, M., Fojcik, J., & Krzystanek, M. (2020). Kawa – lekarstwo, używka i narkotyk. *Psychiatria*, 17(4), 237–246. <https://doi.org/10.5603/PSYCH.a2020.0031>
- Wierzejska, R. (2012). Kofeina – powszechny składnik diety i jej wpływ na zdrowie. *Roczniki Państwowego Zakładu Higieny*, 63(2), 141–147.
- Zhang, R. C., & Madan, C. R. (2021). How Does Caffeine Influence Memory? Drug, Experimental, and Demographic Factors. *Neuroscience & Biobehavioral Reviews*, 131, 525–538. <https://doi.org/10.1016/j.neubiorev.2021.09.033>
- Zucconi, S., Volpato, C., Adinolfi, F., Gandini, E., Gentile, E., Loi, A., & Fioriti, L. (2013). Gathering Consumption Data on Specific Consumer Groups of Energy Drinks. *European Food Safety Authority*, 10(3), 394E. <https://doi.org/10.2903/sp.efsa.2013.EN-394>

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