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FOREWORD

Presented number of Silesian University of Technology. Scientific Papers. Organization and Management Series. Contemporary management. Presented papers contain result of researches conducted by authors from Poland and Ukraine. The number consists of 47 papers.

The papers presented in the number concentrate on many topics connected with organization and management. There are in the number papers about: marketing management, production management, human resource management, sustainability, impact of COVID-19 pandemic on management, small and medium enterprises management, process management, Industry 4.0, innovation management, organizational culture, health care management, corporate governance, waste management, e-commerce, economics, finance, logistics, quality management, service management and knowledge management.

Radosław Wolniak

Bożena Skotnicka-Zasadzień

EXPLORING AN ENTREPRENEURIAL ECOSYSTEM WITH REGARD TO BUSINESS-SCIENCE-GOVERNMENT COOPERATION: PRELIMINARY RESEARCH FINDINGS

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Purpose: The paper provides a theoretical foundation of entrepreneurial ecosystems with strong focus on start-up ecosystem. The empirical purpose of the study is to identify the key actors, institutions and organisations which can provide a nurturing environment and services for the creation of the start-up ecosystem of the city of Poznań with regard to business-science-government collaboration.

Design/methodology/approach: The research applies the method of in-depth semi-structured direct interview with experts in the field of support services to potential founders and start-ups with academic origin, the case study method, participatory observation, and reflection. The explorative qualitative study uses both descriptive and explanatory techniques.

Findings: The research findings provide insight in the real nature of the local start-up ecosystem presenting its key stakeholders, the scope of their support and ways of creating a conducive environment for potential founders and start-ups. The research results highlight the importance of studying the interdependencies among key actors in the start-up ecosystem in order to provide them with necessary resources and to stimulate the synergy effect.

Research limitations/implications: Research limitations resulting from the analysis of a purposefully-selected case of the start-up ecosystem do not allow formulating general conclusions. Nevertheless, it illustrates a real business practice and challenges of the development of the specific entrepreneurial ecosystem. Future research line will concern an in-depth analysis of the most critical obstacles in the process of start-up creation as well as the assessment of the interdependencies among the key stakeholders of the start-up ecosystem to look for more effective cooperation.

Practical implications: The synthesis of the current reflections on entrepreneurial ecosystems and the research findings reflected here can benefit both employees of business incubators, researchers, and entrepreneurship teachers and become an inspiration for further analysis and extended research on problems associated with increasing the efficiency and sustainability of local start-up ecosystems and the need to build valuable relationships with key stakeholders.

Originality/value: The originality of the conducted exploratory research lies in presenting the real business practice and challenges of the development of the specific entrepreneurial ecosystem, and thus contribute to the discussion on the dilemmas associated with conducting the more effective practice-oriented research on start-up ecosystems.

Keywords: entrepreneurial ecosystem, entrepreneurship, start-up ecosystem, incubators, triple helix.

Category of the paper: Research paper.

1. Introduction

Entrepreneurial ecosystems play an important role in stimulating innovation in regions by supporting the creation and development of young companies from future-oriented industries (e.g. ICT, artificial intelligence, biotechnology and others), which in turn is a significant factor driving economic growth. The way in which entrepreneurial ecosystems are formed and evolving is particularly important in the context of searching for the path of economic development for Poland. A significant challenge is to increase the level of “innovation, new assets, and competitiveness through the more efficient use of the research results that lead to the development of products and services” (Badzińska, Mrugalska, 2022, p. 145). The accelerated pace of digitization contributes to an even greater increase in dynamics of the business environment and market structure. Thus, science and technology are critical for the execution and operations of modern businesses.

Innovation support systems emphasize the role of interaction between various actors of the economic environment and innovation policy for the success of activities. Etzkowitz (2002, 2008) underlined the requirement to shift toward a triple helix model of partnership between government, industry, and higher education to strengthen the dynamics of innovation and build a business support network. In turn, Isenberg pointed out that in order “to ignite venture creation and growth, governments need to create an ecosystem that sustains entrepreneurs” (Isenberg, 2010, p. 41).

Entrepreneurial ecosystems develop naturally through co-evolution, but by implementing appropriate forms of substantive, regulatory, financial or infrastructural support, one can try to design them in an intelligent manner and stimulate their development. “Ecosystems are usually a result of intelligent evolution, a process that combines the invisible hand of markets and institutional support to ensure (relative) self-sufficiency” (Buła, Schroeder, 2020, p. 23). Thus, a proper understanding of the nature of the entrepreneurial ecosystem is essential in developing entrepreneurship in the region. Therefore, the ability to identify the triple helix partnerships can be crucial when trying to design a sustainable ecosystem. Moreover, success stories of innovative companies in the ecosystem can affect its condition, contributing to its evolution. “Even one success can have a surprisingly stimulating effect on an entrepreneurship ecosystem – by igniting the imagination of the public and inspiring imitators” (Isenberg, 2010, p. 48).

A look at ecosystems from the point of view of cities as a kind of innovative “hubs” is important, as examples of European start-up ecosystems (e.g. London, Berlin, Munich, Stockholm) confirm that a strong concentration of start-up entrepreneurship occurs precisely around large cities (The Global Startup Ecosystem Report, 2017). In publications and reports on the activity of young innovative companies and start-ups in Poland, cities such as Warsaw, Kraków, Poznań, Wrocław, and Gdańsk are indicated as key cities for the start-up scene

(Deloitte, 2016; Skala, 2018; Polskie Startupy, 2021). The reports emphasize the dominant operating model of companies, the range of services and products they offer, methods of financing or acquiring new employees and building a network of contacts. However, there is still a lack of indications on the actors as well as the conditions for further development relating to the analysis of specific ecosystems at a regional level.

The cognitive goal of this study is therefore an attempt to fill this gap by exploring the start-up entrepreneurial ecosystem of the city of Poznań. Despite the increasing interest in entrepreneurial ecosystems, there is still a challenge how they should be composed and interrelated to create a supportive environment for innovative ventures and thus contribute to the development of the region. The article strives for a more deeper understanding what the real nature of the local start-up ecosystem “driven” by the actors representing the triple helix entities looks like. An essential basis for this study is the concept of entrepreneurial ecosystems (Isenberg, 2011; Brown and Mason, 2017) and the local start-up ecosystem, which focuses on the start-up scene (Wallisch et al., 2019). The empirical part of the paper aims to identify the key actors, institutions and organisations which can provide a nurturing environment and services for the creation of the start-up ecosystem in the city of Poznań. Using a case study method (Yin, 2013) we can understand entrepreneurial ecosystems in a more specific manner and diagnose which actors really provide and organize the connection of resources within the specific ecosystem.

2. Entrepreneurial Ecosystems – theoretical background

The emergence of the concept of entrepreneurial ecosystems is the result of applying the “ecosystem” metaphor to the issue of entrepreneurship where the ecosystem is considering a functional whole of the coordinated set of elements and mutual relationships between them and their environment. The origins of this concept can be traced back to James Moore (1993), who compared the evolutionary dynamics of firms to the natural environment. He claimed that businesses do not evolve in a “vacuum” and noted the relationally embedded nature of how firms interact with suppliers, customers and financiers. In turn, one of the first uses of the term “entrepreneurial ecosystem” is attributed to Boyd Cohen (2006), who defines it as an interconnected group of actors in the local (geographically) community committed to sustainable development by supporting new ventures. In turn, Mason and Brown describe it as an interconnected set of actors, organizations, and processes that “coalesce to connect, mediate and govern the performance within the local entrepreneurial environment” (Mason, Brown, 2014, p. 5). This definition was then supplemented by Stam and Spigel (2016), who constrain the entrepreneurial ecosystem to a geographic cluster of well-related factors with the power of nurturing business ventures: It is “a set of interdependent actors and factors coordinated in such

a way that they enable productive entrepreneurship within a particular territory” (Stam, Spigel, 2016, p. 1). Moreover, ecosystems are capable of self-organization and self-development in the form of complex, adaptive systems related to the interrelationships of components and the ability to adapt ‘inside’ and evolve together with the changing environment (Chan, 2001, in: Tomski, 2018, p. 115).

A particularly influential approach to entrepreneurial ecosystems was developed by Daniel Isenberg (2010) at Babson College who identified six generic domains within the entrepreneurial ecosystem, namely: a conducive culture, a range of institutional and infrastructure supports, quality human capital and social networks, venture friendly markets for products and services, as well as enabling policies and leadership, and availability of appropriate financial capital. Moreover, all these domains contain many elements and factors “interacting in highly complex and idiosyncratic ways” (Mason, Brown, 2014, p. 5). Therefore, special attention should be paid to the diversity of the ecosystem's entities, processes and mutual formal and informal relationships created by “a set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organizations (e.g. firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies) and entrepreneurial processes (e.g. the business birth rate, numbers of high growth firms and serial entrepreneurs (...))” (Mason, Brown, 2014, p. 5).

It should be emphasized that the efficiency of organizations and entities included in entrepreneurial ecosystems depends not only on their own competences and potential, but also on interactions with other entities and the condition of the entire ecosystem. Therefore, the essence of entrepreneurial ecosystems is “to connect a critical mass of actors and resources that fuel the entrepreneurial actors in the entire region and provide a self-sustaining environment in which entrepreneurial activity emerges and start-ups develop and expand” (Freiling and Baron, 2017, p. 73).

Entrepreneurial ecosystems have gained increasing attention over the past decade as governments, private companies, universities and communities began to recognize the potential of integrated policies, structures, programs and processes that foster entrepreneurial activities in the region and boost innovation, employment growth and productivity (Isenberg, 2010, 2011; Mason and Brown, 2014; Stam, Spigel, 2016; Brown and Mason, 2017; Freiling and Baron, 2017; Spigel, 2017, 2020; Theodoraki et al., 2018; Tomski, 2018; Wallisch et al., 2019; Buła, Schroeder, 2020; Badzińska, 2021; Stam, Welter, 2020). When analyzing various approaches to the concept of entrepreneurial ecosystem, it can be noticed that it consists of the following factors: economic and social, cultural, technological, financial, managerial and regulatory, the mutual and effective use of which determines the ecosystem's ability to develop.

According to the entrepreneurial ecosystem model by Isenberg (2011), each ecosystem emerges under a unique set of conditions and circumstances where social, cultural and institutional factors play an underpinning role. Therefore, the interpretation of cause-and-effect relationships is difficult, because these relationships are multidimensional and ambiguous.

“The common denominator among entrepreneurship ecosystem elements is their essentialness for increasing numbers of companies growing more and more rapidly. Intrinsic to the ecosystem metaphor is that these elements interact in ways that the “whole” (the ecosystem) is self-sustaining” (Isenberg, Onyemah, 2016, p. 73). Therefore, it is important to look for answers to research questions about the genesis, key factors and main stakeholders, ways of creating common value as well as appropriate policies and conditions conducive to the creation of sustainable entrepreneurial ecosystems (Stam, Welter, 2020).

Taking into account the above considerations, it should be noted that the start-up ecosystem as a specific type of entrepreneurial ecosystem focuses on the potential of founders and start-ups in their region. The start-up ecosystem includes, as the name suggests, start-up ventures, i.e. those at the initial (seed) stage of development, looking for a scalable and profitable business model (Blank, Dorf, 2012), introducing innovative products and services to the market (Ries, 2011) and operating in conditions of high variability of the environment and competitiveness. Moreover, a start-up ecosystem forms the framework conditions and networks for this specific target in order to provide a better accessibility of resources and facilities to ensure an effective cooperation with local stakeholders. Furthermore, it aims to promote relationships between the ecosystem actors and to identify appropriate operations for the development of networks and support measures in the region (Wallisch et al., 2019). However, despite the ongoing research on ecosystems, there is still a challenge how to provide conducive framework conditions for (potential) academic founders and start-ups and support networking within the entire ecosystem to achieve common goals.

3. Research design and methods

For the theoretical-cognitive goal of this paper, a review of the management science literature was conducted along with the analysis of reports and data from secondary sources on the concept of entrepreneurial ecosystems. The following methods were used to cover various approaches to this subject of study: defining, comparing, attribute analysis, inference.

In turn, the empirical part of the study was designed to explore the main actors (within the business-science-government relationships) of the entrepreneurial ecosystem of the city of Poznań and their activities as well as scope of support they provide for its development. Therefore, in order to achieve the research objective and exemplify the studied problem in practice, the following research questions were posed: What is the configuration of critical triple helix stakeholders within the studied start-up ecosystem? What scope of services and facilities they provide to create a conducive environment for the creation and development of start-ups and the entrepreneurial culture in the local environment.

The empirical method makes use of a case study involving the analysis of stakeholders providing a nurturing environment for start-up incubation in the city of Poznań. The rationale for the use of the case study is its usefulness for the practice-oriented approach (Yin, 2013) related to the need of building effective cooperation within the entrepreneurial ecosystem. The nature of the case study is descriptive and reflective, and as a result it provides an illustration of the local start-up ecosystem of the city of Poznań.

The confrontation of multiple data sources justifies the iterative nature of data collection in the years 2020-2022. Primary data acted as a basis to identify the key stakeholders in the studied start-up ecosystem. An explorative qualitative study was conducted based on in-depth direct interviews with six experts in the field of commercialization and technology transfer, academic entrepreneurship and start-up incubation, intellectual property management as well as with four co-founders of ICT start-ups with academic origin. The experts represented, *inter alia*, Academic Entrepreneurship Incubator of Poznań University of Technology, the University Center for Innovation and Technology Transfer of Adam Mickiewicz University in Poznań (AMU), Poznan Science and Technology Park (PPNT) of Adam Mickiewicz University Foundation, and Foundation for Creating Shared Value by Students. The selection of respondents (experts) was purposeful and resulted from: (i) expert knowledge and practical experience of interview participants in the studied area; (ii) their long-term cooperation with the academic community in Poznań; (iii) their employment in institutes / foundations closely related to the transfer of knowledge and commercialization of research results; (iv) their experience as start-up co-founders; (v) the pragmatic criterion of availability of data. The above criteria lead to the conclusion that data obtained from the surveyed experts would help to attain the objective of the research.

An interview questionnaire was semi-structured and contained the following areas: (i) general questions about their organization (institution, foundation); (ii) questions about forms and scope of support for young entrepreneurs (potential start-up founders); (iii) questions about the sources of financing innovative business concepts of students and alumni; (iv) questions about the critical actors of the start-up ecosystem and the forms of support they provide. In order to verify the gathered information, further online conversations were conducted and the interview questionnaire was sent in an electronic form.

The source of primary data was also: the author's participatory observation, reflection and interviews in the field of supporting academic entrepreneurship conducted as part of a research internship at the Chair of Economic Sciences at the Faculty of Law and Administration at Adam Mickiewicz University (AMU) in Poznan in the period March-June 2020.

The necessity to confront various data sources forced the application of the triangulation principle (multi-method study) (Sułkowski, 2012; Glinka, Czakon, 2021). To expand the database on the studied stakeholders an analysis of materials from the available secondary sources was also conducted. They included: websites of incubators, technology park, foundations, the city of Poznań, press releases, opinions of supported students and start-ups as well as the social media run by academic incubators and start-up community in Poznań.

4. Research findings and discussion

The results of the empirical research allow us to conclude that the start-up ecosystem of the city of Poznań is made up of representatives of the business, scientific and research spheres, as well as the local government. The configuration of critical stakeholders within the studied start-up ecosystem consists of: research institutions, universities, incubators, science and technology parks, start-up environment creating a talent pool, business sphere represented by innovative enterprises, private equity investors and other business-related stakeholders, moreover financial and advisory institutions, as well as public administration and local authorities in supporting entrepreneurship. As a result of the conducted empirical research, stakeholders considered necessary for the studied start-up ecosystem were identified, as outlined in Table 1 (Appendix).

Human capital is a strong point of the studied start-up ecosystem. Poznań is characterized by a large number of students and graduates, including technical sciences and engineering (in the 2020/2021 academic year there were 104,729 students and 24,900 graduates in Poznań; <https://badam.poznan.pl/2021-studenci/>). Nevertheless, the education process still requires a greater practice-oriented approach and better adaptation to the needs of the market.

In the studied ecosystem the crucial role may be played by business and technological universities, which could try to connect the most powerful actors creating and supporting the whole start-up ecosystem in a highly complex manner. An important role in the area of strengthening the entrepreneurial ecosystem is played, for example, by the Adam Mickiewicz University in Poznań, the Poznań University of Economics and Business, and the Poznań University of Technology. They are strongly linked with the economic, social and administrative environment through the collaboration with numerous enterprises and national institutions, as well as global concerns and research units. The intensification of science-industry cooperation is of key importance by creating, inter alia, platforms for the exchange of new technologies and inventions, and delivering appropriate solutions for external partners. Cooperation with local government, national agencies (e.g. Polish Agency for Enterprise Development) and business sphere is of great importance for joint participation in designing a pro-development offer in the field of the broadly understood knowledge-based economy. Entrepreneurial universities are expected to intensify the process of applying for research projects strictly aimed at increasing the competitiveness and innovation of enterprises in the region, thus contributing to the sustainable development of the ecosystem. “The objective is to enable universities to play a creative role in economic and social development from an independent perspective while still being responsive to government and industry priorities” (Etzkowitz, 2016, p. 83).

Undoubtedly, the most important contribution universities make to the start-up ecosystem is their students who bring new ideas and increase the intellectual capacity of the community. Students and alumni as potential founders and existing start-ups create a talent pool for the regional environment and much more broadly. To a large extent, it is their commitment, innovation and creativity that determines whether the start-up scene will be created and will evolve as the core of the entrepreneurial ecosystem. Moreover, active participation in student organizations and scientific circles contribute to raising awareness of entrepreneurship, self-employment and further development of competences. Students involved in creating innovative solutions within scientific circles in the field of computer science, artificial intelligence, biotechnology, telecommunications, production engineering, machine building and many others undoubtedly bring tangible results to the development of the entrepreneurial ecosystem. In turn, participation in national and international competitions creates an opportunity to build both bilateral relationships among local stakeholders and extended multilateral relations as well. The informal ties that arise on this occasion can also be beneficial to the evolution of the ecosystem. Furthermore, start-ups with academic origin “can increase the transfer of research findings from university to the market, drive productivity growth, create new employment, as well as promote business internationalization” (Badzińska, 2021, p. 26). There is also evidence that growth-oriented start-ups provide an important stimulus within entrepreneurial ecosystems by increasing cooperation, the efficient allocation of resources, and investing heavily in human capital. The role played by the academic community represented by researchers, entrepreneurship teachers and authorities providing both substantive, organizational, and financial support as well should also be emphasized. Knowledge transfer is a fundamental driver of ecosystem evolution over time and it is responsible for the creation of intra- and inter-organizational networks of cooperation.

Entrepreneurship incubators located at universities should play a fundamental role in shaping entrepreneurial mindset. Generally, an incubator’s purpose is to provide a supportive environment that enhances the probability of survival and success of incubated entrepreneurs. These institutions are expected to be heavily involved in creating a start-up friendly climate and undertake activities to strengthen the entrepreneurial culture in the region, improve framework conditions and support start-up networks. Incubators placed at universities (e.g. Academic Entrepreneurship Incubator of Poznań University of Technology) are the key actor of the university-based entrepreneurial ecosystem who should provide services to potential founders and start-ups with academic origin facilitating their access to academic and business networking as well as match them with the right scientists and mentors. Unfortunately, the analysis of activities undertaken by academic incubators at public universities leads to the conclusion that their activity is practically invisible to the target group (e.g. lack of extensive promotional campaigns of events, selection of inappropriate communication channels, lack of awareness among students about the existence of an incubator) or that any actions are taken very rarely (e.g. on-line seminars) or not at all. Another issue is the need to adequately adjust the content

of organized events to the needs of potential founders. An undoubted weakness of university incubators is usually the lack of funding from external sources (by third-party funds), but only from modest university funds. As a result, there are very limited possibilities of organizing useful events for students, such as, for example, workshops conducted by business practitioners (e.g. legal, financial and tax advisors, entrepreneurs, investors in the seed and start-up phase) who could share valuable knowledge and real experiences. Moreover, an incubator usually employs one person (sometimes it is even a university teacher) who, for objective reasons, is not able to effectively organize and promote events that build entrepreneurial attitudes among students. A reduction in public funds may affect the scope of activities and further limit support for potential founders.

An example of effective operations in supporting student entrepreneurship is the activity undertaken by the incubator in the Poznań Science and Technology Park of Adam Mickiewicz University Foundation (PPNT). Professionals with many years of experience in the field of pre- and incubation provide professional advice and connectivity with the key actors of the local entrepreneurial ecosystem. In order to overcome resource gaps in the seed stage of potential founders and start-ups the employees of PPNT help support networking with external entities such as advisers, investors, potential partners or team members, early-adopter customers, and potential employees as well. Furthermore, people involved in the activities of the Foundation rely on various actors in the ecosystem to provide potential founders with substantial knowledge. They take on the role of an intermediary, for example by linking young entrepreneurs with private business consultants such as lawyers, tax consultants, business consultants or marketing advisers. All activities are designed to improve the chances of success for this target group. They are providing interactive and practice-oriented opportunities to share knowledge, experience and exchange best practices valuable for potential founders.

The Foundation for Creating Shared Value by Students, in turn, supports economic development and science, including the development of entrepreneurship, disseminates and implements new business solutions among students, promotes project management techniques and implements a socio-economic project. The mission of the Foundation is to support students in creating projects while maintaining the idea of creating shared value. Cooperation with the Foundation helps build students' awareness of the entrepreneurial mindset through a variety of events and formats but also of the challenge that it takes time to build a vibrant, sustainable venture.

Startup communities are an important part of the entrepreneurial ecosystem. They have a significant impact on the cohesion and evolution of the entrepreneurial ecosystem. Moreover, founders and start-ups gain significant value through their access to internal and external networks, which help them develop business partnerships, recruit qualified personnel, and obtain advice from external experts. Community members can enhance both individual performance and benefit from the value created by the ecosystem. Therefore, it necessary to understand and stimulate the mutual relationships that determine the sustainability of the entire

ecosystem. Moreover, a friendly environment where trust dominates fosters the transfer of knowledge and skills between the members involved.

Key elements of the start-up ecosystem are also made up of entrepreneurs associations, network platforms and co-working spaces. They provide opportunities to engage potential founders, as they facilitate the sharing of knowledge and business experience, building a sense of a common start-up community. In addition, each member of the start-up community contributes through their core competencies, creating added value for the entire ecosystem.

The Co-working space “+1” is a joint project of the City of Poznań and the municipal company Wielkopolskie Centrum Wspierania Inwestycji (Investment Support Center of Greater Poland). It provides services and infrastructure to entrepreneurially stimulate local start-up communities. The mission of the co-work is to create a widely accessible place for meetings, work, and exchange of knowledge and experiences in Poznań. The space is focused on supporting people planning to start a business, entrepreneurs, freelancers, people working in the remote work model.

The availability of finance is a further critical factor of entrepreneurial ecosystems. Particularly important is a critical mass of seed and start-up investors to provide finance and hands on support. The investors in the initial waves of new ventures are often private individuals. As noted earlier, most start-ups are initially funded through a combination of self-financing, microcredit, loans from family and friends, and bootstrapping (Polskie Startupy, 2021).

Financial support is provided, for example, by InCredibles powered by Sebastian Kulczyk. The InCredibles is a tech acceleration program focused on supporting talented entrepreneurs from across Central and Eastern Europe in launching disruptive businesses. The InCredibles mentoring program offers free workshops, participation in international conferences and individual consultations with experts and investors in the field of, among others, management, sales and marketing, strategy, communication, financing and human resources. InCredibles supports the diffusion of knowledge and experience as well as establishing of business contacts. It effectively connects young entrepreneurs with investors, clients and contractors. Moreover, InCredibles creates a network of mentors, competence centers, industry organizations and venture capital funds, becoming a platform for support, development and inspiration for young entrepreneurship leaders (InCredibles, 2022).

Focusing on relational elements within the start-up ecosystem a crucial role is played by providing specific and continuous updated information important for the members, offering intended and unintended learning processes within the community, as well as shared entrepreneurial cultural behaviours. All the factors stimulate better mutual understanding, but their effectiveness depends on the local social relations. It is well known that entrepreneurs and potential founders need to utilize their social networks to access the cut edge knowledge, human capital, and other resources required to create and sustain their entrepreneurial ventures. A significant challenge in the studied ecosystem is the lack of coherent communication to build

sustainable relationships with valuable actors and create common ecosystem value. There is a need to create a common communication channel so that all interested parties can keep abreast of information and contribute to important entrepreneurial activities in the local environment. A solution could be to create a platform managed by the local administration, where potential start-up founders and other interested parties could find information about current events offered by various stakeholders. Moreover, proactive management can help improve conditions for members of the entire ecosystem.

As there are a lot of possible combinations of actors in an entrepreneurial ecosystem, the question is who is the “leader” of the structure of the entire ecosystem. Usually „all the members of an entrepreneurial ecosystem have some discretion to act as architects of resources and capital structures” (Freiling, Baron, 2017, p. 74). This study assumes that within the start-up ecosystem of the city of Poznań there are many leaders who manage entrepreneurial actions and programs, but only within their own units (foundations, incubators, entrepreneurship agencies). However, there is no main “architect” who may act as a catalyst for a variety of actors (e.g. universities, chambers of commerce, founding teams, start-up community, government institutions and private business consultants) to encourage the creation of programs and favourable conditions that build awareness of the local start-up community, stimulate the inflow of new founders, but also support the further development of established entrepreneurs.

5. Conclusions

The activities of entrepreneurs, research and scientific institutions, business incubators, seed funds, private equity and other key stakeholders build the position of both companies and the entire entrepreneurial ecosystem. Poznań has strong potential "anchors" for the start-up ecosystem in the form of large national and international enterprises and universities, which are the main sources of knowledge, skills and cooperation. Here is an active start-up community and a significant infrastructure for business development, including entrepreneurship accelerators and incubators, which proves the development potential of local entrepreneurship. Thus, there are favorable conditions for the emergence and development of innovative start-ups.

Nevertheless, some aspects of the local ecosystem require more attention and more targeted efforts to identify enterprises with high potential to support them with the appropriate package of measures, including professional consulting and networking. In addition, the ability of large enterprises to engage in local entrepreneurship should be greatly enhanced by developing a clear and consistent value proposition for the stakeholder. It is necessary to provide a number of forums and initiatives aimed at supporting multilateral cooperation between science,

business and local government and building trust in the field of knowledge exchange, in order to identify projects and initiatives that bring mutual benefits. Local authorities should strengthen their network intermediary function by taking on the role of local network coordinators or intermediaries. Although local authorities have started to support networking events, they often fail to turn these initiatives into concrete actions or stakeholder agreements. Moreover, a lack of integrated activities and information about comprehensive and complementary events is a weakness of this ecosystem. In turn, in the support sphere, there are still many acceleration programs needed to provide different sources of funding and appropriate scope of action.

An ecosystem must be composed not of specific isolated actors but of the interactions among them. Thus, one of the major challenges for the sustainable start-up ecosystem is to interconnect actors, available resources and competences in a highly useful manner. In order to take advantage of the opportunities offered by the entrepreneurial ecosystem, its actors must be aware of the potential benefits of their participation in it. Therefore an increase in consciousness of the activities carried out by various entities and stakeholders belonging to the ecosystem could have a positive impact on its co-evolution. Besides access to young, highly motivated, ambitious and committed entrepreneurs, openness and connections with other ecosystems are necessary in order to share good practices and exchange complementary resources for the development of innovative companies.

Exploring an entrepreneurial ecosystem requires to take into considerations its origin, stimulus as well as the processes by which it becomes self-sustaining. It is well known that ecosystems possess certain resources that are not available elsewhere. For this reason, the interplay of local resources and their relationships for supporting entrepreneurship have become of major relevance to local and regional strategies. In order to use the resources available in the region as effectively as possible and to stimulate the entrepreneurial potential of the key stakeholders of the start-up ecosystem, integration and transparency of activities undertaken by business, science and local authorities is needed. In addition, open access to comprehensive information on programs, policies and operations conducive to the creation of an active start-up community in the region, will allow decision-makers to design complementary offers. Only coordinated and systematic activities between business, science and the government will effectively stimulate the evolution of the start-up ecosystem of the city of Poznań and bring tangible benefits for the development of the agglomeration and the region.

Despite the ongoing research on ecosystems, there is still a challenge how to interrelate all these stakeholders and support measures that may drive the performance and dynamism of start-up ecosystems in Poland. Drawing on this research stream, future research line will concern an in-depth analysis of the most critical obstacles in the process of start-up creation as well as the assessment of the interdependencies among the key stakeholders to look for more effective cooperation for building a sustainable start-up ecosystem in the region. The next step will be to explore examples of good practice from other cities in Poland, develop comparable metrics and

try to provide recommendations for regional policy-makers for further strengthening of local entrepreneurship.

Research limitations of this study resulting from the analysis of a purposefully-selected case of the start-up ecosystem do not allow formulating general conclusions. Nevertheless, it illustrates a real business practice and challenges of the development of the specific entrepreneurial ecosystem, and thus contribute to the discussion on the dilemmas associated with conducting the more effective practice-oriented research on start-up ecosystems.

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Appendix

Table 1.

Stakeholders of the start-up ecosystem of the city of Poznań and the scope of the provided support

Type of entity	Examples	Scope of support
Public Universities	Adam Mickiewicz University in Poznań, Poznań University of Economics and Business, Poznań University of Technology Poznań University of Life Sciences	Substantive support provided by scientists, academics, business practitioners and university authorities. Dissemination of knowledge and practical experiences, entrepreneurship and business modeling courses. Organizational and substantive support: scientific clubs and student organizations, workshops, competitions and trainings, technical facilities and laboratory infrastructure, coworking spaces.
Private Business Schools	Collegium Da Vinci WSB University in Poznań Poznan College of Communication and Management Poznan School of Logistics Poznań Trade and Commerce College Poznan University College of Business University of Social Sciences and Humanities (USWPS) University of Technology and Humanities "Human Resources for Europe"	Substantive support provided by business practitioners. Dissemination of knowledge and practical experiences within entrepreneurship courses. Organizational and substantive support: student organizations, workshops, competitions and trainings, technical facilities and laboratory infrastructure, coworking spaces.
Entrepreneurship incubators at universities; Centers for research, innovation and technology transfer; Foundations, other contact points	Academic Entrepreneurship Incubator of Poznan University of Technology (exemplary support program: "Create Your Start-up" competition) Internship and Career Center at Poznan University of Technology University Center for Innovation and Technology Transfer of Adam Mickiewicz University in Poznań Adam Mickiewicz University Career Office Foundation for Creating Shared Value by Students (exemplary support program: "Shared Value Competition")	Substantive support: exchange of experiences, collaboration supporting students in the development of their innovative business ideas and business models. Developing critical thinking, problem-solving and social responsibility approach, communication, leadership. Substantive and organizational support for students in the implementation of projects while maintaining the idea of creating common value. Consultation of projects and preparing students to participate in competitions. Financial support (scholarships).

Cont. table 1.

<p>Founding teams, start-up community, potential founders; Competitions and networking platforms</p>	<p>StethoMe, Hotailors, IC Solutions, lubimyczytac.pl, Dice+, Glip.pl., notiOne, GO4Robot, 3DTEAM, InStream, Bitnoise, Sempire, picup, Bin-e, EcoEmber "Meetup" Startup Community Poznań Startup POZnań – Poznań Startup Community Poznań Entrepreneurship Days Startup Challenge competition Poznań Entrepreneurship Leader competition in the STARTUP category Shared Value Competition</p>	<p>Substantive and organizational support: dissemination of knowledge and practical experiences through workshops, competitions, trainings and hackathons, founders' meetings, networking, sharing important resources. Startup Community helps meet potential business partners, investors, and like-minded people. Benefits from the value created by the community. Promoting the sustainability of the entire ecosystem and the transfer of knowledge and skills among start-up community members.</p>
<p>Business incubators, innovative laboratories, science and technology parks</p>	<p>Poznan Science and Technology Park of Adam Mickiewicz University Foundation (exemplary support programs: project for start-ups "Scale-up Champions"; the "Innovation Incubator 4.0", "Technological incubator", "Hub R&D". Sigma Software Labs – startup incubator, based on the product and IT service business synergy. The Poznań Technological and Industrial Park (PPTP)</p>	<p>Shaping pro-entrepreneurial and pro-innovative attitudes of students, doctoral students and scientists through specialized training (exchange of best practices, interactive and practice-oriented workshops valuable for founders, start-ups, linking young entrepreneurs with private business consultants). Implementation of incubation projects for innovative companies and start-ups. Supporting technologically advanced digital startups in entering international markets, establishing cooperation with foreign corporations and investors, in scaling their activities. Intermediation in access to the research potential of the academic community, including international cooperation. Support in the commercialization of scientific and technological research results. Offering high-quality R&D services in the field of specialized analyzes and technology development as well as financing research activities; Business consulting in the field of EU projects, EU structural funds and other external national funds. Sigma Software Labs mainly focuses on pre-seed and early stage investments. PPTP is intended for ICT companies in the mature stage of development.</p>
<p>Local government administration bodies</p>	<p>Marshal's Office of the City of Poznań The Department of Economic Activity and Agriculture of the Poznań City Hall the municipal company Investment Support Center of Greater Poland Polish Agency for Enterprise Development (PARP)– Regional Office in Poznań</p>	<p>Providing consultancy, training and financial support in setting up a business. PARP identifies, develops and tests new forms of support for entrepreneurs; introduces new forms of support related to the concept of circular economy and the related processes of automation and digitization of enterprises; cooperates with entrepreneurs, entrepreneurs' organizations, institutions, universities and local government units in voivodships of Western Poland.</p>

Cont. table 1.

<p>Investors and business angels Local companies supporting the ecosystem</p>	<p>Mentoring program InCredibles by Sebastian Kulczyk SpeedUp Venture Capital Group – a leading group of venture capital funds Carlson EVIG Alfa VC Fund For Finance – Private Equity Poznań</p> <p>Volkswagen Poznań, Amica, Beiersdorf Manufacturing Poznań, Bridgestone Poznań, Solaris Bus & Coach, Delpharm, Kompania Piwowarska S.A.</p>	<p>InCredibles provides free workshops, participation in international conferences, individual consultations with experts and investors in the field of management, sales and marketing, strategy, communication, financing and human resources.</p> <p>SpeedUp supports the development of technology companies (from areas such as: consumer internet, electromobility, energy, fintech, martech, adtech, medtech, IoT and hardware) in an early stage of development (seed, pre-revenue, early growth) in Central and Eastern Europe.</p> <p>Carlson EVIG Alfa supports investments in technology projects at an early stage of development. of innovative IoT research projects</p> <p>Substantive support, internships for students, consulting service, financial support</p>
<p>Public business advisory centers</p>	<p>Business Advisory Center Competence Development Academy Poznań Center for Entrepreneurship Support Agency for Enterprise Development of Greater Poland Investment Support Center of Greater Poland</p>	<p>Substantive and organizational support: creating a platform combining business and scientific environment, promoting entrepreneurship among young entrepreneurs, supporting innovative activities.</p> <p>Strengthening the position of the city of Poznań as a leading urban center in Poland through the development of innovative branches of the economy and contributing to a new spatial order for the city of Poznań.</p>
<p>Private business consultants</p>	<p>Lawyers (e.g. law office SMW Legal) Tax consultants Business consultants Marketing advisers</p>	<p>Substantive support, consulting service for start-ups and social organizations</p>
<p>Coworking Spaces</p>	<p>Co-working space “+1” – a joint venture of the City of Poznań and the municipal company Wielkopolskie Centrum Wspierania Inwestycji (Investment Support Center of Greater Poland).</p> <p>Poznań Biznes Partner Business and Science Ltd. Business Link Maraton – The biggest chain of coworking spaces in Poland</p>	<p>A commonly accessible place for meetings, work and exchange of knowledge and experience in business which uses human and idea diversity to build new value. The co-working space is aimed at supporting people planning to set up a business, entrepreneurs, freelancers, and people working remotely. It promotes startups related to the city of Poznań providing access to the necessary knowledge, activating the local community.</p> <p>Infrastructure, IT and organizational support</p>

Source: own study.

TAX LAW AS VIEWED BY ENTREPRENEURS

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Purpose: Due to the fact that businesses operate in a very volatile and competitive environment, the purpose of this paper is to answer the research question, which was formulated as follows: "Is the tax law conducive to doing business in Poland?". Taking into account the current state of research and the experience of the author of the paper, as a person who runs a tax law office, the following hypothesis was formulated: "Variable and complicated tax regulations make it difficult to do business in Poland". It was assumed that the main purpose of the study is to present the subjective assessment of the surveyed entrepreneurs concerning the tax environment and knowledge of tax solutions to improve the tax settlement system.

Design/methodology/approach: In order to achieve the presented goal, literature studies and legal acts concerning the analyzed area were used. For the purpose of examining the Polish tax system, a survey was carried out among the Silesian entrepreneurs. Its aim was to find out the opinion of entrepreneurs on the tax environment. Research methodology – a survey questionnaire containing 9 questions was used. The survey was anonymous. The questions were addressed to company owners. The survey was conducted between March 1 and March 22, 2022. Statistical analysis was also performed. Due to the scale used in the survey questionnaire, measures of correlation - Spearman's coefficient and ϕ – Yule's coefficient as well as corresponding tests of significance were selected as appropriate tools for statistical analysis.

Findings: The article presents the essence of the tax system and the results of the study aimed at getting to know the opinion of entrepreneurs on the tax environment. On this basis, it was found that the tax laws are extensive and changed too often, which adversely affects running a business. This is highly unfavourable to a sense of security in business.

Research limitations/implications: The verification of empirical data concerning the analyzed research problem was based on the use of available data on existing tax laws in Poland. The tax laws of the last 2 years were analyzed. Their analysis confirmed that they are frequently changed.

Practical implications: The results of the study show the complexity of the tax system. Analysis of the tax laws revealed that they are frequently changed and amended.

Originality/value: The presented research and conclusions will provide practical guidance on the tax changes introduced over the last 2 years. This will increase the comfort of doing business. Based on the results of the analysis of taxes applied by entrepreneurs, it is concluded that frequent changes in tax laws and their misinterpretation have a large impact on the assessment of the entire tax system.

Keywords: tax system, optimization, tax law act.

Category of the paper: Research paper.

Introduction

Taxes have been present in human life for a long time. The first mention of them appeared already in connection with the construction of Noah's Ark. Every man over the age of 20 was obliged to pay tax, while wealthy people were to pay no less than half a shekel, and those less wealthy – no more than half a shekel (Gomułowicz, Małecki, 2010). It is impossible not to notice that this simple rule became the foundation of the idea of universality and justice.

The Polish tax system is one of the most complicated in Europe (Szlęzak-Matusiewicz, 2012). It is mostly felt by entrepreneurs who are obliged to pay income tax and value added tax. Also in the case of hiring employees there are new obligations and tax burdens for the entrepreneur as a payer. Obligations related to running a business are often unclear to entrepreneurs and tax regulations are complicated.

The tax system in every country should work efficiently as it greatly affects the development of a country (Barnuta, Borisova, Glyzina, 2015). If taxes are too high, the society reduces spending, which affects demand and hampers economic growth (Yared, 2010).

The article presents the essence of the tax system as well as the results of the study on the evaluation of tax laws, the relationship between tax authorities and taxpayers, explanations of the interpretation of tax laws and applied tax audits. This led to the conclusion that tax laws are biased and changed too often, which causes many misunderstandings between taxpayers and tax authorities.

Characteristics of the tax system in Poland

There is no uniform tax system among the countries of the European Union. Therefore, the way of shaping tax laws remains within the competence of individual governments. The Polish tax system was established in the early 1990s. In 1992 personal income tax was introduced and a new corporate income tax act came into force. The tax system created in the nineteen nineties is in general valid until today, although it has been significantly modified over time (Scholes, Wolfson, Erickson, Maydew, Shevlin, 2014).

An overview of taxation theory is briefly presented below, showing that there is no unanimity among economists on how the most economically beneficial tax system should be constructed.

The first tax conceptions were modeled on the views of the founders of liberal economic thought. According to the views of Adam Smith, legislators should be guided by four main principles when creating tax laws (Smith, 1954):

- evenness, i.e., making the amount of taxes dependent on the amount of income,
- strict definition, i.e., unambiguity of tax laws,
- convenience to the taxpayer,
- low enforcement costs.

In addition, Smith was opposed to taxing basic necessities. He reasoned that taxing necessities led to higher wages for workers to earn a living. This, in turn, led to higher prices for manufactured goods, less demand for them, and less government revenue overall.

Analyzing the tax theories of the 19th and 20th centuries, one should mention the views of D. Ricardo, who was critical of taxes. He believed that taxes are always ultimately paid from state revenues, which negatively influences the development of the state. He concluded that the market is ruled by an invisible hand, which distributes capital in the most optimal way, and government actions can only spoil that.

The importance of taxes in social consumption was recognized by J. Say. However, he also believed that taxes should be as low as possible in order not to hinder the development of the state. According to his views, the tax system should be characterized by the following principles (Say, 1960):

- minimum number of taxes,
- taxes should not burden the taxpayer without sufficient benefit to the state,
- the burden of taxes should be shared equitably,
- taxes should do as little harm to reproduction as possible, and instead encourage morality.

A somewhat new perception of taxation was the acceptance of a fair distribution of the tax burden. According to Say, a properly constructed progression should constitute a part of the tax system. He was a forerunner of the principle that direct tax revenues should cover two thirds of the budget expenses, while one third should be covered by indirect tax revenues.

Interesting tax concepts were professed by J.M. Keynes. He emphasized the particular role of taxes in the policy of interventionism. He argued that it is necessary to introduce higher taxes for the more wealthy and higher benefits for the poorer in order to lead to such a distribution of capital that promotes the growth of demand (Gajl, 1992).

In the second half of the twentieth and the beginning of the twenty-first century two schools clashed: the Post-Keynesian doctrine and the neoclassical doctrine. The former advocated stability, neutrality and minimization of taxation. The second doctrine made taxation dependent on the economic situation.

According to W. Modzelewski, two models of the state can be distinguished:

- a) robbery-slavery, in which citizens are forced to provide services to the state,
- b) tax, in which the obligation to bear public-legal burdens is included in the tax legislation, so that citizens can anticipate in advance the tax consequences of certain actions (Modzelewski, 2020).

In general, accountants mostly understand and correctly interpret tax regulations. Nonetheless, entrepreneurs usually have problems with proper understanding of tax regulations (KPMG Report in Poland, 2020).

The obligation to pay taxes arises from Article 84 of the Polish Constitution. (Constitution of the Republic of Poland, 1997). The legislator must impose obligations on taxpayers in accordance with the norms contained in the various legal acts governing the law-making process. An important principle regarding tax law making rules is that the laws should be written in an understandable and clear manner so that the taxpayer is able to understand what his duties and rights are (Asrinanda, 2018).

The tax system consists of individual taxes that form a whole in economic and legal terms and are interrelated (see Table 1).

Table 1.
Taxes included in the Polish tax system

Taxes			
	direct	indirect	
Taxes and fees constituting state revenue	<ol style="list-style-type: none"> 1. Personal Income Tax (PIT), 2. Corporate Income Tax (CIT), 3. inheritance and gift tax, 4. Tax on Civil Law Transactions (TCLT), 5. agricultural tax, 6. forest tax, 7. property tax, 8. tax on means of transport, 9. tonnage tax, 10. tax on the extraction of certain minerals, 11. lump-sum tax on the value of production sold (so-called shipbuilding tax) 	<ol style="list-style-type: none"> 1. Value Added Tax (VAT), 2. excise tax, 3. gaming tax. 	
	<ol style="list-style-type: none"> 1. Tax on Civil Law Transactions (TCLT) 2. inheritance and gift tax 3. property tax 4. tax on means of transport 5. agricultural tax 6. forest tax 		Taxes constituting local government revenues

Source: Own compilation based on www.podatki-w-polsce.pl (accessed 20.04.2022).

The tax system also consists of:

- domestic and international tax law,
- government and local government administrative bodies.

The presented review of the theory of taxation indicates that there is no unanimity in the development of tax law. However, there is no doubt that the inclusion of such features of the tax system as neutrality, transparency of regulations and cheap tax collection system has a beneficial effect on the economy, as well as meets the expectations of taxpayers.

3. Purpose and scope of the study

In order to find out the opinion of entrepreneurs on the tax environment and their knowledge of tax regulations, a survey in the form of a questionnaire was carried out among entrepreneurs running a business in the Silesian Voivodeship. Defining the objectives of the scope of the study was accompanied by the conviction that there is a cause-effect relationship, according to which the complicated and changeable tax law adversely affects conducting business activity in Poland.

The main objective of the study was to present the subjective assessment of the tax environment made by the surveyed entrepreneurs. The survey questionnaire was preceded by a short introductory letter to introduce the topic and purpose of the research. All respondents were asked the same questions. The questions were structured in such a way that the respondents were willing to answer them. Respondents were selected in a purposive manner within a sample of companies from the Silesia region. Questions were constructed and based on a closed set of answers. The statements were assigned a five-level answer set, which gave them the characteristics of a set of ordinal scales. Each statement was evaluated by the respondent according to its compliance with his/her opinion. A 5-point Likert scale was used in the study. The survey questionnaire was divided into two parts. The first part dealt with the characteristic data of the surveyed entrepreneurs, who were asked to provide, among others, their gender, age, education, as well as data on the business they run. The second part of the survey concerned the evaluation of the tax system by the respondents. The entrepreneurs could express their opinion about the quality of the created law or the frequency of tax changes. The survey was conducted on March 1-22, 2022 among 103 entrepreneurs and it was anonymous. Respondents were asked the following 9 questions:

1. How do you assess the tax system in Poland?
 very complicated complicated simple very simple I have no opinion
2. Do you think tax laws change too often?
 very often often moderately rarely very rarely
3. In your opinion, are the tax laws clearly formulated?
 definitely yes yes no definitely no I have no opinion
4. In your opinion, do taxpayers have enough time to prepare for tax law changes?
 definitely yes rather yes rather no definitely no I have no opinion
5. How would you rate your relationship with tax authorities?
 very good good poor very poor I have no opinion
6. In your opinion, is it easy to get information concerning taxes?
 very easy easy difficult very difficult I have no opinion
7. In your opinion, is the tax burden in Poland too high?
 definitely too high high optimal low I have no opinion

8. Do you think the health insurance contribution reform introduced in 2022 is beneficial to entrepreneurs?
 definitely not favourable not favourable favourable definitely favourable
 I don't know
9. In your opinion, do unstable and voluminous tax laws increase the number of contracts with accounting firms?
 definitely yes rather yes rather no definitely no I have no opinion

4. Tax system in Poland according to entrepreneurs

The vast majority of the respondents were male (67) (see Figure 1).

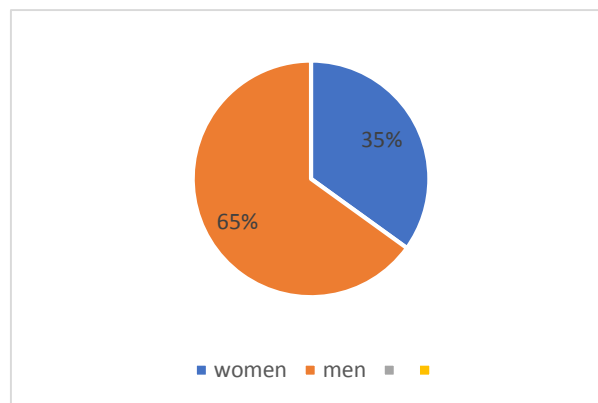


Figure 1. Gender of respondents. Source: Own research.

The analysis of the first part of the survey questionnaire allowed to conclude that the respondents were predominantly aged 31-40 years (63), followed by those aged 18-30 years (19) and 41-50 years (18). Only 3 respondents were over 50 years old (see Figure 2).

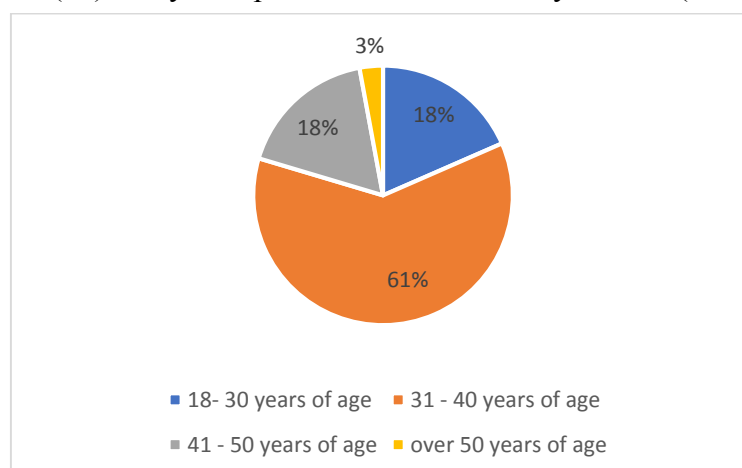


Figure 2. Age of respondents. Source: Own research.

The respondents were divided according to their education. The analysis of answers allows to notice that people with higher education prevail in the surveyed population (52), people with secondary education are on the second place (44) and there are 7 people with vocational education (see Figure 3).

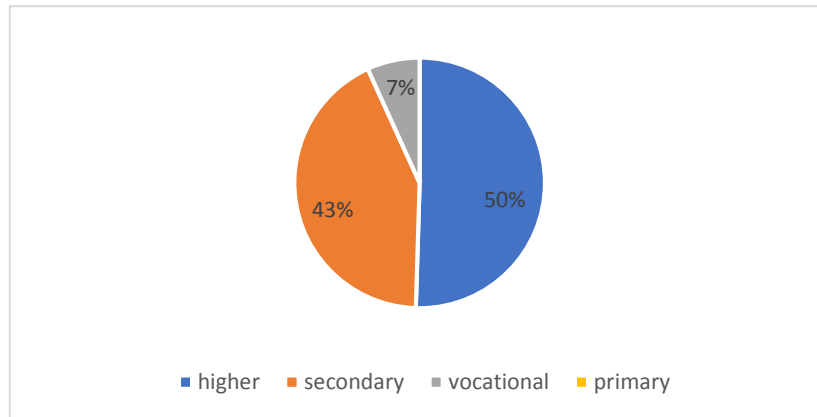


Figure 3. Education of respondents. Source: Own research.

The analysis of the obtained answers allowed to determine the profile of the companies' activities. It turned out that the structure of the surveyed companies was dominated by service companies (54). There were 47 trade companies and 2 production companies (see Figure 4).

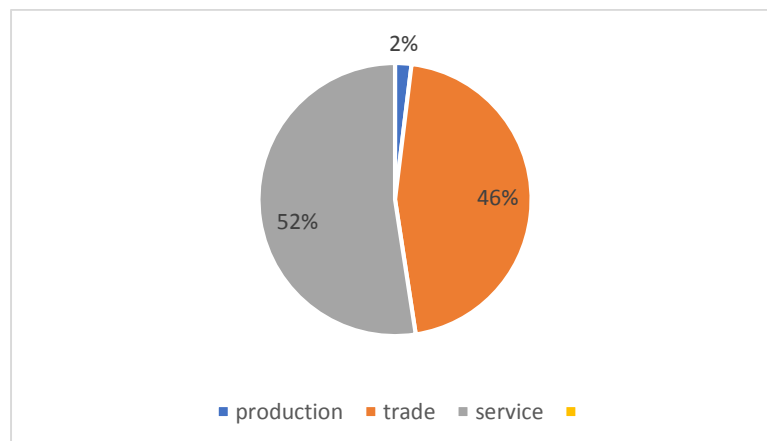


Figure 4. Profile of the surveyed companies. Source: Own research.

Among the surveyed companies, the vast majority were companies with 1 to 9 employees (74). The second largest group were companies with no employees (29) (see Figure 5).

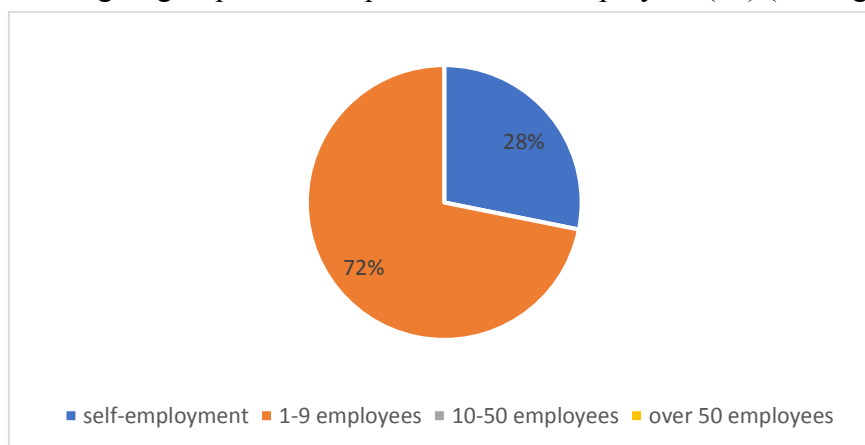


Figure 5. Size of the surveyed enterprises. Source: Own research.

Taking into account the range of activity, companies operating in the regional market prevailed among the respondents (49). The nationwide market is served by 20 entrepreneurs. Only 7 companies operate on the local market, while 27 enterprises operate on the global market (see Figure 6).

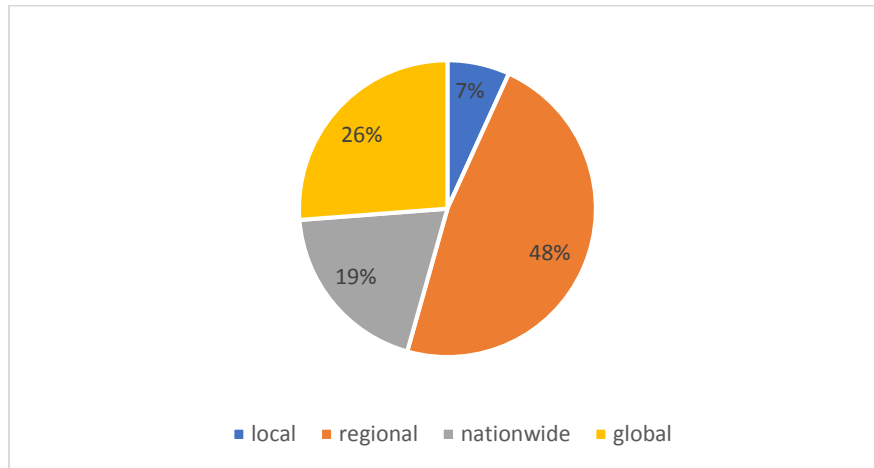


Figure 6. Range of activity of the surveyed companies. Source: Own research.

The second part of the survey concerned issues related to the tax environment of enterprises. The collected research material was described and presented graphically.

The vast majority of respondents found the tax system in Poland very complicated (79). It was considered to be complicated by 18 respondents, while only 6 respondents had no opinion (see Table 2).

Table 2.

The complexity of the tax system

Specification	Number of people	Percentage share
Very complicated	79	76,70%
Complicated	18	17,48%
Simple	0	
Very simple	0	
I have no opinion	6	5,82%
Total	103	100%

Source: Own research.

Nearly all respondents indicated that tax laws change frequently (98). Only 5 respondents believe that tax laws are modified moderately (see Table 3).

Table 3.

Tax laws change frequently

Specification	Number of people	Percentage share
Very often	68	66,02%
Often	30	29,13%
Moderately	5	4,85
Rarely	0	0
Very occasionally	0	0
Total	103	100%

Source: Own research.

Almost all respondents admitted that tax regulations are unclear, which negatively affects running a business. Unclear regulations very often lead to misinterpretation and conflicts between taxpayers and tax offices. The type of business and its environment mean that each entrepreneur attaches different importance to decisions made by the Ministry of Finance (see Table 4).

Table 4.*Tax laws are clearly worded*

Specification	Number of people	Percentage share
Definitely yes	0	0
Yes	2	1,94%
No	19	18,45%
Definitely no	82	79,61%
I have no opinion	0	0
Total	103	

Source: Own research.

According to the survey, more than 88% of respondents consider too late informing the taxpayers about planned changes in tax laws to be a significant problem (see Table 5).

Table 5.*Late notice of planned tax law changes*

Specification	Number of people	Percentage share
Definitely yes	0	0
Rather yes	3	2,91%
Rather no	17	16,51%
Definitely no	74	71,84%
I have no opinion	9	8,74%
Total	103	100%

Source: Own research.

Relationships with officials of the tax apparatus were rated next. Over 76% of the respondents assess their relations with tax officials as positive. The remaining 23% rate them poorly (see Table 6).

Table 6.*Relations with tax authorities*

Specification	Number of people	Percentage share
Very good	23	22,33%
Well	56	54,37%
Poorly	24	23,30%
Very poorly	0	0
I have no opinion	0	0
Total	103	100%

Source: Own research.

According to the respondents, obtaining information regarding tax knowledge is significantly difficult. This is evident even in the situation of inquiring in different tax offices about some tax issue and receiving contradictory information (see Table 7).

Table 7.*Access to tax knowledge*

Specification	Number of people	Percentage share
Very easily	0	0
Easily	4	3,88%
Difficult	43	41,75%
Very difficult	44	42,72%
I have no opinion	12	11,65%
Total	103	100%

Source: Own research.

According to all respondents, the tax burden in Poland is too high. This can be regarded as another barrier to doing business (see Table 8). The necessity of bearing certain tax burdens results from the compulsory nature of tax. It is expressed in the fact that the entity entitled to collect taxes may use coercive measures to enforce the amount of tax due. Compulsory taxation is common in all legislations. The results of research on barriers to SME development show that high tax and social security burdens remain one of the most threatening to enterprise development.

Table 8.*The amount of tax burden*

Specification	Number of people	Percentage share
Definitely too high	97	94,17%
High	6	5,83%
Optimal	0	0
Low	0	0
I have no opinion	0	0
Total	103	100%

Source: Own research.

The reform of the health insurance contribution, which took effect at the beginning of 2022, is assessed unequivocally negatively (see Table 9). The obligation to calculate the amount of the contribution from the income and impossibility of deducting its part from tax significantly increase the burden with regards to tax authorities.

Table 9.*Evaluation of health insurance contribution reform*

Specification	Number of people	Percentage share
Definitely unfavorable	98	95,15%
Unfavorable	5	4,85%
Beneficial	0	0
Definitely beneficial	0	0
I have no opinion	0	0
Total	103	100%

Source: Own research.

Changeable and ambiguous tax regulations cause great difficulty for entrepreneurs and constitute a significant barrier to conducting business activity. Lack of tax knowledge prevents entrepreneurs from meeting their tax obligations in a reliable way. In the opinion of over 87% of respondents, unstable and complex tax regulations are the reason for concluding more contracts with accounting offices (see Table 10).

Table 10.*Impact of tax regulations on the number of contracts with accounting offices*

Specification	Number of people	Percentage share
Definitely yes	73	70,87%
Rather yes	13	12,62%
Rather no	6	5,83%
Definitely no	0	0
I have no opinion	11	10,68%
Total	103	100%

Source: Own research.

The next stage of the empirical part of the study was statistical analysis. Due to the scale used in the questionnaire, measures of correlation – Spearman's coefficient and ϕ – Yule's coefficient – were chosen as appropriate tools for statistical analysis.

Based on the conducted surveys, the statistical relationships of the different formulations of the survey questionnaire were examined. This stage began by examining the correlation between the evaluation of the tax system and the age of the respondents (see Table 11).

Table 11.*Values of Spearman's correlation coefficients between respondents' age and their evaluation of specific features of tax policy in Poland*

Evaluation:	Measure		
	R	t(N-2)	p
tax system in Poland	0,1340	1,3177	0,1908
frequency of tax law changes	0,0501	0,5045	0,6150
clarity of the wording of tax regulations	-0,1966	-2,0148	0,0466
amount of time to prepare for changes in tax laws	-0,1822	-1,7778	0,0787
relations with tax authorities	-0,0906	-0,9141	0,3628
ease of obtaining tax information	-0,2185	-2,1122	0,0375
amount of tax burden in Poland	-0,0072	-0,0724	0,9424
the impact of health insurance contribution reform enacted in 2022 (as beneficial) for businesses	-0,0811	-0,8179	0,4153
the impact of unstable and voluminous tax legislation on the increase in the number of contracts concluded with accounting offices	0,2790	2,7562	0,0071

Source: Own research.

As the age of the respondents increases, their assessment of clarity of tax law wording ($r = -0.1966$; $p = 0.0466$) as well as the ease of obtaining tax information ($r = -0.2185$; $p = 0.0375$) decrease. The assessment of the impact of unstable and voluminous tax laws on the increase in the number of contracts with accounting firms rises ($r = 0.2790$; $p = 0.0071$).

Correlations between the respondents' education and their evaluation of particular features of tax policy in Poland were examined next (see Table 12).

Table 12.

Values of Spearman's correlation coefficients between respondents' education and their evaluation of specific features of tax policy in Poland

Evaluation:	Measure		
	R	t(N-2)	p
tax system in Poland	0,0957	0,9370	0,3511
frequency of tax law changes	0,0547	0,5509	0,5829
clarity of the wording of tax regulations	0,0853	0,8606	0,3915
amount of time to prepare for changes in tax laws	-0,0239	-0,2296	0,8189
relations with tax authorities	0,0099	0,0999	0,9206
ease of obtaining tax information	0,0031	0,0289	0,9770
amount of tax burden in Poland	0,2912	3,0588	0,0028
the impact of health insurance contribution reform enacted in 2022 (as beneficial) for businesses	0,2789	2,9193	0,0043
the impact of unstable and voluminous tax legislation on the increase in the number of contracts concluded with accounting offices	0,1489	1,4285	0,1566

Source: Own research.

As respondents' education increases, their assessment of the amount of tax burden in Poland also increases ($r = 0.2912$; $p = 0.0028$) and so does the impact of the health insurance contribution reform introduced in 2022 on entrepreneurs ($r = 0.2789$; $p = 0.0043$).

The survey confirmed that there are statistical relationships between the evaluation of the tax system features and the size of the enterprise (see Table 13).

Table 13.

Values of Spearman's correlation coefficients between the size of the surveyed enterprises and evaluation of particular features of tax policy in Poland

Evaluation:	Measure		
	R	t(N-2)	p
tax system in Poland	0,1056	1,0349	0,3034
frequency of tax law changes	0,0705	0,7102	0,4792
clarity of the wording of tax regulations	-0,2190	-2,2560	0,0262
amount of time to prepare for changes in tax laws	-0,1001	-0,9653	0,3369
relations with tax authorities	-0,0711	-0,7169	0,4751
ease of obtaining tax information	-0,3152	-3,1338	0,0023
amount of tax burden in Poland	0,0286	0,2879	0,7740
the impact of health insurance contribution reform enacted in 2022 (as beneficial) for businesses	0,0595	0,5989	0,5506
the impact of unstable and voluminous tax legislation on the increase in the number of contracts concluded with accounting offices	0,2478	2,4267	0,0172

Source: Own research.

As the size of the surveyed companies increases, the assessment of clarity of the tax law wording decreases ($r = -0.2190$; $p = 0.0262$) and so does the ease of obtaining tax information ($r = -0.3152$; $p = 0.0023$). The assessment of the impact of unstable and voluminous tax laws on the increase in the number of contracts with accounting firms rises ($r = 0.2478$; $p = 0.0172$).

It turned out that there were also statistical correlations between the assessment of particular features of the tax system in Poland and the territorial range in which the surveyed enterprises operate (see Table 14).

Table 14.

Values of Spearman's correlation coefficients between territorial range of the surveyed enterprises and evaluation of individual features of tax policy in Poland

Evaluation:	Measure		
	R	t(N-2)	p
tax system in Poland	0,1265	1,2434	0,2168
frequency of tax law changes	0,2645	2,7563	0,0069
clarity of the wording of tax regulations	-0,1517	-1,5427	0,1260
amount of time to prepare for changes in tax laws	-0,2272	-2,2381	0,0276
Relations with tax authorities	-0,0904	-0,9123	0,3638
ease of obtaining tax information	-0,2104	-2,0308	0,0453
amount of tax burden in Poland	-0,0809	-0,8153	0,4168
the impact of health insurance contribution reform enacted in 2022 (as beneficial) for businesses	-0,0261	-0,2625	0,7935
the impact of unstable and voluminous tax legislation on the increase in the number of contracts concluded with accounting offices	0,1335	1,2779	0,2046

Source: Own research.

As the size of the surveyed businesses increases, the assessment of the amount of time to prepare for tax law changes decreases ($r = -0.2272$; $p = 0.0276$) and so does the ease of obtaining tax information ($r = -0.2104$; $p = 0.0453$). The assessment of the frequency of tax law changes rises ($r = 0.2645$; $p = 0.0069$).

The next stage was to examine the relationship between the assessment of individual features of the tax system and the profile of business activity of enterprises (see Table 15).

Table 15.

Values of Yule's correlation coefficients – φ and the test of significance χ^2 for the business profile of the surveyed enterprises and the assessment of particular features of tax policy in Poland

Evaluation:	Measure		
	φ	χ^2	p
tax system in Poland	0,117	4,361	0,037
frequency of tax law changes	0,062	1,207	0,272
clarity of the wording of tax regulations	- 0,184	10,761	0,001
amount of time to prepare for changes in tax laws	- 0,046	0,673	0,412
relations with tax authorities	- 0,298	28,251	0,000
ease of obtaining tax information	- 0,223	15,883	0,000
amount of tax burden in Poland	0,062	1,207	0,272
the impact of health insurance contribution reform enacted in 2022 (as beneficial) for businesses	0,062	1,207	0,272
the impact of unstable and voluminous tax legislation on the increase in the number of contracts concluded with accounting offices	0,145	6,721	0,010

Source: Own research.

A statistically significant correlation was confirmed between the business profile of enterprises and the assessment of the clarity of tax law formulation ($\varphi = -0.184$; $p = 0.001$), relations with tax authorities ($\varphi = -0.298$; $p < 0.001$) and the ease of obtaining information on taxes ($\varphi = -0.223$; $p < 0.001$). In these cases, service companies rate the indicated characteristics higher than commercial companies. On the other hand, statistically significant correlations of the business profile of enterprises and assessments of the tax system in Poland ($\varphi = 0.117$; $p = 0.037$) as well as the influence of unstable and extensive tax regulations on the increase in

the number of contracts concluded with accounting offices ($\phi = 0.145$; $p = 0.010$) indicate a higher assessment of these features by trade enterprises.

The final step was to examine the relationship between the evaluation of specific features of the tax system and the gender of the respondents (see Table 16).

Table 16.

Values of Yule's correlation coefficients- ϕ and the test of significance χ^2 for the respondents' gender and evaluation of particular features of tax policy in Poland

Evaluation	Measure		
	R	T(N-2)	p
tax system in Poland			
frequency of tax law changes	-0,1050	3,073	0,0611
clarity of the wording of tax regulations	-	-	-
amount of time to prepare for changes in tax laws	0,1344	5,7480	0,0165
relations with tax authorities	0,1810	10,4125	0,0013
ease of obtaining tax information	0,0959	2,9237	0,0873
amount of tax burden in Poland	-	-	-
the impact of health insurance contribution reform enacted in 2022 (as beneficial to businesses)	-	-	-
the impact of unstable and voluminous tax laws on increasing the number of contracts with accounting firms	-0,2612	21,6940	0,0000

Source: Own research.

It was confirmed that men rated the impact of unstable and voluminous tax laws on the increase in the number of contracts with accounting firms significantly higher ($\phi = 0.2612$ $p < 0.0001$), while women rated significantly higher the following: the clarity of tax law formulation ($\phi = 0.1344$ $p = 0.0165$), the amount of time to prepare for tax law changes ($\phi = 0.1810$ $p = 0.0013$) as well as the ease of obtaining tax information ($\phi = 0.1387$ $p = 0.0134$).

4. Conclusions

Summarizing the hitherto considerations based on the conducted surveys, which provide interesting insights into the evaluation of the tax system by entrepreneurs, it is necessary to answer the most important questions posed in this paper.

The main objective of the study was to answer the research question formulated as follows: "Is the tax law conducive to doing business in Poland?".

The hypothesis of the study was that the intricate and complicated tax regulations make it difficult to do business in Poland. The conducted questionnaire surveys made it possible to verify the hypothesis. Their results confirm the hypothesis that the vague and intricate tax regulations make it difficult to do business in Poland.

The results of the study lead to the following conclusions:

1. The respondents were predominantly male.
2. The study was dominated by people with higher education.
3. The largest group of respondents was between the ages of 31-40.
4. The largest number of companies surveyed operate in the regional market.
5. Over 52% of respondents run a service business.
6. Among the companies surveyed, the vast majority were companies with 1 to 9 employees.
7. The tax system in Poland was assessed negatively. Respondents point to the instability of tax regulations, unclear wording of regulations or late notice of planned tax changes.
8. Relations with tax authorities were rated as positive.
9. According to all respondents, the tax burden is too high, which constitutes a significant barrier to business development.
10. The health insurance reform has been assessed in a very negative way.
11. The frequency of tax changes and obscure tax laws increase the frequency of delegating accounting functions to a specialized outsourcing company. Frequent tax changes and unclear tax laws are significant barriers to SME growth.
12. The conducted statistical study revealed the existence of a number of correlations between specific statements of the survey questionnaire.

The aim of the study was achieved according to the established plan, the hypothesis was verified and confirmed.

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HIERARCHY OF BENEFITS ACHIEVED BY FINAL PURCHASERS THANKS TO COOPERATION WITH OFFERORS VS. THE ENVIRONMENT AND SPECIFICS OF THIS COOPERATION

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Purpose: The aim of the article is to identify the hierarchy of benefits achieved by final purchasers as a result of their cooperation with offerors, taking into account the environment and specifics of this cooperation.

Design/methodology/approach: A cognitive-critical analysis of the world literature on the subject indicates that these issues have not been studied so far. Therefore, it can be concluded that there is a cognitive and research gap in this regard. In order to reduce the gap, six research hypotheses were formulated. Primary research was carried out to verify the hypotheses. It covered 1,196 adult representatives of final purchasers in Poland. The collected data was subjected to quantitative analysis, using, inter alia, average scores analysis, comparative analysis, Pearson's chi-square independence test, and an analysis of the V-Cramer contingency coefficient value.

Findings: The results allowed, among other things, the following conclusions to be drawn: (1) non-material benefits of cooperation with offerors were more valuable for the majority of respondents, (2) the majority of respondents believed that the online and offline environments should be used in parallel as a place of this cooperation, (3) the respondents were more likely to express positive opinions on offers and offerors than negative ones, (4) dependencies were identified between non-material benefits and the environment of cooperation in the case of four benefits (those related to enriching the marketing potential of purchasers and meeting their social expectations).

Originality/value: The results obtained and conclusions drawn on their basis are characterised by high cognitive and readily application value, enriching the knowledge on purchaser behaviour and enabling offerors to take appropriate measures to encourage purchasers into cooperation.

Keywords: final purchaser, offeror, cooperation, benefits, online and offline environment.

Category of the paper: research paper.

1. Introduction

The growing dynamics of changes taking place in the contemporary consumer market has led to more unpredictability for both offerors and final purchasers. Therefore, participation in the market is burdened with an increasing level of risk. Consequently, its participants are faced with mounting challenges, which, while on the one hand more difficult to meet, on the other hand sees meeting them contributes to achieving a competitive advantage (Ronchi, Tontini, Carvalho, 2021). This is particularly important for offerors, whether they are manufacturers, traders, or service providers.

One of such challenges faced by offerors is to meet the growing and dynamically changing expectations of final purchasers, who would like to be much more actively involved in various market initiatives (Deallert, 2019). All changes taking place on the market lead to greater or lesser changes in purchaser expectations, which in turn brings about further changes in the way the market functions. It should be emphasised that the challenge faced by offerors is all the greater as not only the degree, but also the scope of purchaser expectations is changing. Increasingly, the expectations do not only concern the characteristics of marketing offers available on the market, but also the possibility of actively shaping them together with offerors.

All this is part of prosumption, one of the key current consumer trends, based on a paradigm of joint value creation (Prahalad, Ramaswamy, 2004) by offerors and purchasers, who act as value co-creators (Xie, Bagozzi, Troye, 2008). The active participation of purchasers in the marketing activities, which were attributed solely to offerors in the classic approach, allows both parties to achieve various benefits, yet it requires that offerors create the necessary conditions to facilitate joint activities. According to the assumptions of marketing, the starting point is the need to identify purchaser expectations related to this cooperation: the benefits expected by purchasers who join the process of the creation of a marketing product and other elements of an offer.

A review of the world literature, which is presented later in the article, reveals that these aspects have not been studied so far, especially in relation to the environment in which joint actions should be undertaken. Therefore, this article attempts to solve the following research problem: what benefits can a final purchaser achieve thanks to cooperation with offerors when preparing marketing offers, taking into account the environment and specifics of this cooperation? The aim of the article is to identify the hierarchy of benefits achieved by final purchasers as a result of their cooperation with offerors, with regard to the environment and the specifics of this cooperation.

The article was structured to achieve the aim and verify six research hypotheses. It includes the introduction, literature review, presentation of the primary research and its results, as well as the academic discussion, summary and the implications, limitations, and directions of future studies.

2. Literature Review

The scope of activity undertaken by the participants of the contemporary consumer market clearly differs from their role in the classic approach to the market roles they fulfill. These differences are manifested, among other things, by a significant increase in the number of forms of activity undertaken, which results in the interpenetration of the role of the recipient (traditionally related to the final purchaser) and the role of the supplier (traditionally related to the offeror). These changes are part of the paradigm of co-creation value (Prahalad, Ramaswamy, 2004), for which the starting point is the customers and their experience centric concept (Saha, Mani, Goyal, 2020).

Before proceeding to detailed considerations on this subject, the concepts of final purchaser and offeror should be defined.

In this article, the term 'final purchaser' is intentionally used instead of 'consumer', which most other researchers employ. A final purchaser is a person who purchases a product, being also a consumer if they use the product themselves. Therefore, the terms are not synonymous (Baruk, 2021). The analysis covered persons who make the purchase, which justifies the use of this concept. Moreover, in the considerations on cooperation, this article uses the term 'offeror' in relation to enterprises operating on the consumer market. It is also a deliberate procedure.

First of all, the considerations in this article apply to all enterprises, regardless of their specifics. Secondly, in the literature on the subject, considerations on cooperation are usually narrowed down to producers (Mandolfo et al., 2020; Dellaert, 2019) and to service providers (Oertzen et al., 2018). However, in practice, cooperation may take place not only between purchasers and producers, or between purchasers and service providers, but also between purchasers and traders (retailers). Admittedly, it may also involve undertaking joint actions with other purchasers (Liljedal, Dahlén, 2018). However, the effect of such cooperation in practice always influences the offeror, for instance in terms of their image (good or bad), or in the case of the creation of a community of supporters who feel emotional loyalty towards the enterprise. The third key concept in this article is cooperation. In the case of cooperation between active purchasers and offerors, cooperation can be defined as undertaking joint activities aimed at creating products and other elements of a marketing offer so that its material and non-material features better meet purchaser expectations (Seyyedamiri, Tajrobehkar, 2020), bringing benefits also to offerors.

A contemporary final purchaser shows more and more activity that goes far beyond purchasing behaviour. The activity also includes communicative and creative behaviours (jointly creating non-purchasing behaviours), making the purchaser a much more engaged market participant (Zhang et al., 2020) than the one identified with traditional market roles based on the separation of functions. Therefore, in the literature on the subject, a final purchaser is referred to as an active purchaser (Seran, Izvercian, 2014), a committed purchaser (Bilro,

Loureiro, 2020), co-producer (Dargahi, Namin, Ketron, 2020), and a prosumer (Gržanić et al., 2022), etc.

It is worth adding that non-purchasing and purchasing behaviours interact, reinforcing or weakening each other, depending on purchasers' perception of their effects. For example, Alarcón López, Ruiz de Maya, and López López (2017) showed that joint actions undertaken by purchasers and offerors affect the intention of the former to repeat the purchase of the product of a given offeror. Therefore, this brings mutual measurable and immeasurable benefits, making the active purchaser an exceptionally valuable partner for the offeror (Xiao, Ma, Li, 2020; Opata et al., 2020).

Obviously, increasing the object and subject scopes of purchaser activity entails the necessity to increase the activity of offerors. They should create appropriate conditions (Zhang et al., 2018) for the involvement of purchasers in the process of joint creation of marketing offers through taking active measures to stimulate the involvement of purchasers as co-creators (Xie, Bagozzi, Troye, 2008) of products and the non-product components of marketing offers. It is not only about material conditions in the form of appropriate infrastructure (e.g. IT) and prizes, but also about non-material conditions (e.g. the atmosphere of cooperation, partnership relationships, etc.).

It is especially important to choose an environment for cooperation and incentives to effectively transform purchasers into prosumers. Cooperation between purchasers and offerors can take place both in online and offline environments. In the literature on the subject, however, the Internet dominates here. This approach is used, among others, by Tung, and Chen (2022), and Alarcón López, Ruiz de Maya, and López López (2017). It is true that the changes taking place on the market over the past few years have led to a significant increase in virtual activity of purchasers (particularly in social media (Appel et al., 2020)), partly as a consequence of the lockdowns caused by the covid-19 pandemic. However, it must not be forgotten that a large part of everyone's professional and private life still takes place in the real world. This applies, *inter alia*, to formal and informal interpersonal contacts, the establishment and maintenance of which is a necessary condition for non-purchasing behaviour, including communication and creative behaviours. Of course, much of these contacts are real, not virtual.

In order to engage in mutually beneficial cooperation with purchasers, offerors must also use incentives to encourage them to engage in joint activities. This is all the more important as the effective activation of purchasers as prosumers not only helps offerors achieve a competitive advantage (Soltani, Jandaghi, Forouzandeh Shahraki, 2016), but it more and more determines their survival on the market, which is emphasised, *inter alia*, by Kamali, Zarea, Su, and Soltani (2021). In order for these incentives to be attractive to purchasers, what must be understood is their expectations regarding the benefits they would like to obtain by taking on the role of marketing offer creators. Knowing these benefits, the offeror can prepare and use incentives that effectively influence purchasers, for example by highlighting possible benefits through

joint actions. The benefits can be so valuable to purchasers that they significantly exceed the expenditure offerors have to incur.

Although the literature on the subject has so far analysed benefits achieved by purchasers through cooperation with other entities, including offerors, the benefits have not been considered in the context proposed in this article; the expected environment of this cooperation and its specifics have not yet been taken into account. Among the benefits obtained by active purchasers, the following have been mentioned: the possibility of obtaining products that better meet purchaser expectations (Chatterjee, Rana, Dwivedi, 2021; Seyyedamiri, Tajrobehkar, 2020), the possibility of experiencing satisfaction (see Alarcón López, Ruiz de Maya, López López, 2017), the possibility of sharing one's knowledge (Baima et al., 2022), the possibility of acquiring new knowledge (Chatterjee et al., 2021), the possibility of acquiring new skills (Mandolfo et al., 2020), the possibility of acquiring new experiences and/or sharing them (Chen et al., 2018), the possibility of achieving social benefits (Bettiga et al., 2018), e.g. establishing relationships with other entities, and the possibility of achieving happiness in a hedonistic dimension (Chagas, Aguiar, 2020), among others. Moreover, studies have covered dependencies between the cooperation of purchasers and offerors with such variables as their satisfaction (Acharya et al., 2018; Alarcón López, Ruiz de Maya, López López, 2017), the willingness to re-purchase the offeror's product (Alarcón López, Ruiz de Maya, López López, 2017), loyalty and trust (Moise, Gil-Saura, Ruiz-Molina, 2020), etc.

However, as already mentioned, none of these studies followed the approach proposed in this article, according to which the benefits achieved by purchasers are being analysed in the context of the cooperative environment with offerors, taking into account the specifics of its communication. The cognitive and research gap in this area can be filled through achieving the goal of the article, which is to identify the hierarchy of benefits achieved by final purchasers as a result of cooperation with offerors, taking into account the environment of this cooperation and its specifics. In order to achieve the goal, the following six research hypotheses were verified:

H1: There is a dependence between material benefits achieved by final purchasers thanks to their cooperation with offerors and the environment of this cooperation.

H2: There is a dependence between material benefits achieved by final purchasers thanks to their cooperation with offerors and the specifics of opinions conveyed to offerors by purchasers.

H3: There is a dependence between non-material benefits achieved by final purchasers thanks to their cooperation with offerors and the environment of this cooperation.

H4: There is a dependence between non-material benefits achieved by final purchasers thanks to cooperation with offerors and the specifics of opinions conveyed to offerors by purchasers.

H5: There is a dependence between the benefit of the possibility of obtaining a marketing offer that better meets purchaser expectations and the environment of their cooperation with offerors.

H6: There is a dependence between the benefit of the possibility of obtaining a marketing offer that better meets purchaser expectations and the specifics of opinions conveyed to offerors by purchasers.

3. Methods

In order to achieve the goal of this article and to verify the research hypotheses formulated, empirical research was carried out. To collect the primary data, the method of an internet survey was used, in which the CAWI technique was applied. The research was carried out in 2020 among 1,196 adult representatives of final purchasers in Poland. The geographic scope was nationwide. A quota sampling was used. The socio-demographic characteristics (sex, age, education, and region) were dispersed proportional to the distribution of a characteristic in the general population, with a deviation of no more than 10 respondents against the proportion for the distribution of the entire Polish population (based on Central Statistical Office (GUS) data and CAPI population studies).

The object of the article covered the following variables: the benefits achieved by final purchasers through cooperation with offerors, the preferred environment of cooperation between final purchasers and offerors, the specifics of opinions on marketing offers most often presented by final purchasers, and the specifics of opinions on offerors most often presented by final purchasers.

During the research, the respondents were asked to define their preferences regarding the environment of cooperation with offerors (online, offline, both of these environments) and define the specifics of opinions most willingly communicated to offerors (positive, negative, doesn't matter). They were also presented with a set of thirteen benefits that could be achieved by a final purchaser through their cooperation with offerors. The benefits were distinguished on the basis of a cognitive-critical analysis of the literature on the subject (see, *inter alia*, Mandolfo et al., 2020; Chatterjee, Rana, Dwivedi, 2021) and the results of unstructured interviews that had been conducted before the survey. Among them, we can distinguish two material benefits, ten non-material benefits, and a benefit combining both these dimensions, i.e. the one related to the possibility of obtaining a marketing offer that better meets purchaser expectations.

Each benefit from cooperation with offerors was to be assessed by the respondents using the odd Likert scale, which is one of the most fundamental and most frequently used psychometric tools in social sciences (Joshi et al., 2015). In this article, a five-step variant was used, in which the rating 5 meant definitely yes, 4 – rather yes, 3 – neither yes nor no, 2 – rather not, and 1 – definitely not. The use of such a scale is a necessary condition for using the method of average scores analysis.

The primary data collected was subjected to quantitative analysis using the following methods: average scores analysis, comparative analysis, Pearson's chi-square independence test, and the V-Cramer's contingency coefficient analysis. The chi-square test was used to determine whether there are statistically significant dependencies between the analysed variables, and the V-Cramer coefficient to determine the strength of the relationships between the analysed variables. It is used when at least one variable has more than two values (King et al., 2018), i.e. if the contingency table is at least 2×3 .

Statistical analysis of the primary data was performed using the IBM SPSS Statistics Ver. 25.

4. Research Results

Among the thirteen benefits analysed, which, according to the respondents, purchasers can obtain thanks to cooperating with offerors, the value of the average score exceeded 4.00 in the case of seven (Table 1). The highest score was obtained for the benefit of 'the possibility of acquiring new knowledge', i.e. one related to enriching the marketing potential of purchasers. The two remaining benefits from this group, i.e. 'the possibility of acquiring new skills' and 'the possibility of acquiring new experience' also obtained relatively high average scores. In addition, the most important benefits included 'the possibility of obtaining a marketing offer that better meets purchaser expectations' and 'the possibility of establishing relationships with other people', which took the 3rd and 4th positions, respectively, in the hierarchy identified. Benefits allowing for meeting non-material needs, especially self-fulfillment and social needs, were of key importance.

Table 1.

Benefits indicated by the respondents that are achieved by a final purchaser thanks to cooperation with offerors during the preparation of marketing offers

Benefits from cooperation	Indications (%)					Average score	Position	Standard deviation
	5	4	3	2	1			
The feeling of having a genuine influence on the offer and /or offeror	54.6	34.7	7.0	2.8	0.9	4.39	6	0.810
The feeling of being needed	37.9	35.6	17.1	6.9	2.6	3.99	8	1.028
The possibility of testing the suitability of one's ideas	44.6	41.0	10.0	3.2	1.3	4.25	7	0.853
The possibility of obtaining a marketing offer that better meets purchaser expectations	56.8	34.2	6.5	2.0	0.5	4.44	3	0.747
The possibility of obtaining a material prize	20.7	27.9	29.8	14.5	7.1	3.41	10	1.072
The possibility of obtaining a cash prize	23.1	27.6	27.8	14.4	7.1	3.45	9	1.103
The possibility of acquiring new experience	56.3	33.8	6.3	3.0	0.7	4.42	5	0.794
The possibility of acquiring new knowledge	59.9	30.9	6.2	2.2	0.8	4.47	1	0.777
The possibility of acquiring new skills	59.6	30.1	6.7	2.8	0.8	4.45	2	0.802
The possibility of establishing relationships with other people	57.8	31.3	7.1	3.2	0.7	4.43	4	0.811
The possibility of impressing other people with one's activity	23.2	24.0	28.5	14.9	9.4	3.37	11	1.049
Filling up excess free time	16.5	23.2	26.7	18.1	15.5	3.07	13	1.009
The possibility of acquiring respect from other people	20.2	24.1	28.2	16.6	11.0	3.26	12	1.012

where: 5 – definitely yes; 4 – rather yes; 3 – neither yes nor not; 2 – rather not; 1 – definitely not.

Source: own study based on research results.

The relatively smallest role was played by the benefits allowing for the satisfaction of material needs and psychological needs, including ‘the possibility of impressing other people with one's activity’ and ‘the possibility of acquiring respect from other people’. The benefit that received the lowest average score was ‘filling up excess free time’, for which the greatest proportion of respondents answered negatively (over one third). It should be added that for each of the benefits analysed, the value of the standard deviation did not exceed one third of the average score. This indicates that the values of average scores accurately reflect the hierarchy of the benefits identified (*Variance and standard deviation*).

The following stage of the research process analysed the environment of cooperation with offerors preferred by the respondents and the specifics of communication behaviour. As shown in Table 2, almost 70.0% of the respondents thought that both the online and offline environments are equally useful as a place for joint activities. The Internet alone was indicated in this context by slightly more than a quarter of the respondents. This confirms the fact that offerors cannot focus solely on the Internet as an environment of cooperation with purchasers, but should create conditions for undertaking cooperation in both environments in parallel.

Table 2.

The respondents' preferred environment of cooperation with offerors in the preparation of marketing offers (%)

Environment of cooperation	Indications (%)
online	27.3
offline	4.3
both environments are equally useful for cooperation with offerors	68.4

Source: own study based on research results.

The results of the research show that in the course of cooperation with offerors, positive and negative opinions about offers and offerors were expressed by a similar percentage of the respondents (Table 3). It can only be noted that a slightly larger proportion of the respondents shared positive opinions with offerors about them, while a slightly larger percentage of the respondents provided offerors with feedback about the offers regardless of the specifics of these opinions. All the while, over six times more respondents most willingly expressed positive opinions than negative ones in both contexts. The percentage of respondents providing their opinions to offerors regardless of their specifics was similar to the percentage of those expressing positive opinions about offers or offerors. This type of communication activity was demonstrated by almost every other respondent.

Table 3.

The specifics of opinions about marketing offers and offerors that are most willingly communicated to the offerors by respondents (%)

Specifics of opinions	Indications (%)	
	Opinions about offers	Opinions about offerors
Positive	44.1	47.3
Negative	7.3	7.0
Nature of the opinion does not matter	48.6	45.7

Source: own study based on research results.

The aim of the next stage of the research process was to identify dependencies between the benefits achieved by purchasers from cooperation with offerors and the environment of this cooperation as well as the specifics of opinions conveyed to them. As shown in Table 4, eight statistically significant dependencies were identified for the specifics of opinions about offers, and seven dependencies for both other variables. However, each of these dependencies was characterised by a slight strength, as evidenced by the V-Cramer coefficient value, which in no case exceeded 0.3. The only benefit for which a dependence was identified with each of the three analysed variables was the 'possibility of acquiring new skills'.

Table 4.

Benefits indicated by the respondents, which are achieved by a final purchaser thanks to their cooperation with offerors, and the preferred environment for this cooperation, the specifics of opinions about offers, and the specifics of opinions about offerors

Benefits from cooperation	According to the preferred environment for cooperation			According to the specifics of opinions about offers			According to the specifics of opinions about offerors		
	Chi2 test	V-Cramer coefficient	'p'	Chi2 test	V-Cramer coefficient	'p'	Chi2 test	V-Cramer coefficient	'p'
The feeling of having a genuine influence on the offer and/ or offeror	11.804	0.070	0.160	4.516	0.043	0.808	12.094	0.071	0.147
The feeling of being needed	11.633	0.070	0.168	23.513	0.099	0.003	19.161	0.090	0.014
The possibility of testing the suitability of one's ideas	10.152	0.065	0.255	19.149	0.089	0.014	17.674	0.086	0.024
The possibility of obtaining a marketing offer that better meets purchaser expectations	20.556	0.093	0.008	9.486	0.063	0.303	18.219	0.087	0.020
The possibility of obtaining a material prize	17.233	0.085	0.028	15.768	0.081	0.046	12.926	0.074	0.114
The possibility of obtaining a cash prize	18.598	0.088	0.017	9.858	0.064	0.275	9.044	0.061	0.339
The possibility of acquiring new experience	25.040	0.102	0.002	14.456	0.078	0.071	9.317	0.062	0.316
The possibility of acquiring new knowledge	24.262	0.101	0.002	26.937	0.106	0.001	12.193	0.071	0.143
The possibility of acquiring new skills	21.143	0.094	0.007	22.737	0.097	0.004	19.172	0.090	0.014
The possibility of establishing relationships with other people	26.865	0.106	0.001	13.944	0.076	0.083	17.538	0.086	0.025
The possibility of impressing other people with one's activity	7.781	0.057	0.455	16.700	0.084	0.033	24.169	0.101	0.002
Filling up excess free time	7.805	0.057	0.453	16.256	0.082	0.039	12.087	0.071	0.147
The possibility of acquiring respect from other people	12.991	0.074	0.112	28.652	0.109	0.000	19.942	0.091	0.011

where: 'p' – level of significance

Source: own study based on research results.

The results obtained made it possible to verify the research hypotheses formulated (Table 5).

Table 5.

Effects of verifying the research hypotheses

Research hypothesis	Effects of verifying the research hypothesis
H1	Valid
H2	Valid only for the possibility of obtaining a material prize and the specifics of opinions about the offers
H3	Valid for four non-material benefits (including benefits related to enriching the marketing potential of purchasers and meeting their social expectations)
H4	Valid for seven non-material benefits and the specifics of opinions about offers, and for six intangible benefits and the specifics of opinions about offerors
H5	Valid
H6	Valid only for the specifics of opinions about offerors

Source: own study based on research results.

5. Discussion

The results of the research indicate that among the benefits achieved by final purchasers thanks to their cooperation with offerors, the respondents attributed the greatest importance to the following: enriching their marketing potential, the possibility of obtaining a marketing offer that better meets purchaser expectations, and the possibility of establishing relationships with other people. This is in part in line with the results of research by other researchers investigating the benefits of cooperation between final purchasers and offerors. However, as a rule, they analysed selected benefits without attempting to identify their hierarchy as was undertaken in this article. For example, Chatterjee, Rana, and Dwivedi (2021) and Windasari, Lin, Kato-Lin (2021) emphasised the possibility of creating products that better meet the growing requirements of recipients, yet they analysed it from the perspective of benefits achieved by enterprises cooperating with purchasers. A similar perspective was also adopted by Cheung, and To (2020); moreover, they focused only on services, i.e. products of non-material nature.

The influence of cooperation between purchasers and offerors on purchasing behaviour was also studied. For example, Alarcón López, Ruiz de Maya, and López López (2017) looked at the impact of sharing experiences gained by purchasers through cooperation with offerors on the intention to re-purchase the offeror's product. Therefore, they analysed other aspects of cooperation between these two groups of entities, taking into account a different context of the analysis. Research was also carried out on the impact of joint value creation by offerors and purchasers on their intentions to engage in similar behaviour in the future (Tung, Chen, 2022). It should be emphasised, however, that these studies concerned only the online environment; moreover, as can be seen, they referred to a completely different perspective than the approach proposed in this article. In turn, Moise, Gil-Saura, and Ruiz-Molina (2020) found out that the involvement of purchasers in joint activities with offerors positively influences the level of the perceived satisfaction, loyalty and trust. As can be seen, they analysed only selected effects of cooperation, which can be equated with benefits achieved through taking joint actions. Moreover, they did not consider benefits in the context proposed in this article, which takes into account, *inter alia*, the environment for cooperation and its specifics.

6. Conclusions

The research conducted shows that the respondents primarily see the possibility of gaining non-material benefits in cooperation with offerors. They especially appreciate the possibility of enriching their marketing potential, of creating marketing offers that better meet the growing expectations of purchasers, and of establishing interpersonal contacts. Over two thirds of the

respondents stated that cooperation between final purchasers and offerors should take place simultaneously online and offline. Moreover, positive opinions about offers and offerors were much more willingly expressed than negative ones, although the largest percentage of the respondents did not take into account the specifics of the messages provided.

Among the statistically significant dependencies that were identified, one can mention, among other things, the dependence between material benefits achieved by final purchasers thanks to their cooperation with offerors and the environment of this cooperation, and the dependence between the benefit of 'the possibility of obtaining a marketing offer that better meets purchaser expectation's and the environment for cooperation with offerors. Ultimately, it can be said that in light of the responses, some of the research hypotheses turned out to be valid, while others were not confirmed (Table 5).

7. Implications, limitations and directions for future studies

The results of the research carried out and the conclusions drawn on their basis constitute a significant contribution to the theory of marketing and the theory of market behaviour, especially behaviour undertaken as part of cooperation. They make it possible to reduce the knowledge gap identified during the analysis of the world literature on the subject. The results also reflect respondents' expectations regarding the environment of their cooperation with offerors, contradicting the view expressed in literature that the Internet is the only or the best environment for joint activities. The respondents primarily appreciated the fact of using the online and offline environments in parallel. The identification of (1) the hierarchy of benefits that, according to the respondents, final purchasers achieve thanks to their cooperation with offerors, (2) the dependences between benefits achieved by final purchasers thanks to their cooperation with offerors and the preferred environment of cooperation, and (3) the dependences between the benefits achieved by final purchasers thanks to their cooperation with offerors and the specifics of opinions most often communicated to offerors about them and about marketing offers are also of great cognitive value.

The results of the research carried out are also of great empirical value. They have important practical implications, especially managerial ones. They allow, among other things, for shaping the environment of cooperation in line with the expectations of final purchasers, taking into account the need for creating conditions to undertake joint activities both online and offline. On the other hand, identifying the hierarchy of benefits expected by the respondents allows managers to develop a composition of incentives that will effectively stimulate active final purchasers to engage in joint marketing activities. The knowledge of the specifics of the most frequently communicated opinions is an important piece of information, confirming the necessity for managers to attach particular importance to the creation and co-creation of

marketing offers characterised by the greatest possible compliance with the expectations of active purchasers.

Obviously, the research has some limitations. These include those related especially the subject (the research covered only adults), object (the research covered the benefits achieved by final purchasers thanks to cooperation with offerors in relation to three variables), and the geographic scope (the research covered representatives of final purchasers in Poland). The limitations will guide future research, allowing for their elimination. Therefore, in the course of future research, the analysis will cover minors. An attempt will also be made to analyse benefits achieved by final purchasers from cooperation with offerors in terms of other variables, including demographic and behavioural ones.

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OPTIMIZATION OF ENERGY COGENERATION PROCESSES OF DISTRICT HEATING SYSTEMS BASED ON BIOGAS SOURCES – CASE STUDY OF A MUNICIPAL AREA

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Purpose: The aim of this article is to present selected research results in the field of optimization of energy cogeneration processes of heating systems based on biogas sources, in terms of the possibility of obtaining ecological and energy benefits in the municipal area.

Design/methodology/approach: The considerations are a case study, including an analysis of the choice of the optimal variant of agricultural biogas construction in the Łobez Municipality in the Zachodniopomorskie Voivodeship from the point of view of both the substrate used in biogas and the proposed technological solutions. The subject matter focuses on comparing the estimated ecological effect of biogas with different powers and choosing the optimal model solution. The research process used secondary and statistical data and the selected comparative method to calculate the carbon dioxide emission reduction factor.

Findings: The authors indicate which technology of obtaining energy should be dominant in the field of optimization of energy cogeneration processes of heating systems in Poland in areas dominated by agricultural economy.

Research limitations/implications: The presented research concerns the assessment of one of the parameters (substrate used in biogas) affecting the optimization of biogas production. Future research in this area should focus on the assessment of other factors determining the validity of the discussed solutions in relation to the adopted state policy in the field of development of renewable energy sources and agricultural economy.

Practical implications: The results of the research are the first approach to indicate the government and regional administration the type of energy that may form the basis of the future strategy of changes in the field of energy cogeneration of heating systems in municipal and agricultural areas in Poland.

Social implications: The description of the agricultural biogas model, which served as an example, can be helpful in the process of identifying benefits not only for the environment but also as an element stimulating economic and social development at the local and regional level.

Originality/value: An experimental research approach may be helpful in understanding the essence of optimization of energy congregation processes of heating systems based on biogas sources in selected areas of Poland.

Keywords: process optimization, energy management, renewable energy, cogeneration.

Category of the paper: Case study, Technical paper.

1. Introduction

There is no doubt that energy efficiency and demand management in the current era of the energy crisis will play a fundamental role in the new vision of the energy market organization in Poland (Pietrzak et al., 2021; Tucki et al., 2019). It is not without significance that coal has dominated the Polish energy raw materials market for many years, both in terms of its availability and price. This process resulted in the fact that the Polish energy system is based on practically one energy raw material (Polityka, 2009). Nevertheless, coal alone is not able to fully meet Poland's energy needs, and the lack of significant resources of oil and natural gas caused the need to import these raw materials and get a new look at the process of managing the energy transformation (Janiszewska, 2019; Krajowy 2010). The analysis of the energy structure of Poland in the years 2004-2020 (Drożdż, Mróz-Malik, Kopiczko, 2021) indicates a decrease in the share of hard coal and lignite, both in consumption and extraction, in favour of the increasing position of renewable energy sources (RES), including biogas plants. Considering that the share of natural gas and oil in energy consumption in Poland is at a relatively stable level (Central, 2022). At this stage, it should be emphasized that large amounts of waste of agricultural origin and the agri-food industry are produced in Poland (Igliński et al., 2020) An alternative to the agricultural use of organic waste is their use for energy production (Szymańska, Lewandowska, 2015; Brewery, 2020). According to the available research data (Piwowar, Dzikuć, 2016; Ignaciuk, Sulewski, 2021) – the real potential of biomass in Poland in 2020 was estimated at 600 168 TJ, including wet waste intended for biogas at the level of 72 608 TJ (Śleszyński et al., 2021). On this basis, there were postulates that the use of waste from agricultural production may significantly contribute to the improvement of the energy balance of the country, voivodship, powiat and in particular, a given municipality (Piwowar, Dzikuć, 2019).

According to many researchers, the production of agricultural biogas is seen as one of the most forward-looking directions of energy use of biomass. It is a key objective indicated in the programme "Energy Policy of Poland until 2030" (Koryś et al., 2019) In addition, on 13 July 2010, the Council of Ministers adopted the document "Directions for the development of agricultural biogas plants in Poland in 2010-2020", which was developed by the Ministry of Economy in cooperation with the Ministry of Agriculture and Rural Development. This document emphasizes the importance of optimal conditions for the development of

installations producing agricultural biogas, which are to be used for the production of electricity and heat. The legislator, among others, imposed an obligation on public sellers to purchase electricity produced from renewable energy sources, according to the average price of its sale in the previous year (Scarlat, Dallemand, Fahl, 2018). Agricultural biogas plants themselves were exempted from paying stamp duties for official activities related to the keeping by the President of the Agricultural Market Agency of a register of energy companies involved in the production of agricultural biogas with a total electrical capacity not exceeding 5 MW. It is worth noting that Biogas plants also fit into climate protection strategies, such as emission-free CO₂ energy production and contribute to the climate package objectives (Baral et al., 2018). The positive balance of greenhouse gas emissions in agricultural biogas plants is based on the fact that they produce electricity and heat from biomass, which is an undisputed renewable energy source (Masłoń et al., 2018; Wiater, Horysz, 2017). The pro-ecological product is obtained as a result of methane fermentation of a deodorant, devoid of odor, not emitting into the atmosphere, as opposed to slurry and manure, methane and harmful nitrogen compounds, which occur in its mineralised form and have valuable fertilising properties (Tufaner, Avsar, Gonüllü, 2017).

In addition, Directive 2009/28/EC (Directive, 2009) requires Member States to ensure a specific share of energy from renewable sources in gross final consumption of energy in 2020. The mandatory national overall targets consist of an assumed 20% share of energy from renewable sources in the gross final consumption of energy in the Community. For Poland, this target has been set at 15%. Recently, investors in the biomass energy market can count on a number of possibilities to obtain subsidies from the Structural Funds. For example, private enterprises, local government units, public institutions may receive grants for the construction or development of high-efficiency cogeneration units fired with biomass or biogas under the Operational Programme Infrastructure and Environment, Priority IX. Environmentally friendly energy infrastructure and energy efficiency, Action 9.1. High-efficiency power generation (Operational, 2014).

As indicated by the extensive literature on the subject, one of the greatest advantages of using renewable energy sources, including biogas, is the possibility of achieving ecological and energy synergy (Wąs et al., 2020; Bielski et al., 2021) In addition to the benefits that renewable energy brings for the environment, it is seen as an increasingly common factor stimulating economic and social development at the local and regional level (Altzas et al., 2019; Kozłowski et al., 2018). Thus, the process approach to energy cogeneration certainly requires careful analysis and research, both in the context of academic and practical considerations.

In addition, the analysis of the available literature showed that it is limited in the scope of considerations related to the energy cogeneration of heating systems based on biogas sources (Dach, Kula, Woźniak 2021; Antoni, Mazzegannd, Mathieu 2019). In particular, there is a lack of publication in relation to the analyses of individual variants of the case study (Central Europe), which are largely identified with the areas dominated by the agricultural economy.

Therefore, the presented study is an attempt to fill the gap in the literature by discussing the essence of optimization of energy congregation processes of heating systems based on biogas sources on the example of selected municipal areas.

Considering that the aim of the research is to gain extensive knowledge on the perception of the optimization of energy cogeneration processes of heating systems based on biogas sources. The article itself has many important practical implications, both political and economic. The article was organized as follows. Chapter 2 contains a description of the research method used in response to the set objective of the work. Chapter 3 describes the results of experimental studies and their interpretation. In turn, Chapter 4 discusses and presents the conclusions – pointing to their limitations in the perspective of the research conducted so far, at the same time, the future directions of research in relation to the issue of energy cogeneration of heating systems and the strategy of managing the development of renewable energy sources in municipal areas where agriculture plays a key role.

2. Materials and methods

The considerations in this article are of a case-stage nature, focussing on the assessment of the choice of the optimal variant of agricultural biogas construction in the Łobez Municipality in the Zachodniopomorskie Voivodeship from the point of view of:

- substrate used in a biogas plant,
- the proposed technological solutions, i.e. the use of two cogeneration engines with a total electrical power of 1.1 MW or the use of four cogeneration engines with a power of approx. 0.25 MW each.

In addition, the presented research aims to show the differences in the capacity of the planned biogas plant based on a comparison of the estimated ecological effect of the biogas plant. The data for the simulation was taken from the feasibility study of the investment entitled "Construction of a 1.2 MW installation for the production of electricity and heat from biogas in the town of Łobez (Studium, 2018). The choice of this destination was not accidental, but it was dictated by the desire to assess the actual project. On the other hand, the calculations in the scope of carbon savings resulting from the implementation of the investment were made on the basis of the method of calculating the carbon dioxide emission reduction factor in the 1.6.1 Operational Programme Infrastructure and Environment 2014-2020 measure. Individual data used in the research process were obtained from the reports of the Central Statistical Office and the Low-Emission Economy Plan for the Łobez Municipality (Central, 2022; Low, 2022; Energie 2022). This allowed to distinguish development trends and to indicate the dynamics of changes in individual years 2008-2020 in the structure of the heating system in the Łobez Municipality.

3. Results

3.1. Assessment of the district heating system in the analysed municipality – case study

The Łobez is an urban-rural municipality in the Zachodniopomorskie Voivodeship, located in the eastern part of the Łobez county on the Rega River. The area of the municipality is 228 km², of which the area of the town of Łobez is 11.72 km², while the area of rural areas is 216.25 km². The seat of the municipality is the town of Łobez, which includes 21 village councils. The municipality has an agricultural and industrial character. Forest areas cover an area of 37%, while agricultural land covers 56%. The main branch of the economy is agri-food processing. Small and medium-sized farms are predominant in the municipality. The average size of the farm is 20 ha. Agriculture is mainly based on the cultivation of cereals, to a lesser extent on the cultivation of potatoes.

Thermal energy in the Łobez municipality comes from (Low, 2022):

- gas network (individual heating, network heating from the boiler room),
- local boiler rooms fired with fuel other than gas,
- individual heating using fuel other than gas.

Table 1.

Structure of heat generation in the Łobez Municipality

Specification	Amount of primary energy consumed	
	MWh	%
By type of heating		
Individual heating	122 219.21	64.29%
district heating	67 895.94	35.71%
Total	190 115.15	100.0%
By type of recipient		
Population	138 883.08	73.05%
Public buildings	4 375.96	2.30%
Companies	46 856.10	24.65%
Total	190 115.15	100.0%
By fuel used		
Gas	23 465.74	12.34%
Coal	118 836.86	62.51%
Heating oil	3 176.21	1.67%
Wood	44 469.21	23.39%
Electrical power	167.13	0.09%
Total	190 115.15	100,0%

Source: own elaboration based on the Low Carbon Economy Plan for the Łobez Municipality.

The analysis of the data presented in Table 1 indicates that individual heating dominates in the Łobez Municipality 64.29%. The next position is occupied by the heating network. On the other hand, the fuel used to generate heat in 62.51% is coal, in 23.39% wood and in 12.34% gas.

Table 2.
Structure of heat generation in the Łobez Municipality

Specification	Households	
	PCS	%
Gas network, including:	2 348	47.95%
Individual heating	1 359	27.76%
mains heating (local boiler rooms)	989	20.19%
Other individual heating, including:	2 548	52.05%
coal (dominant fuel)	1 620	33.09%
wood (dominant fuel)	839	17.14%
Heating oil	30	0.61%
Electrical power	59	1.21%
Total	4896	100.0%

Source: own elaboration based on the Low Carbon Economy Plan for the Łobez Municipality.

The data presented in Table 2 show that 47.95% of households use the gas network existing in the Łobez Municipality, including 27.76% individual customers and 20% network customers. It should be emphasized that the main supplier of gas to the municipality is Polskie Górnictwo Naftowe i Gazownictwo S.A., using the gas network located mainly in the town of Łobez. On the other hand, individual customers in the municipality outside the urban area use traditional fuels such as coal or wood in the heat production process.

Table 3.
Comparison of the parameters of the gas network in the Łobez Municipality

Gas network	Unit	2008	2020
Total length of active network	Metre	53615	61003
Length of active transmission network	Metre	18637	18637
Length of active distribution network	Metre	34978	42366
Active connections to residential and non-residential buildings	pc.	1325	1386
Gas Recipients	Household	2458	2597
Gas consumption for heating of dwellings	thousand m ³	1291.8	1485.0
Total gas consumption by residents	thousand m ³	1530.4	1512.2
Population using the gas network	Person	5829	7424

Source: own elaboration based on the Central Statistical Office data.

The comparison of data from selected years in Table 3 indicates a noticeable increase in the population using the gas network despite the lack of expansion of the length of the active transmission network itself. In addition, a noticeable trend is the increase in gas consumption in the process of heating apartments, which, according to the authors, is one of the basic premises for the implementation of optimization of energy cogeneration processes of heating systems based on biogas sources.

3.2. Evaluation of the choice of the optimal option for the construction of agricultural biogas in the Łobez Municipality

For the purpose of selecting the optimal variant, one of the parameters, i.e. substrate used in biogas, was analyzed:

- option I covers agricultural products as a primary substrate,
- option II includes sewage sludge as the primary substrate.

The purpose of the simulation was to determine the operational risk in the scope of availability, quality and costs of obtaining substrates. A comparison of the two options is presented in the table 4.

Table 4.

Strategic options for the construction of a biogas plant from the point of view of the substrate used

Option I	Option II
basic substrate: potato wiping, plant substrates (maize silage and other green biomass), and animal faeces – high availability, high biogas yield from agro-food industry waste low acquisition cost, ease of transport (location near the agri-food processing plant), certainty of substrate parameters that have a direct impact on the course of methane fermentation.	basic substrate: sewage sludge, lower biogas yield, increase in acquisition costs - the need to cooperate with the Municipal Services Enterprise in Łobez, greater complexity of the transport procedure, due to administrative and legal constraints - special vehicles, lower intensity of biogas production from sewage sludge and longer time of processes in fermenters.

Source: own study based on the data of the investment feasibility study.

At this stage of consideration, it should be mentioned that the appropriate selection of substrates has an impact on the intensity of biogas production and the speed of processes occurring in fermenters. One of the key postulates in the area of logistics process management is the availability of the substrate, and thus the distance of its source from the location to which it must be delivered, in this case the place of storage of the substrate. It is assumed that for economic reasons this distance should not exceed 5 km (Theuerl, Klnag, Prochnow, 2019). Considering that covering transport costs over longer distances may be economically unjustified. In addition, it may require the use of specialised means of transport. Considering the above, when analyzing the available data, the authors postulate that the more favorable variant of the project implementation is variant I based on agricultural products as the basic substract.

The next stage of the research focused on analyzes in the scope of differences in the planned agricultural biogas power:

- option I – 1.1 MW biogas plant,
- option II – 0.5 MW biogas plant.

The authors assumed that increasing the capacity of an agricultural biogas plant would lead to a positive ecological effect, i.e. a direct increase in the produced energy without the use of conventional sources and an increase in emissions of pollutants into the environment.

Table 5.*Comparison of the estimated ecological effect of biogas plants of different power*

Biogas plant capacity [MW]	Potential energy production in a biogas plant per year [MWh]	Average CO ₂ emissions with 1MWh of conventional energy production [t]	Emission limitation CO ₂ [t]
1.1	1012	0.81	8514.7
0.5	4380	0.81	3547.8

Source: own study based on the methodology of calculating the carbon dioxide emission reduction factor.

The analysis of the presented simulations based on the selected method of calculating the carbon dioxide emission reduction factor shows a higher ecological effect of an agricultural biogas plant with a maximum capacity of 1.1 MW. The estimated effect will be about twice as high as that achieved in a biogas plant with a maximum capacity of 0.5 MW. Therefore, option I, i.e. a 1.1 MW biogas plant, was adopted for further research for the simulation.

At the final stage, the following variants of technological solutions were analyzed:

- option I – use of two cogeneration engines with a total electrical power of 1.1 MW,
- option II – the use of four cogeneration engines with a power of approx. 0.25 MW each.

Table 6.*Variants of technological solutions*

Option I	Option II
<p>option I – use of two cogeneration engines with a total electrical power of 1.1 MW.</p> <p>The cogeneration unit will consist of two cogeneration units (2 pcs of cogeneration units), with a total electrical capacity of 1.1 MW. They will be installed in a sound absorbing enclosure, placed in two containers, with a built-up area of up to 50 m² each and a height of up to 4 m.</p> <p>This solution is more beneficial as it reduces the risk of complete cessation of operation of the biogas plant in the event of a failure.</p>	<p>option II – use of four cogeneration engines with a total electrical power of approx. 0.25 MW each.</p> <p>The cogeneration unit will consist of four cogeneration units (4 pcs of cogeneration units), with a total electrical capacity of approx. 0.25 MW each. They will be installed in a sound absorbing enclosure, placed in four containers, with a built-up area of up to 50 m² each and a height of up to 4 m.</p> <p>The solution increases the risk of failure and cessation of operation of the biogas plant.</p> <p>This option may generate higher operating and maintenance costs compared to Option I.</p>

Source: own study based on the data of the investment feasibility study.

Based on the above variant analysis of technological solutions, the authors postulate that the more favorable variant of the project implementation is Option I based on the use of two cogeneration engines with a total electrical power of 1.1 MW.

4. Discussion and Conclusions

In the face of the ongoing energy crisis, the transition process will certainly be delayed. This does not change the fact that managing the optimisation of energy cogeneration processes may prove crucial for the successful implementation of renewable energy projects. Observations of market reality indicate that agricultural biogas and agricultural biogas plants

are among the fastest growing segments of renewable energy in Europe (Johnson, Boersma, 2013). The dynamic development of agricultural biogas has been possible for several years thanks to the priority given to energy from renewable sources by European Union legislation (Petersen, Snapp, 2013). Therefore, the process of managing the development of biomass energy in Poland becomes important for the entire energy sector. The role of biogas is increasingly recognized also by local authorities (Ribeiro, Rode, 2019). According to many researchers, it is an opportunity for economically neglected regions that have a high potential for biomass of agricultural origin (Zhang, Qiu, 2018; Lauer, Leprich, Thrän, 2020). In the authors' opinion, proper management of the biomass energy development process will not only affect the satisfaction of energy needs, but may also lead to the professional activation of the population and development of rural areas through, among others, the dynamization of small and medium-sized entrepreneurship, increase in employment, increase in tax revenues (Lipiński, Lipiński, Kowalkowski, 2018). In addition, the functioning of agricultural biogas supports local development, based on endogenous resources, especially in rural areas, which require support (Mamica, Mazur-Bubak, Wróbel-Rotter, 2022). The United Kingdom is an example of the transition to a low-carbon economy and the possibility of achieving the above-mentioned benefits. As one of the first countries in the world, it has adopted long-term legally binding emission reduction targets CO₂ under the Climate Change Act 2008. Many of the companies that make up the UK's 'national' energy system are substantially integrated into regional and local economies, including the development of biogas energy in rural areas (Liu, Wang, Cardinal, 2022). Available research confirms the current belief that climate change, energy security and the depletion of conventional oil reserves will change the established patterns and the scale of energy supply, its distribution and consumption (Tomaszewski, 2022; Niemczyk et al., 2022). On this basis, the authors put forward the thesis that all positive phenomena resulting from the adoption of the right strategy in the field of energy transformation can be based on the optimization of energy cogeneration processes of heating systems based on biogas sources.

The presented research results showed that the implementation variant of the project consisting in the construction of a 1.1 MW biogas plant, whose the main substrate will be agricultural products, is also the most environmentally optimal. The production of electricity within the biogas plant reduces the demand for energy from coal and natural gas combustion, i.e. fossil raw materials. This allows to reduce the extraction of these raw materials and use them primarily in obtaining electricity and heat. Thus, the ecological effect of an agricultural biogas plant with a maximum capacity of 1.1 MW will be about twice as high as that achieved in a biogas plant with a maximum capacity of 0.5 MW. On this basis, the authors conclude that the positive impact on the environment, especially on climate and air, will be more noticeable in the case of biogas plants with higher power. A positive impact on the environment is of additional importance due to the proximity of the Natura 2000 site "The Regi River Basin" and on local environmental conditions, in particular air quality. The creation of the investment in

the planned place will bring an additional source of energy in the municipality, at the same time not reducing the air quality. The industrial character of the area, the direct exit onto the provincial road and the proper management of logistics and transport of raw materials will result in the lack of negative aspects felt by the local community due to the functioning of the biogas plant.

The presented research focused on the assessment of the choice of the optimal option for the construction of agricultural biogas in the Łobez Municipality in the field of optimization of energy cogeneration processes of heating systems based on biogas sources. Against the background of academic considerations, it is necessary to answer the question whether the model itself and the conclusions from the research can be implemented in other regions of Poland, where agricultural economy plays a key role? According to the researchers, the implementation of this category of projects should be individual. Duplication of common assumptions and diagrams is not advisable, as different destinations are based on different initial assumptions. It does not change the state of affairs that in any case, starting from the planning stage, through construction and operation, a process approach may prove to be crucial for success, which is a dynamic approach so desired in the case of this category of investment.

The presented research concerns the assessment of one of the parameters (substrate used in biogas) affecting the optimization of biogas production. A much broader analysis will certainly be needed in the near future, in particular regarding the interdisciplinary approach to the implementation of this category of investment. Moreover, future research in this area should focus on the assessment of other factors determining the validity of the discussed solutions in relation to the adopted state policy in the field of development of renewable energy sources and agricultural economy in the rural area.

To sum up, the presented research on the optimization of energy cogeneration processes of heating systems based on biogas sources - the municipal area does not fully exhaust the essence of the issue. They are only an incentive for further research in this matter. Therefore, such analyses will be the subject of future work to determine and identify the key factors for the implementation of an ambitious energy cogeneration plan for municipal areas where farming plays a predominant role.

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JUDICIAL REPORTING AS A GUARANTOR OF THE RULE OF LAW

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Purpose: is to show judicial reporting in relation to the rule of law. The text focuses on the considerations and analysis of the relativity of judicial reporting to the rule of law as a kind of values and subjective rights of civil society. An additional assumption is to indicate the essence of the issue in an interdisciplinary perspective, drawing attention to its importance, multidimensionality, connection and social significance, leaving room for own research.

Design/methodology/approach: The research method used in the article is the analysis of scientific studies, supplemented by the author's observations and experience. The research procedure included a review of Polish and foreign literature, an analysis of legal acts and court decisions, a case study and deductive reasoning. The above text evokes, in the author's opinion, a separate understanding and application, more and more commonly, also by journalists, of the concepts of justice, the rule of law and law.

Findings: A high level of influence of judicial reporting on the rule of law has been demonstrated. Great demand for this type of message and its values, which should be implemented by the rule of law – judgments of common courts, to be considered the most desirable form of the system. Social development in the face of values as an interdisciplinary concept in terms of direction and field allows you to maintain what is with what should happen in the future. It is important not only what intentions people have, but also what competences they have and according to what values they operate. The conducted analysis shows that the correctness of the message and the understanding of the meaning of the rule of law in the area of law are important and vice versa. An autocratically governed society can be fully governed by law, the courts can issue judgments and the court rapporteurs publicly present them, which does not necessarily mean that we are dealing with the rule of law and the rule of law.

Research limitations/implications: Limitations of the obtained results may result from a limited text sample, small text size.

Originality/value: The presented research and conclusions provide practical tips not only to people of science, but above all to average citizens, mainly those who are not aware that the world of values surrounds people, but depends on them, what values they pay attention to and to which he remains indifferent. Man has the freedom to choose what suits him best, but is rarely able to use it rationally and in an appropriate form and time. Among values, man does not have to do anything and can do much. The less complex and understandable the forensic message, the closer to the concept of simple principles of human life and action. Every aspect of judicial reporting contributes to strengthening the rule of law in the spirit of a democratic rule of law. Like the world to the world, there were processes and comments, and what resulted from them socially (...).

Keywords: reporting, value, rule of law, awareness.

Category of the paper: research paper.

Living in the face of uncertainty caused by the multiplicity of less and less justified changes, one could say: why do we need the rule of law, the law, what do we need judgments for, some patterns and rules, if almost no one obeys them, except that they talk about it loudly and often it enchants reality. This text focuses mainly on considering and analyzing the relativity of forensic reporting as a kind of civil society's subjective rights. Societies with a significant degree of social and legal awareness resulting from this fact of philosophical and sociological reflections, which we have or should face, because it seems worth it. Social development in the face of values as an interdisciplinary concept, in terms of direction and field, allows to maintain what is with what should happen in the future. It is important not only what intentions people have, but also what competences they have and according to what values they operate. In order to meet the challenges of time, a person must systematically improve their fitness. To understand the world and its needs, you need to acquire appropriate knowledge and use it properly. People have naturally always avoided difficult things, things that make them anxious, fear and insecure. Most of the time, people are afraid of what they do not know and understand. Even stupidity is not as destructive as ignorance – what is stupid for one, does not have to be stupid for another – he needs stupidity to achieve his goal. A person who is ignorant of yes and no seems defenseless, and is faced with the challenge of making a choice that he does not understand and is unable to make because he is not sure about yes and no. A person who seems to be helpless accepts every piece of information as true. Judicial reporting as one of the most important tools of the rule of law should be objective, but is it possible in the state of unpredictable changes, unstable politics and the decline of values and authorities (...)? The question for today and tomorrow does not seem to be what is the reality, but what is this reality in the future and why? One has to realize that in politics (which is omnipotent) the head is important, although the neck is no less important, and perhaps even more important. An unfavorable judgment can be presented favorably as well as favorable as unfavorable. It all depends on who reports and for what purpose. It should be borne in mind that in such a short study it is impossible to explore the non-uniform interpretation of the matter. However, due to its importance, each of the statements or reflections expressed in public may enrich or, in a sense, complement the scientific achievements to date. The above text evokes, in the author's opinion, the issue of separate understanding and application (more and more commonly, also by journalists) of the concepts of justice, rule of law and law. People often accepting such a great difference in interpretation, which raises the question: can it be true, where in some cases it unfortunately turns out to be a fact.

1. Introduction

Regardless of the level of our intellectual preparation, social status, worldview or religion, when making life decisions we ask or should ask ourselves one of the basic questions: is the rule of law the same as law, or maybe these concepts are not convergent and mean completely something else. Considering the number of statements and messages and the behavior of some self-proclaimed authorities, it does not seem so obvious. The judicial rapporteur should be aware that any decision or statement he makes is worth as much as the justification for it. That is why the correctness of the message and understanding of the meaning of the rule of law in the area of law is so important and vice versa. Values that should be implemented by the rule of law – judgments of common courts must be clear to be considered the most desirable form of the system. The way the law is formulated and its message should be clear and, if possible, commonly understandable (Kojder, 2001, p. 501 et seq.).

The interest of the society does not always coincide with the interest of the recipients, including some media. One gets the impression that the more global, the less ethical and moral. The rule of law should not be equated with the rule of law. An autocratically governed society may be fully governed by law, courts may issue judgments, and court reporters may present them publicly, which does not necessarily mean that we are dealing with the rule of law (Henley, 1992, p. 299). Courts should use axiology in their judgments, and the journalist and court-rapporteur should use the content of the law in line with the sense of justice and not expectations (conformity to natural justice) (Raz, 1979, pp. 214-218).

A human right is freedom to self-realization, expression, theses and teaching, but is it always and at any cost? An indisputable human right is the right to information, transmission and reception, but how does this work in reality? What is the role of individual social groups in it, the role of journalism and what are the consequences of this? Usually such as the level of journalistic message, the degree of politicization of the message and the level of its recipients. In order to be able to assess whether and to what extent the courts apply and obey the law in their judgments, their actions must be clear; must be intersubjectively verifiable, and the justifications written in a language understandable to everyone, not only to lawyers (Kondziela, 1972, p. 140).

Roughly speaking, the definition of law, justice and the rule of law in a more or less economical way does not pose the difficulty of identification for the average bread eater, which difficulty usually arises when justifying commonly accepted and recognized values (Gómez-Arostegui, 2000, p. 35). This is especially true in the context of spectacular events, including court judgments that cause social disapproval of bodies or institutions that apply law and justice in the spirit of the frequently quoted rule of law, the common good and unlimited sovereignty. Usually then (albeit briefly) the concept of justice, the rule of law and law occupies the head of a number of people making their own assessment (Kardasiewicz, 1991, p. 45-52).

How do we live – in the sense of the rule of law, and the law is the same as justice, or maybe it is different – is one of the doubts that appear more and more often. In the present shape of political and economic conditions, looking globally, can we say that we are dealing with a pure form of the rule of law, or maybe with one of its varieties or its multiple forms? Which of these guilt figures should be considered a model of the rule of law? Political correctness is of great importance in the implementation of the rule of law and justice through law, which is shaped, *inter alia*, by the legal awareness of persons participating in these trials. One of the most prominent contemporary theorists and practitioners in the field of values, M. Rokeach defines value as "the persistent belief that a given behavior is socially more attractive than other ways of behavior." The question that remains open is whether there are objective values, or whether they are a derivative of individual needs and ideas of man (Rokeach, 1993, p. 5).

The forensic rapporteur has two basic options – to decide to follow the patterns of reality assessment adopted by the community or not to use them, creating a picture of reality as needed. The judicial rapporteur – as a rule – does not decide anything, but he is able to distort almost everything in order to achieve a political goal and material gain (Tiersma, 1987). An example is the fast information transmission of competing TV stations regarding a socially important judicial sentence, which, apart from manipulation and persuasion, is largely different from the actual facts of the described event, usually, according to the often used technique, "the message must be short and sensational". It is said that the law can do this and that, that should be this and that, but what the law can really do – it seems that maybe not much, because it is not a law that can, but a man through law, provided that he or she wishes. But will he always want to?

2. The essence of forensic reporting

Without going into the historical outline of the definition of communication – media message and its growing demand in the era of rapid exchange of human thoughts, clear technological progress and social communication of information, there is a noticeable social need for reliable judicial communication, often constituting a common awareness of the rule of law, widely understood justice in the field of applicable law and the implementation of justice, in which investigative journalism undoubtedly plays a key role, in various forms of communication.

When considering the question of determining the quality of the reality of forensic reporting for society as a whole, it seems even necessary to find a key answer to the question of whether judicial reporting is socially justified, socially desirable? If so, what is its actual level in the realities of social legal awareness – civic awareness, and very much in the sense of social rule of law and justice?

On the issue of the social need for judicial reporting, Jacek Sobczak made a broad statement in a 2000 study. Journalist – court rapporteur – rights and obligations, confirming the social legitimacy of this type of journalistic form, because punishable acts – "crime, misdemeanor and misdemeanor have always attracted and still attract attention audience (Sobczak, 2000, p. 9). It seems to be true, although such a thesis contains a specific subtext, not always finding full justification and explanation of the entire reflection of the social perception of ongoing court trials".

Society does not always have to be viewed as an audience that is part of it. This is justified when it concerns an active courtroom group as the audience. In support of this direction of considerations, attention should be paid to the degree and scope of the observers – recipients, legal awareness, their sense of democratization, the rule of law and justice. Is the interest of recipients in this type of information the result of searching for sensations, killing time, or is it a manifestation of civic concern for values, civic social involvement in public life? The perception of the rule of law and the judiciary and related judicial reporting in the period before the transformation in Poland differed significantly from the present situation. The Constitution of the People's Republic of Poland gave every citizen the right to speak, while the current one guarantees much more – it grants the right to speak after speech.

In explaining human behavior in the area of transmission and reception of information about the courtroom, the sociology of knowledge (the basis of theoretical reflection) may be helpful, focusing on the relations that exist between knowledge and other social factors. According to its assumptions, the content of views, statements or assessments are not subject to examination by confronting the evidence, but rather to answer the fundamental question in this regard, namely, how does it happen that such views exist. And the very assessment of the interpretation of thoughts is made on the basis of the criterion of source and psychological, economic or mass function.

Adopting such a theory (theoretical paradigm) seems to be correct for several reasons. First, legal awareness is only an aspect of social awareness. Secondly: assuming legal awareness as a part of social awareness, it is difficult to narrow down the considerations only to the knowledge possessed by an individual in the field of subjective rights. Thirdly: in order to discover the discrepancies in the understanding of the concept of social consciousness, the processes related to its acquisition and shaping, it is necessary to explore, for example, the achievements of Karl Marx, Max Scheler, Karl Mannheim, Emil Durkheim or Pitrim Sorokin, where they all share the thesis that thought has a basis existential (Marks et al., 1996, p. 9).

So far, scientists have failed to define the pure form of legal consciousness (there is a dispute between sociologists and legal theorists), however, there is general agreement that legal awareness is part of social consciousness. Using the dictionary knowledge, one can define the concept of legal awareness as a mutually interconnected and integrated whole of the content of

spiritual life, views, values, ideas, attitudes and beliefs of a given community (Olechnicki et al., 2004, p. 215).

Such a general definition does not fully explain the complex, also interdisciplinary, concept. This prompts us to refer to modern legal thought, which arises on the basis of empiricism and rationalism that characterize mechanistic – individualistic and contractualist interpretations of law. Empiricists (such as David Hume) emphasized experience as the primary source of human knowledge obtained through induction (they believed more in the probability than in the certainty of this human knowledge). On the other hand, rationalists derived abstract ideas from reason using the deductive method – remaining fully convinced as to the certainty of knowledge thus achieved.

A concept that is not widely accepted today is the theological one, according to which a special kind of jurisprudence was adopted, law was not distinguished from morality, and the understanding of law came exclusively from God (Leibniz et al., 1998, p. 112). Modern thought has recognized knowledge based on facts and observations as knowledge worthy of attention and trust, as the principles of rationality, cognitive abilities, a rich source of moral and legal ideas. It should not be surprising that this thought resulted in modern theories of subjective rights, individual rights and declarations of human and civil rights, the greatest of whose opponents turned out to be Thomas Hobbes, the creator of "Leviathan", who in his theories proved that "the law of nature (lex naturalis), there is a rule or a general rule which reason finds and which forbids man to do what is destructive to his life, which in some sense is not without logic" (Hobbes, 1954, p. 113).

For many of us, too much emphasis on legal awareness in the media may turn out to be unnecessary, deviating from the main topic. So where is the crux of the matter? It all depends on how prepared those who deal with the forensic reporting message and the preparation of the recipients of the message. How and according to what criteria the recipients analyze the received message. It is often the case that the message presented to recipients is incomprehensible to many, and also to the transmitters themselves, which is pure manipulation and distorts its content, but sometimes this is what it is all about.

3. The impact of forensic reporting on social legal awareness

In order to achieve the assumed effect of judicial reporting, an important element is the transmission of complex information about the rule of law and law. There is no doubt that the condition for such communication is the knowledge of the concept of the rule of law and law itself. Simply put, the knowledge of both means a situation in which, first of all, the addressee, before making a decision on a specific behavior, is aware of the pattern of conduct established by law and the rule of law. Second: is aware of the nature of this pattern. He is aware that it is

only legal, democratic and lawful. This can only happen when there is a process of communicating information about the law, not about morality, custom or tradition, between the communicator and the addressee, not to mention rumors.

The greatest contributions to the analysis of the communication processes of transmitting information about the law belong to the studies of F. Studnicki (Studnicki et al., 1969, p. 92). Which treats the legal norm as one of the basic tools for shaping social relations. As a process of information from the point of view of the normative and assumptions, the achievement of maximum effectiveness. In his opinion, two issues are important for the effectiveness of providing information: who provides this information and what is its type. A perfectly formulated message can be considered one that is fully understandable to recipients belonging to all social groups. But is it possible? Due to the social multifaceted and interdisciplinary cross-section, it does not seem possible to achieve it.

The transmission of information about the law and the rule of law is not an easy and populist message, but it requires considerable knowledge of law making and application (Kuzior, Kwilliński, 2021, p. 89-106).

We deal with the process of interpretation when the meaning of the message about the law is not obviously imposed on the recipient, as well as in cases where the determination of a specific message requires complex mental efforts (Studnicki et al., 1969, p. 94).

It is commonly recognized that the knowledge of legal concepts among average people is low. Consequently, it could be said that the intelligibility of this matter concerns only lawyers. This view, however, was criticized by Maria Borucka-Arctowa and Franciszek Studnicki, who indicated that knowledge about law is conditioned by the social role of an individual, in the legal professions with a narrow specialization (Gryniuk, 1979, p. 18).

The legal assessment in the spirit of the rule of law of a court report by ordinary bread eaters with no legal knowledge is mainly related to their own experiences with law enforcement institutions and bodies. The assessment of the law and the rule of law of people who do not have in-depth knowledge of the law is particularly influenced not by the media coverage itself, but by its narrative, moment and content of the justification of court decisions, often presented in a manner incomprehensible to the average person, e.g. One of the judgments of the District Court in Warsaw stated that "the term today should not be understood as today". It is thanks to the justifications, and not the basis of the judgment, that the individual and the general public receive an explanation why the judgment has such and not another content and on what it was based. In this case, the source of the message plays a special role, especially when it comes to the message of investigative journalism.

Regardless of the source of information (legal source), recipients of information should be convinced of its accuracy, which is particularly important in the case of identifying issues widely publicized by the media and which are of great interest to the public.

It is quite often the case that the parties and the public, after reading the verdict of the ruling, do not pay attention to the arguments cited by the court underlying the decision. In such a situation, the opinion on the law and the rule of law and the assessment of the degree of justice is then based on the presumption that (...) this unknown law is right, useful, just, worthy of respect or on the presumption that it is dangerous, embarrassing, cruel, serving the elite not for the mediocre. Which justifies a thesis that the complexity of the assessment is an intensified issue of gaining knowledge about the rule of law and justice, which is included in the area of the decision rule, and the result largely depends on the degree of reflectivity of the assessment.

Explaining the social role of forensic reporting requires finding an answer to the question of what is the participation of the community itself in this. In the literature on the subject, the normative approach is dominant, in which a set of expectations towards an individual concerns how he or she is to behave. Among those who do not know the law literally, it assumes the nature of a phenomenon based on social awareness in the form of an image of a certain group of people (Wiatr, 1973, p. 110).

Elżbieta Łojko aptly explains it, quoting E. Durkheim in *Sociological Considerations*. M. Weber. T. Parsons. L. Petrażycki that one of the most important aspects of the level and type of integration of society are the mechanisms of shaping the images of the principles of law and the rule of law in social awareness and patterns of behavior. The conclusion is that a lot depends on what sources and how the society will create in its consciousness the image of the law, patterns of behavior in line with the spirit of the rule of law" (Łojko, 2013, p. 45).

Jacek Sobczak's view on the continuing demand for information from court trials still seems to be current, in which journalists – also known as investigative journalists – have a significant share. The open question is whether they have assumed the independent "role of the eyes and ears" of those who cannot observe the ongoing processes themselves? The direction of maintaining the character and rank of investigative journalism as a service to the state and society also seems to be correct. This form of journalism in its complexity undoubtedly has a social rank (Sobczak, 2000, p. 11). It should be pointed out here that the analysis would require extending the research to include forms of communication via the Internet.

In the era of the market economy, focused mainly on making a profit, it is difficult to predict whether the journalistic community itself will maintain and share the view on social service. With increasing difficulties (attributed to various crises), social sense will decline in favor of clean business.

Apart from the current condition of publishers and a number of troubles affecting them, it does not seem that they will focus on expanding the offer of forensic reporting as a basic product in the near future. Therefore, a question must be asked whether, as an alternative and reliable source of public information from the court, the state should not deal with it within the framework of universal legal education. Such a solution carries a high risk of manipulation, it is possible to use this information for the purposes of political games (Treiger, 1992, p. 98). On the other hand, like the world with the world, there were processes and comments, and what resulted from them socially (...).

4. Summary

Thanks to the widespread transmission of information in many areas, the public learns about a number of events related to lawmaking and application, including in the field of judicial reporting, but this is certainly not enough to raise public awareness of the law and the rule of law. Therefore, it seems to be highly justified to promote knowledge about the rule of law, starting from the level of early education. What is the difference between a 6-year-old learning a foreign language and a 6-year-old learning basic issues about law and the rule of law? The message about the law and the rule of law addressed to such young people would be received and used differently in their adult lives, also by young people joining the ranks of journalists or court reporters in the future.

It remains indisputable that there is a social need for journalistic judicial reporting and the need for the rule of law. The investigative journalist or court rapporteur should always remain objective and not succumb to any temptation (...). He should not use eristic stratagems in his report, prove the rightness of someone else's position and not draw unjustified conclusions or persuade the recipients to do so (Ziemiński, 1998, p. 214).

It is an open question whether only journalists should deal with forensic reporting, or also people from outside this profession. It seems that all those who have something interesting and correct to say on this subject do it honestly, to raise public awareness of the law and the rule of law, without exceeding the established patterns and rules in this regard (Kuzior, 2020, p. 351-363). This leads to a concluding conclusion that without the use of appropriate models – values and raising the level of citizens' awareness, it will not be possible to build a society aware of its rights and obligations, and it is not legitimate to say that every manifestation of judicial reporting contributes to strengthening the rule of law in the spirit of a democratic state. rights.

The world of values surrounds man, but it depends on him which values he pays attention to and towards which he is indifferent. Man has the freedom to choose what suits him best (Tischner et al., 2000, p. 22). Among values, man does not have to do anything and can do a lot. The less complex and understandable the forensic message, the closer to the concept of simple principles of human life and action.

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SIGNALING THEORY IN DIVIDEND POLICY

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Purpose: The purpose of this paper is to examine the signaling theory of dividend policy in companies that are listed on the Warsaw Stock Exchange.

Design/methodology/approach: Based on the literature review of signaling theory in dividend policy, the research hypothesis was stated: There is no relationship between future earnings and current dividend payments in the financial statements of Warsaw listed companies during the studied period 2010-2021. Accordingly, an empirical model was built which consisted of an explanatory variable (dividend in subsequent years) and explanatory variables (earnings in subsequent years). In addition, a research questionnaire was conducted for individual investors who have been investing in the Warsaw Stock Exchange for more than one year.

Findings: The estimation results of the econometric model confirmed that there is no relationship between the dividend paid and the profit of a given company. On the other hand, the survey results indicated that dividend policy is an important element in the decision-making process of individual investors in the stock market.

Originality/value: The research in the paper is complementary in nature – the signaling theory in dividend policy was examined in a multifaceted manner – econometric testing of the model and qualitative research in the form of a survey among 100 investors.

Keywords: finance, signaling theory, dividend policy.

Category of the paper: own research.

1. Introduction

Its basic feature was a decrease in the share of companies paying dividends in the total number of companies, a decrease in payout rates and dividend rates with an increase in the value and concentration of payouts. Based on the data presented, it can be assumed that companies will want to share profits with their shareholders in the future as well. The analysis of the literature and the number of studies on the topic of signaling theory in dividend policy indicates that this problem has not been clearly resolved. In view of the literature analysis conducted on the topic of signaling theory in dividend policy, a hypothesis is proposed:

H0: There is no relationship between future earnings and current dividend payments in the financial statements of Warsaw listed companies during the studied period 2010-2021.

For this purpose, a database consisting of companies that paid dividends between 2010 and 2021 was created.

2. Literature Review

The thesis "dividend policy contains some information about future earnings" was implemented to the field of finance by authors Bhattacharya (1979), Miller and Rock (1985), and John and Williams (1985) (Kaźmierska-Jóźwia, k 2017). Signaling theory is a theory that determines the relationship between dividends and stock price. S. Bhattacharya says dividends serve as a signal of future cash flows. Although dividends have no tax benefits, a company will choose to pay them to send a positive signal to shareholders and outside stakeholders. On the other hand, the research of M. Lintner (1957) indicated that an increase in dividends is usually a signal of a permanent change in the level of profit, and not an announcement of a one-time increase in profits in the future (Żyła, 2018). The decision to pay a dividend and the moment of its payment itself is particularly observed by investors who hold shares of a given company in their portfolio and by investors who are potentially interested in buying them. The observation and analysis of these two moments (the announcement of the decision to pay and the moment of the payment itself) is a signal to all investors about the financial health of the company – although undoubtedly the managers of the company who are involved in the management are definitely better informed about the financial situation than the investors themselves. The perception of dividends as a specific information tool was first noticed in their research by M. Miller and F. Modigliani. These considerations were joined by S. Bhattachary, who was the first to create the concept and assumptions about dividends in signaling theory. According to the author, any change in dividend policy communicated by a company to its shareholders is at the same time a specific informational message. A company that makes a public announcement regarding the payment of dividends has a clear basis for doing so. Most often, the announcement of such a decision is preceded by the determination of long-term plans and financial situation within the company. In literature, the importance of dividends in the context of their payment and share prices was also studied. A significant increase in market prices is preceded by an announcement of an increase in the amount paid, and a decrease results in a decrease in prices on the day of the dividend payment announcement and the day after the announcement. On a similar topic, a study was conducted using a sample of 310 companies, where the results indicated that there is a relationship between future earnings and unexpected current dividend changes (Watts, 1973). The study also used a key property common to dividend signaling models-the higher the taxation of dividend income relative to capital gains

income, the greater the value of the information revealed by a particular dividend rate-but the study did not indicate a relationship between dividends and their information content (Healy, Palepu, 1988).

3. Methodology

Due to the literature review conducted on the analyzed topic of signaling theory in dividend policy, hypothesis H0 is posed, which is a continuation of the research on signaling theory in dividend policy.

H0: There is no relationship between future earnings and current dividend payments in the financial statements of Warsaw listed companies during the study period 2010-2021.

In order to accept or reject the hypothesis in the most important stage of the study, a multiple regression of the following values will be estimated:

$$\text{Profit}_t = 1 + \text{Profit}_{t-1} + \text{Profit}_{t-2} + \text{Dividends}_{t-1} + \text{Dividends}_{t-2} + \varepsilon \quad (1)$$

where:

$t = 2010, \dots, 2022,$

$i = 1, \dots, n$ (number of WSE companies that paid dividends),

$E_{i,t+1}$ – company's profit in year $t+1$,

iD_{it} – declared dividend in year t ,

ε – value of random component.

The conclusions drawn from the multiple regression will be complemented by a survey of investors. The survey was addressed to investors who independently make investments on the Warsaw Stock Exchange.

4. The empirical study

A linear mixed regression model was used that allowed for the inclusion of repeated measures for each observation. This model is quite robust to both the effect of violating distributional assumptions of random effects variance and residuals and to distributions with marked differences from normality (Schielzeth et al., 2020). The mixed linear regression equation is shown in (2).

$$y|x, u = x'\beta + z'u + \epsilon \quad (2)$$

where x were the factors with (fixed) effects to be examined, with the notation of the effects as β . Factors with u effects only contributed to the variation in $y|x$. The model assumptions were formulated using equations 2.1-2.3:

$$u \sim N(0, G) \quad (2.1)$$

$$\epsilon \sim (0, R) \quad (2.2)$$

$$\text{Cov}(u, \epsilon) = 0 \quad (2.3)$$

In the current analysis, it was assumed that the random effects were sampled from a multivariate Gaussian distribution $N(0, G)$. The fixed and random effects β and u were determined by maximizing the joint density $f(y, u)$. The significance of the effect of profit and dividends of the previous two years on the profit of the following year in linear mixed model notation was examined using the following formula.

$$\text{Profit}_t = 1 + \text{Profit}_{t-1} + \text{Profit}_{t-2} + \text{Dividends}_{t-1} + \text{Dividends}_{t-2} + (1|id) \quad (3)$$

where $(1|id)$ – random intercept of grouping variable (firm's id) with fixed mean.

The model was characterized by a good differentiation of companies in terms of profit, ICC = 0.70, which made it possible to use a mixed model. The p -value for univariate categorical data was computed from the asymptotic chi-squared distribution of the test statistic without continuity correction. The financial results (profit, gross and net dividends) of 35 companies over the period 2015-2020 was analyzed. The main descriptive statistics of the study sample by year were shown in Table 1.

Table 1.
Signaling theory in dividend policy

Financial performance	Year	N	M	SD	Mdn	IQR	Min	Max
Profit	2015	34	244,75	642,84	79,59	93,22	-17,15	3233
	2016	34	345,43	1035,15	71,3	126,27	4,64	5740
	2017	34	408,99	1295,43	73,17	142,03	6,91	7173
	2018	34	363,29	1073,5	67,31	134,75	12,04	5604
	2019	34	256,1	759,89	74,63	78,8	-263	4298
	2020	34	421,48	1370,26	88,96	105,88	-1507	7340
Gross dividends	2015	27	2,29	3,89	1,30	2,62	0	20,00
	2016	30	2,72	4,83	0,61	2,77	0	20,00
	2017	35	3,06	5,37	0,70	2,76	0	22,00
	2018	35	3,29	5,73	0,89	2,75	0	25,00
	2019	34	3,26	5,23	1,00	3,43	0	25,00
	2020	34	3,19	6,49	0,82	2,66	0	30,00
Net dividends	2015	27	1,86	3,15	1,05	2,12	0	16,20
	2016	30	2,21	3,91	0,49	2,25	0	16,20
	2017	35	2,48	4,35	0,57	2,23	0	17,82
	2018	35	2,66	4,64	0,72	2,21	0	20,25
	2019	34	2,64	4,24	0,81	2,78	0	20,25
	2020	34	2,59	5,26	0,67	2,15	0	24,30

Sources: own research.

Results

The results of a linear mixed model fitting based on equation (3) are shown in Table 2.

Table 2.
An empirical study of signaling theory in dividend policy

Predictors	Estimates	Profit t	
		CI	P
(Intercept)	75.88	-62.98-214.73	0.281
Profit $t-1$	0.62	0.31-0.93	<0.001
Profit $t-2$	0.31	-0.01-0.62	0.055
Dividends $t-1$	-9.66	-65.20-45.89	0.731
Dividends $t-2$	5.59	-53.77-64.95	0.852

Note: marginal $R^2 = 0.72$, observations = 123, $N_{id} = 34^1$.

Sources: own research.

The implemented model showed the significance of only the profit factor at time $t-1$ on the profit at time t . An increase in profit at $t-1$ will cause an increase in profit at t of 0.62. The effect on the dependent variable profit at time $t-2$, although not significant at $\alpha = 0.05$, was significant at the trend level and had a half size positive effect compared to profit at time $t-1$. The significance of the effect of the value of dividends paid (both gross and net) in the last two years on dependent variable not shown. Frequency distributions, percentages, and goodness-of-fit test statistics for responses to the research questions are presented in Tables 3-11.

Table 3.

Frequency of responses, percentages, and statistical test results to the research question «Does an investor pay attention to the fact that it pays dividends when selecting a company for their investment portfolio?» ($N = 50$)

Responses				Hypothesis testing		
Yes	Rather yes	Rather no	No	χ^2	df	P
35 (70%)	10 (20%)	3 (6%)	2 (4%)	57.04	3	<0.001

Source: own research.

Most investors (35 respondents) pay attention to dividends paid by companies when selecting new financial instruments for their portfolio. For those investors (10 respondents) who are not completely sure, dividends paid by companies may be a factor that positively influences their decision to purchase a given financial instrument.

Table 4.

Frequency of responses, percentages, and statistical test results to the research question «Is the dividend policy informative about the financial health of the company?» ($N = 50$)

Responses				Hypothesis testing		
Yes	Rather yes	Rather no	No	χ^2	df	P
24 (48%)	16 (32%)	8 (16%)	2 (4%)	22.0	3	<0.001

Source: own research.

¹ One company's data was not included to the model due to missing data.

Investors who responded to the question in Table 4 recognize that the dividend policy pursued in companies is information about the financial health of the company (24 responses – "yes", 16 responses – "rather yes"). The distribution of answers divided in this way confirms in practice that dividend policy is important from the point of view of investors' decisions to buy shares.

Table 5.

Frequency of responses, percentages, and statistical test results to the research question: «Does the dividend policy affect the valuation of shares of companies that pay out dividends to their shareholders?» (N = 50)

Responses				Hypothesis testing		
Yes	Rather yes	Rather no	No	χ^2	df	P
30 (60%)	13 (26%)	6 (12%)	1 (2%)	38.48	3	<0.001

Source: own research.

Investors who responded to the question in Table 5 believe that the dividend policy pursued influences the value of shares of a given company that pays out this dividend (30 responses – "yes", 13 responses – "rather yes"). The result obtained at this level gives 76% of all answers in the whole survey. The distribution of answers divided in this way confirms in practice that the dividend policy is important from the point of view of the decisions made by investors. In addition, the dividend policy was assessed as a positive determinant affecting the value of shares.

Table 6.

Frequency of responses, percentages, and statistical test results to the research question: «Is the dividend policy of Polish companies clearly understood by the investors?» (N = 50)

Responses				Hypothesis testing		
Yes	Rather yes	Rather no	No	χ^2	df	P
5 (10%)	22 (44%)	15 (30%)	8 (16%)	13.84	3	0.003

Source: own research.

Investors who responded to the question in Table 6 believe that the dividend policy pursued in Polish joint-stock companies is not fully understood and clear to investors who are interested in dividend policy (5 "yes" answers, 22 "rather yes" answers). The result obtained at this level gives 54% of all answers in the survey. The remaining 46% of all survey responses indicate that investors have a negative view of the way Warsaw listed companies communicate about their dividend policy.

Table 7.

Frequency of responses, percentages, and statistical test results to the research question: «Is information on dividend policy communicated systematically by companies listed on the WSE?»

Responses				Hypothesis testing		
Yes	Rather yes	Rather no	No	χ^2	df	p
11 (22%)	20 (40%)	17 (34%)	2 (4%)	17.4	3	<0.001

Source: own research.

Investors who gave a positive answer to the question in Table 7 recognize that information about dividend paid does not appear regularly (11 answers – "yes", 20 answers – "rather yes"). The result obtained at this level gives 62% of all answers in response to the question posed in the survey. The remaining 38% of all survey responses indicate that investors have a negative view of the way Warsaw listed companies communicate about their dividend policy as a result of a lack of continuity in dividend payments to investors.

Table 8.

Frequency of responses, percentages, and statistical test results to the research question: «Is the lack of continuity in dividend payments in subsequent years perceived negatively by investors?»

Responses				Hypothesis testing		
Yes	Rather yes	Rather no	No	χ^2	df	P
29 (58%)	18 (36%)	3 (6%)	0	43.92	3	<0.001

Source: own research.

Investors who gave a positive answer to the question in Table 8 consider that the lack of continuity in dividend payments to shareholders is not a positive signal concerning the company's financial condition (29 answers – "yes", 18 answers – "rather yes"). The result obtained at this level gives 94% of all answers in response to the question posed in the survey.

Table 9.

Frequency of responses, percentages, and statistical test results to the research question: «Do companies have a continuous dividend policy?»

Responses				Hypothesis testing		
Yes	Rather yes	Rather no	No	χ^2	df	p
30 (60%)	17 (34%)	2 (4%)	1 (2%)	45.52	3	<0.001

Source: own research.

Investors who gave a positive answer to the question in Table 9 recognize that companies that have decided to pursue a dividend policy continue to pursue it in future periods (30 answers – "yes", 17 answers – "rather yes"). The result obtained at this level gives 84% of all answers in response to the question posed in the survey.

Table 10.

Frequency of responses, percentages, and statistical test results to the research question: «Are changes in dividend policy (change of value of dividend paid) perceived positively by investors?»

Responses				Hypothesis testing		
Yes	Rather yes	Rather no	No	χ^2	df	p
22 (44%)	18 (36%)	8 (16%)	2 (4%)	20.08	3	<0.001

Source: own research.

Investors who gave a positive answer to the question in Table 10 consider that information about a change in the level of dividend paid is a positive signal for stock exchange investors (22 answers – "yes", 18 answers – "rather yes"). The result obtained at this level gives 80% of all answers in response to the question posed in the survey. Significant goodness-of-fit test scores indicated significant differentiation among subjects within each question.

5. Summary

Dividend policy and the research conducted in connection with it, occupy a lot of space in literature studies. Thus, it is possible to identify and define a wide variety of factors that affect its existence and application in companies. Macroeconomic and microeconomic factors influence the development of dividend policy and the way the company itself operates. The third group, which is the most difficult to measure and quite unpredictable, is the group of behavioral factors. This group includes primarily the behavior of individual investors, whose reactions and decisions can significantly affect the price of company shares. The empirical research carried out in the first part of the article indicates that the dividend paid in year t does not matter for the profits in period $t+1$. Therefore, the hypothesis presented in the paper should be accepted:

H0: There is no relationship between future earnings and current dividend payments in the financial statements of Warsaw listed companies during the studied period 2010-2021.

On the other hand, research addressed to individual investors who transfer their funds to purchase financial instruments on the Warsaw Stock Exchange determines that investors pay attention to whether the company pays dividends (Table 3). Additionally, the majority of respondents positively assess the financial condition of the company that pays dividend (Table 4). Among all the respondents, the vast majority expressed the belief that dividend paid affects the value of share prices (Table 5). On the other hand, investors rather negatively assess the information message sent by companies to the market regarding their dividend policy (Table 6-7). The change in the value of dividend paid is also not a positive phenomenon in the opinion of investors (Table 8). A positive situation for investors is the continuation of companies in paying dividends to shareholders and the change in the value of dividends paid (Table 9-10). In view of the research conducted, it should be considered that dividend policy is more important from the field of behavioral finance. On the other hand, during the studied time period and with the given number of companies, it was not possible to confirm the relationship between the dividend paid in year t and the profits earned in year $t+1$. It seems reasonable to conclude that the signaling theory in dividend policy is not applicable.

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THE NEED OF SUPERVISION AND CONTROL OVER TRANSPORT OF SLAUGHTER ANIMALS AS THE PART OF GROWING AWARENESS OF ANIMAL RIGHTS AND SUSTAINABLE DEVELOPMENT

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Purpose: The article presents issues related to the transport of slaughter animals in terms of sustainable development and during the time of increased interest in animal rights. The aim of the article is to analyze the functioning of transport companies involved in the transport of animals. The first part of the article presents issues related to animal welfare, which is part of the concept of sustainable development. Particular attention was paid to the issue of welfare during the transport of farm animals to the slaughterhouse.

Methodology: The article presents the results of the Supreme Audit Office on the transport of animals, which were carried out in 1998, 2003, 2005 and 2017, and the results of inspections belonging to the tasks of the Veterinary Inspection in the Silesian Voivodeship in 2019 and 2020. Then the author presents her research results. The survey was conducted among the owners of enterprises handling the transport of slaughter animals in the Silesian Voivodeship and among drivers and guards of these enterprises. 94 business owners and 92 drivers transporting animals participated in the study. Chi-square tests were used to show the relationship between the variables

Findings: On the basis of the conducted research, it was found that the control system is conducive to the enforcement of the law in the field of transport of animals for slaughter in enterprises.

Originality/value: In the context of sustainable development, the subject of animal welfare is being increasingly regarded as essential. Ensuring animal welfare is now the key issue for public opinion, livestock farmers, animal rights organizations, entrepreneurs, transport companies and slaughterhouses. The awareness of people related to publicizing animal abuse is increasing, and we as consumers also have a right to know how animals were treated on farms and during transport.

Keywords: sustainability, animal welfare, animal transport, slaughter animals.

Category of the paper: Research paper.

1. Introduction

During the time of globalization of economic activity, there is a need for system solutions in the field of economic processes, providing for environmental needs. To implement management based on sustainable development principles, knowledge and modern technological ideas are essential (Adamik, Sikora-Fernandez, 2021, p. 1572; Stelmaszczyk, Pierścieniak, Krzysztofek, 2021, p. 2367). Since 1990s, sustainability has been a subject of constant interest among academics, managers and businessmen concerned with long pressure, from different profits, prodding organizations to reconsider their business models, including business practices on society and environment (Bottani, Tebaldi, Lazzari, Casella, 2019, pp. 361-366). The concept of sustainable development is a response to the destabilization of socio-economic and natural systems, also in relation to transport processes. Sustainable development strategies, particularly in Europe, centre on transportation, with social, environmental and economic criteria including project evaluation, appraisal and funding (Anastasiadou, 2021, p. 4760). To this purpose, the EU has launched a set of initiatives, both at institutional and at research level to promote sustainable transportation (EC Website, 2016, 2021). It is essential to implement actions to reduce the negative impact of transport on the natural environment and society. Particular attention should be paid to the transport of animals, which are both part of the natural environment and a food source for humans. Their proper treatment during transport enables not only to protect the natural environment, but, most of all, to ensure human health. During transport, animals must be provided with welfare, which is measured by the five freedoms of animals, which include (Five Freedoms...):

- Freedom from hunger, thirst and malnutrition.
- Freedom from emotional trauma and pain.
- Freedom from pain, wounds and disease.
- Freedom to express natural behavior.
- Freedom from fear and stress.

In 2016 the United Nations Committee on World Food Security published its recommendations in Article VIII entitled *Animal health and welfare*. It reads as follows:

Improve animal welfare delivering on the five freedoms and related OIE standards and principles, including through capacity building programs, and supporting voluntary actions in the livestock sector to improve animal welfare (United Nations..., 2016).

This document and this paragraph are significant for at least two reasons. Firstly, animal welfare is located along with domains of sustainability, and secondly it has taken so long to get there (Buller, Blokhuis, Jensen, Keeling, 2018, p. 81).

The animal caretakers involved in processes of transport attempt to minimize discomfort and stress for the animals, but research is needed to concentrate on the gaps in knowledge and to support the implementation of strategies known to reinforce the human-animal interactions

that occur from farm to slaughter (Buller, Blokhuis, Jensen, Keeling, 2018, p. 1). Although, the people involved in the process of transport like feedlot loading crew, truck drivers, animal handlers at the sale barn and slaughter plant try to minimize stress and discomfort for the animals, they still may be exposed to plenty of stressors such as noise, temperature extremes, unfamiliar humans and animals, lack of water/food and new pen conditions (Swanson, Morrow-Tesch, 2001, p. 79; Broom, 2003, pp. 515-518; Ferguson, Warner, 2008, pp. 12-19; Schwartzkopf-Genswein, Faucitano, Dadgar, Shand, González, Crowe, 2012, pp. 227-243; Cockram, 2017, pp. 157-202; Losada-Espinosa, Villarroel, María, Miranda-de la Lama, 2018, pp. 34-48).

Animal welfare still remains one of the main priorities for livestock producers, businesses, and also consumers. The public focus on where their food comes from with a specific attention to animal welfare. Consumer trust and purchasing surveys have provided insight into how consumers are or are not making decisions on meat purchases. This report indicated for example that only 25% respondents in believe that meat is derived from humanely treated animals (The Center for Food Integrity..., 2018; FMI, 2019).

2. Supervision and control of the transport of slaughter animals in Poland

Certainly, the norms and standards imposed by the law on the animal transport are intended to improve animal welfare. Despite this, it is really difficult to state to what extent they are respected by transport organizers and carriers (Smaga, 2017).

Numerous press reports on the violation of animal rights during transport (<https://www.ciwf.pl...>; <http://wyborcza.pl/1...>; <http://wyborcza.pl/7...>) prove that this subject still requires education among the society. According to the latest report by an animal welfare organization – Compassion in World Farming (CINF) – the current EU regulations on the transport of animals are systematically violated. Polish carriers are also involved in this. The investigation, which was conducted in 2014-2016, included three Polish carriers. During the two-year investigation, 10 transports of calves and lambs between European Union countries were inspected (<http://wyborcza.pl/7...>). The report stated, inter alia, that (<http://wyborcza.pl/7...>):

- the vehicles were not equipped with appropriate drinking troughs and feeding facilities for calves and lambs,
- the carriers did not provide right food for young animals,
- the animals did not have a mandatory break after 9 hours of travel, during which they should be fed and watered. Hungry and thirsty animals licked the bars and tried to suck the bellies of other animals,

- animals were transported for up to 36 hours, while the maximum transport time for these animals is 19 hours,
- the calves were transported at the temperature below 0°C,
- the animals were not looked after during transport. There have been cases of wedged limbs in the slits between the floor and the side walls,
- the animals were loaded onto several levels, crowded. Many animals died during the transport,
- cases of beating, pushing and mistreatment have been reported during unloading.

This report is from 2016, and while its results are controversial, they are not occasional cases.

The Supreme Audit Office in Poland has so far conducted four inspections concerning the animal transport: in 1998, in 2003, in 2005 and in the years 2014-2016. During an inspection by the Supreme Audit Office in 1998, it was found that the conditions of the transported animals were disastrous. It was noted, *inter alia*, that the means of transport were in a very poor technical and sanitary condition, there were: leaky roofs, no roofs, holes in the floors, in which the animals had been breaking their limbs. The loading surfaces were dirty and not sanitized from previous transports. The animals were transported in an excessive crowding, without proper compartments. There have been reports of kicking animals and pulling them onto the ramp by the ears (Information of the Supreme Audit Office, 1998).

In the report of the Supreme Audit Office of 2003, it was noted that the situation of animals in transport had improved. Means of transport carrying animals met the requirements specified in the regulations to a greater extent than previously. The scope and scale of exceeding the loading density standards also decreased. Cases where animals died during transport or were injured have occurred incidentally (Information of the Supreme Audit Office, 2003).

The inspection conducted in 2003-2004 was taken on the initiative of the Supreme Audit Office, by reason of reports in the press on the inhumane treatment of farm animals, as well as a suggestion of the Deputy Speaker of the Parliament and members of the Parliamentary Group of Friends of Animals (<http://www.viva.org.pl...>).

On May 1, 2004, five new laws related to animal welfare entered into force, and law changes on animal protection were also made. However, there was still a lack of sufficiently detailed regulations regarding all aspects of animal welfare inspections, which made it difficult to conduct the inspections precisely and to apply the criminal sanctions provided for by law. The Supreme Audit Office control presented that the supervision over the conditions of purchase, slaughter and transport of animals was insufficient in the period under examination. The reliability and effectiveness of actions taken by the Veterinary Inspection and the Road Transport Inspection were unsatisfactory. The conditions of animal transport have not improved. The control of 36 entities transporting animals revealed irregularities in relation to 19, i.e., 53% of the audited entities. The control of 52 vehicles carrying animals found irregularities in 50% of the audited vehicles. Among other things, the transport of non-recorded

animals, by vehicles in poor technical and sanitary condition, in which it was not possible to properly dispose the animals, by vehicles without a decision to allow the animal transport, driven by people who did not respect the law. There were also irregularities in actions of Veterinary Inspection authorities. Among 9 audited District Veterinary Inspectorates, irregularities regarding the supervision of collection centres, marketplaces or collective bases were found in 4 inspectorates, regarding the supervision of slaughter in 5, and regarding the supervision of transport in 3. According to the Supreme Audit Office, the supervision of the Road Transport Inspection was also unsatisfactory. The inspections of vehicles transporting animals were out of the designated directions of the Inspection activity. Vehicles transporting animals were audited occasionally. In the period from 2003 to the first half of 2004, the Road Transport Inspection conducted 878 inspections of means of transporting animals and 11 inspections of enterprises carrying out the transport of live animals, out of over 2,000 entities with nearly 4 thousand vehicles that operate in the country. In these inspection protocols, there were no sufficient data necessary to assess the conditions of the animal transport. The scope of cooperation of the Veterinary Inspection with the Road Transport Inspection and non-governmental organizations was also insufficient in the controlled period. No improvement was found in comparison to the results of the previous audits conducted by the Supreme Audit Office. Not all the Supreme Audit Office requests were implemented. Disregard of the provisions of law within the scope of this audit by the Supreme Audit Office is not only of ethical and moral significance. The marginal treatment of entities involved in the animal transport by the Road Transport Inspection was incorrect and not only due to animal welfare, but also due to the risk to road safety posed by vehicles in poor technical condition or driven by people who had not respected the permitted working time limits (Information of the Supreme Audit Office, 2005).

The Supreme Audit Office reports that currently the control of vehicles transporting animals is very difficult (<https://www.agropolska.pl...>): *The veterinary inspection cannot stop the vehicle on its own. Police officers are not trained to inspect vehicles carrying animals, so they prefer to avoid it. In turn, the Road Transport Inspection, which conducts such training, does not have the authority to inspect vehicles weighing up to 3.5 tons. While a large part of livestock is transported by them and the greatest irregularities occur right in them. That is the reason for the next, recent audit by the Supreme Audit Office.* It is part of the entire cycle of research on the situation of animals in Poland (<https://www.agropolska.pl...>). During the 2014-2016 audit, the Supreme Audit Office was also supposed to handle the following issues, which were pointed out by representatives of the Road Transport Inspection and pro-animal organizations (<https://www.agropolska.pl...>):

- scale of penalties not adjusted to the reality, both in terms of the fine values and their recipients,
- no procedures for handling an accident involving animals,
- common rules so that the Border Guard, Police and Customs Service join the inspection of animal carriers,
- supervision over animal markets, where the largest number of animal carriers using vehicles up to 3.5 tons is present. According to those who examine the situation, sick animals, unable to get into cars, and sometimes even to stand are traded there. There are acts of violence against animals at the markets: kicking, twisting their tails, tugging their ears, throwing them off tall cars,

In July 2017, the latest report of the Supreme Audit Office was published – Supervision over the transport and slaughter of farm animals (Information of the Supreme Audit Office, 2017). The justification for undertaking the control was the results of implementing the "Zero tolerance" program by the Veterinary Inspection, which presented violations of animal welfare in transport and slaughter. The reason for the control was also information provided by social organizations and the media, pointing to cases of improper treatment of farm animals during transport and slaughter. The control matters included the following (Information of the Supreme Audit Office, 2017):

- controlling the Veterinary Inspection over compliance with the law on the protection of farm animals in transport and slaughter,
- conducting supervision tasks by the Road Transport Inspection over compliance with the regulations on the protection of animals by carriers,
- taking actions by the Veterinary Inspectorate and the Road Transport Inspection in response to signals about irregularities.

The inspections were conducted: in entities handling the animal transport (Veterinary Inspection and Road Transport Inspectorate), on the road, at places of loading animals and at places of destination of the animal transport.

The inspection showed that the district veterinarians inspected over 755 thousand means of transport for animals in the years of 2014-2015. A total of 2,518 irregularities were recorded, which mainly concerned the animal inability to transport, conducted records, practices during transport and the means of transport themselves. A total of 95 penalties were imposed, and other steps were taken in 901 cases.

In the period between 2014 and the first half of 2016, the Road Transport Inspectorate carried out 6.7 thousand animal transport inspections. Inspectors recorded 59 cases of violations of the rules on animal transport.

The Supreme Audit Office determined in the inspection assessment that the Transport Inspection carried out inspections only at designated points on public roads, on weekdays, during the day. Nonetheless, no tipped inspections were carried out, i.e., those with prior determination of the course of a given transport, hence many carriers could easily slip by the Road Transport inspections. "Farm" transport was completely out of control of the inspectors. The scope of the police supervision over compliance with the law on the protection of animals in the farm animal transport remains unknown - both regarding the possible effects of the inspection and the applied legal actions.

The inspection assessment also stated that the cooperation of the relevant services in order to jointly act for the protection of animal rights during slaughter and transport was insufficient. The Road Transport Inspection occasionally organized inspections together with the Veterinary Inspection. It cooperated with social organizations only in the field of protecting the welfare and humane treatment of horses. Moreover, provincial and district veterinarians did not cooperate with the veterinary government or social organizations.

As a result of the audit by the Supreme Audit Office, conclusions were formulated for the Chief Road Transport Inspector, in which it is recommended to standardize the scope of inspections of entrepreneurs involved in the animal transport in order to obligatorily control matters related to compliance with the regulations on the protection of animals in transport. It is also suggested to collaborate with pro-animal organizations in order to enforce the rules on the protection of animals in transport more effectively. The last recommendation of the Supreme Audit Office for the Chief Road Transport Inspector is an application to the Veterinary Inspection to provide access to the TRACES system, which is used to plan animal transport inspections (Information of the Supreme Audit Office, 2017). In its 2017 report, the Supreme Audit Office also included a diagram regarding the division of animal transport in Poland according to permits, duration of transport and authorities entitled to inspect means of transport (Fig. 1).

For short farm transports (up to 50 km) and for the transport of animals to pastures, no permits for carriers issued by the Veterinary Inspection are required. However, in the case of long transport of animals and in the case of animal transport up to 8 hours with vehicles over 3.5 tons, permits issued by the Veterinary Inspection are required. Vehicles weighing more than 3.5 tons in long transports and up to 8 hours are subject to control by the Road Transport Inspection, Veterinary Inspection and Police. Farm transport and transport to pasture by vehicles weighing less than 3.5 tons is subject to control by the Veterinary Inspection and the Police.

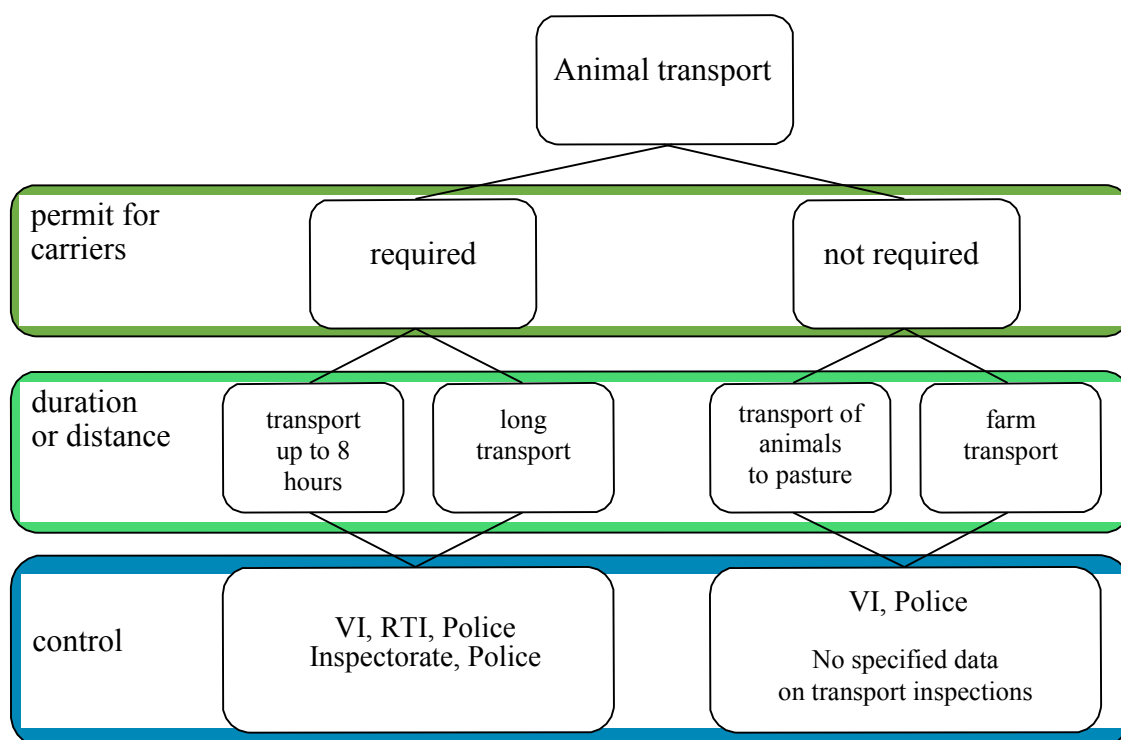


Figure 1. Animal transport in Poland. Source: Information of the Supreme Audit Office, Supervision over the transport and slaughter of farm animals (Information of the Supreme Audit Office, 2017).

Regarding animal welfare, the Provincial Veterinary Inspectorate of the Silesian Voivodeship annually publishes a report on the implementation of the tasks of the Veterinary Inspection in the Silesian Voivodeship. In the report, we can read, *inter alia*, that the Veterinary Inspection, in the field of supervision over compliance with the regulations on the protection of animals in transport, keeps records of carriers and means of transport approved for long transport. The Veterinary Inspection also conducts inspections on the loading and unloading of animals: during road transport, at destinations, collection points, purchase points, transshipment points and control points. These inspections cover a right number of animals transported each year (Information of the Supreme Audit Office, 2017).

The website of the Voivodeship Veterinary Inspectorate in Katowice contains information on the report on the implementation of the tasks of the Veterinary Inspection in the Silesian Voivodeship in 2019 and 2020 (<https://katowice.wiw.gov.pl...>). The number of inspections to ensure the welfare of animals during transport is presented in Table 1.

4,416 planned inspections in the area of animal transport and 4,324 temporary inspections of animal transport were conducted in 2019, in the Silesian Voivodeship, which gives a total of 8,740 inspections. In 2020, the number of planned inspections was 7,153, of which 7,060 were completed. There were 2,001 temporary inspections and 9,061 in all. Table 2 presents the number of detected illegal animal transport activities

Table 1.*Inspections conducted in the Silesian Voivodeship in 2019 and 2020*

Year	Inspection area	Number of scheduled inspections	Number of planned inspections conducted	% plan implementation	Number of temporary inspections conducted	Total number of conducted inspections
2019	Transport - welfare	4.416	4.416	100%	4.323	8.740
2020	Transport - welfare	7.153	7.060	98.7	2.001	9.061

Source: Report on the implementation of the tasks of the Veterinary Inspection in the Silesian Voivodeship in 2019, Katowice 2020; Inspections conducted in the Silesian Voivodeship in 2019, Report on the implementation of the tasks of the Veterinary Inspection in the Silesian Voivodeship in 2020, Katowice 2021; Inspections conducted in the Silesian Voivodeship in 2020 (Report on the implementation..., 2019, 2020).

Table 2.*Illegal activities detected in the Silesian Voivodeship in 2019*

Year	The activity area of the Veterinary Inspectorate	Number of illegal activities detected	Number of illegal activities eliminated
2019	Animal transport	1	1
2020	Animal transport	0	0

Source: Report on the implementation of the tasks of the Veterinary Inspection in the Silesian Voivodeship, Katowice 2020; Illegal activities detected in the Silesian Voivodeship in 2019; Report on the implementation of the tasks of the Veterinary Inspection in the Silesian Voivodeship, Katowice 2021; Illegal activities detected in the Silesian Voivodeship in 2020 Report on the implementation..., 2019, 2020).

During the inspections regarding animal transport in the Silesian Voivodeship in 2019, one irregularity was detected. However, the Veterinary Inspectorate did not notice any irregularities in the animal transport in 2020.

By analysing and comparing the results of the discussed reports of animal welfare organizations, the results of the audit by the Supreme Audit Office on the transport of animals conducted in 1998, 2003, 2005 and 2017 and the inspections belonging to the tasks of the Veterinary Inspection in the Silesian Voivodeship in 2019 and 2020, it should be stated that due to the large discrepancies between them, it is impossible to assess explicitly the actual condition of the slaughter animal transport. The last audit of the Supreme Audit Office regarding animal transport conducted in 2014-2016 revealed irregularities in every hundredth vehicle transporting animals, and the provisions on the protection of animal rights were not always respected (Information of the Supreme Audit Office, 2017). The 2016 inspection conducted by the Veterinary Inspection in the Silesian Voivodeship did not reveal any major irregularities. Perhaps this is due to the fact that the current rules make it difficult to inspect vehicles transporting animals, and therefore they may be conducted selectively and too superficially. Nevertheless, reports of pro-animal organizations on the conditions of animal transport in Poland and the European Union are highly disturbing. Undeniably, further inspections and supervision over the animal transport are crucial in the process of improving the conditions for the transport of slaughter animals and monitoring their welfare.

3. Methodology

The hypothesis of the article is that the control system does not conduce to the enforcement of the law regarding slaughter animal transport in enterprises.

The research task was performed using primary data sources. A survey was carried out among the owners of enterprises handling the transport of slaughter animals in the Silesian Voivodeship and among drivers and guards of these enterprises. The database of companies with a permit for the animal transport was created based on the information contained on the website of the Chief Veterinary Inspectorate. This database was dated September 2017. 360 entities holding a permit for the transport of animals were registered in the Silesian Voivodeship in this database. After eliminating enterprises handling the transport of animals beyond the scope of this dissertation (such as: animal shelters, veterinary clinics, transport of domestic animals, transport of pigeons, transport of fish or transport of wild and exotic animals), 120 companies were selected for further analysis. 94 questionnaires completed by business owners and 92 questionnaires completed by drivers transporting animals were received

4. Research results

The conducted study also enabled to check to what extent the regulations on the animal transport are a barrier to business activity. The collected data is presented in Table 3.

Table 3.

Are the regulations on the animal transport a barrier to business activity?

To what extent are the regulations on the animal transport a barrier to business activity	Number of enterprises	Proportion of enterprises
They are definitely a large limitation	0	0
They are rather a big limitation	7	7.4%
It is hard to say	24	25.5%
They are rather irrelevant	37	39.4%
They are definitely not a limitation	26	27.7%
Total	94	100%

Source: Own elaboration based on the results of the surveys.

Table 3 shows that the respondents do not see the regulations on the animal transport as a significant limitation in performing transport activities. The regulations are rather a limitation for only 7 surveyed entities, they do not have any impact on conducting business activity for 37 surveyed entities, and they are definitely not a limitation for 26 surveyed entities. 24 business owners replied that it is difficult to say whether the regulations on the animal transport are a barrier for business activity. Most of the responses, which indicate that the regulations on the animal transport are not a limitation or do not affect business activity, may indicate that they

are not fully aware of the applicable law regulating the animal transport, which is frequently changed. It may be also related to the delegation of tasks and obligations related to the law in the field of transport management to other employees.

The survey enabled to obtain information on ensuring animal welfare in the surveyed enterprises. In this case, more than one answer could be marked. The results are presented in Table 4.

Table 4.

What is animal welfare in the surveyed enterprises according to the owners?

Ensuring animal welfare in your enterprise consists	Number of ticks	Proportion of ticks
Mainly in providing emotional needs	29	30.9%
Mainly in providing biological needs	50	53.2%
Mainly in providing natural breeding conditions	25	26.6%
It is hard to say	5	5.3%
Answers in total	109	100%

Source: Own elaboration based on the results of the surveys.

According to 53.2% of business owners transporting animals, animal welfare is mainly about providing them with biological needs, 30.9% of them believe that ensuring animal welfare also means ensuring emotional needs, 26.6% believe that animal welfare is about providing natural breeding conditions for animals. Only 5.3% of owners indicated the answer that it is difficult to say what it means to ensure welfare.

The questionnaire for the business owners transporting slaughter animals and drivers of these enterprises enabled to assess the condition of the means of transport for animals in their enterprises. The results of the survey are presented in Figure 2.

Only 4.3% of surveyed owners and 3.3% of surveyed drivers assess the condition of the fleet in their own enterprise as mediocre. In turn, 46.8% of owners and 50% of drivers assess their means of transport rather positively, and 48.9% of owners and 46.7% of drivers assess them as definitely positive. This means that both employees and owners of animal transport enterprises are satisfied with the fleet they have, which they believe is at a high level.

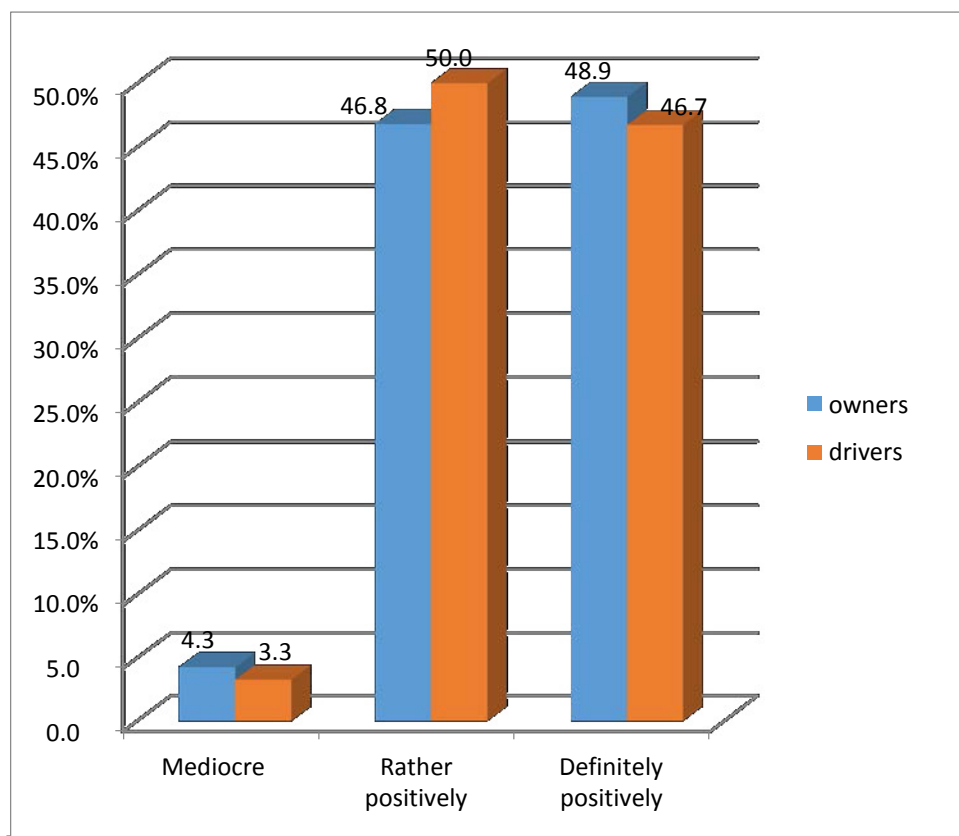


Figure 2. Assessment of the condition of means of transport for animals in the examined enterprises. Source: Own elaboration based on the results of the surveys.

The survey also held a question about the frequency of conducted inspections regarding maintaining animal welfare in transport. Table 5 presents data on the frequency of inspections during the animal transport by the Road Transport Inspectorate assisted by a veterinarian.

Table 5.

The frequency of inspections during the animal transport by the Road Transport Inspectorate officials assisted by a veterinarian

How often are you inspected during the transport of animals by officers of the Road Transport Inspection assisted by a veterinarian?	Number of drivers	Proportion of drivers
Once a month	21	22.8%
Every 3 months	18	19.6%
Once during each half year	4	4.3%
Once a year	5	5.4%
I was not inspected by the RTI	44	47.8%
Total	92	100%

Source: Own elaboration based on the results of the surveys.

Based on the results of the survey, it can be concluded that almost half of the surveyed drivers have never been inspected by the Road Transport Inspectorate. 22.8% of drivers are inspected once a month, 19.6% are inspected once every three months, 4.3% are inspected once during each half year, and 5.4% once a year. The media inform more and more about the cases of inhumane transport of slaughter animals. It seems that there are more and more such cases, and they are not minor. Therefore, it can be concluded that the frequency of performed inspections is insufficient.

The questionnaire also enabled to assess the quality of the Road Transport Inspectorate inspection among the surveyed drivers. The results are presented in Table 6.

Table 6.

The method of conducting an inspection by the Road Transport Inspectorate

How do you assess the RTI inspections	Number of drivers	Proportion of drivers
The inspections were rather superficial and inaccurate	0	0%
The inspections were conducted very accurately	46	95.8%
The inspections were conducted sufficiently	1	2.1%
I have no opinion	1	2.1%
Total	48	100%

Source: Own elaboration based on the results of the surveys.

The vast majority of the surveyed drivers who were inspected say that the inspections of the Road Transport Inspectorate were conducted very accurately, 2.1% believe that the inspections were conducted sufficiently, 2.1% do not have an opinion in this matter.

The survey also collected information on the assessment of the impact of actions taken by competing enterprises on the welfare of transported animals. Data regarding this matter are presented in Figure 3.

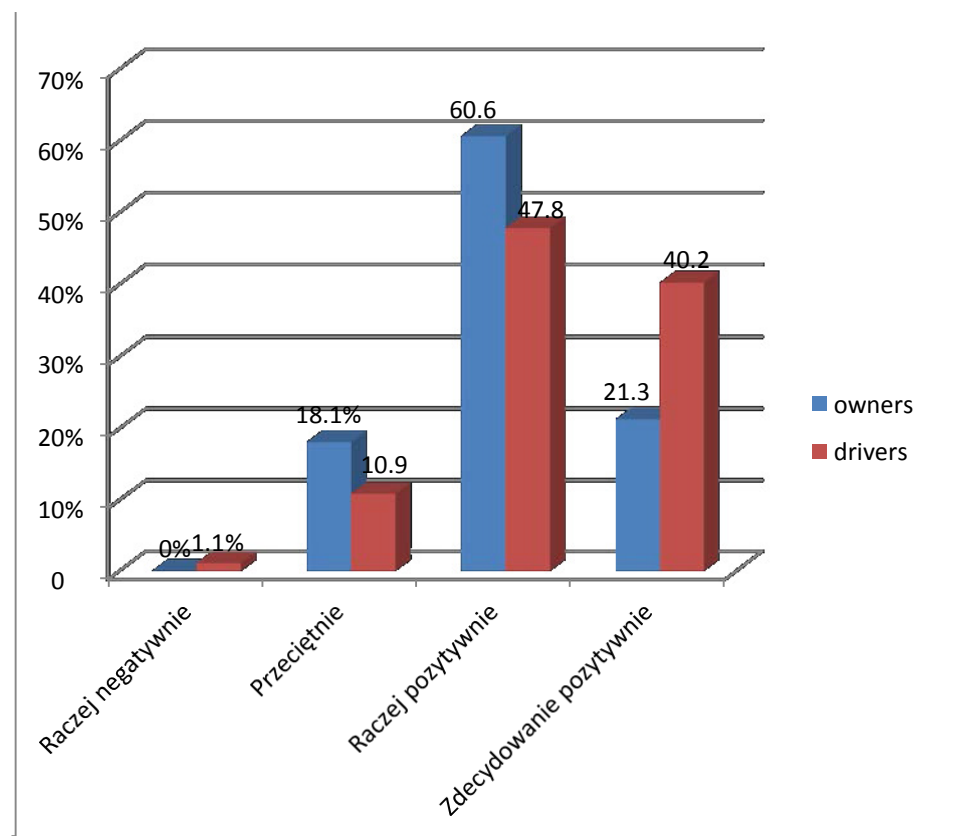


Figure 3. Assessment of the impact of actions taken by competitive enterprises on animal welfare. Source: Own elaboration based on the results of the surveys.

Figure 3 shows that none of the surveyed owners assessed the impact of actions taken by competitive companies rather negatively. However, 1.1% of the surveyed drivers responded in this way. Although, 18.1% of business owners and 10.9% of drivers rated the impact of the

competition actions for the welfare of transported animals as mediocre. This impact was positively assessed by 60.6% of owners and 47.8% of drivers. 21.3% of owners and 40.2% of drivers positively assessed the impact of actions taken by competitive enterprises on the welfare of transported animals. This shows that both the owners and drivers of enterprises assess animal welfare more positively in their enterprises than in competing enterprises.

The questionnaire for the business owners transporting slaughter animals and drivers of these enterprises enabled to assess the condition of the means of transport for animals in their enterprises. The results of the survey are presented in Figure 4.

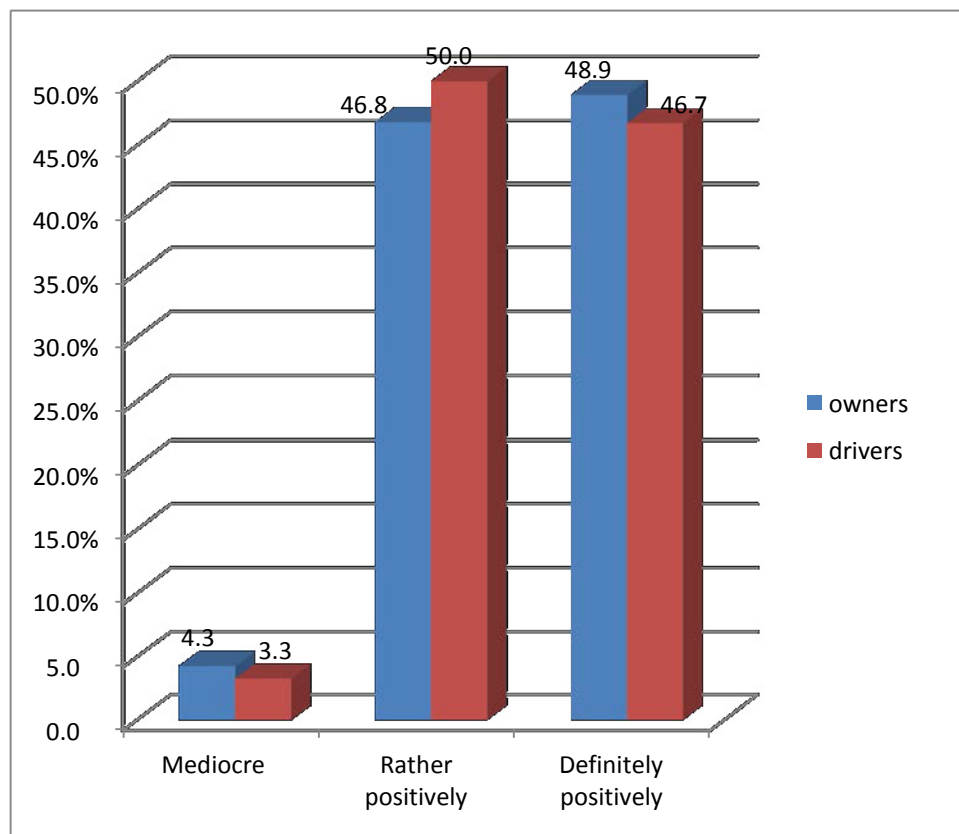


Figure 4. Assessment of the condition of means of transport for animals in the examined enterprises. Source: Own elaboration based on the results of the surveys.

Only 4.3% of surveyed owners and 3.3% of surveyed drivers assess the condition of the fleet in their own enterprise as mediocre. In turn, 46.8% of owners and 50% of drivers assess their means of transport rather positively, and 48.9% of owners and 46.7% of drivers assess them as definitely positive. This means that both employees and owners of animal transport enterprises are satisfied with the fleet they have, which they believe is at a high level.

The survey also enabled to determine whether there is a need to improve the conditions of animal transport in the surveyed enterprises, as presented in Table 7.

Table 7.*Need to improve animal transport conditions in enterprises*

Do you see the need to improve the conditions of animal transport in your enterprise?	Number of enterprises	Proportion of enterprises
Definitely not	25	26.6%
Rather not	31	33%
I have no opinion	21	22.3%
Rather yes	16	17%
Definitely yes	1	1.1%
Total	94	100%

Source: Own elaboration based on the results of the surveys.

The data presented in Table 7 shows that 33% of the surveyed entities do not see the need to improve the conditions of animal transport in their enterprise, 26.6% definitely do not see such a need, 22.3% have no opinion in this matter. In turn, 17% of the surveyed entities see the need to improve the conditions of animal transport, and 1.1% definitely see such a need. It can therefore be concluded that no need to improve the conditions of animal transport and the lack of opinion in this matter, which account for 81.9% of all responses, may indicate a lack of direct contact between the owners and management of enterprises with transport and animals, and lack of knowledge in this field. In order to verify the hypothesis that: "The control system does not conduce to the enforcement of the law on transport of slaughter animals in enterprises", the relationships between variables were examined:

1. The perception of legal provisions as a barrier for business activity and the welfare of the animals transported in the enterprise.
2. The perception of legal provisions as a barrier for business activity and the condition of means of transport for animals.
3. The level of provided welfare and the frequency of inspections performed by the Road Transport Inspectorate.
4. The level of provided welfare and the assessment of the inspections of the Road Transport Inspectorate.
5. The actions of other drivers or employees of enterprises that affect the deterioration of animal welfare and the frequency of inspections performed by the Road Transport Inspectorate.
6. The actions of other drivers or employees of enterprises that affect the deterioration of animal welfare and the assessment of the inspection of the Road Transport Inspectorate.
7. The assessment of the condition of means of transport for animals and the frequency of inspections performed by the Road Transport Inspectorate.
8. The assessment of the condition of the means of transport for animals and the assessment of the inspection of the Road Transport Inspectorate.
9. The need to improve the conditions of animal transport and the frequency of inspections by the Road Transport Inspectorate.
10. The need to improve the conditions of animal transport and the assessment of the inspection of the Road Transport Inspectorate.

The analysis assumes that the current level and frequency of inspections in the transport of slaughter animals, performed by authorized institutions, does not have a significant impact on the compliance with the regulations by enterprises performing this transport. This impact was examined both in relation to the technical condition of the means of transport and the conditions of animal transport, which directly translates to animal welfare.

Table 8.

Chi-square test: viewing legal provisions as a barrier to business activity and the welfare of transported animals

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
The perception of the legal provisions as a barrier to business activity and the welfare of animals transported in the enterprise	28.66	93	1.000

Note. $p = 0.05$.

Source: Own elaboration based on the results of the surveys.

The test results presented in Table 8 show that no statistically significant relationships were found between the analysed variables ($p = 1.000$). Therefore, there is no relationship between the perception of legal provisions as a barrier to business activity and the welfare of animals transported in the enterprise.

Table 9.

Chi-square test: The perception of legal provisions as a barrier to business activity and the condition of means of transport for animals

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
Perception of the legal provisions as a barrier to business activity and the condition of the means of transport for animals	21.48	93	1.000

Note. $p = 0.05$.

Source: Own elaboration based on the results of the surveys.

The results of the chi-square test presented in Table 9 show that there is no relationship between the variables ($p = 1.000$). This means that the perception of legal provisions as a barrier to business activity does not depend on the assessment of the condition of the means of transport for animals

Table 10.

Chi-square test: The level of provided welfare and the frequency of inspections of the Road Transport Inspectorate

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
The level of provided welfare and the frequency of inspections of the Road Transport Inspectorate	326.05	91	0.000

Note. $p = 0.05$.

Source: Own elaboration based on the results of the surveys.

The test results presented in Table 10 show a statistically significant relationship between the variables ($p = 0.000$). This means that the level of welfare provided in enterprises depends on the frequency of driver inspections of the Road Transport Inspectorate.

Table 11.

Chi-square test: The level of provided welfare and the assessment of inspections by the Road Transport Inspectorate

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
The level of provided welfare and the assessment of inspections of the Road Transport Inspectorate	137.58	4	0.000

Note. $p = 0.05$.

Source: Own elaboration based on the results of the surveys.

The test results in Table 11 show a statistically significant relationship between the variables. This indicates that the level of welfare provided in the enterprise affects the assessment of inspections of the Road Transport Inspectorate

Table 12.

Chi-square test: The actions of other drivers or employees of enterprises which affect the deterioration of animal welfare and the frequency of inspections of the Road Transport Inspectorate

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
The actions by other drivers or employees of enterprises, which affect the deterioration of animal welfare and the frequency of inspections of the Road Transport Inspectorate	11.113	91	0.074

Note. $p = 0.05$.

Source: Own elaboration based on the results of the surveys.

The test results presented in Table 12 show that there was no statistically significant relationship between the variables ($p = 0.074$). This proves that the actions of other drivers or employees, which deteriorate the welfare of transported animals is not related to the frequency of inspections of the Road Transport Inspectorate.

Table 13.

Chi-square test: The actions of other drivers or employees of enterprises, which affect the deterioration of animal welfare and the assessment of inspections of the Road Transport Inspectorate

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
The actions of other drivers or employees of enterprises, which affect the deterioration of animal welfare and the assessment of inspections of the Road Transport Inspectorate	1.833	47	1.000

Note. $p = 0.05$.

Source: Own elaboration based on the results of the surveys.

The results of the chi-square test presented in Table 13 do not show statistically significant relationships between the variables ($p = 1.000$). Therefore, it can be concluded that there is no relationship between the actions of other drivers or employees, which affect the deterioration of animal welfare and the assessment of inspections of the Road Transport Inspectorate.

Table 14.

Chi-square test: the assessment of the condition of means of transport for animals in the own enterprise and the frequency of inspections of the Road Transport Inspectorate

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
The assessment of the condition of means of transport for animals in the own enterprise and the frequency of inspections of the Road Transport Inspectorate	332.283	91	0.000

Note. $p = 0.05$.

Source: Own elaboration based on the results of the surveys.

The test results presented in Table 14 show a statistically significant relationship between the variables ($p = 0.000$). This means that the assessment of the condition of the means of transport for animals in the own enterprise depends on the frequency of inspections of the Road Transport Inspectorate.

Table 15.

Chi-square test: the assessment of the condition of means of transport for animals in the own enterprise and the frequency of inspections of the Road Transport Inspectorate

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
The assessment of the condition of means of transport for animals in the own enterprise and the assessment of inspections of the Road Transport Inspectorate	150.833	47	0.000

Note. $p = 0.05$.

Source: Own elaboration based on the results of the surveys.

The test results presented in Table 15 show that statistically significant relationships between the variables were drawn ($p = 0.000$). This proves that the assessment of the condition of the means of transport for animals in the own enterprise affects the assessment of inspections of the Road Transport Inspectorate.

Table 16.

Chi-square test: the need to improve animal transport conditions in the own enterprise and the frequency of inspections of the Road Transport Inspectorate

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
The need to improve animal transport conditions in the own enterprise and the frequency of inspections of the Road Transport Inspectorate	100.833	91	0.225

Note. $p = 0.05$.

Source: Own elaboration based on the results of the surveys.

There were no statistically significant relationships between the variables ($p = 0.225$) presented in Table 16. This means that there is no relationship between the need to improve the conditions of animal transport in the own enterprise and the frequency of inspections of the Road Transport Inspectorate officials.

Table 17.

Chi-square test: the need to improve animal transport conditions and the assessment of inspections of the Road Transport Inspectorate

Relationships between variables	Value of chi-square test	Number of degrees of freedom	p-value
The need to improve animal transport conditions in the own enterprise and the assessment of inspections of the Road Transport Inspectorate	1.000	47	1.000

Note. $P = 0.05$.

Source: Own elaboration based on the results of the surveys.

The results of the chi-square test presented in Table 17 show that there are no statistically significant relationships between the variables ($p = 1.000$). Therefore, it can be concluded that the perception of the need to improve the conditions of animal transport in the own enterprise does not depend on the assessment of inspections of the Road Transport Inspectorate.

4.1. Related work

The authors of Animal Welfare in the U.S slaughter industry – a focus on fed cattle (Edwards-Callaway, Calvo-Lorenzo, 2020, p. 15) surveyed attendees at the annual NAMI Animal Care and Handling Conference, which is attended by many stakeholders, educators, packing plant employees, people in corporate roles at food companies, and auditors. The Institutional Review Board at to anonymously indicate what they felt were the top animal welfare issues. Attendees also have experience with other livestock and poultry species. Respondents were asked the following question: “What do you think are the top 3 animal welfare issues in the beef packing industry?” All answers were reviewed and allocated into larger categories for comparison. The number of times a certain category was mentioned was tallied and then divided by the total number of possible answers (three animal welfare issues listed \times total number of respondents) by position within the industry to be expressed as a percentage (role = n, total no. of possible answers: Managers = 22, 66; Auditors = 5, 15; Corporate = 8, 24; Educator = 5, 15). Figure 5 presents the resulting percentages for the top three challenges indicated by respondents’ roles. Training needs and cattle handling with specific mention of downer animals were listed as main priorities in all groups. Stunning was also mentioned across multiple groups.

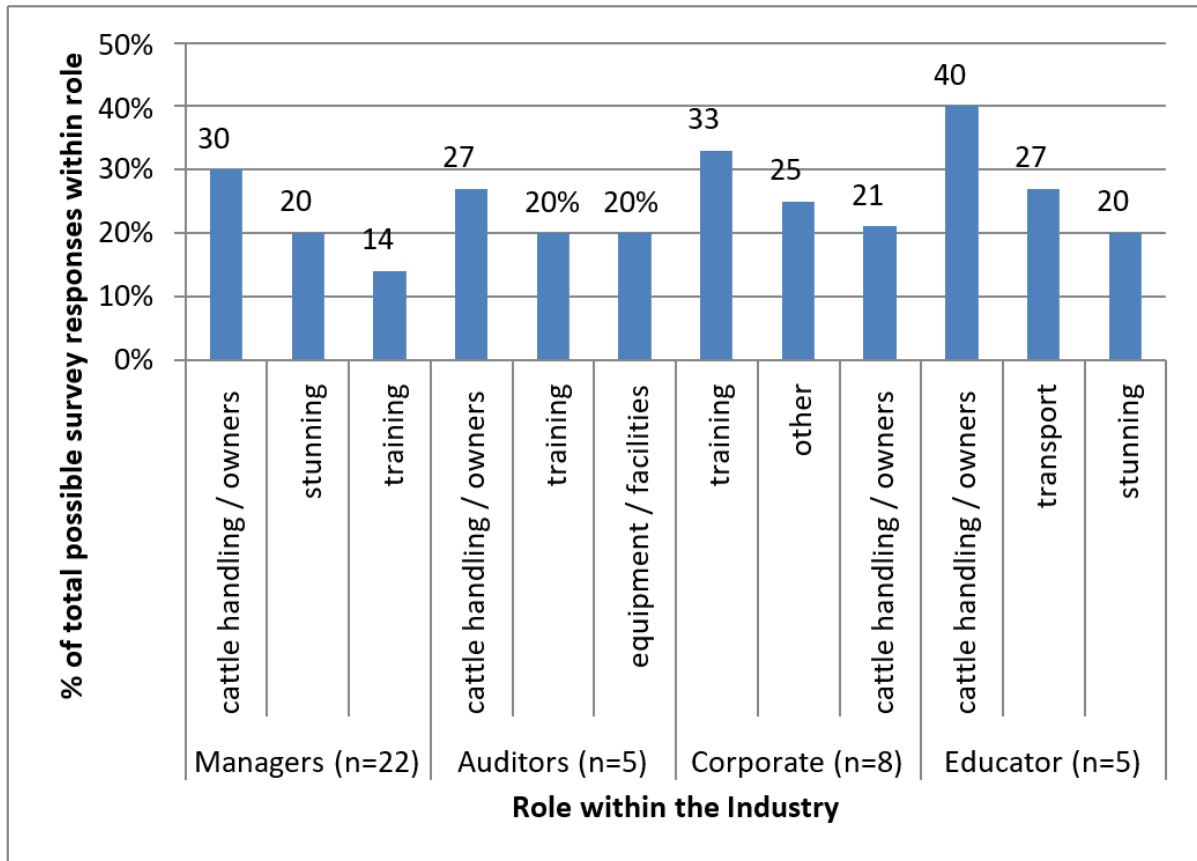


Figure 5. Assessment of the condition of means of transport for animals in the examined enterprises. Source: Edwards-Callaway, L.N., Calvo-Lorenzo, M.S. (2020). Animal Welfare in the U.S slaughter industry – a focus on cattle. *Journal of Animal Science*, Vol. 98, No. 4, p. 15.

Figure 6 shows answers for survey question „What do you think the beef packing industry needs to do to improve animal welfare?” Astonishing was also mentioned across all groups the following answers: training and education, communication, facility maintenance and research. It is interesting that majority of survey responses were based on some aspect of the human-animal interaction. Training and communication were two main factors identified as areas of need.

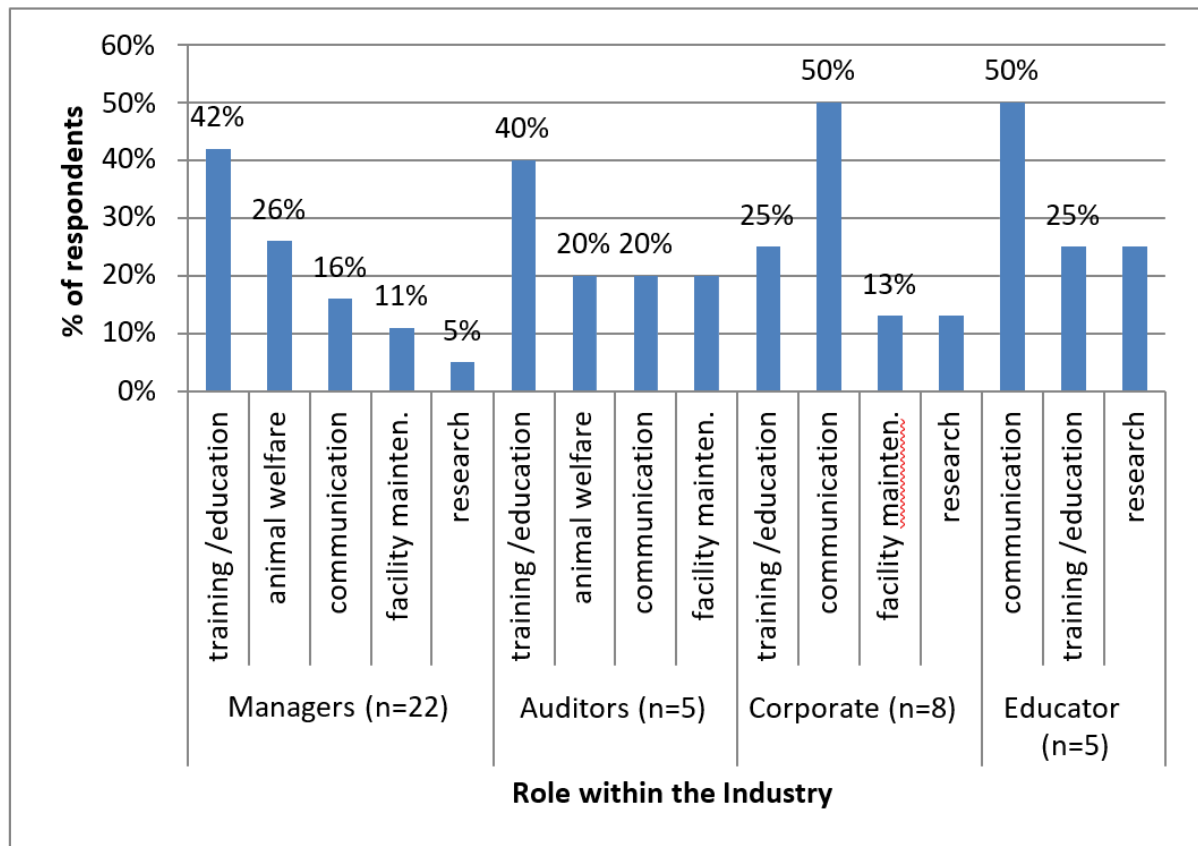


Figure 6. Responses from North American Meat Institute (NAMI) Animal Care and Handling Conference attendees to the question "What do you think the beef packing industry needs to do to improve animal welfare?" Source: Edwards-Callaway, L.N., Calvo-Lorenzo, M.S. (2020). Animal Welfare in the U.S slaughter industry – a focus on cattle. *Journal of Animal Science*, Vol. 98, No. 4, p. 15.

According to the survey, there is an opportunity for more focus on providing appropriate training to plant employees, likely both in quality and quantity. The author's survey showed that animal caretakers and supervisors are asking for more focus on communication and training relative to animal welfare. An emphasis on the areas of training and education and its interconnection with the animal welfare topics is warranted for future research

5. Conclusions

Based on the conducted research, it was found that the main hypothesis that "The control system does not conduce to the enforcement of the law in the transport of slaughter animals in enterprises" has been verified negatively. There were no statistical relationships between:

- The perception of legal provisions as a barrier to business activity and the welfare of animals transported in the enterprise.
- The perception of legal provisions as a barrier to business activity and the condition of the means of transport for animals.

- The actions of other drivers or employees of enterprises, which affect the deterioration of animal welfare and the frequency of inspections performed by the Road Transport Inspectorate.
- The actions of other drivers or employees of enterprises, which affect the deterioration of animal welfare and the assessment of inspections by the Road Transport Inspectorate.
- The need to improve the conditions of animal transport and the frequency of inspections of the Road Transport Inspectorate.
- The need to improve the conditions of animal transport and the assessment of inspections performed by the Road Transport Inspectorate.

Legal provisions have a significant impact on the activities of enterprises regarding organizing and functioning of slaughter animal transport. Law enforcement is favoured by the control system, in particular the frequency and assessment of inspections of authorized institutions. The relationships were shown between:

- The level of provided welfare and the frequency of inspections performed by the Road Transport Inspectorate.
- The level of provided welfare and the assessment of inspections of the Road Transport Inspectorate.
- The assessment of the condition of means of transport for animals and the frequency of inspections performed by the Road Transport Inspectorate.
- The assessment of the condition of means of transport for animals and the assessment of inspections of the Road Transport Inspectorate.

Entrepreneurs are aware of the importance of legal provisions regulating their activities. The result of this awareness is the acceptance of legal provisions that do not constitute a barrier for enterprises in running their business. Regarding technical means of transport and ensuring animal welfare, both the frequency of inspections and the assessment of the Road Transport Inspection are important. Therefore, enterprises perceive the role of inspections in observance of legal regulations. A certain exception may be the lack of influence of the frequency of inspections and their assessment on the need to improve the conditions of animal transport. This involves treating animals as commodities, not as living organisms. Entrepreneurs and drivers are often unaware of the feelings and needs of the transported. However, on the other hand, they are aware that ensuring animal welfare during transport is an important activity in terms of the law and the control system. It is also surprising that there is no relationship between the actions of other drivers or employees of enterprises, which affect the deterioration of animal welfare, and the frequency and assessment of inspections. Although the respondents see the impact of inspections on their actions regarding ensuring animal welfare, they do not see the role of inspections in ensuring animal welfare in competing enterprises.

The respondents fully accept the need for legal regulations and a system for controlling their observance in terms of the transport of slaughter animals, which results in the fact that the law is not perceived as a barrier to running a business in the analysed area. The awareness of people related to publicizing animal abuse is increasing, and we as consumers also have a right to know how animals were treated on farms and during transport. An extremely important role in shaping the awareness of producers, carriers and consumers is played by relevant state authorities, as well as pro-animal and pro-environmental organizations supervising and controlling animal welfare.

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THE CORE OF TEAM COMMUNICATION. TREND, ORGANIZATION VALUE AND AFFECTION ON MANAGEMENT

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Purpose: As the organization grows, attention begins to be paid to the growing potential and role of communication. Communication, which so far played mainly the role of providing information in the course of the current rapid evolution, is beginning to be noticeable in every aspect of business operations. Currently, managers must be aware that communication affects the entire organization, while it is their role to influence communication in order to obtain the best benefits. The purpose of this article is to present comments or problems that were noticed by the authors of the reviewed articles during the communication process.

Design/methodology/approach: This review is based on studies conducted in case to understand communication problems, published between 2017 and 2022.

Findings: The analysis highlight that the communication problems in organizations are increasingly encountered and, what is most important, almost always very easy to solve.

Practical implications: In the case that almost all the publications discussed are focused on the most common problems in enterprises, it can be assumed that with a high probability such problems will appear or have already appeared in every organization. Thanks to this review, as well as a deeper analysis of the aforementioned literature, readers of this article can very quickly identify similar communication problems in their environment and its exemplary solution.

Originality/value: This review emphasizes that communication should be considered on many levels since it affects both people and organizations in different respects. In addition, in this research work, it can be indicated that communication allows us to better understand human needs and act on them appropriately.

Keywords: Communication value, efficient communication, evolution of communication, team communication, core of communication.

Category of the paper: Literature review.

1. Introduction

In the extensive theory of economics and management, it is possible to distinguish many disciplines, each of which is important and shows how to properly manage a company, people, time, capital, and above all, yourself. However, while learning about various areas relevant to everyday matters and problems that arise in the organization, it can be recognized that communication has a significant impact on most management levels.

"Communication (...) in practical terms is the process of exchange of ideas and information between two or more people, leading to a mutual understanding" (Bakirbekova and Suleimenova, 2018). It is a factor that builds the organization; drives it and ensures its survival (Turaga, 2019). Communication is the enabler of all actions (Atkočiūnienė and Siudikienė, 2021). At the same time, the lack of communication causes problems in achieving strategic goals (Zerfass and Volk, 2018). Communication can be described as a resource being part of immaterial capital (Zerfass and Viertmann, 2017). It plays an integrating role to support the implementation of tasks (Pekkala, 2020); communication not only supports introducing changes in the organization but also introduces changes that at times force changes in communication (Barr et al., 2017). Ultimately, communication is the result of long-term and continuous adaptation to the needs of the organization. It is created, modified and adjusted and it is considered to be a long-term process (Neill, Men and Yue, 2020).

Communication is the backbone of the organization's activities (Zerfass and Viertmann, 2017). It allows for prompt integration and dissemination of changes, information and decisions. Communication takes into account, the opinion of all employees from the highest to the lowest level (everyone's opinions and ideas are listened to) (Zerfass and Viertmann, 2017).

Based on the articles analyzed and the opinions contained, it can be noticed that communication supports many areas. This involves increasing situational awareness by creating a common understanding, creating community in teams, understanding expectations, determining the time needed for communication, providing tools and content, training, coaching, and supporting, providing feedback, and finally implementing reward and motivational methods (Pekkala, 2020). Good communication improves management, shortens the time of introducing employees, and reduces resistance to change (Bakirbekova and Suleimenova, 2018).

Although different organizations utilize communication in a different ways, each of them knows its value for the enterprise (Zerfass, Verčič and Volk, 2017). Communication develops within the organization (Turaga, 2019), and by maintaining good communication, it is possible to prevent burnout of the employees in the organization (Stacho, et al., 2019). "If people cannot exchange information, they will not be able to work together to formulate goals and achieve them" (Bakirbekova and Suleimenova, 2018). If communication is utilized well, it gives the employees a sense of belonging to the group and their voice is also important; communication

from one employee to another – parallel – has been identified as the key to successful change implementation where the participation of each employee in communication is key (Neill, Men and Yue, 2020). "Effective communication is the lifeline and the core of a successful organization. (...) In fact communication has been identified as one of the key soft skills in today's workplaces" (Agarwal and Gupta, 2018).

There are still no exact research results presenting a comprehensive understanding of how communications departments contribute to strategic and operational management success (Zerfass and Volk, 2018). Although extensive research on communication is conducted exclusively on literature, therefore it does not always translate into real practical application. Consequently, the assessment of the effectiveness of communication must be carried out in an appropriate manner during the management process (Volk and Zerfass, 2021).

Communication and its style allow you to get to know the character of a person. Each unit in the course of development and experience defines their own style of communication. "Communication style is defined as a cognitive process that entails micro behavior in order to make a macro level judgment, wherein the attempt is to get literal meaning across one another" (Agarwal and Gupta, 2018).

Knowing the application of communication and its positive and negative consequences, communication professionals should demonstrate that employees will achieve better results if they understand and accurately apply the communication process (Zerfass and Viertmann, 2017). Communication allows you to build relationships in the company and is based on trust (Turaga, 2019). Well-conducted communication makes it possible to understand and integrate many different generations (despite the visible differences) (Knapp, 2017). Communication should enter the organizational culture as it builds awareness among employees that they are important to the organization. It is exactly managers whose communication behaviors affect the effectiveness of human resources management (Stacho et al., 2019). Effective communication supports many areas of teamwork (Bakirbekova and Suleimenova, 2018).

This article focuses on the key aspects of communication in relation to the development and evolution of the market and the companies there. Communication is what binds the organization and each of its employees. Improving communication skills influences the development of the organization and it helps the organization identify talented employees (Stacho et al., 2019). The departments responsible for managing communications are aware of the changes taking place in the market and what impact it has on changes in communication; "the task of communication management is to design the most appropriate combination of processes for each organization" (Pekkala, 2020). The growing market forces changes in communication to enable the company to remain competitive with others (Finnie, Mueller and Sweetman, 2018). The most important aspect of communication that should be remembered is the fact that a person learns communication throughout the life (Turaga, 2019), therefore "to get sustainable results, it also required a lot of hand-holding, patience and persistence, combined with clear communication over many on-site visits with management and workers" (Chin, 2019).

2. Method

The publications analyzed in the following work were selected from the databases of journals and literature in which topics related to economics and management are discussed. The databases used included "EBSCO", "Emerald" and "JSTOR". The given databases from which the articles were taken were selected because they contain many publications with the necessary knowledge from many different scientific fields. In addition, the author of this article, as a student of the University of Economics and Business, had free access to the indicated databases. Articles were searched on the basis of a combination of words and phrases including the word: "communication" with consecutive: "human resources management", "teamwork", "effectiveness" or "possibilities".

The review and analysis of the "EBSCO" database showed a total of 3,809 items related to communication and the phrases mentioned above. The review and analysis of "Emerald" database revealed a total of 1,100 items based on the phrases mentioned above. A total of 3,594 items were searched in "JSTOR" database based on the above-mentioned phrases.

When selecting articles related to communication, the following criteria were used: (1) communication was to be the main problem discussed in the article; (2) the publications were to show both positive and negative communication situations; (3) communication was to be considered in relation to human resources management in enterprises and organizations; (4) the articles were to refer to the various levels on which communication is present, (5) communication was to be discussed from both a theoretical and practical point of view, (6) all articles had to be less than 6 years old to relate mainly to modern-day communication and its nature and (7) all articles had to be in English as it is the most popular language in which the most scientific articles are written.

In the next step, among the articles that were selected at the first stage of the search, it was analyzed whether a given article concentrates on communication because all the prepared scientific work was focused mainly on communication and its operation. Subsequently, a detailed review of the abstracts of the selected articles was carried out. As a result of applying all the criteria related to the search, 12 items were distinguished from "EBSCO" database. Based on all search criteria in "Emerald" database, 8 items were selected. After applying the given search criteria, 6 items were chosen from "JSTOR" database. Those 26 articles were selected for detailed analysis, in which the process and importance of communication were discussed in as much detail as possible, and at the same time, each article touched upon a given aspect from various points of view.

3. Review

Based on the aforementioned articles and different points of view shown in them, in the current review analysis author decided to focus on 5 the most frequently mentioned aspects according to which communication offers great potential while having a significant impact on the development of the company and its employees: (1) evaluation, impact and value of communication; (2) the essence and benefits of team communication, (3) communication in the transfer of knowledge, (4) communication evolution, (5) modern communication and young generations.

This work focuses on communication and its impact on people as well as enterprises. Therefore, each of the above-mentioned aspects is to emphasize that communication is not a homogeneous process that can be easily assessed. Each of the indicated points (1-5) characterizes communication from a different point of view and emphasizes that communication does not consist solely in conveying information.

The first part of the review focuses on showing what communication is and why it plays a crucial role for every person and every organization. Afterward, the focus was on communication dependence in relation to teamwork and its support in the process of carrying out tasks. In the third part, it is emphasized that communication enables the transfer of information in different and more and more effective ways. The penultimate part shows that communication, just like a person and a company, is constantly developing in order to improve its operation. Finally, it was indicated that due to the growth potential and the essence of the new generation, which are millennials, almost all known communication so far changes rapidly to adapt to the needs and possibilities of the new generation.

4. Evaluation, impact and value of communication

Often, research on communication does not select adequate measurement methods (Zerfass, Verčič and Volk, 2017). It is difficult to find an appropriate tool that would allow influencing communication as a whole during management (there are few universal and standardized communication tools) (Volk and Zerfass, 2021). The bigger the organization or the bigger the communication department, consequently the more tools are used. Some tools may be effective only for a selected group of employees, which may impose the use of more tools in order to be able to affect as many employees as possible. Research shows that tools are becoming more and more common, but many of them are still not used accurately. During the research, the respondents stated that communication measurement is mainly based on their own group of tools, created on the basis of general databases of measurement tools. It should be mentioned

that several managers have never chosen completely identical toolkits (Zerfass, Verčič and Volk, 2017).

Each manager has a different point of view on a given situation, but how can you tell if a given point of view is the best? (Chin, 2019). The tools are flexible. This means that the person responsible for communication may, and often should, to some extent try to adjust them (tools) to their own needs and specific situations. As a consequence of the lack of appropriate communication tools, many managers are forced to use their own or external practical and proven experience in influencing communication and, based on this, introduce their own ideas for "communication management" (Volk and Zerfass, 2021).

Communication specialists, despite having high theoretical and practical knowledge and appropriate tools to check the effectiveness of communication, are not able to conduct complex analyzes of effectiveness (the required competencies for this aspect of communication have not yet been characterized) (Zerfass, Verčič and Volk, 2017).

According to the research (Stacho et al., 2019), about 37% of enterprises do not delegate their managers for communication training, which is detrimental to the development of their knowledge and the use of communication. How can managers responsible for communication ensure that it is at the highest possible level if they do not have the opportunity to obtain this knowledge? In about 80% of enterprises, the management board tries to inform about the willingness to introduce changes, trying to give a clear picture of the situation to employees, while in as many as 43% of organizations, managers do not actively discuss with employees. This means that changes are announced (based on one-way communication), but employees cannot take an active part in it and share their opinions (there are no signs of two-way communication). "People feel a stronger connection to the firm when they have a SAY in its future" (Ackerman, 2017). "(Via communication) when employees understand better the vision and benefits of change, they are more likely to commit to the change initiative and support change" (Neill, Men and Yue, 2020).

Communication involving all employees is one of the determinants of a "healthy workplace" (Hameed, Ijaz and Sabharwal, 2022). Additionally, communication in which all employees are involved plays an important role in building employee well-being (Hameed, Ijaz and Sabharwal, 2022). With appropriate communication with employees, it is possible to create a bond between the employee and the organization and other employees (Ackerman, 2017). Everyone should learn communication, the improvement of which will have a positive effect on all activities within the organization. Good HRM (Human Resources Management) practices and communication approaches are a gateway to the development of employees and organizations. As nowadays the practice that "man lives to work" is abandoned, and emphasis is placed on giving more freedom and flexibility at work. Following best practices will bring the most benefits for employees as well as for the enterprises". According to researchers, employees with higher psychological well-being at work demonstrated better task performance" (Hameed, Ijaz and Sabharwal, 2022). "These examples also clarified something

essential about CSR (Corporate Social Responsibility) work: to establish trust, you need to build relationships, and those relationships can be found at unexpected times and unexpected places, for example, teatime became a critical moment for information gathering from management" (Chin, 2019).

5. The essence and benefits of team communication

"Employees are the key to organizational performance" (Hameed, Ijaz and Sabharwal, 2022). According to Turaga (2019), good communication equals high efficiency, and everyone should try to make their communication better and more efficient. Open communication is an instrument that improves efficiency (Stacho et al., 2019). Managers, despite their willingness, often do not know how to accurately show employees that they are valuable to them and to the company (Ackerman, 2017). "80% of the surveyed organizations find communication as the most challenging issue at the workplace" (Agarwal and Gupta, 2018). Employees expect that well-managed communication will fairly take their opinions into account in building the organization and its culture. Employees who feel that they are treated equally with others are able to work with higher efficiency. In other words, they can learn precisely what they did right or wrong and understand where they can improve, and recognize their strengths (Mazzei, Butera and Quaratino, 2019). "Kim and Rhee (2011) conceptualized ECB (Employee Communication Behaviors) in two categories, which they termed megaphoning and scouting. They defined megaphoning as employees' positive or negative external communication behaviors about their organization (p. 246) and scouting as employees' voluntary communication efforts to bring relevant information to the organization" (Pekkala, 2020).

"Effective leaders are those who are effective in communication" (Bakirbekova and Suleimenova, 2018). "A firm is a team, not a hierarchy of staff, senior staff and owners" (Ackerman, 2017). Including all employees in the culture and their active participation in its creation is of great importance and value for the company (Deley and Mindel, 2018). Two-way communication is better than one-way information transfer (Zerfass and Volk, 2018). Although highly communicative people are important for the development of communication, it is more important to create environments in which everyone can communicate freely and efficiently.

Employees are more likely to communicate with a manager they trust (Kamal Kumar and Kumar Mishra, 2017). On the other hand, "when subordinates are treated as slave laborers working under contractual obligations (...) they fear to speak up to superiors" (Kamal Kumar and Kumar Mishra, 2017). If there are no negative consequences, employees are willing and inclined to engage in critical discussions with their superiors (Mazzei, Butera and Quaratino, 2019).

"Thanks to informal communication, the free exchange of ideas take place, thus encouraging creativity" (Stacho et al., 2019). Taking into account changes suggested and introduced thanks to employees will result in strengthening of communication of others, this will act as an incentive and have a positive impact on employees and the company (Kamal Kumar and Kumar Mishra, 2017). Employees' lack of commitment to change causes them to resist change (Neill, Men and Yue, 2020). "Organizational change has been defined as planned process that allows organizations to adjust and behave differently to accommodate new contingencies, technologies, value, processes and staff" (Neill, Men and Yue, 2020). "Commitment to change is widely defined as a force (mind-set) that binds an individual to a course of action deemed necessary for the successful implementation of a change initiative" (Neill, Men and Yue, 2020). Communication in change management helps to eliminate uncertainty and it contributes to improved motivation among employees (Stacho, et al., 2019). "A fundamental task for modern organizations is to manage changes to adapt to the evolving environment and remain competitive in the market" (Neill, Men and Yue, 2020). As a consequence of well-planned and conducted communication, the organization as a whole gains the possibility of more efficient development, which has been emphasized by many years of research.

6. Communication in the information flow

Improved communication will result in a better flow of information (Stacho et al., 2019). Communication should be planned to deliver the most important information and it should filter out the irrelevant one (Bakirbekova and Suleimenova, 2018). In order to be able to respond to the changing market as quickly and as best as possible, there is an increasing need for up-to-date information and the emphasis should be placed on the development of communication in enterprises (Cacciatore, Meng and Berger, 2017). "Effective communication flow is especially important when the character of work requires cooperation between several employees" (Stacho et al., 2019). In all examined regions it was found that there should be a strong emphasis on the development of new communication skills in order to better influence the increase in the importance and value of information. Additionally, the current industrial revolution, known as the "digital revolution", is aimed at improving and accelerating the flow of information (Cacciatore, Meng and Berger, 2017). In the above research, where the respondents answered the question about the speed and quality of information flow, it was found that this is a very important process for the success of the organization.

Well-conducted communication ensures the possibility of constantly maintaining a high level of creativity in organizations based on the proper use of the possessed knowledge. "Creativity can be defined as the creation of something new, new elements or the solution of problems when the direction has already been chosen" (Atkočiūnienė and Siudikienė, 2021). When analyzing the knowledge management and creativity promotion process, it can be noticed that they are closely related to appropriate communication in the organization.

7. The evolution of communication

The development of technology is beneficial to the conduct and development of communication; introduces new communication tools (Stacho, et al., 2019). Changes in the form of communication are unavoidable in the case of changes that have a significant impact on the organization (Barr et al., 2017). Communication is constantly developing (Atkočiūnienė and Siudikienė, 2021) and what is important communication wants to develop (Touhidul and Sorooshian, 2019). Thanks to the development of technology and communication, communication can be carried out in new ways (Saha, Saha, 2018). "Today we have systems that allow humans to communicate better and faster" (Palerm Ferri, 2017). For example, "asynchronous communication via e-mail allows for quick responses and, thus, reduces the barriers to collaboration encounter when individuals do not work the same hours" (Barr et al., 2017).

In the last 30 years, there has been a very rapid development in technology (including communication technology) (Palerm Ferri, 2017). As a result of technology development and increased interest in social media, organizations adapt to publishing data and transferring knowledge about the enterprise; the so far used - one-way - communication is changed to a new one that takes into account the response from the market (Cacciatore, Meng and Berger, 2017).

Changes in the form of work (remote work) forced changes also in communication (Finnie, Mueller and Sweetman, 2018). The old ways of communication are now considered to be ineffective and time-consuming (Touhidul and Sorooshian, 2019). Communication used to be based solely on a one-sided relationship, during which campaigns were conducted to inform stakeholders and people interested in what is happening in the company. Now communication is based on encouraging people to view published content while expressing their own opinions (reacting to them) – two-way communication (Atkočiūnienė and Siudikienė, 2021). The emphasis on communication and its essence has only recently been considered (Pekkala, 2020). Communication tools over the years have become more and more used because they are only used to transmit information, but also to build relationships and research them (Touhidul and Sorooshian, 2019). Respondents in many studies emphasize that these tools – due to the development of communication – will be used more often (Volk and Zerfass, 2021).

Since communication is a relatively young subject, that has only started to be drawn attention recently, therefore many people do not know how to use it effectively. This suggests that developing organizations should focus primarily on knowing and implementing it thoroughly while making employees aware that this is also expected of them. Many areas of communication have not been explored, leaving room for further research (Pekkala, 2020). Communication is approached too generally, and there should be more research into specific areas of communication (Bakirbekova and Suleimenova, 2018). On the other hand, research is already underway in an attempt to integrate communication and business strategy (Cacciatore, Meng and Berger, 2017). Additionally, based on the analysis of the literature and the results of research on the practical application of communication tools, many of them are misunderstood and, consequently, misused. This means that there is a visible difference between theoretical knowledge and practical application, which necessarily needs to be deepened by managers. Communication should always be matched to the current situation and the competencies of its users. It happens that, as in any change, it is necessary to know the opinions of each of the parties, and not just stick to theoretical knowledge or experiences from other, completely different stories or analyzes. When studying communication, its impact on the organization and people is examined, however, there is no one ideal and comprehensive method of assessing and measuring communication (Zerfass and Viertmann, 2017).

Research on communication tools has great potential (Volk and Zerfass, 2021). "Scholars might explore empirically how various contributions are reflected in different roles, how communication leaders combine both strategic and operational aspects in practice and which competencies are required for performing such multiple responsibilities" (Zerfass and Volk, 2018). This shows how extensive the future possible lines of research into communication are.

8. Modern communication and new generations

New technologies offer enormous potential for modern communication; technology allows communication over longer distances and at higher speeds (Saha, Saha, 2018). The new technology opens up new communication channels that create more potential and more room for action. At the same time, by using more channels, you can show that the organization is not limited and can adapt to the environment by using new, creative solutions. Moreover, thanks to new communication channels, it is possible to reach a wider audience (Atkočiūnienė and Siudikienė, 2021). New methods of communication assume more "online" contact, limiting interpersonal contacts (Saha, Saha, 2018). With technological advancement, people are moving away from traditional forms of communication, losing the ability to conduct it properly.

The digital revolution brings about significant changes in the ways, effectiveness, methods, and efficiency of communication. The old ways do not bring any earlier results, so more and more companies are putting emphasis on educating employees in new ways of communicating with the market. The use of social media to communicate with recipients is considered to be one of the modern and effective methods of influencing outside the organization. Additionally, along with the evolution of enterprises, new methods of communication are developed, adapted to the needs of the market and responding to unforeseen situations (Cacciatore, Meng and Berger, 2017).

The newest young generation is the millennials who are now entering a growing market. "Millennials are efficient, creative and most importantly the replacement of the aging workforce" (Agarwal and Gupta, 2018). "There are certain challenges that organizations face with the millennials. communication skill is one such challenge" (Agarwal and Gupta, 2018). Based on the knowledge of the millennial approach to work and its relation to previous generations, it can be noticed that the market forces certain changes. In order to make the organization's effectiveness as efficient as possible, employees should be made aware that the old market has evolved with the help of new technologies, therefore, similarly, old employees should change with the interference of the young millennial generation. On the other hand, new technologies arose thanks to the old market, so new generations should draw on good practices and experiences of older employees. "Therefore, practitioners are trying to recommend how to invest effort to identify areas of interest for millennials to drive up their perceived level of usefulness" (Hung, Chen and Su, 2020). Knowing that new technology, including social media, is developing intensively and that it is most used by millennials, the actions to improve functioning should be dictated by the preferences of millennials as future users.

As the market changes, the employees' approach to work changes. Organizations should not only focus on increasing the financial result, but also on influencing the satisfaction and needs of members of the organization. Consequently, a satisfied employee will bring more benefits to the organization.

On the other hand, the downside of technology may be the increase in unproductive behavior (Barr et al., 2017). As a result of the development of technology, the crisis of true communication is growing (Palerm Ferri, 2017) and millennials are struggling with distinguishing between good and bad features of technology (Agarwal and Gupta, 2018).

9. Discussion and Summary

Communication is everywhere, both in the organization and in everyday life. Communication is necessary, essential, significant and, most of all, it affects efficiency and enables development. "Communication is the air that brings fresh ideas, new information and

knowledge. Without air, the atmosphere becomes stagnant, heavy and monotonous" (Bakirbekova and Suleimenova, 2018). The organizations have to emphasize that the "communication department's contributions go far beyond delivering content and communication services" (Zerfass and Volk, 2018). "The communication department had a central role in providing support, as well as in driving the communication initiatives and making sure that things happened" (Pekkala, 2020). Communication is, has been, and will be considered on many different levels because as an enterprise resource it needs to be developed in order to be able to continuously increase its value.

Better communication now will reduce the occurrence of undesirable problems in the future (Zerfass and Viertmann, 2017). Thanks to good communication, it is possible to guide employees in such a way that they know what is happening around them. Based on the analysis in interviews with communication practitioners, it can be concluded that communication determines and helps to maintain a kind of path leading to the employee's success and the organization. "Respondents were of the view that while a conducive communication climate can make even the most recent employee come up with new ideas and suggestions, a nonconductive climate can push even the most vocal employee into silence" (Kamal Kumar and Kumar Mishra, 2017).

The development of communication is necessary for the full implementation of "revolution 4.0" (Stacho et al., 2019). As technology advances, communication becomes better, however, some forms of communication turn out to be ineffective if the current situation is not taken into account (Boerngen, 2019). It should be noted that if communication in the organization is ineffective, then it should not be completely changed, but should be adapted to the strategy and goals (Zerfass and Viertmann, 2017).

Communication is a very complex process, the measurement of which consists of many factors. It has many levels on which it affects, therefore it is necessary to develop it evenly because only extensive and broad communication will provide the most benefits. "Communication is indeed an art - the art of exchanging ideas and opinions, of socializing, and of being part of the community. Communication is not only through technology. Individuals can use verbal and writing capacities, as well as body language, intonation, and so many more other subtle clues that technology cannot convey" (Palerm Ferri, 2017). The development of technology affects and causes changes in the communication process (work and data flow). Based on new technologies, it is possible to integrate old and new processes, increasing their impact on work. However, many new tools distort the perception of content for "old" employees. Consequently, it becomes necessary to systematize the knowledge in order to limit possible future errors.

"Communication WAS face-to-face" (Palerm Ferri, 2017). (Now) such technology diverts attention from other important things (Saha, Saha, 2018). "Their (students') eyes are fixed on the screen. They are not interested to know what is going on around them, they are not sure who is sitting beside them and when he/she is leaving" (Saha, Saha, 2018). On this basis, it can

be concluded that the modern generation in their communication reflects the true picture of the crisis of interpersonal communication.

In this article, the analysis addresses specific areas of the knowledge and application of communication. The aim of this article is to systematize the current knowledge on the potential of communication and at the same time remind all current and future managers that communication must always be at the appropriate level. However, it should also be taken in account that despite the many benefits of developing communication, there are also some negative aspects to consider.

Among the current research on communication, there is a developing direction in which communication is heading. Based on past experience and the present situation, communication will play an even greater role in the future. Knowing that the future of communication rests in the hands of managers who are currently becoming more and more proficient in its application, it can be noticed that the next generations of new managers, as a result of the current progress in communication technologies, will have a really wide range of techniques that will bring communication to a high level.

The subject of communication is relatively young in relation to enterprise research. Due to the awareness that communication is becoming an increasingly important aspect for both people and companies, it may be necessary to learn more about the proper identification and evaluation of communication (while identifying errors and problems related to it).

Although communication has existed and has been functioning “always”, the emphasis on its development, relevance, and value for people and organizations has only recently been paying off. The research conducted in this area is not of a sufficiently high level, therefore many methods of measurement and communication characteristics have not yet been standardized to allow for a universal approach to conducting modern research in this field. Focus on developing systems for more accurate evaluation and validation of communication as a qualitative factor is worth exploring in future research.

Today, managers face many challenges, among which communication is the most important one to consider and learn about. Communication determines success, adds value, and helps solve problems. At the same time, communication functions like a living organism, it influences others and most importantly it grows to go forward. In order to operate as efficiently as possible, it may be necessary to thoroughly understand many different aspects of communication and how to use them in practice. The role of managers and supervisors should focus on emphasizing the value of the voice and opinion of each employee. By implementing good practices of Human Resources Management, you can build an almost great team. A team that knows how to communicate first and foremost.

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ANALYSIS OF A COMPANY'S ACTIVITY IN TERMS OF DISTRIBUTION COSTS

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Aim: Running a business is correlated with incurring costs. These are related to the management of resources in enterprises, which is why they must be constantly analysed and controlled. Based on cost information, certain management decisions are made. The aim of the article is to present basic issues concerning the functioning of distribution costs in an enterprise.

Design/methodology/approach: An analysis of a company's activities in terms of distribution costs was conducted. In addition, the article defines the logistical indicators and measures of an enterprise and presents expenses incurred for training in specific years.

Determinations: The article presents the allocation of primary distribution costs, which are divided into storage costs, transport costs, inventory maintenance costs, and administrative costs through conducting an interview in the enterprise.

Originality/Value: The results of the study can be used in the company's strategic distribution decisions.

Keywords: distribution logistics, logistics costs, enterprise.

1. Introduction

Currently, distribution policy is an area within which important decisions are made in an organization. Over the years, this process has been significantly intensified, due to the fact that an enterprise's financial results and position on the market depend on the decisions made in the field of its distribution policy (Bełch, 2016a, pp. 14-16). Intense consideration of the issue of distribution has led to finding many different interpretations and the establishment of different theoretical concepts of this process (Crochet, 2014, p. 512). Distribution is a particularly complex area. The purpose of this phenomenon, which is one of the most important elements of marketing impact on the market, is to overcome various barriers separating the manufacturer from the final buyer.

Distribution logistics are activities related to the goods and services flow at a specific time and place. All tasks carried out within the distribution system and its individual subsystems generate costs. In turn, logistics costs are the basic method of quantitatively measuring the effectiveness and efficiency of all company processes. Cost management requires looking at the phenomena that cause costs, as well as focusing on increasing cost efficiency.

2. Analysis of a company's activities in terms of distribution cost factors

A manufacturing company is presented as an entity conducting business activity, the main purpose of which is to achieve profit and meet the needs of its customers. Each enterprise operating on the market has to bear certain internal and external costs. It should be noted that companies try to reduce costs, but often external costs are minimized to the detriment of other costs (Ślusarczyk, 2011, pp. 14-16). In the literature "cost is the consumption of resources expressed in money, arising from the implementation of activities related to achieving the organization's objectives, in an enterprise it is the consumption of resources during the production and sale of products" (Fertsch, 2006, p. 189). One of the main goals of logistics is to minimize the product flow cost, increase the company's profit, and create a satisfactory level of customer service (Gołębbska, 2006, pp. 36-37). Companies very often point to stocks as a cost-generating factor, but it should be noted that they are inextricably linked to the production process. The structure of logistics costs in manufacturing enterprises can be presented as follows (Fechner, Szyszka, 2006, pp. 186-189).

When analysing a production plant's value and cost structure, all the smallest details should be taken into account. Starting with revenues, number of employees, products, etc., providing information on the size of the business, through other studies facilitating the analysis of cost factors of distribution, namely the results regarding individual costs:

- transport, considering additional transport costs,
- maintaining inventories, i.e. the costs of accumulation and ageing of material inventories,
- product storage, as well as the costs of packaging, equipment, energy, computer software,
- administration, i.e. costs related to mandatory product controls, material flow, as well as computer hardware and software, and personnel involved in logistics and distribution processes,
- lost benefits, obtained through calculating costs at the specific product level.

The method of calculating costs in the discussed production plant depends on several factors. In order for accounting employees to accurately manage documents, it is necessary to know the controlling areas and products, as well as individual fractions. There are two steps to

this process. The first is the responsibility of specific substantive cells that develop contracts and orders. Their tasks include the initial documentation implementation. The following step, however, is considered to be the work of an employee from the accounting department, namely the posting of a document that was initially implemented. The work of these people gives the opportunity to control all costs incurred by the company. Thus, the figure below shows what share is occupied by the basic costs.

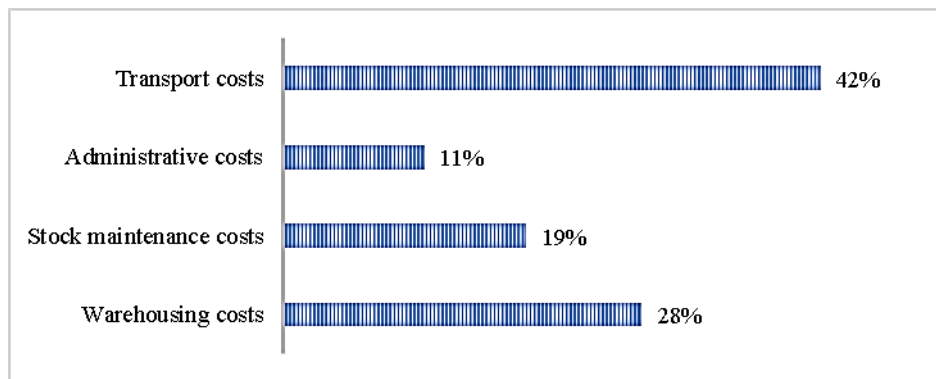


Figure 1. Allocation of basic distribution costs in the enterprise. Own study based on the company's source materials.

Based on the above chart, it is clear that the largest expenses incurred by the company are related to transport costs. Such a high percentage (42%) is mainly comprised of costs related to transport services, the costs of maintaining cars, the consumption of materials, fuels and energy related to the operation of these cars, the remuneration for drivers, as well as the repair and maintenance costs of means of transport. For the sake of comparison, figure 2 will show the difference in incurred expenses related to the basic distribution costs by the plant over a period of 3 years.

From figure 2 it can be concluded that, despite the passage of years, transport costs still constitute the largest sum of total distribution costs – on average they account for 40.6%. It is certainly not possible for administrative costs to exceed the cost limit of maintaining stocks, as the former represent 11% for 2019, 12% for 2020 and 8% for 2021 respectively, while the costs of maintaining stocks represent 19%, 12% and 21% respectively. Storage costs change in relation to the costs of maintaining inventories, i.e. when the costs of collecting inventories decrease, the cost of their storage also decreases. The above figure indicates an even spread of distribution costs, which is important when operating, among others, a production plant. However, if certain indicators were to change dramatically, managers would have to find the reason for this and then take steps to regulate this situation.

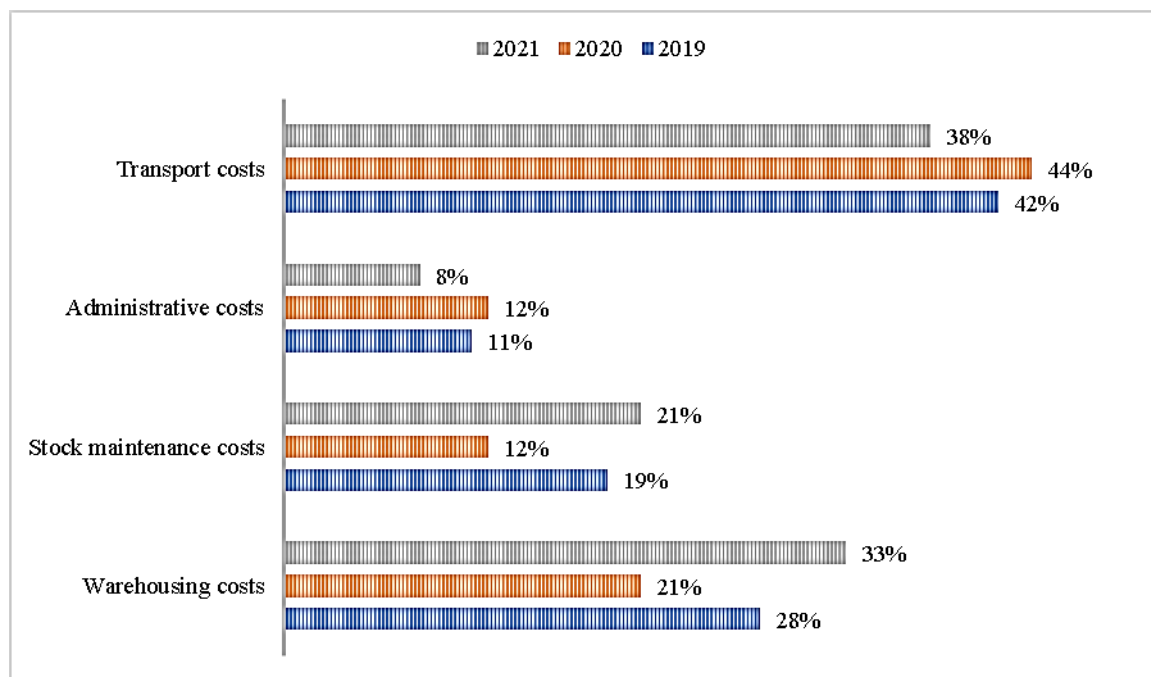


Figure 2. Distribution costs incurred by the company in 2019-2021. Own study based on the company's source materials.

Table 1 below shows a detailed breakdown of transport costs per year. Transportation costs include the operation of cars, their maintenance and repairs, fees, insurance, as well as compensation for employees, transport services, motorway tolls and parking lots. The table shows that the costs of repairing means of transport are the lowest (only 5% of the total costs), because at the turn of one year they are definitely lower than the others. The cost of car maintenance is just behind the cost of repairs. They account for 10% of transport costs and are also not among the highest, as insurance fees are paid only once a year. The above figure indicates that 15% of the total transport costs are related to transport services – these include motorway tolls, vignettes. The basic costs that overlap with transport-related costs are the 30% employee costs, and above all – costs related to fuel consumption, i.e. 40% of the total transport costs.

Table 1.

Detailed breakdown of transport costs in the enterprise

Exploitation	Wages and salaries	Transport services	Maintenance	Repairs
40%	30%	15%	10%	5%

Own study based on the company's source materials.

Based on the figure presented earlier, it should be noted that the next area associated with high costs incurred by the company, are costs related to product storage. These costs include stockpiling warehousing, property taxes including rent, maintenance costs (heating and lighting), costs of repairs, maintenance of buildings and maintaining the safety of warehouse space, as well as employee remuneration. In view of this, the figure below will present, similar to transport costs, a detailed breakdown of the total storage costs incurred by the company in the years 2020-2021.

The following shows that storage costs differ little from each other over a two-year period. The highest costs are related to the storage of products, they amounted to 38% in 2020 and 32% in 2021 of all storage costs. However, they may change due to the condition of the product, as finished products are often stored in the open air, which reduces all costs. Therefore, it is concluded that storage costs are also deeply related to the stock maintenance costs. The material storage costs are directly followed by costs related to employee remuneration, which constitute 22% (2020) and 26% (2021) of all costs. The costs associated with all kinds of fees – rent, lighting, heating and other costs of maintaining the warehouse space are comparable. These constituted 15% to 20% of all costs in 2020-2021. It is clear from the above figure that the lowest costs are associated with any repairs being made. In 2020, the company spent only 5% on building repair and maintenance, while in 2021 that figure was only 2% more.

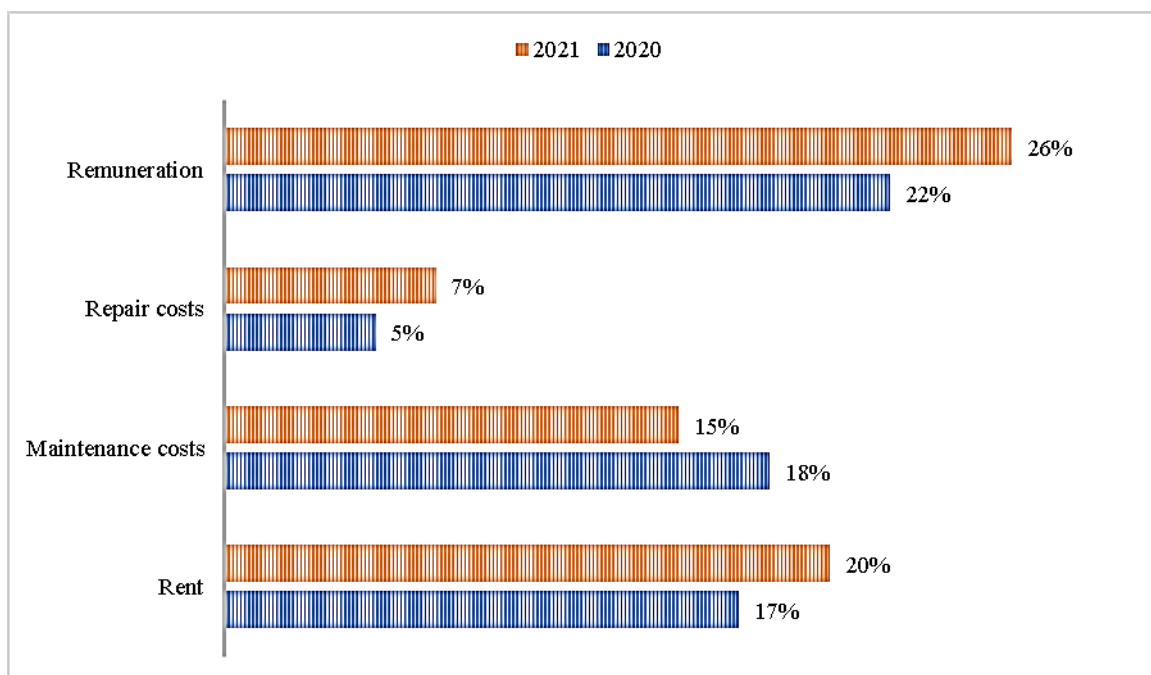


Figure 3. Breakdown of total storage costs in 2020-2021. Own study based on the company's source materials.

It is worth noting that the costs of storing finished products are much lower than the total costs. Expanded clay aggregate (LECA) in large quantities is accumulated in the open air, allowing the plant to save on the use of storage space, and thus reducing all fees.

Additional costs in the area of distribution borne by the company comprise costs related to the mandatory periodic training for employees and the so-called company-wide costs, which include protective clothing, medical care and first aid. Employees such as drivers, warehousemen, marketers, managers, or production personnel must undergo periodic training. The related expenditure is high, due to the number of company employees, as well as the frequency of training for individual departments. The figure below shows the company's expenditure on staff education and courses in 2017-2021 in PLN.

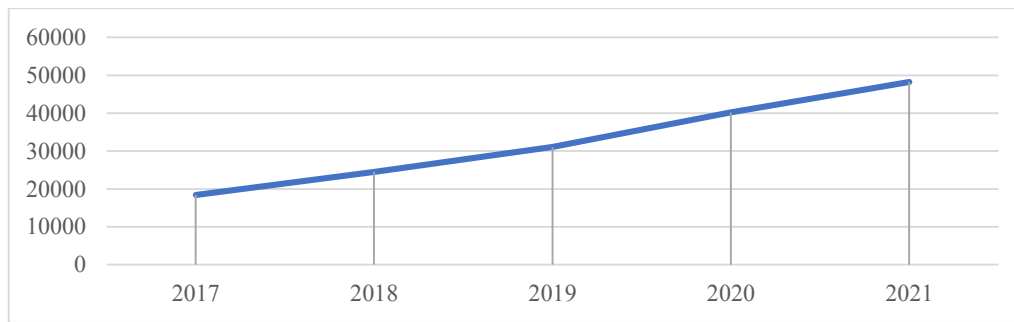


Figure 4. Company expenditure on training for distribution employees in 2017-2021. Own study based on the company's source materials.

The above chart shows the expenditures allocated to employee training. Over the five year period, these expenditures increased from year to year. Comparing 2017 to 2021, the difference is significant and amounts to almost PLN 30,000. In 2017, the company paid PLN 18,452 for training, and in 2021 it paid almost three times as much – nearly PLN 48,500. Between these years, expenditures grew by about 10 thousand over a year, namely in 2010 they amounted to almost 25 thousand PLN, in 2011 they amounted to just over 31 thousand PLN, and in 2012 nearly 42 thousand PLN. The annual increase in employee training expenditures may be caused by inflation and technological development, and thus the need to increase the knowledge and awareness of employees regarding behaviour in emergency situations.

3. The Company's logistic indicators and measures

Distribution logistics involves linking all activities related to supplying the customer with finished products. The elements of distribution include the sales method, service and sales path (Ficoń, 2019, pp. 151-153). Distribution connects the logistics market with the recipient market. As part of the measurement taking into account the economic aspect of distribution, individual measures are distinguished (Twaróg, 2006, pp. 58-60).

Assessment of the company's distribution system uses indicators that encompass warehouse management combined with transport. Another important indicator are the stock losses created during accumulation of production and its transport.

Table 2.

Measuring instruments for distribution economics

Measures			
structural, framework	of productivity	of economy	qualitative
number of customers, deliveries per unit of time and levels, and storage locations	shipping and ordering productivity	costs of fulfilling a recipient's order and order distribution	percentage share of defective deliveries, delays, complaints

Cont. table 2.



average sales per customer, distance between storage levels, and distance between warehouse and customer	order transport time	share of order performance costs in sales and shipping costs ratio of company transport costs to rented transport costs	average delivery time volume of supplementary deliveries average delivery time
order format			
costs of shortages order and external transport performance			
distribution worker contribution			

Own study based on the company's source materials.

Table 2 is designed to assess the economic aspect of distribution. The measures are divided into four main sections related to the construction of the company's distribution, productivity, economy, as well as quality.

Cost accounting in enterprises may vary. Below is a diagram that shows the methods of recording, indicating which method the company's operations are based. Table 3 shows that the company, for the purpose of recording cost, is limited to only the method of cost accounting. It omits the accounting of individual direct and indirect costs, the costs of specific products and services, as well as the ABC method.

Table 3.
Method of recording costs

Recording method	
	Cost accounting
	Division of costs into direct and indirect
	Calculation at the product and service level
	Cost calculation using the ABC method
	

Own study based on the company's source materials.

Cost-generating factors include the relationship with the customer, the method of customer communication, the service sharing the distance, as well as the frequency and size of orders placed by the customer. In order to maintain a good customer relationship and acquire regular consumers, the company strives for the highest customer service quality. All these factors indicate the amount of incurred costs.

Table 4 presents what in the process of order placement by a customer influences the amount of costs. It follows from the above that the best solution for the company would be a large, standard order, placed by a customer not too far from the production plant, using an electronic form of communication, and a short payment cycle. In cost reduction, it is important that the customer accepts the prices proposed in offers and price lists, rather than agreeing the price through the negotiation process or tenders. Placing small and frequent orders, similar to a product quality guarantee, increases transport costs.

Table 4.
Customer cost drivers

Low costs	High costs
standard orders	special orders
large orders	small, frequent deliveries
shorter distance to the customer	greater distance to the customer
classic selling procedures (offer/price list)	pre-sales services (negotiations/ advice/ tender)
no pre-sales service	training, servicing, warranty
electronic communication	traditional communication
short payment chain	long payment chain

Own study based on the company's source materials.

In order to calculate the logistics costs needed to assess the production process situation and the related costs, the company uses appropriate formulas.

4. Summary

Costs are one of the most important economic categories related to a company's functioning. Their appropriate division and accounting allow correct determining the company's financial result in a given period. Familiarity with the costs, knowledge about them, learning their essence and economic thread ensure effective and efficient enterprise management (Geyskens, Steenkamp and Kumar, 2006, pp. 519-543; Müller and Aust, 2011, pp. 1287-1330). Calculating distribution costs, i.e. the sum of all costs related to the physical flow of products from the manufacturer to the end customer, i.e. customer service, orders, transport, warehouse space maintenance and inventory maintenance, is a difficult process, although very important in proper company functioning. Costs are interdependent, which means that deciding to reduce costs in one particular sphere may result in increased costs in another sphere, and thus in an increase in total costs.

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PSYCHOSOCIAL CONSEQUENCES OF THE COVID-19 PANDEMIC IN THE CONTEXT OF PSYCHIATRIC CARE

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Purpose: The study aimed to review the current literature on the psychosocial consequences of the COVID-19 pandemic in psychiatric care.

Design/methodology/approach: Based on the available literature, the author discussed and grouped the stressors related to the coronavirus pandemic. Next, the author drew attention to the harmful effects of pandemic stressors on psychosocial consequences. The author based his considerations on the latest world literature on the subject – only from the pandemic period, i.e., 2020-2022. For this purpose, the author studied mainly scientific articles and electronic sources. The author used the following professional scientific databases: Taylor & Francis online, PubMed, and Google Scholar to collect scientific literature.

Findings: The SARS-CoV-2 virus has changed the image of everyday functioning in society, which has had an impact on mental health. The coronavirus pandemic contributed to psychosocial disorders that significantly reduced the quality of life. There has been a significant increase in depression, drug-induced disorders, and post-traumatic stress disorders. In the literature analysis, the author also indicated a rise in loneliness among seniors, increased domestic violence, and an increased risk of suicidal behavior.

Social implications: The pandemic has shown investment in health means an investment in the economy, security, and the world's future. An efficient and safe health system is a *raison d'etat*, but it is also a colossal civilization challenge. The author noted the great importance of psychiatric care in alleviating stressors related to the COVID-19 pandemic. The author also pointed to the urgent need to subsidize psychiatry in Poland and increase human resources in this area.

Originality/value: The author addressed the article to scientists, health care researchers, and managers/directors managing medical entities to make them aware that the coronavirus pandemic has serious health consequences, primarily in the mental sphere, posing a challenge health care systems around the world. The article's value highlights the invaluable and underestimated role of psychiatry in dealing with individual, institutional and social difficulties related to COVID-19 and future emerging infectious diseases. According to the author, the post-pandemic situation in psychiatry should consider the stressors identified during the pandemic and its psychosocial consequences. In this way, doctors can accurately diagnose a patient and propose an effective treatment path, treating the patient comprehensively and holistically.

Keywords: SARS-CoV-2, COVID-19 pandemic, COVID-19-related stressors, psychosocial consequences of a pandemic, psychiatric care.

Category of the paper: General review.

1. Introduction

In December 2019, epidemiologists identified unknown origin pneumonia in Wuhan, Hubei Province, China. After careful examination, a new virus was isolated, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Due to the global spread of the new virus, the World Health Organization declared a pandemic on March 12, 2020 (Ciotti et al., 2020). In Poland, the first case of COVID-19 infection occurred on March 4, 2020. Since then, the coronavirus has spread gradually in the country (Sozański et al., 2021).

The COVID-19 pandemic, one of the world's most devastating health events due to the rapid global spread of the coronavirus, has a wide-ranging impact on mental health, especially in people with pre-existing mental disorders (Campion et al., 2020). The pandemic has had many dire negative consequences on mental health. Among them, it is possible to indicate, among other things, an increase in the rates of suicidal ideation, increased mental suffering, depression, anxiety, and abuse of psychoactive substances (Kumar, Nayar, 2021; Sinyor et al., 2021). The World Health Organization (2020a, 2020b) indicates the psychological and psychosocial consequences of the pandemic: increased loneliness, insomnia, alcohol abuse, drug use, self-harm, and suicidal behavior. There is also an increase in domestic violence cases (Abramson, 2020; Chandra, 2020; Graham-Harrison et al., 2020). The coronavirus pandemic has caused enormous difficulties due to the disease itself and public fear, prolonged isolation, physical distance, disruptions in education, and school closings. In addition, there were economic problems and increased violence on the partner's part (Sinyor et al., 2021).

Lockdown was supposed to quarantine people suffering from COVID-19 and minimize contact with people infected with the coronavirus. Social distance has become the main rule – people had to stay at home and have as little social contact as possible outside the home. The exceptions to this rule were the necessary purchases and daily exercise. Many workers had to stay and work from home (Østertun Geirdal et al., 2021). Isolation, quarantine, and the subsequent economic crisis can significantly affect mental health. Most studies to date show an increase in loneliness during a pandemic. Of course, it is possible to maintain social relationships through technology-based solutions. Still, there is a risk of excluding older people who are the least inclined to use technology and the most vulnerable to loneliness. In addition, remote social contacts cannot fully compensate for the loss of physical contact (Dahlberg, 2021). The results of previous studies have shown that exposure to COVID-19 had a direct impact on stress and an indirect effect on anxiety and depression through the use of media (traditional and social) and interpersonal communication (First et al., 2021).

Psychiatric care should be crucial because of the above psychosocial consequences caused by the COVID-19 pandemic. According to Professor Janusz Heitzman, a psychiatrist, and vice-president of the Polish Psychiatric Association, COVID-19 has exacerbated mental diseases. One can speak of a humanitarian crisis in psychiatric care (Lurka, 2020). Although it recommends conducting online visits to psychiatric care during an epidemic crisis (Krzystanek et al., 2020), however, in the long run, this does not solve the long-term effects of the pandemic.

Stress resulting from social limitations, trauma related to developing COVID-19, and the increasing number of reports on the neurotrophic effect of SARS-CoV-2 increase the risk of depression, anxiety, and other mental disorders. Thus, during a pandemic, the demand for the availability of psychiatric care increases (Sokół-Szawłowska, 2021).

The current epidemic situation in the world poses enormous challenges for decision-makers, both in the global health care system and the economy (Zalsman et al., 2020).

The article aims to present the issues available in the literature on the psychosocial consequences of the COVID-19 pandemic. The author raised the importance of psychiatric care in alleviating stressors related to the coronavirus pandemic. The author studied scientific articles and electronic sources from 2020 to 2022.

2. Methodology

The author based the study on the literature analysis concerning the mental health and psychosocial consequences of the COVID-19 pandemic regarding psychiatric care in Poland and the world. The bibliography includes 50 works: scientific articles, a monograph chapter and a report (42), and electronic sources (8) from the current pandemic, i.e., 2020-2022. During desk research analysis, the author has used the following professional scientific databases (brackets show the number of cited publications in a given database): Taylor & Francis online (12), PubMed (17), and Google Scholar (13). The author used these scientific databases due to the possibility of accessing them through entry from the Wrocław University of Economics and Business position. Second, these databases made it possible to collect the literature for this article.

3. COVID-19-related stressors

The coronavirus pandemic has profoundly impacted all aspects of the functioning of societies around the world, including mental health. The COVID-19 pandemic and its consequences show three distinctive features of traumatic events: unpredictability, uncontrollable, and a threat of death or severe injury (Denckla et al., 2020). The stressors associated with COVID-19 can be related to the disease: physical risk of getting sick, loss of a loved one, and risk of infecting others. Second, there are work-related stressors among health professionals. Finally, stressors may arise from measures taken to limit virus transmission: home/job loss, social isolation, and domestic violence (Olf et al., 2021). Table 1 presents stressors related to the coronavirus pandemic broken down into different groups: the COVID-19 disease itself, the transmission of the virus, the various constraints caused by the pandemic, the performed work, and information on COVID-19 from the media.

Table 1.
Pandemic-related stressors

Pandemic-related stressors	
group of stressors	stressors
COVID-19 disease itself	Severe illness Physical risk of getting sick Risk of infecting others Fear of hospitalization Fear of a positive test result Uncertainty about disease progression Fear of the unpredictable course of the disease Fear of death as a result of illness Witnessing death Loss of a loved one Intrusive thoughts
The transmission of the virus	Fear of infecting family members Parental psychological distress Frequency of exposure to individuals infected with the virus Fear of contact with potentially contaminated objects or surfaces Stigmatizing, discriminating against being a person suffering from coronavirus and suffering from mental disorders at the same time Extreme exposure to COVID-19 details Fear of being vaccinated against COVID-19 Patients' decision problems in the context of conspiracy theories undermining the validity of vaccinations Giving up or trying to defer taking the COVID-19 vaccine Inadequate PPE (personal protective equipment) Ineffective preventive behavior Insecurity Food insecurity

Cont. table 1.

The various constraints caused by the pandemic	<p>Social isolation Diminished personal freedoms Physical distancing Home confinement Increase in hygiene and isolation behavior Quarantine Loss of sense of control Disorganization of previous activities/no clearly defined day structure Inability to achieve the current goals Less interest in online therapy among children with mental disorders and children with intellectual disabilities Loneliness Increasing the need for contact with other people Feeling bored Family conflicts Domestic violence Partner's intimate violence The need for remote learning Blurring the boundaries between education and family life Psychophysical overload with daily duties The presence of other household members makes it difficult or impossible to carry out educational tasks Feeling of mental "suffocation" in the face of the inability to isolate yourself from the rest of the people Lack of access to testing for COVID-19 patients Economic hardships Home loss Worrying "in advance" - stores may run out of food Shortages of available resources (foods, paper products, personal protective equipment) Inability to plan economic and personal decisions Partial closure and inactivity of welfare organizations</p>
The performed work	<p>Increased workloads Organizational difficulties in health care Overload of the healthcare system Making difficult medical decisions Difficulties in treating and helping people with COVID-19 Work in uncomfortable coveralls and personal protective equipment Being a caregiver The daily interaction of medical professionals with the death and suffering of patients Exposure to moral anxiety among health professionals who engage in activities and make choices that are inconsistent with their morals, ethics, or values Burnout of professional groups directly involved in the fight against the pandemic The need to work remotely Working from home with kids The presence of other household members makes it difficult or impossible to carry out professional tasks Smooth boundaries between work and family life Restriction/suspension of professional activity A sense of economic threat A sense of existential threat Fear of bankruptcy Job loss Loss of benefits and health insurance Loss of meaning/purpose provided by sustained employment Increased risk of stigmatization, prejudice, and discrimination against people who lost their jobs and received government aid as a result of the pandemic</p>

Cont. table 1.

Information on COVID-19 from the media	Inconsistency in communications and directives on public health measures Regular media reports of the pandemic and the uncertainty surrounding its outcome Compulsive checking in the media and confirming the possible dangers of a pandemic Media messages reinforcing the negative aspects related to the pandemic situation Emphasizing statistics on morbidity and mortality from COVID-19 Inconsistent and irrational ministerial statements regarding: a. compliance/non-compliance with recommendations related to social distancing b. limiting activities of industries that had little impact on the increase in infections c. restrictions for institutions/sectors that are the source of high virus transmission Unpredictability regarding the degree and duration of the restrictions imposed in some countries Potentially fake news/reports/misinformation about the COVID-19 pandemic Doubts about the efficiency of the health care system
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Source: own study based on: Boden et al., 2021; Buecker, Horstmann, 2021; Dąbkowska, 2021; Devoto et al., 2022; Dymecka, 2021; Gilleen et al., 2021; Gryksa, Neumann, 2022; Heitzman, 2020; Jamaluddin et al., 2022; Księżka-Koszalka, 2021; Lotzin, 2021; Low, Mounst, 2022; Ma et al., 2020; Michalska, 2020; Olf et al., 2021; Shalev, Shapiro, 2020; Tucker, Czapl, 2021; Veer et al., 2021; Vintila et al., 2022; Xiong et al., 2020.

The study results by Kira et al. (2021) and Wirkner et al. (2022) indicate that COVID-19 is a new type of traumatic stress with severe mental health implications. This stress is not necessarily related to the actual COVID-19 infection. Still, it is more related to the perceived/real threat of an uncontrolled virus and the direct and indirect economic and social consequences of actions taken by various actors to deal with them. World epidemiological data show that about 30% of people experience mental disorders during the coronavirus pandemic, and over 50% of respondents complain of psychological distress. These results indicate a necessity to take preventive and remedial actions in their implementation (Księżka-Koszalka, 2021).

4. Psychosocial consequences of the COVID-19 pandemic

The psychosocial effects of the COVID-19 pandemic are both individual symptoms and their syndromes. The literature can mention the following psychosocial symptoms or disorders resulting from the harmful effects of the pandemic stressors listed in Table 1. These negative consequences are present in Table 2.

Table 2.*Psychosocial consequences of the COVID-19 pandemic*

Psychosocial effects/disorders
Prolonged anxiety reaction
Anxiety disorders
Anger
Distress
Irritability
Impulsiveness
Sadness
Inability to express joy/satisfaction
Failure to express positive feelings
States of nervous tension
Inability to break away from the constant experience of trauma
Post-traumatic stress disorder
Disorganizing disorder of mood regulation (severe and recurrent outbursts of verbal and behavioral anger, and in between chronically irritable moods that last most of the day almost daily)
Depressed mood states
Complicated grief due to the suddenness and unexpectedness of the death
Complicated grief due to difficulties communicating before death
Complicated grief due to limitations to social support and mourning rituals
Somatization
Frustration
Increasing mental fatigue
An increase in the number of suicides
Depressive disorders
Intensification of domestic violence / interpersonal conflicts in families
Sleep disturbance
Nightmares
No feeling of rest after sleep
Prolonged persistence of fear
Psychotic disorders
Higher risk of self-destructive behavior and suicide
Loss of interest and the ability to experience pleasure as revealed by subjective complaints
Burnout
Family financial crisis
Parental burnout is a sense of exhaustion, inadequacy, and emotional distance as a parent
Engaging in transactional sexual behavior
Risk of unplanned, early pregnancy / spontaneous parenthood
Psychomotor slowing down
Slowness or agitation
The feeling of lack of energy
The sense of lack of self-worth
The dominant build-up of the surface of unreality
Uncertainty about your own identity
A feeling of bewilderment
Significant changes in appetite and body weight - over 5% per month
Reduction of intellectual abilities
Marginalization of selected groups of children
Forced begging
Widening the social gap in the context of the lack or limited access to remote learning equipment, making it even more difficult for children from low socioeconomic status families to have equal access to education
Dropping out of education
Taking risky behavior by children and adolescents
Loss of tenderness and parental care
The use of children for a variety of household work
Easier to hide physical, psychological, and sexual violence against children in the family
Less supervision of children online by parents/guardians
Increased exposure of children to experience online violence

Inadequate guilt
 Insecurity in children
 Reduced ability to think or concentrate, or pay attention
 Abuse/increase in addiction to alcohol, psychoactive substances
 Confusion
 Symptoms of impaired perception (delusions and pseudohallucinations related to excessive vigilance about the environment and the presumption of the source of infection)
 A feeling of slowing down over time
 Difficulty remembering certain aspects of traumatic events
 Insomnia or excessive sleepiness almost daily
 Trouble with memory
 Chronic fatigue
 Increased loneliness
 Feeling of helplessness
 Panic states
 Avoiding people and places that bring to mind the past trauma
 Recurring thoughts of death beyond the fear of death
 Recurrent suicidal thoughts without a specific plan
 States of despair
 Feeling of hopelessness
 Self-blame and lowered self-esteem
 Excessive vigilance
 A persistent sense of harm and suffering
 Motor restlessness
 Limiting attention to one problem - epidemics
 Unprovoked irritability and outbursts of anger (verbal aggression and aggressive behavior towards other people or objects)
 Aggressive reaction to neutral stimuli
 Increased reactivity to external stimuli
 Inappropriate and unintentional activity
 Symptoms of avoidance as an attempt to release the traumatic burden - escape from recurring feelings, thoughts, and memories about the pandemic and its consequences, as well as people and situations evoking distressing thoughts, feelings, and memories
 Serious and embarrassing difficulty in coming to terms with the loss of the existing lifestyle, values, and goods
 Recurring reflection on epidemic threats in the form of intrusive personal and electronic memories
 Recurring harassing dreams with epidemic-related content
 Repeated dissociative reactions related to the feeling of unreality of the threat that completely changed the current status of a given person, the rhythm of his daily functioning, and plans for the future
 Intrusive tracking of media information about the epidemic
 Obsessive (often inappropriate and ineffective) use of treatments
 Thorough hand washing
 Avoiding the crowds
 Delayed return to normal
 An increase in help-seeking behavior

Source: own study based on: Boden et al., 2021; Dąbkowska, 2021; de Sousa Moreira et al., 2020; Devoto et al., 2022; Dymecka, 2021; Heitzman, 2020; Jamaluddin et al., 2022; Koole, Rothermund, 2022; Księżka-Koszalka, 2021; Kunzler et al., 2021; Michalska, 2020; Serafini et al., 2020; Veer et al., 2021.

The psychosocial consequences of a pandemic listed in Table 2 vary in importance, especially in psychiatric care. First, the above reactions/behaviors were related to a massive quarantine imposed to mitigate the spread of COVID-19. Second, such reactions are generalized fear and pervasive community anxiety usually associated with outbreaks and increase as new cases escalate and inadequate, fear-inducing information provided by the media (Serafini et al., 2020).

The author didn't group behaviors/disorders/effects that are the aftermath of the ongoing coronavirus pandemic - as was the case with pandemic stressors. First, it wasn't easy to distinguish and name particular groups unequivocally. Second, some factors would probably fit different groups at once, and it would be difficult for them to select the correct ones from the proposed groups. Finally, the author noted some of these effects are duplicated with the stressors in Table 1 - hence the additional difficulty in classifying them.

5. Psychiatric care in Poland and the world – current state

The picture of psychiatric care in Poland is as follows: many needs, little money, and staff shortages. Spending on psychiatry is only 3.04% of the National Health Fund on healthcare services, which is significantly low compared to Western countries, which amounts to 6-8%. The COVID-19 pandemic greatly affected the mental health of Poles, which manifests in an increase in the incidence of mental illness and exacerbation of the disease among people already suffering from illness. All this influences the scale of needs in psychiatric care in an unimaginable way (Kaczmarczyk, 2020).

The COVID-19 outbreak has exposed potential gaps in psychiatric care. Due to the vast and significant impact of the coronavirus pandemic on the mental health of the population, the task of psychiatrists during an epidemic is, firstly, to adapt and supplement the form of information transmission to the potential perception of recipients. As part of developing this message, specialists in social communication, social psychology, economics, pedagogy, and others are also necessary. Their position guarantees a reliable and knowledge-based transmission in managing the strategy of dealing with the effects of an epidemic (Heitzman, 2020).

Global research indicates a higher incidence of adverse psychiatric outcomes symptoms than in the pre-coronavirus pandemic. Signs of these adverse psychiatric outcomes could be seen more frequently at the outset of the epidemic when people were at risk of forced quarantine, unexpected unemployment, and the uncertainty surrounding the spread of the virus. The duration of psychosocial symptoms is a significant factor in assessing the psychosocial effects of the coronavirus outbreak. Hence, further post-pandemic research appears necessary to determine the long-term psychosocial consequences of the COVID-19 pandemic (Xiong et al., 2020).

Overall, the psychosocial consequences of SARS-CoV-2 virus infection cause an unprecedented increase in the incidence of mental disorders, particularly anxiety disorders, which may accelerate the development of several other comorbid mental illnesses such as mood disorders (depression, bipolar disorder), schizophrenia, substance abuse (Jansen van Vuren et al., 2021). According to psychiatrists, there will be lasting changes in the practice of psychiatry in terms of how it can implement and what they learn from treating disorders in this

difficult pandemic time (Freeman, 2020). It points to the lack of adequate training in internal medicine among psychiatrists in some countries to effectively treat patients with mental disorders and coexisting SARS-CoV-2 infection (Szcześniak, 2021). In addition, the current treatment options and the psychosocial stress associated with the COVID-19 pandemic can lead to a wave of neuropsychiatric sequelae. Hence it is crucial to pay more attention to the possible neuropsychiatric consequences of SARS-CoV-2 viral infection, which may be helpful in early identification and better treatment (Dinakaran, 2020). Therefore, psychiatric care worldwide, especially in Poland, requires additional investment so that psychiatry has the financial and human resources in the long-term fight against the effects of the COVID-19 pandemic.

6. Conclusions

In this paper, the author drew attention to the consequences of the COVID-19 pandemic in mental disorders of a population nature. They can cause significant economic losses. The mental health effects of COVID-19 are enormous. First, there was a substantial increase in depression, drug disorders, and post-traumatic stress disorders; second, the rise in loneliness among seniors, increasing domestic violence, and the risk of suicidal behavior. The coronavirus pandemic contributed to psychosocial conditions that significantly reduced the quality of life. The SARS-CoV-2 virus has changed the image of everyday functioning in the family, school, and work, which impacts mental health.

The COVID-19 pandemic has changed people's lives worldwide. It has affected individuals and society, including citizens' physical and mental health. The result of the pandemic situation is a broad spectrum of symptoms and problems of a psychosocial nature. Actions aimed at counteracting the pandemic changed everyday functioning and created a complex system of stressors negatively affecting the population's mental health in the context of potential coronavirus infections.

The coronavirus pandemic poses a severe challenge to healthcare systems around the world. Psychiatry can play an essential role in dealing with the individual, institutional and social difficulties of COVID-19 and future emerging infectious diseases. The post-pandemic situation in psychiatry should take into account the stressors identified during the pandemic, as well as its psychosocial consequences. Only in this way medical professionals, including psychiatrists, can accurately diagnose the patient and propose an effective treatment path by treating the patient comprehensively. At the same time, one cannot forget about the increase in funding and medical staff, which are still areas that still require improvement from a global perspective.

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INFLUENCE OF THE PRODUCTION DIRECTION OF EUROPEAN UNION FARMS ON THE LEVEL OF FINANCIAL LIABILITIES

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Purpose: The main purpose of the study was to investigate the relationship between the direction of production of farms in the European Union and the level of their liabilities.

Design/methodology/approach: The study period includes the years 2005-2019. Data relating to eight types of farming identified in the FADN database were used to illustrate the directions of production. The conducted research focuses on the following types of liabilities: total, incurred for a period longer than one year and incurred for a period of less than one year with outstanding cash payments. One-way ANOVA variance was used to achieve the research objective.

Findings: The conducted research showed that the most common differences in the level of liabilities are between the type of granivores and the types of farms focused on plant production and other permanent crops with farms focused on field crops, horticulture and livestock production. Relatively few differences can be observed in the case of farms targeting the same source of food origin (except for other permanent crops).

Originality/value: The obtained results indicate a significant differentiation in the level of liabilities in farms focused on plant and livestock production, which results from the different specificity of their production.

Keywords: agriculture, plant production, livestock production, FADN, analysis of variance.

Category of the paper: Research paper.

1. Introduction

The use of external financing sources by farms is an important factor in the development of production and property security. This is due to the necessity of their functioning in an increasingly competitive agricultural market, including among the constantly changing prices for agricultural raw materials or the necessary resources used during production.

The existing uncertainty of sales as well as relatively long production cycles may make it necessary to use various forms of financial support to an increasing extent.

The access of farms to sources of financing varies, due to the profile of agricultural activity, adopted goals, strategies, economic results, etc. (Stryckova, 2015). The investment decisions made by farms are based primarily on equity. This is due to the limited access to foreign capital. As noted by Barry et al. (2000) financing of agriculture on preferential terms is important due to the relatively high share of small farms and the capital intensity of this sector. The high level of self-financing also results from the high asymmetry of information (Ma and Tian, 2006; Posey and Reichert, 2011), farmers' aversion to debt (Kata, 2010; Gałecka and Pyra, 2016), or high investment risk (Swinnen and Gow, 1999). However, as noted by Azhagaiah and Gavoury (2011), farms should to some extent use both equity and foreign capital, as this is the best choice. Proper use of external sources of financing agricultural activity may contribute to an increase in the production potential, work efficiency, or to the improvement of the achieved competitive position. At the same time, it should be noted that the level of indebtedness of farms is influenced by many internal and external factors. As Daniłowska (2005) notes, the interest of farmers in external financial sources is influenced by the level, structure and terms of loan repayment, which are the result of the impact of these factors.

The diversified structure of financing farms necessitates the examination of the level of their liabilities and the analysis of their diversification in accordance with the adopted criteria. The legitimacy of undertaking this type of research results from the necessity to analyze empirical data from the micro-, meso- or macroeconomic point of view. These tests are possible, among others thanks to the implementation of the FADN database, which allows to select a representative sample according to the criterion of the type of farming, which indicates the production attitude of farms (Goraj et al., 2006). The research carried out on such a sample of farms allows for the formulation of conclusions that relate to the entire population of farms.

Topics related to the level of using external financing sources by farms is a frequently undertaken issue. They dealt with, inter alia, Diederer et al. (2003) and van der Meulen et al. (2016), pointing out that farmers with higher indebtedness can be expected to adapt innovations earlier by using foreign capital, or Ganderton et al. (2000) and Sherrick et al. (2004) presenting that farms with high debt more often adopt a risk management strategy. The available research results also allow to state that farmers are reluctant to use external sources of financing, which is mainly the result of the specificity of their activities, farmers' aversion to risk, and credit limitations (Bierlen et al., 1988; Petrick, 2005; Zinych and Odening, 2009). A significant part of the work also relates to the study of the financial situation of farms, where one of the examined indicators is the level of debt (Burja and Burja, 2010; Grzelak, 2014).

These studies do not show the analysis of the relationships between the type of production of farms and the level of debt. There are also no studies undertaken in this area, which are based on the use of tools for the analysis of variance. Therefore, the main goal of the study was to study the relationship between the production direction of European Union farms and the level

of their debt. In addition, the results achieved are to show how the production direction of European Union farms affects the level of liabilities of farms.

2. Research methodology

The study covers all the European Union member countries. The research period was limited to the years 2005-2019. In order to illustrate the production direction of farms, the data relating to eight types of farming identified in the FADN database were used. The following types of farms have been distinguished:

- field crops (A),
- horticulture (B),
- wine (C),
- other permanent crops (D),
- milk (E),
- grazing livestock (F),
- granivores (G),
- mixed (H).

The research undertaken focuses on 3 types of outstanding debts: (1) total liabilities (1) and two variables that it comprises, i.e. liabilities incurred for a period longer than one year (2) and liabilities incurred for a period shorter than one year with any outstanding cash payments (3). In the FADN database, these variables are characterized by the following symbols: SE485, SE490 and SE495.

The one-factor analysis of variance ANOVA has been used to achieve the research objective. According to the definition, the ANOVA is a method that detects the differences between averages in several populations (Aczel and Sounderpandian, 2018). Thus, the ANOVA is used to analyse measurable observations depending on one or several factors, at the same time it explains if they cause differences between group averages. The ANOVA examines the hypothesis of equal averages, i.e.:

$$H_0: m_1 = m_2 = \dots = m_k$$
$$H_1: m_i \neq m_j \text{ for some } i \neq j$$

The test statistics give the answer to the question how much results from the acting of the factor, and how much from the randomness of phenomena. The statistic has a distribution F with $k-1$ and $n-k$ degrees of freedom, where k is the number of degrees of the analysed factor and n is a sample size.

An important aspect of conducting research using the ANOVA method is taking into account a number of assumptions (Stanisz, 2007):

1. the independence of random variables in the analysed populations (groups),
2. the measurability of analysed variables,
3. the normal distribution of variables in each population (group),
4. the uniformity of variables in all populations (groups).

The assumption of normal distribution of variables in each population (group) was conducted by means of the Anderson-Darling test, which proposes two opposing statistical hypotheses (Anderson and Darling, 1952). The null hypothesis is that the data distribution follows the normal distribution, and the alternative hypothesis is that the data distribution does not follow the normal distribution.

In order to check if there is a reason to reject the zero hypothesis p value is used. When p value is lower than the accepted level of test significance 0,05, there is no reason to reject the zero hypothesis of normal distribution of the analysed characteristics.

The studies of the uniformity of variables in all populations (groups) was conducted by means of the Bartlett test, which compares the weighted arithmetic mean of variance with the geometric mean of variance. It is based on the statistics with asymptotic distribution χ^2 .

If any of these assumptions is not met, the Kruskal-Wallis non-parametric test should be used. The interpretation of the test may be similar to the parametric one-way ANOVA with the difference that the test indicates the equality of average ranks, not average values.

To identify particular dependencies between the production direction of the European Union agricultural enterprises and the particular types of liabilities, the following hypotheses were formulating:

$H_{0(i)}$: the distribution of value of the achieved value i- type of liabilities incurred by farms of the European Union in every direction of production of these enterprises is the same (the direction of production of the European Union agricultural enterprises has no significant influence on the achieved value of i- type of liabilities of these enterprises),

$H_{1(i)}$: at least two directions of production of the European Union agricultural enterprises differ in terms of the value of i- type of liabilities of these enterprises from the others (the direction of production of the European Union agricultural enterprises has significant influence on the achieved value of i- type of liabilities of these enterprises).

3. The study results

In the first stage of the research, the basic statistics of the adopted dependent variables were examined. The results are presented in table 1.

Table 1.
Basic data of dependent variables in individual groups

Dependent variable: Total liabilities						
Types of agricultural enterprises	Average	Median	Min	Max	Kurtosis	Skewness
A	45145.33	44154	34548	56525	-0.81	0.26
B	93402.40	94971	78430	103530	-0.74	-0.59
C	44531.20	41965	37534	56184	-1.38	0.53
D	7643.40	8518	4469	10381	-1.73	-0.25
E	103500.27	101217	64055	156365	-0.19	0.62
F	34229.00	32248	29085	43760	-1.03	0.57
G	223982.73	255739	130593	323763	-1.59	-0.15
H	31648.13	31598	20233	47738	-0.35	0.62
Dependent variable: Long & medium-term loans						
Types of agricultural enterprises	Average	Median	Min	Max	Kurtosis	Skewness
A	33165.67	32966	24079	41581	-0.97	-0.08
B	69803.13	70923	58759	78221	-1.01	-0.44
C	24693.07	23154	21252	31611	-1.11	0.75
D	5767.47	6585	3241	7962	-1.70	-0.29
E	87012.47	86329	52525	130754	-0.35	0.50
F	25953.93	24133	22165	33688	-0.90	0.67
G	180787.87	209901	104944	256643	-1.59	-0.26
H	22876.33	22996	14349	33967	-0.24	0.58
Dependent variable: Short-terms loans						
Types of agricultural enterprises	Average	Median	Min	Max	Kurtosis	Skewness
A	11979.40	11628	10469	15204	0.09	1.13
B	23599.13	23300	19670	29397	-0.57	0.62
C	19838.20	19886	15593	25329	-1.52	0.22
D	1876.00	1917	1228	2680	-1.45	0.22
E	16487.67	16093	11530	25611	0.39	1.10
F	8275.27	7928	6920	10072	-1.51	0.34
G	43194.53	45838	24835	69735	-1.47	0.27
H	8771.87	8602	5884	13771	-0.69	0.62

Source: own study.

In the case of the total amount of liabilities, the lowest level was characteristic for farms such as: other permanent crops, mixed and grazing livestock. The highest level of liabilities was recorded in the case of: granivores, milk and horticulture. The lowest average values of long-term liabilities – as in the case of the total amount of liabilities – occurred in farms of the type: other permanent crops, grazing livestock and mixed, while the highest were in the type: milk, horticulture and field crops. Slightly different values were observed for short-term liabilities. The lowest level was recorded for farms focused on the production of other permanent crops, granivores and mixed, and the highest: granivores, horticulture and wine.

The obtained results of the average levels of individual variables allow for the initial rejection of the null hypothesis in most cases. Moreover, on the basis of the observations of kurtosis and obliquity it can be stated that in some cases of investment there may be problems with the normality of distribution.

To confirm the initial assumptions the box-and-whisker plots were created (figure 1).

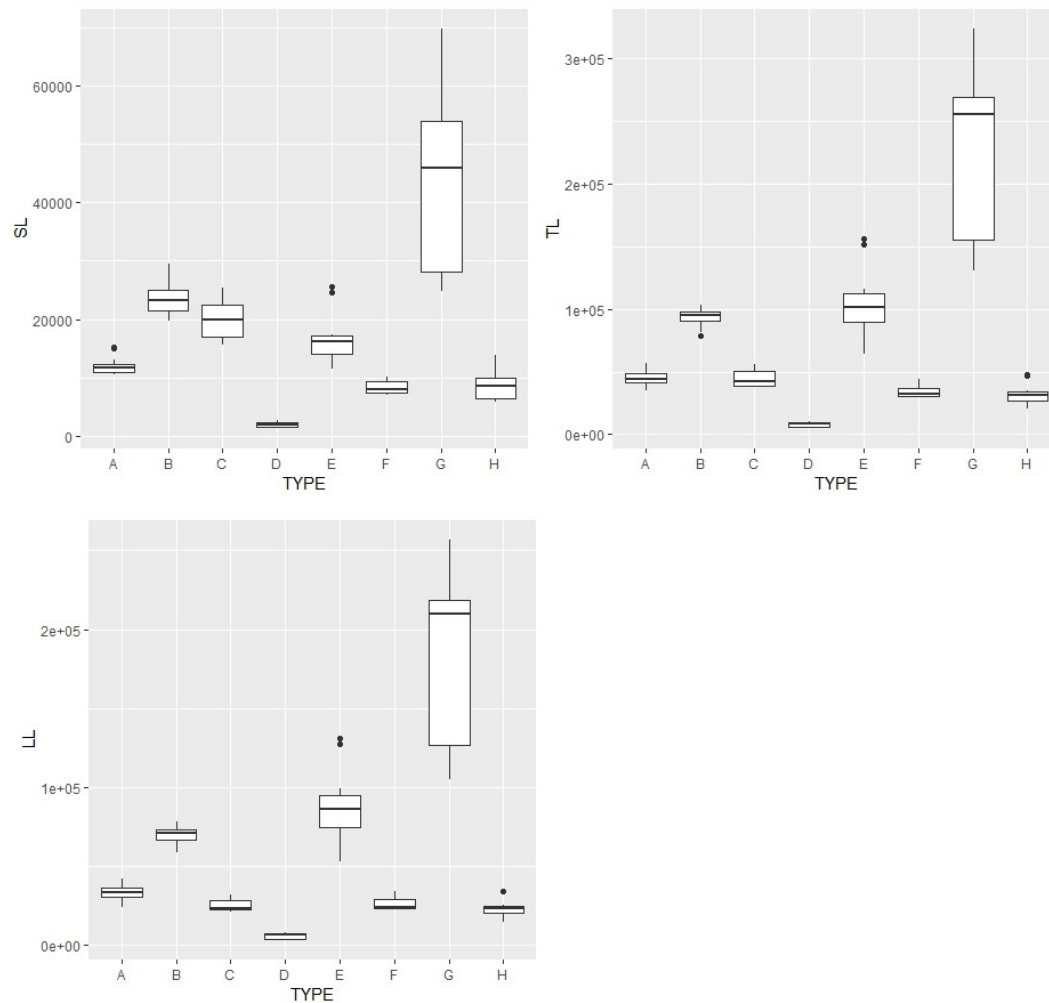


Figure 1. Box-and-whisker plot illustrating the relationship between the direction of production of the European Union agricultural enterprises and individual types of liabilities. Source: own study.

In order to check the normality of distribution of dependent variable in the analysed groups the Anderson-Darling test was conducted. The obtained results indicate that in each of the groups of the analyzed liabilities of European Union farms there is a p-value below 5% (table 2). This means that in each of the studied groups there is no normal distribution.

Table 2.

Results of the Anderson-Darling test for individual dependent variables

Types of agricultural enterprises	Dependent variable: Total liabilities		Dependent variable: Long & medium-term loans		Dependent variable: Short-terms loans	
	Test statistics A	p-value	Test statistics A	p-value	Test statistics A	p-value
A	0.210	0.827	0.179	0.900	0.928	0.014
B	0.329	0.475	0.380	0.357	0.349	0.426
C	0.721	0.047	1.145	0.004	0.371	0.376
D	0.723	0.046	0.766	0.036	0.334	0.464
E	0.503	0.172	0.419	0.285	0.974	0.010
F	0.536	0.141	0.636	0.078	0.522	0.154
G	0.585	0.107	0.684	0.059	0.473	0.207
H	0.487	0.190	0.553	0.127	0.495	0.181

Source: own study.

For the purpose of verification the uniformity of variance, the Bartlett test was performed (table 3). The obtained results allow to conclude that there is no homogeneity of variance in any of the groups of the level of liabilities of European Union farms. This is evidenced by the obtained p-value, where each of them is less than 5%.

Table 3.
Bartlett test results for individual dependent variables

Dependent variable: Total liabilities	
K-squared	p-value
236.240	< 2.2e-16
Dependent variable: Long & medium-term loans	
K-squared	p-value
245.920	< 2.2e-16
Dependent variable: Short-terms loans	
K-squared	p-value
201.080	< 2.2e-16

Source: own study.

On the basis of the conducted Anderson-Darling and Bartlett tests it should be stated that in the case of each dependent variable the assumptions of the ANOVA tests were not fulfilled. Consequently, the non-parametric Kruskal-Wallis test was used in further research on dependencies between the direction of production of the European Union agricultural enterprises and individual dependent variables. The results of the Kruskal-Wallis rank ANOVA test for individual dependent variables are presented in table 4.

The values obtained in the Kruskal-Wallis test allow for the conclusion that at the significance level of 5%, individual null hypotheses should be rejected, which indicate that the distribution of the level of liabilities of farms in each production direction of these farms is the same in favor of the alternative hypothesis, according to which at least two lines of production differ in terms of the level of liabilities from the others. This makes it possible to conclude that the production directions of farms in the European Union countries significantly differentiate the level of liabilities.

Table 4.
Results of the Kruskal-Wallis rank ANOVA test for individual dependent variables

Dependent variable: Total liabilities	
Chi-squared	p-value
109.44	< 2.2e-16
Dependent variable: Long & medium-term loans	
Chi-squared	p-value
108.27	< 2.2e-16
Dependent variable: Short-terms loans	
Chi-squared	p-value
110.46	< 2.2e-16

Source: own study.

In order to identify the reasons of significant differences in the direction of production of the European Union agricultural enterprises and the values of individual explanatory variables, a multiple comparison test was used (table 5).

Table 5.
Dunn test results with Bonferroni correction

		Dependent variable: Total liabilities						
Types of agricultural enterprises	A	B	C	D	E	F	G	
B	0.292	-	-	-	-	-	-	
C	1.000	0.205	-	-	-	-	-	
D	0.001* ¹	0.000*	0.002*	-	-	-	-	
E	0.088	1.000	0.058	0.000*	-	-	-	
F	0.884	0.000*	1.000	0.457	0.000*	-	-	
G	0.000*	0.766	0.000*	0.000*	1.000	0.000*	-	
H	0.412	0.000*	0.569	0.971	0.000*	1.000	0.000*	
		Dependent variable: Long & medium-term loans						
Types of agricultural enterprises	A	B	C	D	E	F	G	
B	1.000	-	-	-	-	-	-	
C	0.630	0.002*	-	-	-	-	-	
D	0.000*	0.000*	0.241	-	-	-	-	
E	0.177	1.000	0.000*	0.000*	-	-	-	
F	1.000	0.018*	1.000	0.046	0.001*	-	-	
G	0.002*	0.534	0.000*	0.000*	1.000	0.000*	-	
H	0.310	0.001*	1.000	0.501	0.000*	1.000	0.000*	
		Dependent variable: Short-terms loans						
Types of agricultural enterprises	A	B	C	D	E	F	G	
B	0.015*	-	-	-	-	-	-	
C	0.242	1.000	-	-	-	-	-	
D	0.006*	0.000*	0.000*	-	-	-	-	
E	1.000	1.000	1.000	0.000*	-	-	-	
F	1.000	0.000*	0.001*	1.000	0.017*	-	-	
G	0.000*	1.000	0.287	0.000*	0.018*	0.000*	-	
H	1.000	0.000*	0.001*	0.682	0.036	1.000	0.000*	

*¹ - statistically significant differences

Source: own study.

The obtained results of Dunn's test with Bonferroni's correction indicate that significant differences in all types of liabilities occur in the case of farms focused on other permanent crops with farms such as: field crops, horticulture and milk, granivores with farms focused on field crops, other permanent crops, grazing livestock and mixed, the type of horticulture with the type granivores and mixed, as well as farms with the production direction of grazing livestock with the milk type. Significant differences also occur in individual cases of the analyzed variables. This is the case between wine farms with farms focused on other permanent crops, horticulture, milk, grazing livestock, granivores and mixed, such as milk with the granivores and mixed type, and field crops with the horticulture type. The obtained results are consistent with the research by Bratek and Praulins (2009), who showed that farms in Poland and Latvia use differently from foreign capital in various types of activity conducted by these farms.

At the same time, it should be emphasized that significant differences are not observable in every type of agricultural production. Such a situation occurs in the case of farms dedicated to field crops with the type of wine, milk, grazing livestock and mixed, farms oriented towards horticulture with the type of milk and granivores, the type of other permanent crops with the type of grazing livestock and mixed, as well as the type of grazing livestock with mixed type.

4. The final conclusions

The conducted research showed that the most common differences in the level of liabilities are between the type of granivores and the types of farms focused on plant production and permanent crops with farms focused on field crops, horticulture and livestock production. Relatively few differences can be observed in the case of farms targeting the same source of food origin (except for other permanent crops).

In the generic structure of the level of liabilities, their highest level (total, short-term and long-term) was recorded for farms such as granivores, milk and horticulture. On the other hand, the lowest values are found mainly in mixed farms and farms characterized by other permanent crops. At the same time, a great similarity is observed in the structure of the level of total liabilities and liabilities with a long maturity period. Thus, the obtained results indicate a significant differentiation in the level of liabilities in farms focused on plant and animal production, which results from the different specificity of their production.

At the same time, it should be noted that the research in this topic should be additionally extended. It is recommended to indicate the reasons for the differentiation in the level of liabilities of individual farms, as well as to conduct a comprehensive financial analysis of the level of indebtedness of farms. This would allow to show even more the role of obligations in the functioning of farms in the European Union.

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AGE DIVERSITY MANAGEMENT IN SMALL AND MEDIUM ENTERPRISES FROM THE POZNAŃ POWIAT – RESULTS OF THE STUDY

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Purpose: The main aim of the article is to present the concept of age diversity management and selected results of own research study made on SMEs from the Poznań powiat. The choice of the area of interest results from the fact that over the last several decades, both the population and the labor force are aging. Such a situation may lead to a reduction in the total number of people employed, investments through a decrease in savings and an increase in pressure on the pension system and the state budget.

Design/methodology/approach: Fifty SMEs from the Poznań powiat of the Greater Poland voivodeship participated in the study. In addition, enterprises should employ a minimum of 4 people up to 50 and a minimum of 4 over 50 years old. The survey was carried out using the CATI and PAPI methods.

Findings: Based on the research, it can be indicated that the vast majority of SMEs in the analyzed area do not have an age management system in place. Moreover, the needs of the older workers are not realized enough by the managers.

Research limitations/implications: It would be better to conduct a survey on a bigger research trail in next edition.

Practical implications: It is important to encourage enterprises through trainings and co-financing to implement an age management system, in particular when one can observe the demographic changes worldwide.

Originality/value: The originality of the work is sought in an attempt to examine whether SMEs from the Poznań powiat take into account needs of older employees and adapt working conditions to them. Accordingly, the article analyzes the answers made by respondents according to four basic spheres of age management process. What is more, it suggests how to improve the issues badly assessed in the survey.

Keywords: age management, age diversity, demographic crisis.

Category of the paper: Research paper.

1. Introduction

Terms such as "old age" and "aging" of the population were not in the considerable interest of economists until half a century ago. Although the analyses of economies took into account the number of the population and the rate of its growth, they did not focus on its internal structure (Jurek, 2012). However, the focus on this issue began when it was noticed that the populations of highly developed countries are aging at a very fast pace. This is evidenced by i.a. data on basic demographic aspects. And so, in 1950 the world was inhabited by almost 129 million people aged 65+, in 50 years this number has increased almost six times, and according to the forecast – in 2050 it will be 1.55 billion people. In addition, life expectancy has increased from 53 years in 1950 to 73 in 2020. In turn, in 2050 it is to be at the level of 77.35 years. At the same time, the fertility rate decreased from 5 to 2.4 in the period 1950-2020. It is estimated that in thirty years it will be at 2.18 and till 2070 the number of births will no longer compensate for the number of deaths on a global scale. What's more, between 1950 and 2050, the median age in the world will increase by as much as 13 years (Statista, 2021).

Poland is also experiencing demographic changes and in particular the issue of population ageing. The share of people aged 65+ in 2020 compared to 1960 increased almost 4-times and is now at the level of 18.73%. The fertility rate is at the level of 1.46, which means that our country does not achieve simple replacement of generations (Statista, 2021). What's more, the average inhabitant of our country is currently at the age of 41.6 years, and in 2050 he will already be 50.9 years old (WB, 2021). Therefore, the issue of the aging of the population should be taken into account in the aspect of the functioning and management of a modern enterprise. Therefore, the fear of a labour shortage forces the need to activate people of pre-retirement age (45-64 years) and even extend professional activity beyond the statutory working age. The use of the potential of employees determines building a competitive advantage and can be a source of opportunities for the development of modern organizations. A number of activities carried out by enterprises, focusing on adapting the conditions and workplace to the needs of older people, perfectly fit into the ideas of the age diversity management of employees (or age management).

The above findings became a prerequisite for conducting a quantitative study on a sample of 50 small and medium-sized enterprises from the Poznań powiat. Through its implementation, answers were sought, i.a. to the following research problems, which took the form of the following questions: 1) whether equality due to age is important from the point of view of employees; 2) does the employer recognise the importance of managing diversity due to age? 3) whether the analyzed enterprises have a developed and implemented age management system. In the preparation phase of empirical research, three research hypotheses were therefore adopted. To conduct the study CATI and PAPI techniques were used.

The article consists of four parts. The first characterises the labour market of seniors in Poland based on measures such as the activity rate and the employment rate and making compares to the EU27 average. The second part presents the idea of age management. In turn, in the third - the basic research criteria are presented and in the fourth part the results of research in the above-mentioned area of interest of the article are widely discussed.

2. Senior labour market in Poland

Among many determinants responsible for the competitiveness of the economy as a whole, human capital stands out, including entrepreneurial, creative and innovative attitudes and behaviors of the older generation (Kryk, 2008). As the researchers conclude, "these behaviors predominantly determine the longer maintenance of employment on the labor market, thus contributing to the creation of added value for the whole society" (Urbaniak et al., 2015, p. 76). Activation of seniors, prolonging their professional activity, and thus using their valuable potential in the form of knowledge and experience by the owners of modern enterprises is particularly important in a situation where Polish seniors belong to a group characterized by less activity on the labor market than their average peers from Europe.

Analyzing the activity rate in Poland, it can be concluded that in recent years its value has undoubtedly increased in the age ranges of 55-59 years, 60-64 and over 65 years of age. It is worth noting that this measure in 2020 for the 55-59 year range was as much as 8 p.p. lower than the EU27 average. Selected statistics are presented in the chart below.

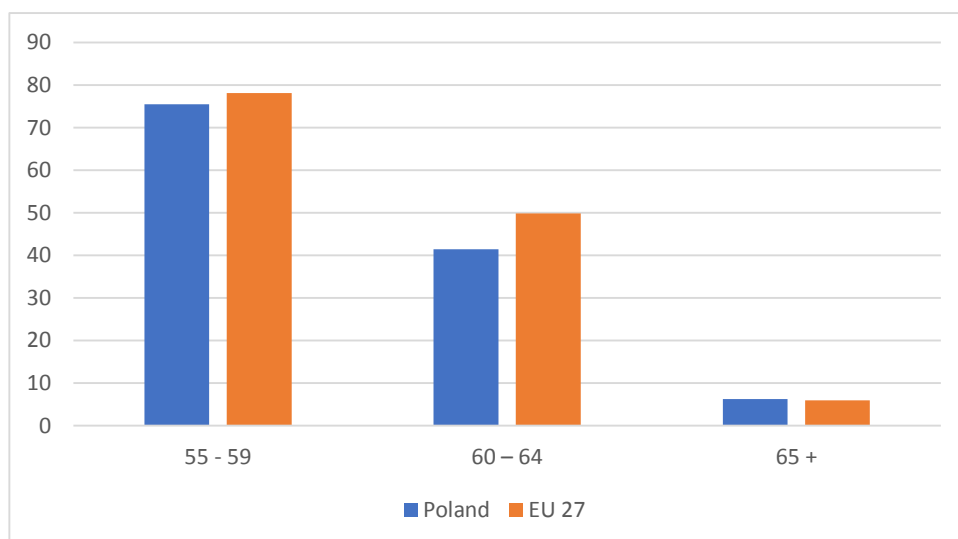


Figure 1. Activity rate for Poland and EU27, third quarter of 2021. Source: (Eurostat, 2022).

The measure considered here was 75.5% for the first age range and was less than 3 percentage points lower than the EU27 average. In 2020, this difference still reached about 6 p.p. Poland currently ranks better compared to such countries as: Belgium (73.8%), Malta (72%), Greece (69.27%), Croatia (69.7%), Italy (69.4%), Luxembourg (69%) and Romania (66.3%). The undisputed leaders in the EU for the 55-59 year range have been the Czech Republic (89.5%) and Sweden (90.5%) for several years now. On the other hand, analyzing the range of 60-64 years, one can observe a lower level of the labor force participation rate, as much as 8 p.p. compared to the EU27 average. In the entire European Union, its highest level in the third quarter 2021 was recorded in countries such as Sweden (72.6%), Estonia (72.0%) and the Netherlands (64.8%). In turn, the value of this measure for people 65+ has been slightly higher than the EU27 average for over a year (Eurostat, 2022).

Analyzing another characteristic of the labor market, i.e. the employment index, it can be concluded that for people aged 55-59, 60-64 and 65+, it was characterized by an increasing trend over the years 2010 - 2019 (only for the period 2012 - 2015 this indicator has not changed in the 65+ group) (Eurostat, 2019b). Currently, for the age range of 55-59 years, Poland with a result of 73.7% is close to the EU27 average of 74%. The undisputed leaders in this group include the Czech Republic (87.3%), Estonia (82%) and Germany (81.2%). On the other hand, for the 60-64 years, our country represents a lower level of almost 7 p.p. than the EU27 average with the result of 47%. For the last age range, the measure is 6.2% for Poland and is slightly higher than the EU27 average of 5.7%. Although our country is far from the results achieved by such countries as: Estonia (15.8%), Sweden (13.4%), Latvia (12.8%) or Lithuania (11.5%), an improvement in the employment of older people on Polish labour market can be noted (Eurostat, 2021). These data are presented below.

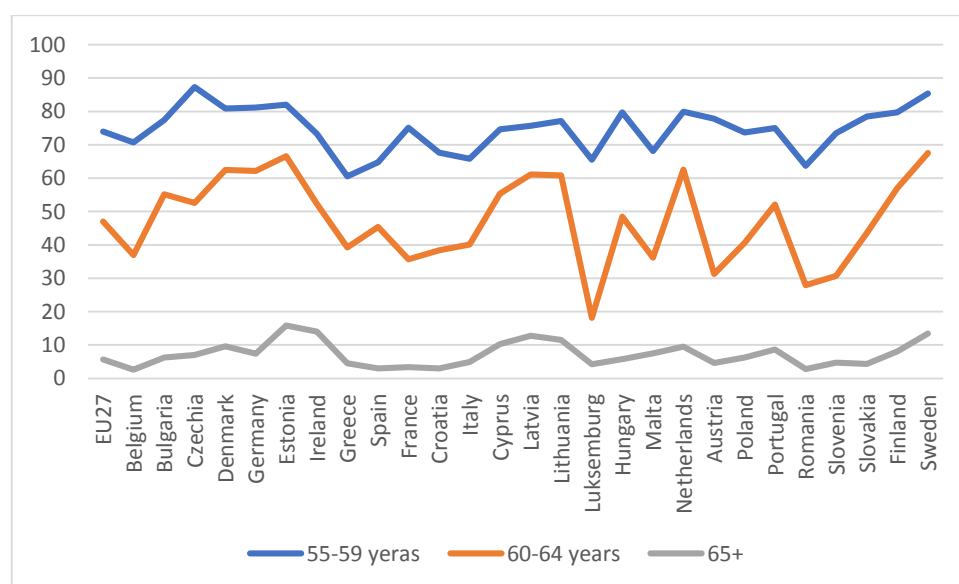


Figure 2. Employment rate in 3 age ranges in EU countries, third quarter 2021. Source: (Eurostat, 2021).

It is not optimistic that Poles are still one of those nations that would like to leave the labor market as soon as possible. In the case of men, it is 58.6 years, while in the case of Polish women, the preferred age of leaving the labor market is 57.3 years. Only residents of Slovenia, Cyprus and Malta would like to leave the labour market even earlier. At the same time, it is worth adding that citizens of countries such as Denmark and the Netherlands would like to work as long as possible of all European residents (on average women up to 66 and men up to 67 years of age) (Eurostat, 2020).

2. Age management in the enterprise

It is generally accepted that age management is a part of diversity management. Age, as the original element of the identity of the individual, is here understood as a distinguishing feature of people employed in the enterprise. In the face of changes in the demographic structure of the population observed in the world and the tendency to ageing populations, this feature is of great interest not only to management theoreticians, but above all to practitioners in enterprises. Although the idea itself is aimed at employees of all ages, in this case, special care is directed at older employees for fear of the availability of labor resources. It is not subject to the issue that "the demographic phenomena taking place will have implications for companies due to the deteriorating prospect of generation replacement and problems in the succession of positions and in ensuring an appropriate competence base" (Borkowska et al., 2016, p. 43).

Note here that the activities that are covered by age management are typical and regular tasks of human resource management. An important difference, however, is that they are aimed at identifying the diverse situation of employees, styles of action and behavior, as well as competences. It is commonly accepted that the management of age diversity enables a more rational and effective use of the labor resources available in the company due to the fact that the area of interest includes the issues of adapting the conditions and place of performing tasks to the needs and capabilities of employees of different ages (Liwiński, Sztanderska, 2010).

Age management aimed at maintaining the employment of older people until they reach retirement age or even longer requires a number of actions from the company's management. In the literature, seven basic areas are most frequently distinguished, i.e. recruitment, learning and training, promotion and internal inter-station transfers, flexible forms of employment and retirement, as well as a change in attitude towards older workers (Naegle, Walker, 2006). In addition, some researchers of the organization also postulate the inclusion of wage policy and, in addition to health issues, also those related to the well-being of the employee in the workplace (IBnDiPP, 2013).

It should be added here that the management of age diversity in the macroeconomic approach presented here is becoming a necessity that can bring a number of numerous benefits to the employees themselves, business owners or customers. And so, on the scale of the economic entity, it is indicated here i.a. the possibility of maintaining competences at a sufficiently high level, maintaining the continuity of the company's operations, achieving advantages from diversity due to the age of its employees, increase in labor productivity, decrease in the cost of human resources management. In the individual dimension, the unquestionable benefits for the elderly include i.a. the possibility of maintaining employment at least until the statutory retirement age, achieving satisfaction with the work performed as well as the financial situation and life in general. Another group of benefits is socio-economic in nature and includes for example maintaining or even increasing the stock of economically active people, protecting the pension system and public finances, removing the threat of an increase in tax and para-tax burdens and reducing age discrimination during employment (IBnDiPP, 2013).

In the literature in the field of management, economics or gerontology, numerous causative factors responsible for the success of the implementation of the idea are discussed. Thus, first of all, it is pointed out that it is necessary to raise awareness of issues relating to old age, the ageing of the population, not only among the management of enterprises, but also among all those employed regardless of their age. In addition, it is also important to carefully plan and implement the individual stages of the implementation of the concept and to show special care for improving working conditions. As noted by J. Liwiński and U. Sztauderska, it is necessary to improve working conditions in a situation where the company wants to maintain or improve the health and skills of aging employees (Liwiński, Sztauderska, 2010). The third, most often mentioned here condition is the mutual cooperation of each party expressed by good, effective communication enabling building respect and trust. What's more, pursuing an informed age management strategy requires management to collect and analyze available information about employees. It is also necessary to monitor on an ongoing basis the changes that are taking place in the labour market at the local, national and even international level. As some researchers rightly point out, particular consideration should be given to the migration of refugees, who will have a real impact on the functioning of the labour market in the near future in many countries (Borkowska et al., 2016). In addition, it is also worth gathering knowledge about government programs supporting employment in enterprises (Liwiński, Sztauderska, 2010, p. 17).

3. Research criteria

As part of the project entitled "Methods of shaping the intellectual capital of employees taking into account age diversity" in the period 2021-2022, a study was carried out on a sample of 50 small and medium-sized enterprises from the Poznań poviát. The main research problem was to recognize the extent to which these entities take into account the phenomenon of diversity due to age in the management of the intellectual capital of the enterprise. The author of the project's area of interest included in particular the elderly. The selection of enterprises constituting the research population was deliberate, and the criteria for this selection were:

1. location (Poznań poviát characterized by the largest number of people in non-mobile age (45-59/64), i.e. 86,268 people, the largest number of unemployed aged 55-59 (12.7%) and aged 60+ (8.2%), as well as one of the highest demographic age rates in the voivodship (GUS, 2020b; USwP, 2020a; PUP, 2019);
2. the total number of employees employed (small and medium-sized entities, which are the largest group of enterprises in the Poznań poviát (just behind the city of Poznań), hence their condition and prospects for further development most clearly illustrate the potential of entrepreneurship, innovation and competitiveness) (SWW, 2020);
3. section C according to PKD 2007 (it is classified as one of the key industries of Wielkopolska and develops most strongly in the Poznań poviát (next to the Kalisz and Konin poviáts)) (Dąbrowska et al., 2019);
4. employment of a minimum of 4 people up to 50 years of age and a minimum of 4 people over 50 years of age.

On the basis of the analysis of data from the database purchased from the Statistical Office in Poznań and their correction by research assumptions, a group of 362 entities was distinguished. Fifty companies agreed to participate in the study using the CATI and PAPI techniques, of which 32 were small and 18 medium-sized economic operators. The basic research tool was an interview questionnaire consisting of 20 questions. The implementation of relevant research required terminological findings i. a. in a set of the following terms: age, elderly person, diversity, age diversity management, stereotype, age discrimination.

Respondents represented 64% of small businesses. The average survey respondent was 55.9 years old. The respondents were mostly men (64%), 80% of the respondents had incomplete or full higher education and their average work experience was 30.2 years. 78% of respondents described their health as good or very good.

4. Implementation of the concept in SMEs from the Poznań poviat – conclusions from the research

The basic premise of the study was that adapting management instruments to the age categories of employees creates a high chance of obtaining a number of benefits, described above, in the micro and macroeconomic aspect. Therefore, the study sought to verify i.a. the following research hypotheses:

(H1) Equality on grounds of age is important from the point of view of workers.

(H2) The employer recognises the importance of managing diversity due to age.

(H3) Companies have developed and implemented a system for managing age diversity.

In order to verify the first research hypothesis, in the interview questionnaire was put the question whether equality due to age is important for respondents. For more than 89% of people employed, this is an important issue in their workplace. At the same time, as many as 58% of respondents admitted that they had experienced various manifestations of age discrimination. Their predominant form was disrespect (38%), ridicule (32%) and neglect (28%). This state of affairs can undoubtedly have a negative impact on the performance of work, as well as hinder the intergenerational cooperation itself, and the flow of information, knowledge and experience will then become less effective. Age discrimination (or ageism) may lead to a decrease in the involvement of seniors in their professional activities and even to the earlier deactivation of seniors from the labor market. It is worth adding here that "work is not only a source of income, but also builds prestige, determines the place and role of the individual in society and the family. Work is often the basic, and often the only stimulus to life activity: it gives life meaning, motivates to leave the house, to take care of appearance, physical and mental condition – this dependence is most visible in relation to lonely people who cannot realize themselves in the family, acting as a grandfather or grandmother. Professional responsibilities allow many elderly people to find their own value and usefulness" (Schimanek, 2010, p. 13).

In view of the high rank given by respondents to the issue of equality on the basis of age, it seems expedient to verify the second hypothesis. Therefore, the through the survey questionnaire workers were asked, whether they considered that their employer saw the importance of managing diversity due to age. 67% of respondents answered this question negatively, which allows to reject this research hypothesis. What's more, in the opinion of respondents, business owners do not pay enough attention to such issues as: care for developing cultural sensitivity, managing and motivating employees to exchange knowledge and experience, care for respecting the rights and differences of others (including attitudes, views, age) and using different ways of thinking and acting employees from different age ranges. A compilation of the answers given by the respondents is provided on the figure below.

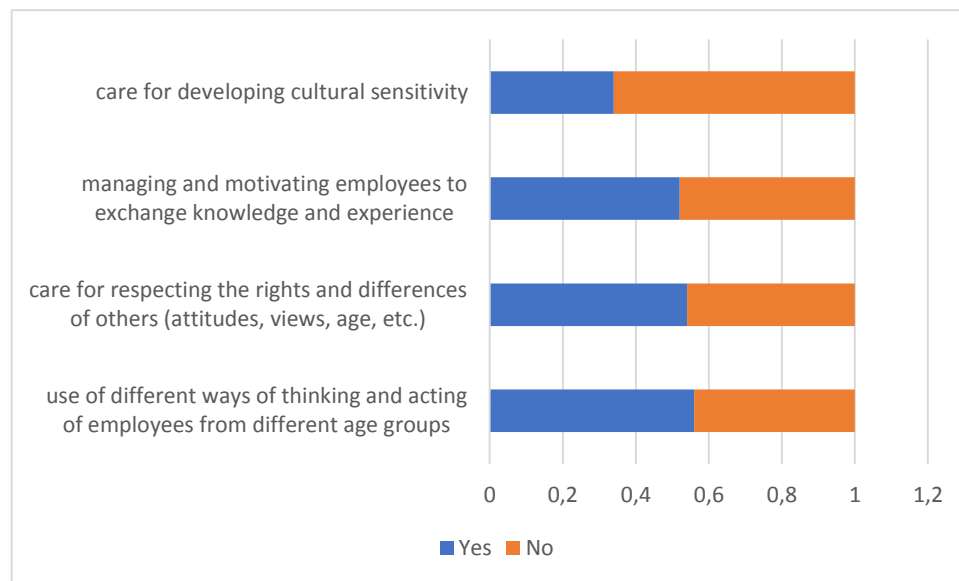


Figure 3. Attitudes and behaviors of the company's management in the opinion of respondents. Source: own study.

In view of observed by the respondents the low concern of managers over the issue of age diversity of employees, it becomes important to verify the last hypothesis. Therefore, through the interview questionnaire, respondents were asked, whether the age diversity management system is not only implemented in their enterprises, but also fully realized. Only in 6 surveyed companies the system is implemented, but – as indicated by respondents – in only 3 it is fully used. These results prove that hypothesis 3 should be rejected. What's more, 27 out of 50 respondents indicated that the approach to the issue of multigenerational employees and potential difficulties is only intuitive, ad hoc on the part of the company's management. There are no formalized procedures on issues such as age discrimination or the fight against stereotypes. At the same time, it is worth adding here that the respondents themselves pointed to numerous benefits that the age management system could bring, both in the individual aspect, as well as for the enterprise and the economy as a whole. The greatest benefits that an employee can gain include: 1) an increase in satisfaction with life and work; 2) reducing intergenerational conflict and 3) improving working conditions. On the other hand, the benefits that the company itself can gain are: 1) reducing the risk of losing capital of knowledge, skills and experience; 2) improving the image in the eyes of the client; 3) improving the competitive position of the company. The group of benefits for the economy and society included: 1) protection of the pension system and public finances against excessive burden; 2) dismiss the threat of a drastic increase in taxes and 3) reduce digital and social exclusion.

What is more, the lack of both written support systems for the elderly and a broader institutionalized care for the elderly can also be seen when analyzing selected areas of age management proposed by J. Jaworska (Jaworska, 2010). Only in a few of their sub-areas one can observe the interest of entrepreneurs in the needs of older people (i.a. issues of flexible forms of work, ergonomics of work or integration meetings). The basic areas analyzed in the

survey, along with a set of questions and the percentage distribution of respondents' answers are presented in the table below.

Table 1.
Selected areas of age management

ACTIVITIES IN THE ENTERPRISE	QUESTION IN THE INTERVIEW QUESTIONNAIRE	NUMBER OF INDICATIONS (%)	
		YES	NO
organization of the workplace	Does the company use flexible forms of work organization (e.g. mobile work, remote work, etc.)?	YES	64
		NO	36
	Does the company delegate an employee to help an elderly person?	YES	36
		NO	64
	Does the company use so-called mixed teams?	YES	32
		NO	68
Does the company agree to work part-time?	YES	18	
	NO	82	
improving qualifications and transferring knowledge	Does the company invest in lifelong learning and training (basic or advanced)?	YES	58
		NO	42
	Does the company care about the transfer of knowledge between younger and older employees?	YES	46
		NO	54
taking care of health, increasing the availability of care services	Does the company offer employees free of charge or co-finance preventive examinations in part?	YES	48
		NO	52
	Does the company organize sports activities to improve its physical fitness?	YES	36
		NO	64
	Does the company care about the ergonomics of the workplace?	YES	70
		NO	30
elimination of negative attitude to work	Does the company organize integration meetings?	YES	78
		NO	22
	Does the company recognize and counteract age discrimination?	YES	58
		NO	42

Source: own study.

The responses of the respondents collected above make it possible to draw some valuable conclusions. Firstly, in the first of the analyzed areas, i.e. "workplace organization", 64% of respondents indicated the possibility of using flexible forms of performing their work (including remote or mobile work). Undoubtedly, the pandemic and related precautionary measures taken in enterprises could have contributed to this possibility. It is also worth adding here that such an option is also strictly dependent on the nature of the work performed. In the case of the surveyed companies, there was undoubtedly such a possibility, because only five of the surveyed people are production workers who have to perform their activities in the workplace. The rest of the survey respondents are white-collar workers (9 department managers, 13 office workers, 23 employees responsible for orders and working directly with the company's customers). Unfortunately, only in every third enterprise another employee is delegated to help an elderly person in a situation when he or she has difficulties with performing official tasks. However - importantly - such action could strengthen cooperation between the two generations by faster and more effective transfer of both knowledge, skills and professional experience. Such involvement could also positively influence employees' trust in management. As A. Klimczuk states, "trust mobilizes subjectivity, spontaneity, openness and unrestrained action towards other people. It also reduces feelings of insecurity and risk, and makes it easier

to initiate interactions and maintain lasting relationships with others. Mutual trust allows one to use other people's resources. Trust is associated with attitudes such as optimism, a sense of influence, kindness and tolerance. Trusting others is conducive to increasing social capital [...], gives a sense of recognition and acceptance from others, opens up a chance for additional benefits, is conducive to receiving additional information, goods or other values" (Klimczuk, 2012, p. 79). Moreover, in only 16 enterprises the respondents of the survey indicated that the management cares about the transfer of knowledge between the younger and older generations. As Ł. Jurek emphasizes, "each generation of employees is different – it has its own strengths and weaknesses. The main idea of age management is not to homogenize staff, but to use differences. It is about achieving a synergy effect from the cooperation of employees of different ages. The main advantage of young people is the current theoretical knowledge and the ability to use modern technologies. In turn, the main advantage of older people is experience and practical skills. Competences of young and old employees are complementary. Their cooperation generates added value, which increases the effect of the work of the entire team. Moreover, such cooperation leads to the clash of various ideas and ideas, which results in an increase in creativity" (Jurek, 2012, p. 154). Moreover, in the surveyed area as many as 82% of company management do not agree to work part-time.

On the other hand, when analyzing the second area, it can be indicated that more than half of the companies (62% of positive responses) invest in lifelong education and in basic or advanced training. This situation is optimistic as it indicates that SMEs appreciate the importance of courses and training for the development of both employees and enterprises in a competitive market. Investments in human capital increase the value of older people in the labor market. As Ł. Jurek notices, "dynamic scientific progress causes that the qualifications obtained once become obsolete. Nowadays, it is assumed that obtaining a school diploma is not the end of the education process, but only the end of the first stage of education and a starting point for further education. Education should be a lifelong process" (Jurek, 2012, p. 150). In addition, what is important, such state does not confirm the common stereotype in Poland that it is not worth investing in people aged 50+ (Gajowiak, 2014b). As K. Turek concludes, "there is a belief among employers that older workers are inferior, have lower competences, are less efficient, less prepared for work, it is more difficult for them to adapt to new solutions and learn new technologies" (Turek, 2013, p. 87). At the same time, the quoted researcher emphasizes that "disregarding the extent to which this belief is wrong and whether it is supported by the experience of specific employers, maintaining such an opinion may have disastrous consequences for both parties to the employment contract. Lack of interest in the development and working conditions of older workers, pressure to retire as early as possible may have a negative impact on productivity and commitment at work, arouse reluctance to continue working and accelerate the decision to retire. For employers, the lack of commitment and low productivity of employees means potential costs and losses. A different nature of this relationship may backfire" (Turek, 2013, p. 87).

When analyzing the area of "caring for one's health", it can be indicated that only half of enterprises (52%) offer their employees free or partially subsidized preventive examinations. This situation requires improvement, as research shows that health problems are, in the opinion of older people in Poland, the most common reason for their early professional deactivation. At the same time, it is worth adding that the health condition of a mature person depends on a number of factors, including the record of the human genome, living conditions, lifestyle, education, level of health care or workplace conditions (Gajowiak, 2014a). In addition, only 18 companies organize sports activities to improve the physical fitness of employees. It is worth emphasizing that promoting physical activity in modern enterprises can undoubtedly contribute to reducing sickness absenteeism and, consequently, its costs for the enterprise. Unfortunately – according to Eurostat surveys – Poles aged 20-64 currently belong to the group of nationalities characterized by one of the highest sickness absences during the working week in the entire EU27 (Eurostat, 2019d). It is worth adding here, however, that as many as 70% of enterprises care about the ergonomics of the workplace, and thus adapt it to the physical and mental properties of their employees. There is no doubt that the conditions in which a person works may not lead to a deterioration of his health, i.e. due to inadequate lighting, the need to carry heavy loads or maintain an incorrect body posture for a long time (Schimanek, 2010). This care will affect both the productivity, effectiveness of the tasks performed, as well as the comfort of work itself, and further motivation to perform it.

The answers obtained to the question concerning the last area, i.e. "elimination of negative attitudes towards work", prove that every third company organizes integration meetings aimed at creating and maintaining bonds between employees. It is worth adding here that 29 respondents 50+ take part in this form of activity, of which 9 very often, and 17 often. Unfortunately, according to the responses, only 54% of respondents say that company management recognizes and counteracts age discrimination. Preventing discriminatory practices in the surveyed companies is particularly important in a situation where as many as 78% of the surveyed people experience the existence and reproduction of stereotypes about old age and the elderly. The predominant three negative statements concerned: too high individualism in action, weakened physical and mental condition and workaholism.

5. Conclusion

Numerous statistical data confirm the fact that there is a tendency to age the population on a global scale, as well as to a decrease in the number of births. This raises concerns about the future of the smooth functioning of the labour market, as the ratio of economically active to inactive people is changing very quickly in favour of the second group. This forces both the state and companies to take action to extend the professional activity of seniors. What's more,

the issue of multigenerationality of employees and the need to take into account the differences between them in the functioning of the company is also of interest, because "generational affiliation also has a significant impact on the approach to work, the way of motivation, communication styles, the level of competence, professional experience, the ability to use technology, as well as the formation of their own professional and life goals and implementation strategies" (Smolbik-Jęczmień, 2019, p. 96).

It should be noted that adaptation to the contemporary trends of the global labor market is visible through the focus of the owners of enterprises on managing the age diversity of employees, i.e. a system of activities in the area of creating a friendly work environment and division of professional tasks, the main goal of which is to maximize the potential of employees, as well as ensuring them effective cooperation regardless of the age difference of the staff. The implementation of this goal requires a series of activities aimed at maintaining professional activity and increasing the effectiveness of work performed. "These activities should be based on a multidimensional strategy, the key elements of which are: prevention (preventing age-related problems, such as knowledge obsolescence or occupational diseases), coherence of activities (integration of all entities and tools ensuring high effectiveness of activities), education (informing about the needs and benefits resulting from age diversity) and evaluation (verifying the effectiveness of actions taken) (Jurek, 2012, p. 155).

What is not optimistic is the fact that in Poland this idea is not very popular. This is also confirmed by studies conducted in small and medium-sized enterprises from the Poznań poviat. Out of 50 surveyed companies, only 6 had an age management system implemented, although – as the respondents underlined – only in 3 did it function fully (which made it impossible to accept hypothesis 2). Only in a few of the analyzed sub-areas, i.e. flexible forms of employment, workplace ergonomics and integration meetings, the respondents positively assessed the activities of enterprises. Therefore, it is recommended in the first of the analyzed areas (workplace organization) to segregate tasks (depending on the type of position and production cycle) that an older person could perform for a shorter period, even for a lower salary, determined at the time of employment. Moreover, in the analyzed enterprises there is an urgent need to ensure a specific succession of organizational knowledge. In the event of a longer sickness absence or retirement of an employee, there is concern about "brain drain", which threatens the continuity of business tasks. Therefore, it is recommended to implement such activities as: mentoring, shadowing and creating the so-called mixed teams. These three proposals are intended to facilitate a better transfer of knowledge, skills and experience. Moreover, directing activities to create a community between the younger and older generation may both inhibit the reproduction of stereotypes, but also encourage – when they are based on actual observation – to change attitudes and behavior. In the longer term, they may also strengthen the motivation to extend professional activity and increase the satisfaction of the younger and older generation with their work and life. On the other hand, in the area of "taking care of health", employers could define a top-down list of tasks that could be performed jointly

by representatives of the younger and older generation. In the case of heavy physical work, it would be worth commissioning them to people with much better physical and health condition. In addition, companies could conduct regular employee surveys to identify problems between generations (e.g. discrimination against older people as well as duplicated stereotypes). One solution could also be the creation of an internal code of ethics.

The above-mentioned recommendations may contribute to the improvement of the existing situation in enterprises. As the research shows, for as many as 89% of the surveyed employees the issue of equal treatment regardless of age is important (confirmed hypothesis number 1), especially when more than half of them (58%) experience discrimination on the basis of age in the workplace. Moreover, these employees expect greater involvement of their superiors in issues related to personnel management in the context of multi-generations. In the opinion of 67% of respondents, company managers do not perceive its value. Therefore, on the basis of the respondents' answers, the hypothesis number 3 was rejected. In turn, the respondents themselves indicated in the interview questionnaire numerous undisputed benefits of age management for themselves, the organization, as well as the economy and society.

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KEY COMPONENTS OF THE BUSINESS MODEL IN AN INDUSTRY 5.0 ENVIRONMENT

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Purpose: The aim of the article is to identify the key components of the business model of an enterprise operating in the Industry 5.0 environment

Design/methodology/approach: The achievements and results presented in the article were obtained on the basis of literature research and expert research conducted among 25 professionals with experience in strategic management, Industry 4.0 and Industry 5.0 technologies. The research technique was the Delphi method. The key components of the business model were presented in the form of Business Model Canvas.

Findings: Based on the research results obtained, components shaping the business model of a company operating in the Industry 5.0 environment were identified.

Research limitations/implications: The analysis of experts' opinions is a preliminary stage of identifying key components of the business model of a company operating in the Industry 5.0 environment. The research should be extended to the analysis of case studies of companies implementing Industry 4.0 technologies.

Originality/value: The original achievements obtained during the research include obtaining valuable research results in the field of key components of the business model affecting the formation of its architecture, competitive advantage and value creation and monetization. The research results were obtained directly from experts who have the necessary knowledge of strategic management, Industry 4.0 technologies and Industry 5.0 pillars.

Keywords: business model, Canvas, Industry 5.0, Industry 4.0, competitiveness, value creation.

Category of the paper: Research paper.

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Introduction

Rapidly changing business environment, development of new technologies, increasing intensity of competition and globalization, put companies in the face of increasingly difficult requirements. The fourth industrial revolution has been going on for several years now, affecting not only business and industry, but also other areas of life, providing opportunities previously unattainable for companies and customers (Grabowska, Saniuk, 2022). Dynamic technological development and solutions implemented in modern companies result in a change of management paradigms and a need to build new business models. This is reflected in the creation of new business models, such that allow for open innovation, rapid reorganization of processes and very flexible adjustment of business operations to new conditions, rapidly changing competitive and common environment (Müller et al., 2018).

Changes resulting from Industry 5.0 requirements force many management areas to restructure or even build business models from scratch. In future business realities, what was previously the domain of multiple market participants will be offered within a single application by a single player (Arnold et al., 2016). Trends will be shaped profoundly by customer expectations and experiences, creating the potential to transform almost every sector, within B2B and B2C. As a result, companies will be forced to define their strategies and business models very differently over the next few years – not in relation to traditional market competitors, but to the emerging consumer ecosystems (Burmeister et al., 2016).

The fourth industrial revolution is the age in which modern technological solutions shape the industrial environment and influence the economy and society, intensifying the sustainable development of the world. Concepts identified with this revolution are Industry 4.0 and Industry 5.0 created on its basis.

Industry 4.0 through digitalization brings enterprises into the world of Smart Factory, builds cyber-physical production systems, as forms of integration of information technology and operational technology in enterprises and the entire value chain (Lee et al., 2015; Liu et al., 2017). Industry 4.0 as it raised many public concerns about the elimination of man from his workplace in favor of the robot resulted in the evolution to Industry 5.0. It began to emphasize the fact that Industry 4.0 technologies cannot impose their choices on man but offer them to him. The first mentions of the role of operators in Industry 4.0 appeared in the publications of Romero et al. (2016). It was emphasized that a symbiosis between humans and new technologies is needed. The authors proposed the introduction of the human factor into cyber-physical systems. In addition to the human factor, research gaps in the areas of sustainability, resilience, security, and others were noted in Industry 4.0 (Saniuk et al., 2020).

Industry 5.0 is an industry that focuses on the consideration of the key role of humans and greater involvement of their knowledge and competencies in a cyber-physical production system. Man and machine collaborate for improved quality and efficiency in production (Broo

et al., 2021; Haleem, 2019). The interaction of human and artificial intelligence is paramount in Industry 5.0. The concept is also expected to be more beneficial to the environment as companies develop systems that use renewable energy and eliminate waste (Nahavandi, 2019).

The premise of Industry 5.0 focuses on creating interaction in the human-machine system. The interaction involves connecting humans with smart devices and cyber-physical system through smart mobile devices (Demir et al., 2019; Vollmer, 2018). Nowadays, robots seem to be replacing humans due to advances in artificial intelligence development and the possibility of brain-machine interface development (Longo, 2020). This means in the future a strong combination of robots with the human brain and using them as a collaborator, executor of commands rather than a competitor (Nahavandi, 2019). The idea of Industry 5.0 will therefore focus on developing more advanced human-machine interfaces using artificial intelligence algorithms. This represents an opportunity to utilize the capabilities of human brains in the process of increasing the efficiency of automation and robotization of systems (Aslam et al., 2020). This means, breaking away from the view of losing control of the cyber physical world dominated by thinking robots what was so feared about Industry 4.0 (Haleem, Javaid, 2019). The transformation of the Industry 4.0 concept to Industry 5.0 is a combination of the advantages of the cyber-physical system of intelligent machines and common sense thinking, which can mean a focus on productivity and sustainability (Özdemir, Hekim 2018). In the process of human-machine integration, it is also important to develop competence and knowledge in new technologies and the trend of talent management.

According to the European Commission, the strength of Industry 5.0 is the social objectives beyond jobs and economic growth to become a resilient provider of well-being, thanks to the fact that production respects the limits of the planet and the welfare of the industrial worker is at the heart of the production process. A favorable factor in the development of the Industry 5.0 concept is the growing environmental awareness of society. This means an interest in green products, the sharing economy, and an interest in developing a closed loop economy (Elfar et al., 2021; Aslam et al., 2020; Di Nardo, Yu, 2021). Industry 5.0 does not deny the need to digitize societies, economies, and industries but rather extends it to include social and environmental aspects (Doyle-Kent, Kopacek, 2019). Digitalization in Industry 5.0 is a broad philosophy that organizes processes in the enterprise and value creation chains.

The fourth industrial revolution along with the key technologies of Industry 4.0 and the pillars of Industry 5.0 creates the need to create new business models, hence the purpose of this article is to identify the key components of the business model of an enterprise operating in the Industry 5.0 environment.

Materials and Methods

The research conducted consisted of two parts. The first part of the research consisted of literature analysis. The systematic review of the literature along with the critical analysis of the content of selected publications allowed to identify the research gap in the form of unidentified components of the business model of an enterprise operating in the environment of Industry 5.0. In the second part, research was conducted among experts using the Delphi method. Research questions were formulated and interviews with experts were conducted. The research with 25 experts was conducted in the period from March 01 to May 15, 2022.

The experts participating in the survey were selected by three Competent Judges (academics with knowledge in the field of Industry 4.0 and Industry 5.0). The experts were business practitioners, managers from manufacturing companies implementing Industry 4.0 technologies.

Results and Discussion

The business model of an enterprise operating in an environment determined by the pillars of Industry 5.0 can be defined as a configuration of business processes connecting and developing resources, formed in the form of social and technical architecture of the enterprise, built on flexible, digital processes, enabling the creation of cyber-physical networks capable of meeting the demand for personalized products. This model is based on a strong combination of the megatrends of the fourth industrial revolution¹, the key technologies of Industry 4.0² and the pillars of Industry 5.0³. The implementation of strategies in this model in practice takes place through the construction of a cyber-physical cooperation network, ensuring both the efficient use of resources and skills and their renewal. The technological innovations implemented enable collaboration within cyber-physical networks, which aim to produce personalized products and offer complementary services. These activities take into account the principles of sustainable production. Based on the Business Model Canvas template created by A. Osterwalder (2004), a Canvas was created for the business model of a company operating in an Industry 5.0 environment. It takes into account the potential for radical change that Industry 5.0 brings to the entire value chain in the manufacturing sector. By filling in the nine main

¹ The megatrends of the fourth industrial revolution are: Economy 4.0, Smart Factories, Society 5.0, Sustainable Consumption and Sustainable Production.

² Key technologies of Industry 4.0 include Autonomous Robots, Big Data, Cloud Computing, Systems Integration, Additive Manufacturing, Industrial Internet of Things, Augmented Reality, Simulation, and Technologies that Support Cybersecurity.

³ The pillars of Industry 5.0 are: Human-Centric, Sustainability, Resilience.

elements of the model, the value position of the company, its infrastructure, its customers and its finances were described (Figure 1).










 <p>Key partners</p> <p>Partners working in a cyber-physical network, forming agile teams to deliver a specific project</p> <p>The customer as a partner, a participant in the product design process</p>	 <p>Key activities</p> <p>Automated Manufacturing according to customer expectations</p> <p>Production as a service</p> <p>Production as a product (servitization)</p> <p>Digitized, resilient processes</p>	 <p>Value provided</p> <p>Product made with sustainable development in mind</p> <p>Product personalized according to individual customer order at the price of a mass-produced product (supporting sustainable consumption)</p> <p>PRODUCT ↓ servitization ↓ SERVICE</p> <p>Industrial Internet of Things (IoT) platforms</p>	 <p>Customer relationship</p> <p>Personal relationship with the customer</p> <p>A relationship using the latest technology</p> <p>Digital platforms</p> <p>Partnership throughout the product lifecycle</p>	 <p>Customers</p> <p>Mass customization</p> <p>Segmented market</p> <p>Diversified market</p>
	 <p>Key resources</p> <p>Humans working with robots</p> <p>Knowledge of customer preferences</p> <p>Resilient, sustainable</p>		 <p>Channel</p> <p>Wholesale or retail network</p> <p>Digital news channel</p>	
<p>Cost</p> <p>Management Manufacturing Servitization</p> 		<p>Revenue</p> <p>Sale of products/services Servitization Fee charged for use of product Licensing Monetization of value</p> 		

Figure 1. Key components of the business model of a company operating in the Industry 5.0 environment – Canvas

The most important and fundamental element of the business model of the Industry 5.0 era – Canvas – is market segmentation. It defines different groups of customers to whom the added value produced in the company is delivered. The basis for distinguishing customer segments are the following characteristics: satisfying the needs of a customer segment that requires a legitimate business differentiating offer; customers in a given segment are reachable by using specific distribution channels; a specific segment generates particular ways of behaving and building relationships with customers; each customer segment has a distinct profitability; customers in different segments are able to pay a different price for different products and/or services of the enterprise.

The next element is the added value that the enterprise offers, or more precisely, the products and/or services that the enterprise provides to distinguished customer segments, creating what is called a value-added or value proposition. Once again, it should be emphasized that the task of the enterprise is to provide a value proposition that not only responds to the customer's reported demand, but also comes up with future complementary values. What stands out here are products and services personalized according to the customer's individual order at the price of a mass-produced product and Industrial Internet of Things platforms.

The key activities that a company must perform in order to deliver value, establish customer relationships, and generate a revenue structure are automated production in line with customer expectations, production as a service, production as a product, and digitized processes.

The element called "customer relationships" describes the type of interaction a company has with identified customer segments. These relationships can be personal, but also completely automated, using digital platforms. Certainly, it should be a type of interaction that assumes partnership throughout the product lifecycle.

Another element is the distribution channels described as the wholesale and retail network. Through these, the company communicates and reaches out to a segment of customers in order to provide them with added value in the form of a product and/or service.

The revenue structure indicates product/service sales, servitization, fees charged for product use, and licensing are described as the company's ways of generating revenue from specific customer segments.

Key resources is an element describing the resources needed to generate added value and reach customer segments through distribution channels. Among the key resources identified: elimination of underutilized production capacity (obtained through collaboration in cyber-physical enterprise networks) and knowledge of customer preferences gained through support such as data analytics.

The term key partners describes the network of suppliers and contractors that make a company function. These include partners working in a cyber-physical network, forming agile teams to deliver a specific project, and customers as partners, participants in product design.

The cost structure represents all the costs that the Industry 5.0 business model generates. Creating and delivering added value, maintaining customer relationships and generating revenue generate costs. They can be easily calculated after defining key resources, key activities and key partners. Simplifying, they are defined as management, production, and servitization costs.

Conclusion

The conducted research indicates that the concept of business models in the conditions of the fourth industrial revolution is gradually being built using the key technologies of Industry 4.0 and the pillars of Industry 5.0, in order to achieve a modern form of management able to meet the challenges of turbulent, competitive and technologically advanced environment. Among all the mentioned elements in the business model template of an enterprise operating in the Industry 5.0 environment – Canvas, the following deserve special attention:

- the new role of customers as partners, participants in the product design process,
- partners working together in a cyber-physical network, forming agile teams to deliver a specific project,
- automated production in line with personalized customer expectations,
- manufacturing as a service,
- eliminating unused production capacity by making spare capacity available to cyber-physical network partners,
- offering personalized products, maximally tailored to customer preferences, at the price of a mass-produced product,
- partnering with the customer throughout the product lifecycle, having a positive impact on sustainable consumption,
- servitization.

Consideration of the concepts of business models in the era of the fourth industrial revolution certainly does not exhaust such an important and broad issue of business management. The changeability of the environment and rapid development of technology may cause both the lengthening of the list of concepts forming the Fourth Industrial Revolution, as well as changes in the structure of those already identified. An interesting direction of further research may be the analysis of competitiveness and flexibility of enterprises building their business models on the basis of cyber-physical cooperation networks. Enterprises that will include in their offer, in addition to highly individualized products, personalized services as a complementary addition to them.

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THE CONCEPT OF MULTI-HIERARCHICAL ASSESSMENT OF PROCESS ORIENTATION IMPLEMENTATION – PRODUCTION ORGANIZATION EXPERIENCE

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Purpose: The main objective of the article is to present the concept of assessing the level of an organization's utilization of its potential for transformation towards process orientation, using a practical implementation example.

Design/methodology/approach: The structure of the research procedure was based on the theoretical assumptions regarding the methodological procedures involving development of a model of process maturity assessment. Such research methods as bibliometric analysis, systematic literature review, participant observation, opinion survey and semi-structured interview were used to achieve the research objectives formulated.

Findings: The value of the article entails the combination of quantitative and qualitative methods to determine an organization's propensity for transition towards higher levels of process maturity. This effect has been achieved using a method of multi-hierarchical process maturity assessment. It has been determined that the organization under examination is at the second level of process maturity, although many of the elements diagnosed show third-level process maturity potential. An authorial research method has been additionally verified, as well as the examined organization's real and utilized potential has been determined, which constitute the basis for assessing the level of process maturity.

Research limitations/implications: inability to fully objectify the research results obtained.

Practical implications: The article shows the basis and the method for identifying the examined company's real and utilized potential of process maturity as well as for determining the level of process maturity, based on which the company's strategy towards a higher level of process maturity can be formulated.

Originality/value: The unique nature of this article lies in the proposed method of multi-hierarchical assessment of an organization's process maturity. In order to deepen the interpretation of the results obtained from a quantitative study, qualitative research was used. This allows development of a strategy for achievement of higher levels of maturity.

Keywords: BPM maturity, process management, process orientation, maturity model.

Category of the paper: Research paper.

1. Introduction

To ensure in order to evaluate and analyze an organization's potential for its transformation towards process orientation, a concept of defining and dimensioning the category of a 'potential' on two planes of its occurrence was adopted. The first is the plane of the potential utilized, while the second – the plane of the company's real potential. For the purpose of this article, the notion of a *potential* has been defined as set of an organization's elements determining its goal and strategy implementation opportunities, which include: the company employees' intellectual and executive capabilities, its organizational system, information and communication technology, culture, recognition and anticipation of the market conditions, as well as its financial capabilities and knowledge management. It has been assumed that the potential utilized is contained within the sphere of the real potential. The difference between these spheres is determined by the state of an organization's unused opportunities for implementation of process orientation into its system in a full dimension of such process organization determinants as teamwork and knowledge management, high employee empowerment, implementation of a market mechanism within the organization, focus on the process as an object in the construction of an organization's functioning system and structure, as well as customer perspective processes design viewed in external and internal terms. Estimation of the potential utilized allows to determine the current level of an organization's process maturity. Determination of the real potential allows development of a strategy for implementation of solutions enabling a higher level of process maturity than the current one. To deepen the diagnostic value of the analyses performed, a multi-hierarchical perspective was adopted for the assessment of both categories of potential. This means that the empirical investigation covered all the management levels specified within the organizational structure of the company under analysis. It was also assumed that the lowest assessment level identified should be used to estimate the entire organization's level of maturity, since, according to some researchers, groups develop a certain level of collective effectiveness, which affects various task performance. It has been found that the stronger the perception of collective efficacy, the higher the group's aspirations and its motivational commitment to undertakings (Bandura, 2001). In other words, the sense of collective efficacy may be related to the utilized and the real potential; for the lower the sense of efficacy, the higher the aspiration to maintain the potential utilized, rather than to achieve the real potential.

Adopting the above assumption, the Authors of the article begin with the commonly accepted axiom that an entire organization's efficiency is determined by the efficiency of its weakest link (i.e., the weakest utilized potential), nevertheless, most commonly, due to a lack of awareness of the scale of the problem, companies are not able to utilize that potential so as

to increase their operational efficiency¹. In essence, organizational management also entails the strive to equalize these potentials, by minimizing the difference between the utilized and the real potential. The greater the difference, the greater the range of an organization's unutilized real potential. The measurement of an organization's process maturity level, provided that it is diagnostic in terms of the actual state, should therefore constitute a tool for managing the potential (utilized and real) towards its constant harmonious growth and balance. In the method described in this article, the Authors have assumed that the level of process maturity is defined by the potential utilized with the awareness of the need to activate it towards reaching the real potential.

The research problem was formulated in the form of a research question: What are the factors supporting and limiting an organization's transformation towards process orientation?

The main objective of the article is to elaborate a concept of utilized and real potential assessment, so as to determine the level of process maturity in an organization. The main objective was assigned sub-objectives, intersecting at three planes: theoretical-cognitive (TO), methodological (MO) and empirical (EO). TO1: Review of process maturity models and the methodological procedures used such model design. TO2: Review of the research on the assessment of process solution implementation. MO: Presentation of a method for multi-hierarchical measurement of an organization's potential for transformation towards its processization. The measurement is intended to define possible strategies for transformation towards a process organization. EO: Presentation of the research results obtained via application of a multi-hierarchical measurement method.

2. Systematic literature review

Process maturity is identified in this article as a state in which an organization consciously discounts the benefits of BPM and BPO implementation. This means that it does not refer to the maturity of individual processes or the architecture thereof, but to the assessment of the degree of process solution implementation in all the subsystems of an organization.

When analyzing the publications on process maturity measurement, it can be noticed that these works concern both theoretical aspects, entailing existing literature reviews, and empirical aspects, incorporating specific research methods. The theoretical studies analyzed involved scientific reviews (Van Looy et al., 2010; Van Looy, 2013) and evaluation (Britsch et al., 2012) of the process maturity models available, including the ranking thereof by common element

¹ *Example:* By investing in employees, the real potential (RP) can be increased, nevertheless, without changing the system in which they are operate, the potential utilized (UP) remains the same. Overestimation is the difference between the sets of RP and UP. Only from the perspective of the requirements associated with the building of a process-characterized organization the RP can be determined.

identification (Pidun and Felden, 2010), as well as developed guidelines for organizations to consider when implementing process innovation (Vlahovic et al., 2010; Van Looy, 2013). Other studies examined the factors affecting achievement of process maturity (Rotaru et al., 2009) or those based on which organizations can develop the competencies needed for this endeavor (Looy et al., 2014).

The empirical studies analyzed were conducted using quantitative and qualitative methods. The change in the intensity of the research approaches is noteworthy. In the early period (prior to 2015), quantitative research predominated, followed by a greater use of qualitative methods. The quantitative methods used included questionnaire surveys (opinion polls), conducted on large samples. They were intended to identify the important stages in and the critical success factors determining the achievement of higher levels of process orientation, or to show a relationship between process maturity achievement and such various organizational system elements (Păunescu and Acatrinei, 2012) as intra-organizational collaboration (Niehaves and Plattfaut, 2011) and the management style (Novotny and Rohmann, 2015). It has been indicated that, as process maturity increases, network collaboration and extra-organizational orientation develop (Rohloff, 2018). Researchers have also attempted to identify the limitations of process maturity models (e.g., Radosavljević, 2014). On the one hand, it has been noted that the models enable achievement of higher performance, associated with economic effects (Cleven et al., 2010), while on the other, the models' validity has been questioned, because, according to some researchers, they did not include all the organizational factors relevant for achievement of process maturity (Niehaves and Plattfaut, 2011). In addition to quantitative studies, which are characterized by generalization of the issue of process maturity, qualitative research, deepening the knowledge in this area, was carried out as well. It has been noted that quantitative studies are focused more on the process modeling practices, rather than on the persons involved in implementation initiatives (Rohloff, 2018). These studies aimed to identify the relationships between process maturity and leadership, and to report on the experience of process implementation and harmonization in organizations (Feldbacher et al., 2011). By that, individual paths to process maturity have been shown (Van den Bergh and Viaene, 2012). The key success factors, such as the role of the structural and resource base and of the process owners has been highlighted as well (Trkman, 2013; Valenca et al., 2013), including the process owners' prominence (Reijers and Peeters, 2010) and their changing function as an organization reaches process maturity. It has been observed that the management style changes to a more democratic one in organizations entering higher levels of process maturity; perhaps due to greater involvement of other organization members in process implementation and improvement (Houy et al., 2011). In the last decade, the existing business process maturity models began to be modified and adapted to the individual needs of industries and then organizations. In this way, the models developed allowed diagnosis of organizations' actual situation in terms of process management, providing information on what the next steps in maturity assessment for each of the factors analyzed should entail (Okřeǳlicka et al., 2015).

As such, the studies became more individualized in terms of organization and industry types, with focus on development of models, which function as, so to speak, roadmaps that can guide organizations, e.g., health care entities, towards a certain level of process maturity (Mens and Ravesteyn, 2016; Schriek et al., 2016). The business process maturity models constituted a basis for construction of individualized models. Methodologically, the case studies were supported by the Delphi method, with the participation of experts representing the fields associated with the scope of the examined organizations' activity (Mens and Ravesteyn, 2016). As a result, the business models proved applicable to public organizations as well. The process maturity model began to be combined with other methods, such as the SIX Sigma (de Boer et al., 2015). By synergizing the process maturity model with supporting approaches, organizations can determine the best strategy to improve business performance. It has also been noted that additional factors, such as organizational culture and the organization members' attitude towards process implementation, are necessary for achievement of process maturity. Motivation systems, adequate process management and process maturity achievement trainings, availability of skilled personnel, the methods of management, IT, strategic alignment, i.e., alignment of strategy and goals with process management, turned out to be the key elements (Christiansson and Rentzhog, 2019). Attention has also been drawn to differences in the perception and implementation of process maturity models, not only among but also within organizations, i.e., between the management and employees (De Waal et al., 2017a; de Waal et al., 2017b). It has been found, that in addition to the resources, leadership, and culture, "process resource and knowledge" capabilities and achievement of the same level of different stakeholders' process maturity are also important for successful implementation initiatives, especially when it comes to customer focus (de Waal, et al., 2017b). Additional key determinants of process maturity are process measurement, process control, and process resources.

3. Materials and methods

3.1. Characteristics of the examined entity

The organization examined has been operating for 70 years. Its genotype activity is focused on the production of specialized clothing for uniformed services. The organization's external customers are public sector entities, located both in Poland and abroad. The clothing production is individualized for each customer and requires very high levels of flexibility in the preparatory, design and manufacturing processes (full customization of the products manufactured, including adjustment of the clothing sizes to individual users). Assuming the criterion of employment size, the organization examined was classified as a large enterprise

(over 250 employees), with three hierarchical levels. It should be emphasized here that, due to the scope of its activities and the confidentiality issues, presentation of detailed company characteristics has been deliberately limited.

3.2. The maturity assessment model used

The review and analysis of the literature on the broadly defined BPM (Business Process Management), BPO (Business Process Orientation) and the associated research methodologies enabled indication of a gap, consisting in the scarcity of studies focusing on multi-hierarchical maturity level assessment.

Following the theoretical study, models of organizational process maturity were selected, based on the following criteria: their applicability for objectivized assessment (assessment by process symptoms), model development on the basis of the methodological assumptions for maturity model design, their high level of operationalization, identified as the number of the empirical studies implemented, and the possibility of model adaptation to the specificity of the organization under examination.

As a result of the analysis of 69 models of process management maturity, described in the work of (Felch and Asdecker, 2020), a multi-criteria model of process maturity (MMPM) was selected (Sliż, 2018). Furthermore, the Six Core Elements of Business Process Management, developed by M. Rosemann and J. vom Brocke (2015), were used for selection of the maturity model used in the empirical study. The results of this part of the assessment are presented in Table 2.

Table 1.

Identification of the BPM core elements for possible examination using a quantitative method and the MMPM model

Factors	Capability areas	Quantitative study using the MMPM* model
Strategic Alignment	Process Improvement Planning	X
		X
		X
	Strategy & Process Capability Linkage	-
	Enterprise Process Architecture	X
		X
	Process Measures	X
X		
X		
Process Customer & Stakeholders	X	
Governance	Process Management Decision Making	X
		X
	Process Roles and Responsibilities	X
	Process Metrics & Performance Linkage	-
	Process Related Standards	X
		X
Process Management Compliance	-	

Cont. table 1.

Methods	Process Design & Modelling	-
	Process Implementation & Execution	X
	Process Monitoring & Control	X
	Process Improvement & Innovation	X
		X
Process Program & Project Management	-	
Information Technology	Process Design & Modelling	-
	Process Implementation & Execution	-
	Process Monitoring & Control	-
	Process Improvement & Innovation	-
	Process Program & Project Management	-
People	Process Skills & Expertise	X
	Process Education	X
	Process Management Knowledge	X
	Process Collaboration	X
		-
Process Management Leaders	-	
Culture	Responsiveness in Process Change	X
	Process Values & Beliefs	-
	Process Attitude & Behavior	-
	Leadership Attention to Process	X
	Process Management Social Networks	-

*X – possible to assess, - impossible to assess.

Source: own elaboration based on: (Rosemann, vom Brocke, 2015).

As Table 2 shows, the MMPM model enabled assessment of 24 out of the 39 capability areas. The level characteristics of the MMPM used are shown in Table 2.

Table 2.
Characteristics of the maturity assessment model used

Level	Description
Level 1 – an organization showing weak symptoms of a process approach	The organization is characterized by the elements dominant in the functional approach to management. The multi-level, vertical, hierarchical structure prevents horizontal preorientation. In the long-term dimension, there are no single symptoms that could indicate a change in management orientation. The term 'process' is not used in the organization, or it is equated with the notion of a task.
Level 2 – processes have been identified and formalized	As a result of a formalized process architecture in the organization, decisions are made regarding the necessity of formalized process measurement. At the second level of maturity, symptoms indicating the measurement of main processes are visible. The simultaneous orientation towards tasks and results prevents comprehensive process measurement. The term 'process' is used correctly in the organization.
Level 3 – processes have been measured	In an organization characterized by the third level of maturity, processes are identified and formalized or explored. A process assessment measurement system is additionally designed and implemented, taking the level of external customer satisfaction into account. Symptoms indicating that the management decisions are made based on the process measurement system designed can occur at this level.
Level 4 – processes are managed	A process organization, in which all the criteria specified, indicating a correctly identified, formalized and measured process architecture, have been met. Such organization is focused on the search for new solutions resulting from the attempt to flexibly respond to external impulses. Managerial decisions are oriented at the process-generated effects and the compatibility thereof with customer needs and expectations. A system of external and internal training improves the inter-employee knowledge transfer. The leader role desired is to manage the diffusion of knowledge in the interdisciplinary teams established and oriented at task execution and problem solving across the entire organization.

Cont. table 2.

<p>Level 5 – processes are under improvement</p>	<p>An organization of this level is characterized by continuous process improvement. As a result of process measurement and the improvement generated by all employees, the organization seeks new areas of added value generation. An internal marketization mechanism is implemented in the organization. Process management is based on the results of the measurement system designed, with particular emphasis on the assessment of the level of customer satisfaction, from an external and internal perspective. Based on an analysis of the process effect, corrective actions are taken, aimed at continuous process improvement, based on the customer requirements.</p>
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Source: Own elaboration based on (Sliż, 2018).

It needs to be emphasized here that for an organization to be categorized as one at a higher level of maturity, it should meet all the previous-level criteria.

3.3. Assumptions of the multi-hierarchical method for assessment of an organization's process maturity

As part of the study, the Authors designed a research method which allows a holistic view of an organization and enables assessment of the utilized and the real potential, from the perspective of the organization participants at all organizational levels – (multi-hierarchy).

The following formed the basis for the research method design:

1. The assumption that organizational reality is not so much objectively given and independent of the actors inhabiting it, but rather is socially constructed, in accordance with the significance assigned to it by the various actors of organizational life. In other words, organization members assign certain significance to their practices, imagine the goals, tasks, and the course of the processes in a specific way. One of the conditions which can differentiate the perception of organizational reality is the employee position in the hierarchy.
2. The diagnosis (resulting from the above assumption) that the existing research methods (based on the literature review) mostly do not meet the criterion of objectivity and holistic view of process maturity in organizations, which is manifested by:
 - the incomplete/purposeful/convenient selection of the respondents in the organization examined,
 - the narrowing down of the number of respondents to 1-2 persons from the organization under examination,
 - the construction of research tools examining the respondents' subjective feelings regarding the maturity level achieved by the organization,
 - the lack of a broader view, in terms of the organization's potential to move towards a higher level of process maturity, through the prism of the broadly understood organizational culture.

The identified limitations of the methods applied can greatly influence the ultimate assessment of process maturity in the organizations under examination. When designing the maturity research methodology, the Authors of this work adopted the need to objectivize (as much as possible) the measurement as well as a cross-sectional/multi-hierarchical diagnosis of the organization's potential for processization as the study criterion. Hence, the following has been proposed as part of the study:

- a two-stage research process using quantitative (survey questionnaire) and qualitative (in-depth individual interview) methods,
- quantitative research, conducted at all hierarchical levels, and non-random selection with purposive selection, using the following criteria: the position held (managerial - non-managerial) and the functional area,
- development of a research tool allowing for an objectivized assessment of process maturity/process orientation/the potential for processization, based on the respondents' indicated symptoms rather than their subjective evaluation
- adaptation of the research tool to the specifics of individual hierarchical levels.

The quantitative survey was focused on determining the current state of the organization – the level of the organization's utilized and real potential, from the perspective of different groups of organization participants: the managerial personnel and the executive staff.

The qualitative study using an individual semi-structured in-depth interview aimed to:

- determine the reasons for the symptoms indicated at different hierarchical levels, which are difficult to investigate via quantitative research;
- complement the quantitative research by indicating specific examples (for the researched organization only) of the behaviors associated with the symptoms declared (diagnosed),
- complement the quantitative research results perspective, which is particularly important when the research results vary (and/or are ambiguous) for individual hierarchical employee levels in the organization,
- enable identification of the organizational culture manifestations (e.g., values, expectations, actual behavior), often unrealized and/or unarticulated by the organizational participants, which can support or hinder the change towards organization processization,
- facilitate – owing to the above – formulation of a strategy for transition towards processization.

In order to classify the organization within an appropriate level of process maturity (i.e., to properly interpret the results obtained from the quantitative survey), the study required a necessary reference to the individual, but collectively mediated, significance assigned by the employees to their functioning in the organization. In other words, the quantitative study was complemented by an interpretative perspective. The complementarity of such an approach

allowed for more holistic and in-depth analysis of the organization, the conditions of its functioning, and the processes implemented. The data collection methods and techniques in such conceived research are open-ended, soft, uncategorized, and sensitive to the unpredictable individual interpretations provided by the survey participants. As such, this part of the research entailed individual in-depth interviews involving general indications of the topics which, in the first stage of the research, became as the subject of the conversations carried out with the organization members, and constituted the empirical material subjected to further empirical analysis in the next stage. 21 such interviews were conducted (including managerial – 14 and executive – 7 positions).

The issues raised during the interviews concerned both the employees' process awareness and their perception of the organizational reality.

The number of the interviews results from the rules applicable to this type of research, which indicate that the pool of the significance assigned by a given, relatively homogeneous group of respondents (1 organization) becomes saturated after 20 interviews (Marton, 1988), provided that the researcher constructs the group of the interviewees in a purposeful manner, trying to maximize its diversity, which was the case in this part of the research. The survey was conducted with individuals representing all managerial levels. Gender, age and functional balance was ensured. All interviews lasted between 40-60 minutes. They were then transcribed and analyzed using S. Kvale's seven steps of interview analysis. Following the consecutive steps of material reduction, 3 categories emerged, describing process implementation and standardization, process management and process improvement in the organization under examination. Each category consisted of subcategories. This part of the study enabled identification of the potential barriers in the organization which can impede its transition to higher levels of process maturity. In the final part of the study, possible interpretive clues regarding the organization's potential level of maturity were proposed.

The multi-stage research process was designed taking the study objectives/research hypotheses/research problems into account.

Ultimately – the research consisted of two stages:

- Stage 1. quantitative research using the research tool developed, incorporating the managers' perspective (N = 23), and executive employee quantitative research using the research tool developed (N = 30),
- Stage 2. qualitative research using the individual in-depth interview method (N = 21; including 14 executives).

4. Results

4.1. Quantitative research results

The results described are presented in distribution by the level in the organizational hierarchy, with division into two groups of respondents, i.e., representatives of the examined organization's managerial personnel and employees (implementers of the main and auxiliary processes) (Table 3).

Table 3.

Descriptive statistics of quantitative survey results using the MMPM model

QU #	BPM core element (Factor/ Capability area)	QU in the research questionnaire	Employees N=29			Managerial personnel N=23		
			Most common value	MIN	MAX	Most common value	MIN	MAX
Levels 1 and 2								
1	Governance/ Process Related Standards	Does the organization utilize an ISO quality management system?	5	3	5	5	3	5
4	Strategic Alignment/ Enterprise Process Architecture	How do you define the business process in the organization?	3	0	5	5	1	5
8*	Strategic Alignment/ Enterprise Process Architecture	Which of the processes listed are implemented in the organization?	5	0.75	5	5	0.75	5
9	Strategic Alignment/ Enterprise Process Architecture	Do you have access to the documentation (procedure description/ graphic process flow map) regarding the process in which you are involved? (E)	0.5	0	0.375	0	0	5
	Methods/ Process Implementation and Execution	Is there a description, model or a graphical flow map of the process activities in the organization? (M)						
Level 3								
2	Governance/ Process Roles and Responsibilities	Which of the organization roles listed does your supervisor require you to fulfill? (E)	2	0	5	5	0	5
	Governance/ Process Roles and Responsibilities	Which of the roles listed you require most of your subordinates? (M)						
3	Governance/ Process Management Decision Making	What are you held accountable for by your supervisor? (E)	4	3	5	5	3	5
	Governance/ Process Management Decision Making	Your managerial activity is oriented at: (M)						
11*	Methods/ Process Monitoring and Control	Which of the following measures are used for process assessment?	2	0	5	1.5	0.5	3.5

Cont. table 3.

Level 4								
5*	People/ Process Management Knowledge	I would like to participate in trainings which: (E)	0.5	0	5	2.5	0	5
	People/ Process Management Knowledge	What is the desired nature of the trainings intended for your subordinates? (M)						
6*	People/ Process Management Knowledge	How are trainings implemented in your department/division/team?	0	0	3.5	3.5	0	3.5
	People/ Process Management Knowledge	Training/s in which I participate (E)						
	People/ Process Management Knowledge	Training/s implemented in the organization (M)						
7*	People/ Process Management Knowledge	By participating in internal trainings (implemented by you/ co-workers/supervisors), I gain the opportunity to: (E)	0	0	5	1	0	5
	People/ Process Management Knowledge	Internal trainings (implemented by colleagues/supervisors) in your subordinate department/division/team involve: (M)						
10	Culture/ Leadership Attention to Process	Which of the following leadership roles (supervisor/team leader, etc.) do you expect most? (E)	3	0	5	3	0	5
	Culture/ Leadership Attention to Process	Which of the following leadership roles do you expect most in your subordinate team/division/department? (M)						
Level 5								
18*	Strategic Alignment/ Enterprise Process Architecture	Which of the following statements are true about process improvements in this organization?	0.5	0	4.25	2.5	0.25	4.75
12*	Strategic Alignment/ Enterprise Process Architecture	Which of the following services would be more beneficial (e.g., due to higher quality/quicker deadlines/lower price) to purchase from external vendors than to implement in-house at your organization?	0	0	4	2.5	0	3.5
13	Strategic Alignment/ Process Measures	Are your familiar with your organization's internal suppliers/vendors and customers?	1	0	1	1	0	1

Cont. table 3.

14	Strategic Alignment/ Process Measures	What do you consider when evaluating the inputs received from your internal supplier/vendor (e.g., data/information/material/semi-finished product/tools) which are necessary for your task/operation performance?	0	0	0.5	0	0	0.5
15	People/ Process Collaboration	Can you negotiate the terms with your internal supplier/vendor?	0	0	0.5	0.5	0	0.5
16	Strategic Alignment/ Process Measures AND Process Customer and Stakeholders	Does the organization utilize a system for internal supplier/vendor satisfaction evaluation by internal customer/s?	0	0	2.5	1	0	2.5
17	Strategic/ Process Measures	Does the organization formulate the criteria for quality and quantity valuation of the internal services provided in the organization?	0.5	0	0.5	0	0	0.5
19*	Methods/ Process Improvement and Innovation	Which of the management methods presented find practical application in the organization?	0.5	0	3	1	0	4

* The questions are marked E and M: E – question addressed to employees, M – question addressed to management representatives.

** Questions with multivariate xxx answers.

Source: own calculation and elaboration based on a study carried out in 2020.

Based on the MMPM assumptions (Table 2) and the analysis of partial results, the organization examined has been assigned a maturity level. Figure 1 shows the results of the maturity level assessment with the hierarchical level division adopted.

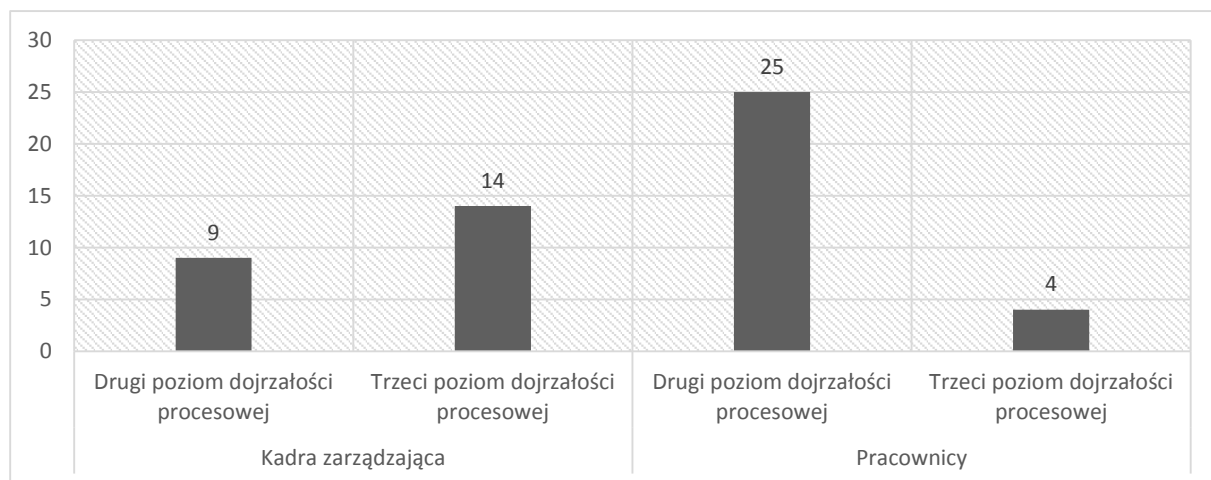


Figure 1. Summary representation of maturity by hierarchical level. Source: own calculation and elaboration based on a study carried out in 2020.

As can Figure 1 indicates, the differences in objectivized assessment of process solution implementation, the greatest dispersion is visible in the group of employees, whose answers, based on the results, allowed the organization to be classified within the second (25) and third levels (4) of process maturity. In the managerial personnel group of respondents, on the other hand, similar results were obtained for the second (9) and third (14) levels of process maturity.

Based on the assumption that the entire organization's efficiency is determined by the efficiency of its weakest link, the organization's maturity level has been estimated at level 2.

4.2. Qualitative research results

The primary aim of the qualitative study was to deepen the knowledge on the organization, its operating conditions and the processes implemented. This stage was complementary to the quantitative research and allowed identification of the factors hindering implementation of the solutions leading to achievement of higher levels of process maturity and thus to the company's utilization of its real potential (Table 5).

Table 5.

The organization participants' convictions and their behavior symptoms hindering the evolution towards a higher level of process maturity

Factors	Capability areas	Conviction	Behavior symptoms
Strategic Alignment	Strategy & Process Capability Linkage	The basis for decision making and activity entails the conviction about the need to ensure the company's security (including avoidance of business risk) by maintaining organizational and economic stability.	<ul style="list-style-type: none"> –employee control, centralization of decision making –lack of trust in the employees' competencies –lack of tolerance for error making –lack of readiness to take responsibility for the decisions made (submission of orders for verification, awaiting the company CEO's decision) –avoidance of initiatives and exceedance of the responsibilities specified out of a fear of making errors and facing the consequences
	Enterprise Process Architecture	The conviction that the company's security and its stability can only be achieved through a command & control system.	<ul style="list-style-type: none"> – employee control, centralization of decision making – lack of trust in the employees' competencies – lack of tolerance for error making – decision about on-site implementation, as it is the most strategic and most important process – delegation of less strategically important activities to cooperators – the cooperator selection is not accidental, as they constitute a securement for the company, also in case of contract deficiency – client involvement in the selection of suppliers and fabrics, price negotiations, pattern delivery to the cooperator – shifting the burden of responsibility from the company to the customer
	Process Customer & Stakeholders	External customer empowerment at simultaneous internal customer objectification. The conviction that organizational life entails a non-zero-sum game; operation based on the principle of gain and loss balance, maintenance of relationships when they are beneficial	<ul style="list-style-type: none"> –undertaking various types of activity aimed at satisfying external customer expectations –orientation on own activity implementation –lack of understanding of how the effects of work affect the other/subsequent job positions –lack of defined internal customer needs –less involvement in mutual assistance –lack of knowledge sharing –lack of above and beyond activity in terms of one's job-related responsibilities

Cont. table 5.

Governance	Process Management Decision Making	Expectation of full acceptance of the existing hierarchy and the roles in the organization	<ul style="list-style-type: none"> -decisions are made by the company CEO. -employees' job is to obediently perform tasks, while the supervisor's job is to delegate and check as well as make decisions and take responsibility
		The basis for decision making and activity entails the conviction about the need to ensure the company's security (including avoidance of business risk) by maintaining organizational and economic stability.	<ul style="list-style-type: none"> - focus on familiar and repetitive aspects, e.g., the task scope, reluctance to change - lack of activity beyond what is defined - shifting the responsibilities and tasks beyond the task scope to other departments - in the face of such threats as negative consequences of the decisions and error making; employees and managers choose obedience, in exchange for the care and security offered
		Information is a source of power	<ul style="list-style-type: none"> - not everyone has access to necessary information - retention of information in departments - information trading - insufficient manner of information provision, information delay - lack of advance information which would allow better preparation for order execution - employees are not fully informed about what is happening in the organization
		The conviction about the need for perfect personal performance (no errors) and the need to constantly prove one's competence and suitability.	<ul style="list-style-type: none"> - problems are solved within departments - reluctance to share information about failures (error hiding) - in case of problems, the focus is put on human errors rather than on solving the problem within a system/process context
	Process Roles and Responsibilities	<p>Expectation of full acceptance of the existing hierarchy and roles in the organization.</p> <p>The conviction about the need to elaborate the documentation proving the correctness of one's actions</p>	<ul style="list-style-type: none"> - tasks and responsibilities are defined - authority/power is defined, nevertheless, there is a fear of ultimate decision making - employees enter the role of passive performers, thus avoid the consequences of their decisions - avoidance of exceeding the scopes established and avoidance of process-benefiting initiative undertaking - unknown and unclear powers and roles of the persons outside the department, who, by their actions interfere with the competencies of individual departments; conflicts emerge - employees' perceptions of bout their roles: independence, self-education, awareness, self-control, lack of error making, responsibility for one's actions.
	Process Related Standards		<ul style="list-style-type: none"> - the ISO expected by the company's customers - documents protect individuals, as they guarantee that the person responsible for decision making and task performance actually carried out those duties

Cont. table 5.

Methods	Process Monitoring & Control	The conviction that some areas (functions), e.g., production, are more important leads to a belief that certain areas are more important and thus are given more attention and undergo more intensive measurement, while other are of lesser importance.	<ul style="list-style-type: none"> – the management’s attention and support are focused on the ‘important’ areas – visible favoritism (e.g., awards) of the ‘important’ areas – struggle for attention and perceived importance in the organization – lack of a structured and coherent measurement and monitoring system in the organization: e.g., lead time (as a measure) causes conflicts, because it is not present as a measurement criterion in all the organizational areas, e.g., in the technology department, where the orientation towards accuracy/perfection prevails – employee misunderstandings resulting from the bonus systems used (e.g., in the production department, downtime, which sometimes it is caused by the lack of inputs from other departments, is measured) – work effects are measured in the production process only, due to the manager’s prioritization of this process
	Process Improvement & Innovation	Innovation is risky. Innovation can lead to errors. Focus on personal/departmental rather than systemic perfection	<ul style="list-style-type: none"> – lack of willingness to exceed beyond the tasks defined and take risks – acting as a performer rather than an initiator of ideas – putting out fires rather than changing the system – lack of knowledge sharing – improvements on the job position and in the department
People	Process Education and Management Knowledge	Knowledge is a source of power	<ul style="list-style-type: none"> – retention of knowledge within the department – insufficient manner of information provision, information delay – lack of advance information which would allow better preparation for task implementation – lack of joint training which all employees participate in, lack of internal consultations – lack of openness in information sharing – skill outflow from the organization - employees who can perform each task very well are retiring, while those with average level skills remain
Culture	Process Values & Beliefs	Task-orientation, strive for predictability and security	– Individualistic behavior; lack of interest in the process as a whole, interest in the activities performed on the job only
	Process Attitudes & Behaviors	The conviction about the need to compete and dominate, so as to gain advantage. The conviction about group division within the organization: ‘our person’, ‘their person’, ‘ours and not ours’, ‘old-young’, which fosters rivalry and the strive for certain persons’ domination over others rather than the cooperation thereof.	<ul style="list-style-type: none"> – limitation of interest to job position/department – misunderstandings and conflicts, the senior employees’ imposition of a way of working triggers resistance and lack of commitment on the part of younger workers – younger workers are protected from being used by older workers from other departments – young employees strive for independence, while older workers strive for power – lack of mutual understanding and openness to one another – formation of clans, which is manifested by avoidance and isolation of individuals and departments – a sense of resignation and inability to change

Cont. table 5.

	Process Management Social Networks	<p>The conviction about the need to compete and dominate, so as to gain advantage.</p> <p>The conviction about group division in the organization: 'our person', 'their person', 'ours and not ours', 'old-young', which fosters rivalry and the strive for certain persons' domination others rather than the cooperation thereof.</p>	<ul style="list-style-type: none"> – prioritization of departmental benefits over organizational goals – individual activity – lack of teamwork – lack of consideration for other participants in the organization in terms of employee activity – avoidance of direct communication, focus on e-mail communication – lack of bipartisan joint activity across functional boundaries – silo mentality
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Source: own elaboration.

The qualitative study covered both the areas included as well as those omitted in the quantitative study (e.g., the cultural and organizational strategy aspects), which became a vehicle for explanatory information on the existing differences between management and employees regarding their perception of process maturity. It has been found that the undisclosed convictions and cognitive schemas, which hinder the implementation of process maturity solutions and prevent greater utilization of the organization's real potential, are the root of the discrepancies diagnosed.

It turns out that the pursuit of safety and security as well as the lack of acceptance for errors minimizes the willingness to take risks and perform activities beyond the responsibility framework agreed, which can hinder or even prevent the search for new solutions necessary at higher levels of process maturity. Similarly, the focus on maintaining the superiors' control, as well as the acceptance of the hierarchical relationship and the resulting expectations as to the employee roles played, undoubtedly can limit the organization participants' involvement in cooperation and shared responsibility as well as their engagement in the process of authority decentralization.

The third element which exerts a significant inhibiting effect on the organization's development towards increasingly higher levels of process maturity is the conviction that organizational reality entails relationships that are based on competition and achievement of personal rather than organizational benefits. This is fostered by a structure dividing people into functions and work teams as well as by the 'us' and 'them' mindset. This creates an atmosphere encouraging the struggle for recognition, power and higher hierarchy positions, which significantly reduces the flow of knowledge, systemic problem solving and the focus on internal customer satisfaction, which in turn determines the development towards a process-oriented approach.

It should also be emphasized that the factor strengthening the organization during its transition to higher levels of process maturity entails the employees' attitudes, knowledge and experience. In consequence, this would need to be supported by proper design of organizational solutions aimed at development of mutual trust and understanding, which would improve the

internal relations within the organization and thus enable the organization's transition to a higher level of process maturity.

The second reinforcing element are the CEO values: readiness to take risks, the continuous change inherent in processes ('one must move forward', 'better must replace good'), the expectations of oneself and others, honesty.

Summing up, the qualitative research allowed identification of the organizational culture manifestations in the organization examined, which facilitates formulation of a strategy for transition towards the organization's processization. The organizational culture manifestations identified in the company examined have led the Authors to a firm belief that in their current state, they hinder implementation of solutions aimed at a change towards a process organization (even at level III) and largely determine the current assessment of the potential utilized – up to level II of process maturity. In this case, implementation of level III process solutions will be possible after changes in the organizational culture.

5. Discussion

The main considerations resulting from the analysis of the results obtained in the quantitative study, favoring the company's classification at the second level of maturity (Level 2), include the following:

- functional organizational structure,
- informal communication to ensure operational efficiency,
- perceived process boundaries are determined by functional area boundaries,
- lack of process owners,
- too little emphasis on communication between functional areas,
- low level of awareness and identification of supporting processes and their course,
- desired employee role in the convention of the functional approach,
- management activities focused on tasks,
- lack of defined process architecture,
- lack of a consistent system of metrics for the entire process architecture in the organization,
- despite the subjective assessment confirming customer supplier identification in external and internal terms, lack of a measurement system and supporting activities activating market relations within the organization.

It should be emphasized here that the quantitative study was complemented by a qualitative proceeding aimed at deepening the knowledge on the organization and the conditions of its functioning and the processes implemented. As a result, the research has highlighted the barriers preventing classification of the company Zakłady Odzieżowe WYBRZEŻE S.I. at a level higher than the second level of process maturity.

A significant barrier hindering the organization's further development towards its process orientation is the organizational culture resulting from certain socially shared convictions. The most important of these convictions include: the strive for security, stability and a sense of certainty – among both the employees and managers, which is manifested in their characteristic behaviors. The managers strive for a sense of power and control; as such, they adopt a specific style of management based on task setting and subordinates control; they are not interested in sharing the management powers with lower levels of management. The employees, on the other hand, are not willing to undertake activity beyond their assigned duties; they simply do what is expected of them, avoiding decision making and responsibility taking, even within the limits of their positions. The employee attention and intra-organizational relationships are limited to a department or team, which results in a lack of a broader view of what is happening across the organization. Barriers to the flow of information on the positive and negative aspects of performance exist as well. This results in the specific manner in which improvements are undertaken at particular process stages - they entail individual initiatives on the part of those responsible for a given department or the those working in it, rather than a result of teamwork, and thus they ultimately may not be compatible with the rest of the process/es.

The employees also show negative perception of the changes that are inevitably associated with process maturity development. It has also been noticed that has not implemented a training system that would develop the employees' competencies and enable knowledge sharing, which would prepare the employees more effectively for the company's undertakings.

It can be said that the organizational culture in Zakłady Odzieżowe WYBRZEŻE S.I. is rather preventive, and oriented at protection and preservation of the status quo, rather than promotional, i.e., characterized by readiness for new skill acquisition, which greatly hinders the company's achievement of its real potential. It has been noted that the perception of process maturity depends on the position in the hierarchy of process participants and on the individual level of knowledge as well as the personal values, experience and readiness for decision making.

It has also been found that the organizational participants do use the term 'process' but interpret it differently; there is no designed system of process goals and measures, while the organizational structure is not conducive to ensuring process fluidity.

6. Conclusion

The essential aim of the analytic-diagnostic research conducted was to determine the potential of the examined company's susceptibility to a change towards an organization characterized by process parameters. The realization of this aim is closely linked with the strategy of gradual transformation of the organizational and management system towards a process organization adopted by the Management Board of Zakłady Odzieżowe WYBRZEŻE S.I.

Because this change is of generative evolution character, i.e., requiring transformation of all the system elements, over a certain period of time determined by various conditions, it is essential to recognize the current state, in terms of the company's vulnerability to the pace and scope of possible changes.

In the empirical procedure, an assumption was made that the conditions for a change in the direction desired by the organization should be analyzed taking the levels of process maturity that have been developed and tested in various organizations into account. They are treated as a starting point for determining the possible and feasible changes in the direction desired by the company's Management Board. The levels of the organization's process maturity have been characterized in the details necessary for their analysis under the operating conditions of the organization examined.

The relatively low, i.e., the second, current level of process maturity identified in the organization forces and obliges the Management Board of the organization examined to undertake intensive activity aimed at employee training in different personnel configurations, using different formulas allowing transfer of the employees' ideas, knowledge and views. This procedure should enable different organizational area employees to develop contacts outside the formal scope, as a compensation for the lack of such opportunities in the official and formalized realities. In the light of the research conducted by the Authors, the significance of this category of interpersonal relations is very high in the organization examined, exerting impact of the same significance on its harmonious operation. What is more, outlining the scope of the necessary transformations in the HR capability management systems is crucial for the success of undertakings aimed at a pro-process change in the organization. This particularly refers to the reconfiguration of the motivational system and the design of a qualification and talent management system.

One important value of the article entails the combination of quantitative and qualitative methods in the search for an answer to the question of what the diagnosed organization's susceptibility to its change towards process maturity is. This effect was obtained using the method of multi-hierarchical process maturity assessment. As a result, it has been established that the organization analyzed – Zakłady Odzieżowe WYBRZEŻE S.I., ranks at the second level of process maturity, although it shows a third level process maturity potential in many of

the diagnosed elements. The starting point for the assessment of the organization's susceptibility should therefore entail skillful confrontation of its real potential with its utilized potential, because the margin between those two potentials determines the intensity of the organization's strive towards equalization of the two categories. The fundamental purpose of the organization's activity should entail reduction of the existing gap or acting to maintain it rather than to increase it.

7. Managerial implications

The analytical and diagnostic research on the actual state of the organization's functioning on the various levels distinguished, the effects of which are presented in the results section, allows formulation of managerial implications, which are to serve the purpose of defining a set of the actions and undertakings increasing the organization's potential for a change towards a level of process maturity higher than the one achieved so far.

- a. A complete list of the processes necessary to fully describe the organizational space of the company's functioning needs to be identified. This refers to its non-productive activity (auxiliary processes) in particular.
- b. A reference flow of the main and auxiliary processes needs to be designed, taking the levels of freedom of the influence on the change of the process structure by the process owners dedicated to the management thereof.
- c. A strategy for the company's transition to the third and, in time, the fourth level of process maturity needs to be developed. In the Authors' opinion, this option is realistic in a few years' perspective, after meeting the subsequent conditions of the organization's adaptation to the rules defined at this level of maturity. The relatively good economic situation on the market of clothing production, which the company operates on, is conducive to this process.
- d. The prospect of implementing level 3 and, in relatively short time, level 4 process solutions is feasible, provided that all employees are made aware of the principles guiding a process-oriented organization, preferably using a specific example defined on the basis of the system realities of the organization.
- e. A new, more precise scheme of the company's organizational structure needs to be developed. A preliminary assessment of the problem in this regard has directed the Authors towards the concept of a matrix (process-function) structure.
- f. In the Authors' opinion, diagnostic and analytical work should be undertaken, in order to identify the desired organizational culture supporting the organization's process orientation.

The article's unique value entails the combination of qualitative and quantitative methods to determine the organization's potential for moving to a higher level of process maturity.

8. Future research

The research results presented provide a starting point for further empirical investigations. The next objective is to verify the multi-hierarchical method developed, using a larger sample of other organizations characterized by various core functions. This should be followed by an evaluation of the method proposed, in terms of its usefulness for development of strategies of organization transition to higher levels of process maturity, and verification of the method, to confirm its diagnosticity with regard to the essence of the problem under examination. This means answering the question regarding the extent to which the method developed reflects the reality examined, and the extent to which it reduces the image of that reality.

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IMPROVEMENT OF THE PRODUCTION PROCESS USING LEAN MANAGEMENT – CASE STUDY

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Purpose: The aim of the article is to present the benefits of using selected Lean Management elements in the production process on the example of a company producing mechanical seals.

Design/methodology/approach: The article is theoretical and empirical in nature and is based on the analysis of a selected case. In the empirical part, the analysis concerns selected elements of the production process in the examined enterprise.

Findings: The results obtained in the article refer to the benefits of using Lean Management in the production process in the analyzed enterprise. The use of identification and elimination of waste and standardization of activities at workplaces (introduction of job instructions) in selected areas of the production process allowed for the improvement of its parameters, which was presented in the article.

Research limitations/implications: The limitations in the empirical area could be the reference only to selected aspects of Lean Management and the analyzed process. Future research will cover the broader scope of Lean Management and other companies.

Practical implications: The results of the case study show the direct impact of Lean Management on the parameters of the analyzed production process. Thanks to the use of Lean Management, the process parameters have improved, which is an important factor in the context of the effectiveness of the company's functioning as a system.

Originality/value: The added value of the article is the practical presentation of the use of Lean Management to improve the parameters of the production process.

Keywords: Lean Management, production process, improvement.

Category of the paper: Research paper.

1. Introduction

The article is a theoretical and empirical study of the concept of Lean Management and the effects of its application on the example of a company producing mechanical face seals. Accordingly, the article is divided into two parts: theoretical and empirical. The theoretical part presents the assumptions of Lean Management and selected concept instruments. The assumptions indicate the basic principles of Lean Management, which they are:

1. Identification of the value stream.
2. Elimination of waste (Muda).
3. Ensuring the flow of activities in the processes.
4. Process control by means of a pull system.
5. Constant pursuit of the perfection of processes.

This part also describes the continuous improvement of Kaizen and the basic instrument of Lean Management – Value Stream Mapping.

The empirical part of the article refers to the analysis of selected areas of the production process in order to indicate the possibilities of their improvement. By using selected Lean Management assumptions, such as: identification and elimination of waste and standardization of activities at workplaces (introduction of job instructions) the following areas were analyzed: threading process of holes, balancing rotors and shafts process and wire drilling process. The use of the above assumptions of Lean Management allowed to improve the analyzed areas, among others in: operational time, tools consumption per 1000 pieces of the product, the quantity missing for 1000 items of the product, calibration of heads for every 1000 pieces of finished product, timeliness of orders and complaint's rate.

The method used in the article was a case study.

2. Literature review – meaning of Lean Management and its instruments

Lean Management constitutes a management concept that has been successfully implemented by enterprises and organizations around the world. In Poland, an increasing number of organizations can boast of successful implementations of this concept. The concept of Lean Management is of Japanese origin. It derives from the Lean Thinking philosophy, implemented in the terminology of economics and management by J.P. Womack'a, D.T. Jones'a and D. Roos'a, scientists representing the Massachusetts Institute of Technology (Womack, Jones, & Roos, 1990; Womack, Jones, 1996). It should be added, however, that the first term of lean production was used by J. Krafcik, who in 1988 published a work entitled *Triumph of the Lean Production System* (Krafcik, 1988, pp. 41-52). The concept of Lean Management has been developed in Toyota Motor Company as part of the Toyota Production System and has been used and developed over the years in the production plants of this brand (Lisiecka, Burka, 2016, p. 15; Bhasin, 2015). The core of the Lean Management concept is the production process, but it is now being used successfully in the service sector. The components of the so-called Toyota Production System House are shown in Figure 1.

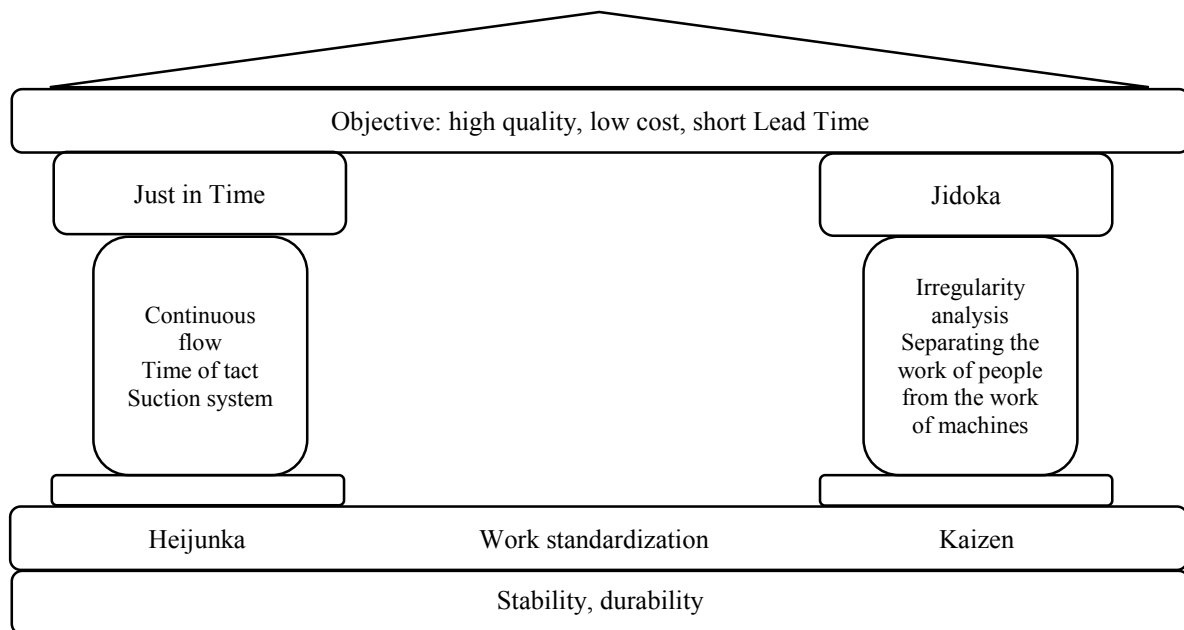


Figure 1. Toyota Production System House. Adapted from: "Lean Service w teorii i praktyce" by K. Lisiecka, I. Burka. Copyright 2006 by Wydawnictwo Uniwersytetu Ekonomicznego.

The overriding goal is high quality and low costs of the implemented processes. The basic elements of the concept, such as standardization and continuous improvement, form its foundation. They are based on continuous improvement activities such as continuous flow, irregularity analysis, Just in Time and Jidoka.

The fundamental features of the Lean Management concept are striving to improve the broadly understood quality, minimize costs and shorten the time of process implementation as a result of the systematic elimination of waste as part of management based on a flat organizational structure. Lean Management stands for process-focused management. Properly implemented principles of process management may be a factor supporting the adaptation of the Lean Management concept. Process management, aimed at achieving the synergy effect to achieve the goals of a company, has become the basis for "lean management" for the comprehensive improvement of the management system. The key goal of process management and the Lean Management concept based on it is the elimination of rigid functional structures. Instead of this ineffective model, the Lean Management concept introduces a flattened and horizontal organizational structure that focuses on processes and knowledge accumulation, while decomposing the strategic goals into the goals of processes and individual positions along the value chain. Process management in the Lean Management concept concerns not only operational processes, but also auxiliary processes, without which the proper functioning of a company would not be possible (Wiśniewska, Grudowski, 2014, pp. 34-38).

The implementation of Lean Management means the implementation of five fundamental principles on which the concept is based. These principles are:

1. Identification of the value stream.
2. Elimination of waste (Muda).
3. Ensuring the flow of activities in the processes.
4. Process control by means of a pull system.
5. Constant pursuit of the perfection of processes.

The starting point of Lean Management is value. It is created by a company, but defined by the end customer (employee/student/doctoral student). Value makes sense when it relates to a specific service that meets customer requirements, under certain conditions, e.g., a specific time. Value stream means all activities necessary to carry a service through three stages: research and development (concept, design, offering), information management (e.g., preparation of an offer) and service provision (Puvanasvaran, Megat, Tang, Muhamad, Hamouda, 2009, pp. 930-943).

The second principle of Lean Management concerns the elimination of waste, i.e., those processes and tasks that do not add value and do not participate in the process of meeting customer requirements. The essence of the Lean Management concept points to seven areas of waste (Muda), which are: waiting, unnecessary movement, overproduction, wrong process, unnecessary supplies, defects and transport (Vukadinovic, DJapan, Macuzic, 2016, pp. 43-45). Muda is a key element of control of activities in Kaizen, although other categories may also be used in it, such as: Muri – analysis of excessive workload of employees, processes, etc., and Mura – analysis of irregularities in the flow of work, documents, information, etc. The three categories mentioned above create a 3M tool that improves processes and services (Wheeler-Webb, Furterer, 2019, pp. 928-947)

These examples of waste show the heart of the problem. In the processes carried out in the company, many losses are generated that are not identified, and their occurrence generates costs. An instrument that allows Lean Management to identify and eliminate waste is Value Stream Mapping, which is described later.

The implementation of the next three principles of Lean Management is as follows. Ensuring the flow of activities in processes constitutes the principle number three. Lean Management emphasizes the essence of continuous (smooth) implementation of processes and tasks. In this way, the aim is to avoid downtime (breaks) that do not create value, and therefore to eliminate waste. The service delivery process should be a continuous flow of tasks creating its value. Another principle applies to process control through a pull system. In the pull system, the customer starts the service provision process. The processes of preparing the service and its provision will not be launched if there is no demand for it. The constant pursuit of process perfection means endless improvement. In the Lean Management concept, they are implemented through Kaizen. Kaizen is a prototype of "lean management" (Grudzewski, Hejduk, 2004, pp. 203-205).

The implementation of continuous improvement through Kaizen means that all employees, regardless of their position and functions, are involved in this process. Kaizen is based on the assumption that employees have knowledge, skills and abilities that can be better used in the interests of the company. This concept requires changes in the behavior of employees and the authority of the management. The awareness of each employee that he shapes specific processes in the company, motivates him to act, improve his qualifications, which leads to the optimization of processes, increases their quality and the quality of services resulting from these processes (Frąś, 2013, p. 264; Sigidov, Rybantseva, Moiseenko, 2014, pp. 20-30).

An important role in this respect is played by the company management, especially at the highest level. Appropriate knowledge and skills are necessary in the implementation of the Lean Management concept and continuous Kaizen improvement. The company management should conduct a diagnosis of the current state, convince employees about the legitimacy of changes, develop a plan for the implementation of Lean Management and continuous improvement, provide the necessary resources, conduct continuous communication in this area, establish roles and responsibilities for individual employees and have a vision of the company functioning after the implementation of changes (McLoughlin, Miura, 2018, pp. 3-17).

In relation to the above, the most important Kaizen principles constituting continuous improvement should be indicated (Prošić, 2011, pp. 174-175):

- discard permanent, conventional ideas in favor of innovative thinking,
- think how to perform a given activity, and not why it cannot be performed,
- instead of making up excuses, start by questioning current practices,
- perfection should not be sought immediately in action; actions can be taken even when 50% of the target achievement effectiveness is achieved,
- a mistake should be corrected immediately,
- the problem should be solved with knowledge and skills, not necessarily financial issues,
- it is desirable to use improvement tools, such as 5Why, and root causes,
- the wisdom of ten people is much more valuable than the knowledge of one.

M.F. Suárez-Barraza, J. Ramis-Pujol and L. Kerbache in the context of the rules also add: identifying, reducing and eliminating waste, team work for continuous improvement, support for company management, training of employees and the use of knowledge and experience of employees many years of experience (Suárez-Barraza, Ramis-Pujol, Kerbache, 2011, pp. 296-302).

Involving all employees in matters of quality improvement means that many problems are solved through teamwork. Team improvement in the Kaizen concept is its characteristic feature. The team is mutually dependent on the goals and tasks it is to accomplish. Teamwork allows you to achieve a better effect than working alone through joint effort. In Kaizen, significant importance is attached to the collective responsibility for reducing costs and improving results.

Each team member feels obliged to initiate changes in the workplace. In the Kaizen concept, employees focus on improving all aspects of work. Each team member is a representative of a specific profession and an expert in their field. Continuous improvement, in a way, forces employees to be active and aware of thinking and acting to seek better solutions, ways of performing work, etc. The rationalization conclusions submitted by employees in order to solve specific problems are also important.

The implementation of Lean Management principles in the practice of company operation takes place through the use of various instruments of the nature of approaches, systems, methods, techniques and tools for management and quality improvement, processes and services. The range of instruments includes: Value Stream Mapping, Kaizen, 5S, PDCA, process management, reengineering, work standardization, brainstorming, benchmarking, QFD method, FMEA method, SWOT analysis, training system, motivating system, flowchart, Ishikawa diagram, Pareto chart, checklists, 5xWhy, corrective actions, preventive actions, audit, risk analysis and others (Grudowski, Leseure, 2013, pp. 45-49; Wolniak, 2014, pp. 157-166; Jakubowski, Woźniak, Stańkowska, 2017, pp. 17-29; Feld, 2000; Parv, 2017).

One of the key instruments is Value Stream Mapping (VSM). Value Stream Mapping is a combination of slimming the organization (mainly through the identification and elimination of waste) with the improvement of service quality. Value Stream Mapping is the analysis of all activities in a process, starting with the customer and moving up the value stream to the resources needed to deliver the service. The value stream map is a graphical presentation of the flow of information and materials in the process of order fulfillment for selected services. It contains information such as: customer demand and their variability, customer requirements, the method of communication with customers, the form and duration of information flow within the organization, details of the service process, problems that hinder the implementation of the order, etc. (Maciąg, 2016a, pp. 117-118; Haefner, Kraemer, Stauss, Lanza, 2014, pp. 254-259).

Value Stream Mapping consists of three stages (Czerska, 2009, p. 45):

1. Analysis of the current state - the current value stream (Value Stream Analysis).
2. Creating a vision of the future state - the target state of the value stream (Value Stream Designing).
3. Planning the improvement and implementation of solutions (Value Stream Work Plan).

There are basic principles of Value Stream Mapping (Lisiecka, Burka, 2016, p. 101):

- mapping should start with defining customer requirements,
- you should not divide task mapping between different employees,
- there should be one leader in the entire value stream, otherwise no one will be responsible for the entire stream and part of it will remain unattended,
- mapping takes place in two stages, i.e., at the flow level (door-to-door mapping), i.e., at the level of individual component processes, and then individual activities in the process should be dealt with,
- mapping should be performed after each change in the value stream.

In each process, three types of value-added activities can be distinguished. These are: activities creating added value (in other words increasing value, i.e. those in which the properties of the service expected and accepted by the client are shaped), which do not create value, but are necessary in the process (these activities are necessary at a given level of work organization for the service to be created and meet the customer's expectations; if possible, they should be eliminated) and those that do not create added value – being a source of waste (unnecessary activities from the point of view of internal and external customers, therefore they must be absolutely eliminated) (Hamrol, 2015, p. 99; Hines, Lethbridge, 2008, pp. 53-56). The added value is created by those activities for which the customer wants to pay or those that make the customer want to use a given service.

Value Stream Mapping is both diagnostic and prognostic in nature. In the mapping work, the current state map is first created. Then, the analysis is performed, which includes such process characteristics as: processing time, share of activities that do not create value, percentage of irregularities and others, appropriate to the specificity of the mapped value stream. At further stages, problem areas are identified that require improvement, and on this basis a map of the future state is created, i.e. the target improvement of the process (Czerska, 2009, pp. 45-57; Kucheryavenko, Chistnikova, Thorikov, Nazarova, 2019, pp. 687-705).

3. Research method and results of analysis

The research method used in the empirical part of the article was a case study. In the management and quality sciences, a case study is a detailed description of a usually real economic phenomenon, e.g., an organization, a management process, its elements or the environment of an organization, to formulating conclusions about the causes and results of its course (Grzegorzczak, 2015).

A case study analysis of scientific problems can take the form of single or multiple analyzes. A single analysis is used when the studied phenomenon is of a long-term, typical, exceptional or revealing nature. The use of a single analysis is also recommended when the case is critical to the existing theory or when there is no theory relating to the phenomena under study. Multiple analysis is used when the purpose of the research is to test or improve an existing theory (Wójcik, 2013).

In the management and quality sciences, there are three goals that are served by case studies. These are the goals: theory-creating, theory-testing, and practical. The article focuses on a practical purpose, and the case study was of an application nature. It contained a description of the problem under study and the process of solving it, so explains the specific desired effects of the decisions made (Czakoń, 2015).

The graphical course of the case analysis is shown in the figure 2.

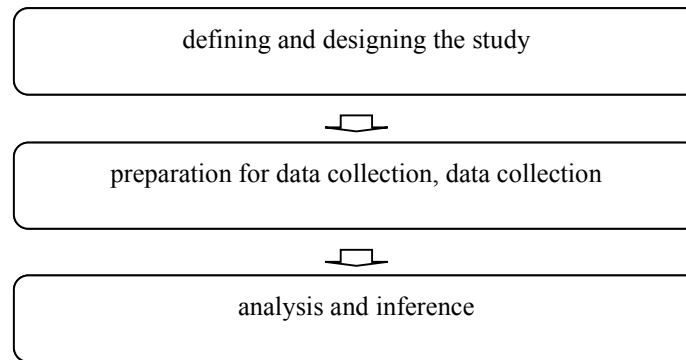


Figure 2. Case study stages. Adapted from: “Case study research, jako metoda badań naukowych” by K. Lisiecka, A. Kostka-Bochenek. Copyright 2009 by Przegląd Organizacji.

The table below shows the basic assumptions for the case study.

Table 1.

Assumptions of the case study

Items	Description
Research goals	Theoretical: description of meaning of Lean Management and its instruments useful for manufacturing company Practical: present the benefits of using selected Lean Management elements in the production process on the example of a company producing mechanical seals
Research method	Case study
The interviewees	Employees of analyzed company (managers)
Date of realization	January-March 2022

Source: personal elaboration.

The case study covered the production process within the company specializing in the production of face mechanical seals that can be used in various devices with a rotating shaft, e.g., centrifugal pumps, compressors and fans. The analyzed enterprise is 100% an enterprise with Polish capital, which has been operating on the market continuously for nearly 40 years. The company's customers are mainly pump manufacturers, as well as repair companies from many industries: food, petrochemical, energy, chemical, mining, pharmaceutical, water and sewage and others. An important element in the functioning of the enterprise is export activity. Currently, nearly half of sales go to foreign markets, incl. to Germany, the USA, France, Belgium, the Netherlands and others. All products are based on own designs and are subject to Polish and foreign patent protection. In order to provide customers with the highest quality of products manufactured in the enterprise, the activity is carried out on the basis of the requirements of normative quality management systems (ISO 9001) and the environment (ISO 14001).

The empirical analysis covered selected areas of the production process: threading process of holes, balancing rotors and shafts process and wire drilling process. The basic problem that occurred with regard to the production process was the performance of work on the basis of well-established patterns, partially documented, but without rigorous instructions and standardization. As a result of the situation, the conducted analysis of the state showed the possibility of implementing Lean Management elements such as: identification and elimination

of waste and standardization of activities at workplaces (introduction of job instructions). The analyzes of the proposed improvements were verified 3 months after their introduction. The states before and after the improvements are presented in the following tables (2-4). Below the tables there are extended descriptions of the introduced changes.

Table 2.

Analysis of the threading process of holes

Criteria	Before Lean Management	After implementation of Lean Management
Operational time	About 1h and 10 minutes	About 45 minutes
Tools consumption per 1000 pieces of the product	From 20 to 50 taps	From 12 to 35 taps
The quantity missing for 1000 items of the product	Even up to 22 pieces	About 7 pieces
Timeliness of orders	80%	94%
Complaint's rate	1,2%	0,6%

Source: personal elaboration.

1. Operational time.

The time was reduced from one hour and 10 minutes to a value of 45 minutes. The time was counted in full along with the preparation and cleaning of details. The technological instructions resulted mainly in the benefits of the selection of taps and the repair of any damage.

2. Tools consumption per 1000 pieces of the product.

The number of taps needed to make 1000 pieces of a finished product has been reduced from 20 to 50 taps to a range from 12 to 35 taps. The elimination of damage resulting from the wrong selection of the tool allowed to reduce the demand to the natural phenomenon of tool wear resulting from the friction force and torque occurring during threading.

3. The quantity missing for 1000 items of the product.

The activities allowed to reduce the quantity of the missing items from 22 to an average of about 7. We are talking about a shortage, i.e., a situation where a detail has been damaged in a way that eliminates the possibility of "saving" the product. Such damage most often resulted from the breakage of the tap, caused by the wrong choice of the tool and inappropriate cutting parameters.

4. Timeliness of orders.

The process has been improved in a way that gives a measurable benefit in the form of timely orders, as it has been improved from 80% to 94%. So, before the application of the Lean, on average, 20% of details were not shipped according to the deadline agreed with the client, and after modernization, only 6% were delayed. This phenomenon was mainly caused by the phenomenon of improving the components or making substitutes resulting from permanent damage.

5. Complaint's rate.

Complaints were reduced from 1.2% to 0.6%, which resulted in an increase in customer satisfaction. Complaints most often resulted from careless inspection of the finished product and they were already noticed at the customer's, which unfortunately had to end with official complaints.

Table 3.

Analysis of the balancing rotors and shafts process

Criteria	Before Lean Management	After implementation of Lean Management
Operational time	About 40 minutes	About 25 minutes
Tools consumption per 1000 pieces of the product	From 10 to 28 drills	From 7 to 12 drills
The quantity missing for 1000 items of the product	Up to 25 pieces	About 9 pieces
Timeliness of orders	75%	90%
Complaint's rate	0,6%	0,2%

Source: personal elaboration.

1. Operational time.

The time needed to perform a balancing operation has been reduced from 40 minutes to 25 minutes. This is a consequence of the selection of more stable balancing parameters and, what is very important, the use of the so-called initial balancing of shafts necessary for the balancing process, which resulted in faster achievement of the intended level of balancing.

2. Tools consumption per 1000 pieces of the product.

The reduction is possible due to the similarity as in the case of threading holes, the key in this topic is the appropriate selection of the tool for the balancing performed. During balancing, only the conical part of the drill works, but very often it is enough to permanently damage the drill when machining "difficult" materials.

3. The quantity missing for 1000 items of the product.

In the process of missing parts by the quality control department, parts were mainly balanced in the wrong balancing plane (most often on the wrong side). Attempts were made to supplement the damage with welds, but it was inconsistent with the customer's requirements, as most details have a material transfer feature, which means that the appropriate material is controlled from the moment of "leaving" the steelworks. The scrap rate has been reduced from 25 to 9.

4. Timeliness of orders.

Timeliness has been improved from 75% to 90% showing a significant improvement in customer satisfaction. The lack of timeliness is mainly due to incorrect balances that end in scrapping the details. Unfortunately, in this area it is better to add another piece than to expose the client to damage resulting from improper balancing.

5. Complaint's rate.

It can be seen that this indicator is small in the case of balancing, as the incorrectness of the balancing is difficult for the customer to notice in a short time. Incorrect balancing can often be noticed after years of use of the machine set, because slow damage occurs, for example, to rolling bearings, which ends with a seal service. The index was reduced with the help of precise selection of machining parameters.

Table 4.

Analysis of the wire drilling process

Criteria	Before Lean Management	After implementation of Lean Management
Operational time	About 1h and 10 minutes	About 35 minutes
Calibration of heads for every 1000 pieces of finished product	About 6 times	About 4 times
The quantity missing for 1000 items of the product	Up to 15 pieces	About 7 pieces
Timeliness of orders	85%	92%
Complaint's rate	1,4%	0,8%

Source: personal elaboration.

1. Operational time.

The time required to cut one wedge groove was significantly reduced from 1 hour and 10 minutes to approximately 35 minutes. The reason for such a significant reduction is proper mounting, not damaging the geometry of the machine and, most importantly, the ability to perform other activities while the machine is in operation.

2. Calibration of heads for every 1000 pieces of finished product.

Service activities were limited due to more thoughtful assembly of details. The impact on the structural elements was minimized, therefore the need for calibration was reduced from 6 times to 4, which resulted in a reduction of service costs.

3. The quantity missing for 1000 items of the product.

Reduction of the occurrence of shortages was possible with the help of thoughtful operation. This allowed to reduce this indicator from the level of 15 items to the level of 7 items. This reduced the amount of scrap due to the wrong position of the wedge groove and the wrong size or shape.

4. Timeliness.

The on-time ratio has been improved from 85% to 92%, which has helped to strengthen customer satisfaction with on-time deliveries. The punctuality was noticed after reducing to a minimum the amount of re-making details after the shortage process.

5. Complaint's rate.

Complaints were reduced from 1.4% to 0.8%, which was a consequence of more refined production based on technological instructions. The process of returns was basically only due to the inadequate dimension of the keyway groove.

As the above analysis showed, the application of selected Lean Management assumptions: identification and elimination of waste and standardization of activities at workplaces (introduction of job instructions) made it possible to improve selected areas of the production process. This is evidenced by the selected criteria presented in tables 2, 3 and 4. Improvements in some areas are significant and in the short term.

The use of the Lean Management concept and its instruments allows for the improvement of processes, products and services. It is important to identify the problem of what is to be improved and use the right elements of Lean Management.

4. Summary

Effective implementation of activities aimed at improving the production process involves the need to spend time both by managers and employees at various levels of the organizational structure. Lean Management strives to develop such methods of conduct to ultimately obtain appropriate profits resulting from the application of improvement actions.

The article presents the use of selected elements of Lean Management (identification and elimination of waste and standardization of activities at workplaces (introduction of job instructions)) in order to improve the efficiency of selected areas of the production process.

The classic structure of the article (theoretical and empirical) allowed for the formulation of the following goals, which were achieved:

- theoretical: description of meaning of Lean Management and its instruments useful for manufacturing company,
- practical: present the benefits of using selected Lean Management elements in the production process on the example of a company producing mechanical seals.

The verification of the improvements proved their rightness just three months after the introduction. Thanks to this, subsequent changes can be implemented, with an attitude towards the next success.

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CHOOSING A SUPPLIER OF FUELS AND ENERGY IN LARGE-FORMAT RETAIL ENTERPRISES

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Purpose: The overriding goal of the considerations is to indicate the assumptions and rule for the implementation of the procedure leading to the appointment of an appropriate fuel and energy supplier in large-format enterprises (L-FE), to the extent necessary to improve economic results. The choice will take into account both the size and structure of the resources that are at the disposal of the enterprise and the environmental conditions. The practical goal will be to develop a concept for the implementation of the procedure for the evaluation and selection of a supplier of energy carriers for the needs of a commercial entity.

Design/methodology/approach: The research procedure will run through the following stages:

1. Presentation of the theoretical foundations by discussing concepts related to the functioning of the fuel and energy economy as well as indicating the methods and criteria for selecting a supplier. The research method used will be a review of the literature on the subject.
2. Recognition of the L-FE decision situation through the analysis of the subjective, objective and process structure. The research method used will be direct observation with participation. The observation will be carried out in four commercial networks (in total seven enterprises).
3. Setting the assumptions for the implementation of the procedure for the evaluation and selection of the supplier of energy carriers in L-FE. At this stage, the purpose of the procedure, its essence, stages and tasks of implementation as well as the procedure will be indicated. Responsible persons and contractors will be appointed. The evaluation criteria as well as the applicable entry and exit documents will be proposed. The research method used will be the expert method.

Findings: The added value of the article is the answer to the question: how is the process of assessing and selecting the supplier of energy carriers in L-FE? The work indicates its goal, stages and tasks of implementation, applicable documents, methods of proceeding and evaluation criteria. The proposed solution contains practical guidelines. Should be noted that the adopted scheme of conduct and the method of its application in a trading enterprise creates the possibility of transferring the developed solutions to other economic systems.

Originality/value: In this article, the actions taken have been focused on areas that have and will have an impact on reducing the costs of the company's operation and, consequently, on improving their competitive position on the market.

Keywords: purchase, fuel, energy, trade, distribution.

Category of the paper: Case study.

Introduction

One of the important companies on the retail market are large-format enterprises (L-FE). These are economic units located in large and medium-sized cities. They specialize in selling goods to end users. They offer a wide range of commercial space, a wide range and a limited range of support services.

In the examined enterprises, in the structure of costs by type, the costs related to the purchase of energy carriers have a high share. Energy and fuels are commonly used there for lighting, maintaining the right temperature, humidity, cooking and baking, as well as driving equipment and means of transport. Electricity and gaseous fuels have the largest share in the consumption structure of the enterprise's carriers.

In recent years, the purchase prices of fuels and energy have shown a significant increase and were characterized by uncertainty as to their future size (Statistical..., 2021). It should be emphasized that the domestic market was strongly determined by the current political and social events recorded in the world (Mulder, 2021). In Poland, the climate and energy policy of the European Union (EU) had a significant impact on the prices of electricity and heat, in confrontation with the condition of the electricity sector and the designated directions for its transformation. The process of deregulating the electricity and natural gas markets was carried out in the country, and thus market mechanisms developed in their wholesale and retail trade. On the other hand, the prices of liquid fuels were determined on an arm's length basis, based on the crude oil quotation, the USD exchange rate and the level of national taxes (Oil..., 2021). In the past period, also important were activities related to the introduction of regulations and standards or financial support to improve the efficiency of fuel and energy consumption in economic systems.

In response to the above-mentioned issues, it was assumed that the main objective of the paper will be to indicate the assumptions and rule for the implementation of the procedure leading to the appointment of an appropriate fuel and energy supplier in L-FE, to the extent necessary to improve economic results. The choice will take into account both the size and structure of the resources that are at the disposal of the enterprise and the environmental conditions. The practical goal will be to develop a concept of procedure for the evaluation and selection of a supplier of energy carriers for the needs of a commercial entity.

The essence of the research problem boils down to answering the following question: how is the process of assessing and selecting a supplier of energy carriers in the examined enterprise? The above question can be broken down into specific questions about its goal, stages and tasks of implementation, binding documents, methods of proceeding and evaluation criteria.

Therefore, the subject of research is the process of supplier evaluation and selection. The research area is the fuel and energy subsystem located at L-FE.

The research procedure will run through the following stages:

1. Presentation of the theoretical foundations by discussing concepts related to the functioning of the fuel and energy economy as well as indicating the methods and criteria for selecting a supplier. The research method used will be a review of the literature on the subject.
2. Recognition of the L-FE decision situation through the analysis of the subjective, objective and process structure. The research method used will be direct observation with participation. The observation will be carried out in four commercial networks (in total seven enterprises).
3. Setting the assumptions for the implementation of the procedure for the evaluation and selection of the supplier of energy carriers in L-FE. At this stage, the purpose of the procedure, its essence, stages and tasks of implementation as well as the procedure will be indicated. Responsible persons and contractors will be appointed. The evaluation criteria as well as the applicable entry and exit documents will be proposed. The research method used will be the expert method.

2. Theoretical basis

The term energy can be viewed in different terms (Harker, Backhurst, 1982). In the fuel and energy economy, it means a certain physical form of energy desired by consumers, expressed in given units of measurement, which is the subject of trade and is commonly used for human use. Energy cannot arise *ex nihilo*. It can be obtained by the use of energy carriers (Jedynak, 2022). Energy carriers come in various physical forms. They are both renewable and non-renewable. They are found in the natural environment and result from specific technological processes. In the literature on the subject, their classification also takes into account the method of their processing or their final destination (Shah, 2015).

The basic values used in the energy analysis of energy carriers commonly include their chemical composition, heat of combustion, calorific value and the efficiency of energy transformations of devices. The other parameters to be considered are directly related to their separate physico-chemical properties (Jedynak, 2022).

Commonly used measures in trade in fuels and energy are units included in the International System of Units (SI – *Système International d'Unités*) for mass, volume, temperature, pressure, power and energy flux, heat or work (Certi, Fontini, 2019).. In addition, other non-systemic units are also applicable. They are specific for a given area or refer to a given energy carrier. They reflect historical processes or cultural determinants (Jedynak, 2022).

In the literature on the subject, the fuel and energy system is presented in two perspectives (Edwards, 2017). In a broader sense at the level of the entire economy and in a narrow sense from the point of view of an organizational unit. In a broader sense, it is a separate part of the national economy. Depending on the researcher's needs, different classification criteria can be distinguished. For example, taking into account the stages of fuel and energy flow (subsystem of supply, production, distribution and waste management), type of fuel (subsystem of solid, liquid, gaseous fuels and electricity) or construction (sub-system subject, object, process). In the narrow sense, the fuel and energy system is a separate part within a given organizational unit. It includes both the supply and consumption subsystem. The subject structure of the supply subsystem is made up of the department and positions responsible for the purchase and supply of individual energy carriers and suppliers. The consumption subsystem includes a department and a position responsible for the consumption of individual energy carriers (Jedynek, 2022).

The literature on the subject commonly indicates two groups of supplier evaluation and selection methods. The first is through a survey, the so-called audit. The second is taxonomic methods, including the point, point-graphic, graphic, indicator or AHP methods. The adopted stages of their implementation include both the preparatory and implementation phases. The preparatory phase aims at determining the assumptions and rules applicable during the conduct of the procedure. Moreover, it is related to the identification and development of tools. The implementation phase is the launch of the procedure in accordance with predefined guidelines. The end result is the appointment of a supplier (Dwiliński, 2006).

The following evaluation criteria are commonly used to evaluate suppliers, i.e. delivery time, supplier reliability, supplier readiness and flexibility, and delivery efficiency (Christopher, 2016). Additionally, the offered price and the quality of the products are taken into account (Twaróg, 2006). Due to their importance, they are divided into primary and secondary criteria. However, assuming the nature of the assessment, we can indicate quantitative and qualitative. The adopted criterion, regardless of its type, requires detailed definition. For this, indicators and gauges are commonly used. The influence of the various criteria on the purchase decision varies. Therefore, it is important to indicate their importance by adopting an appropriate weighting (Jedynek, 2017).

3. Description of the decision situation

The entity structure of L-FE includes a given organizational unit, functional departments located there, as well as people and their work. The organization in the examined enterprise is based on a hierarchical organizational structure. There are commercial and auxiliary departments. There are four groups of work positions, i.e. management, support, core and support staff. Within the scope of their assumed scope of duties, there is a specialization. The organizational structure at L-FE is presented in Figure 1.

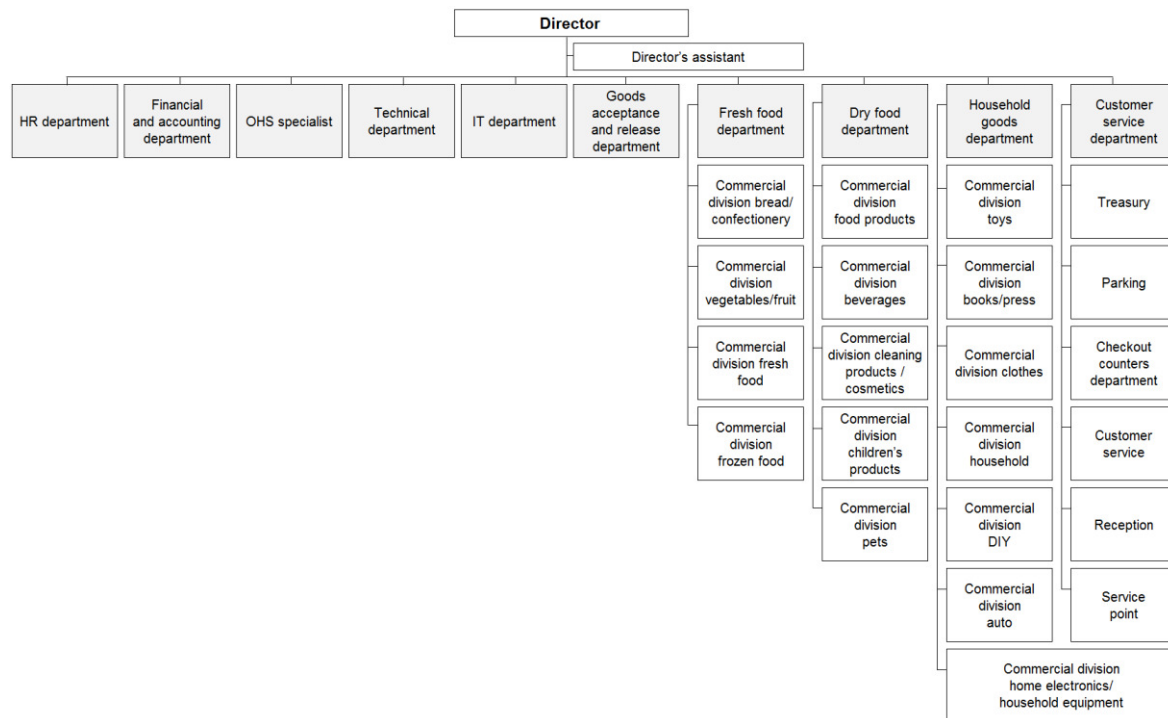


Figure 1. Organizational structure of L-FE. Source: own study.

The subject structure of the L-FE includes the subject of work and the means of work. The subject of work is a commodity constituting a commercial offer. In the surveyed enterprises, according to the generic criterion, it is possible to indicate the division of goods into groups, subgroups, classes and subclasses. This division determines the organization of commercial and warehouse space at the same time. The characteristics of the goods are presented in Table 1.

Table 1.
Characteristics of stored goods in a grocery hypermarket

Group	Characteristics									
	Undemanding	Ensuring conditions	Posing a threat	Small-sized	Medium-sized	Large-size	Unit constants	Ssolid loose	Liquid	Ggas
Vegetables/Fruits		■		■	■		■	■	■	
Bakery/Confectionery		■		■			■	■		
Fresh products		■		■			■	■	■	
Frozen food		■		■			■	■		
Groceries	■			■	■		■	■	■	
Drinks	■			■	■				■	
Chemicals/cosmetics	■			■	■		■	■	■	■
Children's articles	■			■	■		■	■	■	
Articles for animals	■			■	■		■	■		
Industrial articles	■	■	■	■	■	■	■	■	■	■

Source: own study.

In the surveyed enterprises, the means of work include technical infrastructure and materials for the operation of machines and devices.

Technical infrastructure includes building structures and their equipment. In the structure of buildings in L-FE, closed buildings constitute the main part. It is complemented by semi-open and open warehouses and a car park. The plan of the sales hall and warehouse is presented in Figure 2.

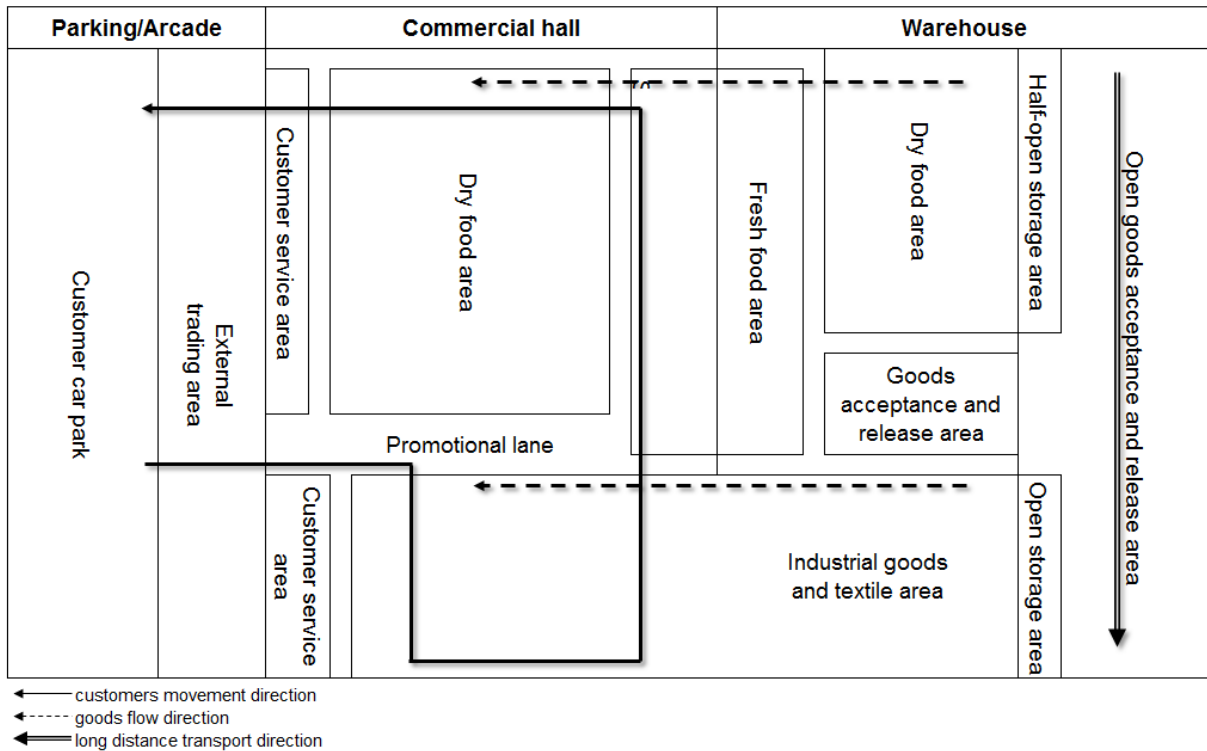


Figure 2. An example of the structure of retail and warehouse space in large-format stores. Source: own study.

At L-FE, technical devices are devices used for storing goods, supporting goods and customer service, transporting goods and their manipulation, or IT systems. Consumables, on the other hand, include fuel and energy. The scope of application of particular technical devices and energy carriers is presented in Figures 3 and 4.

Technical devices	Warehouse space		Retail space		Secondary space	
	Goods receipt and release area	Storage area	Commercial area	Customer service area	Publicly available	Specialized
Storage facilities		■ ■ ■	■ ■ ■	■		■
Goods handling support devices	• lighting	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
	• air conditioning and ventilation		■ ■ ■			
	• heating	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
	• fire protection	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
	• security	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
• supporting	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	
Customer service support devices			■ ■ ■	■ ■ ■	■	
Transport and handling devices	• hand pallet truck	■ ■ ■	■ ■ ■			■
	• pallet truck lifting	■ ■	■ ■ ■			■
	• pallet truck	■ ■	■ ■ ■			■
	• samochody dostawcze					
Auxiliary devices	■ ■ ■	■	■ ■ ■			
IT system	■ ■ ■	■	■	■ ■ ■	■	■ ■ ■
Other devices	• administrative and office	■ ■	■ ■	■ ■	■ ■ ■	
	• social					
	• technical department					■ ■ ■
	• security					■ ■ ■
	• cleaning service					■ ■ ■

■ ■ ■ commonly used, ■ ■ used for selected activities, ■ used to a limited extent

Figure 3. The scope of application of technical devices in L-FE. Source: own study.

Technical devices	Energy carriers			
	Electricity	Natural Gas	LNG	Diesel
Storage facilities				
Goods handling support devices	■			■
	■			
	■	■	■	
	■			
	■			
Customer service support devices	■			
Transport and handling devices	■			
	■	■	■	■
	■			■
	■			■
Auxiliary devices	■			
IT system	■			
Other devices	■			
	■	■		
	■			
	■			
	■			

Figure 4. The scope of application of energy carriers by technical devices in L-FE. Source: own study.

The L-FE process structure is a set of supported processes, the primary purpose of which is to ensure the flow of goods from their suppliers to final recipients along with information. Taking into account the specificity of retail trade and adopting the criterion of the importance of the processes being implemented, two groups of them should be indicated, i.e.

- main (sales) proces,
- supporting processes, i.e. supply of goods (including evaluation and supplier selection), storage and logistic customer service.

4. Development of assumptions for the implementation of the procedure

At L-FE, the main objective of the procedure for the evaluation and selection of the supplier of energy carriers is the conduct of the procedure by the company. The implementation of the goal will allow to select the appropriate fuel and energy supplier, taking into account both the size and structure of the reported fuel and energy needs as well as financial, technical, human resources, as well as administrative, legal, economic and technical conditions.

The essence of the procedure is suitable for answering the following questions:

- What is the size of the current needs reported by the company for fuels and energy and what are the possibilities of obtaining them?
- Who is the supplier of fuels and energy on the domestic market and what are the purchase conditions there?
- What criteria should be applied in the enterprise in the assessment of fuel and energy suppliers?
- Which of the fuel and energy suppliers on the domestic market is best suited to the reported needs and capabilities of the enterprise?

Taking into account the above goal and organization of the examined enterprise, it was assumed that the evaluation and selection of the supplier of energy carriers would be carried out with the use of the scoring method. Its course will take place in the following stages, i.e.:

1. Determination of the size and structure of fuel and energy consumption.
2. Identification and characteristics of the domestic fuel and energy market.
3. Development of assumptions for the evaluation and selection of the supplier.
4. Identification of the conditions of purchase of fuels and energy.
5. Assessment and selection of the supplier of energy carriers.

For the purposes of the procedure, documents have been divided into two groups, i.e. entry documents and exit documents.

Entry documents are existing documents, the so-called secondary sources, in or around the enterprise.

The exit documents are prepared forms with a strictly defined purpose and structure, filled in and approved by an indicated person. They are assigned to a specific task, support their course or constitute a confirmation of their performance.

The diagram of the procedure implementation along with the documentation is presented in Figure 5.

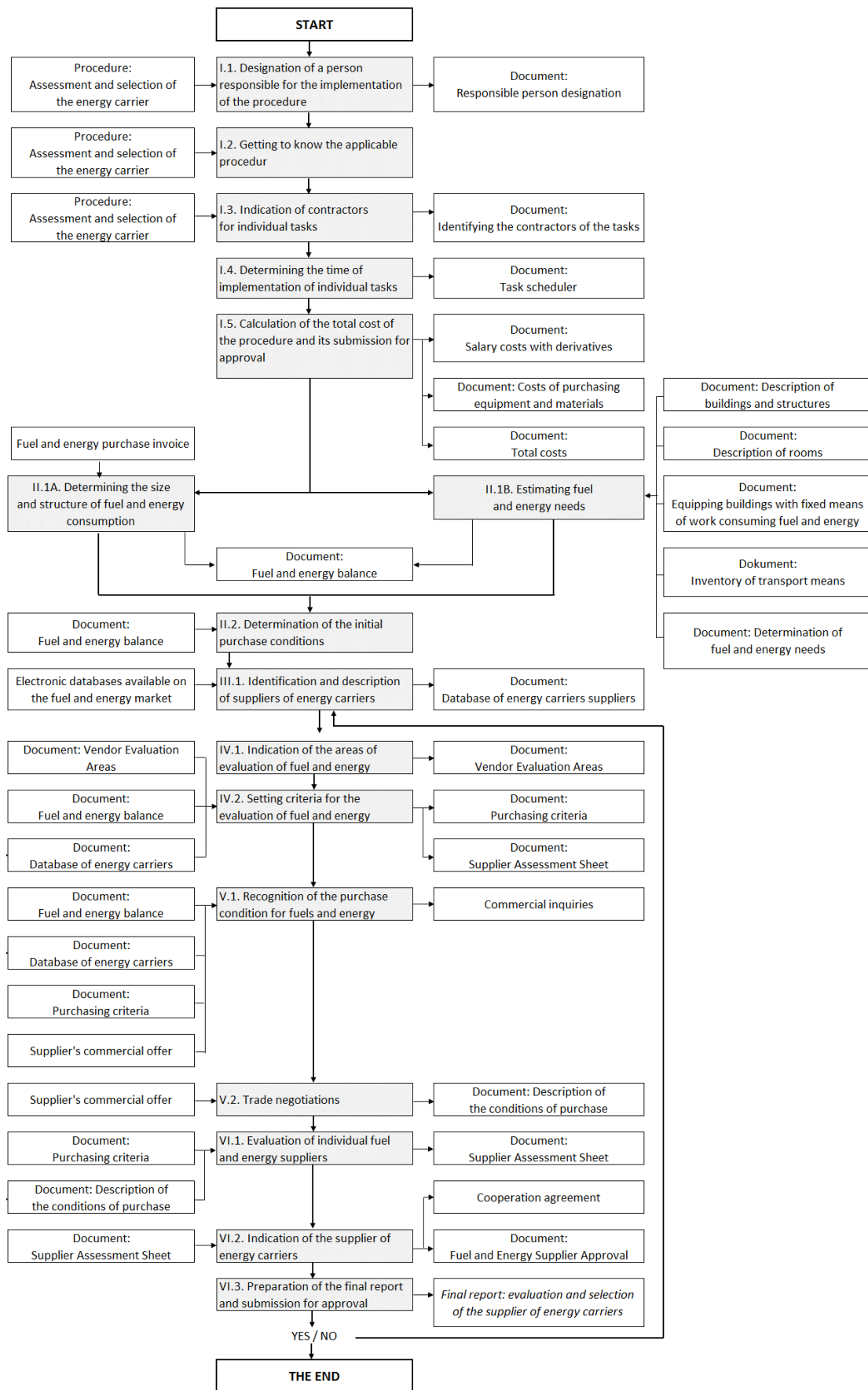


Figure 5. Map of the process of assessing and selecting a supplier of energy carriers in L-FE. Source: own study.

As part of individual stages and tasks, four detailed methods of proceeding were indicated, i.e. document analysis, expert method, direct interview and evaluation using indicators. The methods adopted with the division into individual tasks are presented in Table 2.

Table 2.

Methods of implementing the procedure for the evaluation and selection of the supplier of energy carriers in large-format stores

Stage	I					II			III	IV		V		VI		
Task	1	2	3	4	5	1A	1B	2	1	1	2	1	2	1	2	3
Document analysis		■			■	■			■							■
Expert method	■		■	■			■	■		■	■					■
Direct interview						■						■	■			
Assessment with indicators														■		

Source: own study.

Three groups of employees were designated to conduct the procedure, i.e. .:

- Director, responsible for launching the procedure and approving the final results obtained.
- Manager, responsible for the overall course of the procedure.
- Contractor, person carrying out the indicated stage and (or) task.

The detailed scope of their duties is presented in Table 3.

Table 3.

Responsibilities of individual groups of employees, the procedure of evaluation and selection of energy suppliers in L-FE

Position	Description
Director	<ul style="list-style-type: none"> - getting acquainted with the applicable procedure in the enterprise - indication of the person responsible for the implementation of the procedure - acceptance of the cumulative costs of implementing the procedure and the final results of the final report - managing the work of staff - providing certain means of work necessary to perform the indicated activities
Manager	<ul style="list-style-type: none"> - getting acquainted with the applicable procedure in the enterprise - indication of the performers of individual stages and (or) tasks - developing a schedule for the implementation of tasks - calculation of the total costs of the procedure and its submission for approval - providing certain means of work necessary to perform the indicated activities - managing the work of staff - indication of the supplier of energy carriers - preparation of the final report and submission for approval
Task performer	<ul style="list-style-type: none"> - carrying out the indicated tasks and informing the manager about their progress on an ongoing basis - proper use, protection and control of the entrusted means of work - reporting material needs

Source: own study.

Taking into account the subject, purpose and stages of the procedure as well as the organization of the L-FE, the following areas of evaluation of the supplier of energy carriers were indicated:

- economic and financial, i.e. price, access costs and payment terms,
- organizational and technical, i.e. readiness, flexibility and effectiveness of the service,
- safety, i.e. product and service quality and supplier reliability.

The indicated areas need to be defined by specifying the purchase parameters, their measurement units, weight and the method of evaluation. An exemplary assessment is presented in Table 4.

Table 4.

An exemplary evaluation of the purchase of fuels and energy together with their evaluation

Assessment area	Parameters	J.m.	Scales	Scoring			
				0	1	2	3
Economic and financial	Unit price	PLN/liter	0,5	below the average of the assessed vendors	0-5% of the average of the evaluated suppliers	6-10% of the average of the suppliers assessed	over 10% of the average of the suppliers assessed
	Payment deadline	day	0,2	when you buy	1-7	8-14	over 14
Organizational and technical	Electronic platform and there is functionality	–	0,1	not available	available, satisfactory, partially meets the requirements	available, good grade, meets basic requirements	available, grade very good, meets all the requirements
Security	Previous experience in cooperation	–	0,2	lack of cooperation or unsatisfactory, the supplier does not comply with the terms of the contract	satisfactory, the supplier partially complies with the terms of the contract	good grade, supplier meets the basic requirements	very good grade, the supplier meets all the requirements

Source: own study.

5. Conclusions

It should be emphasized that the proposed solution contains practical guidelines enabling the conduct of the procedure for the evaluation and selection of the supplier of energy carriers. The adopted scheme of conduct and the method of its application in a commercial unit creates the possibility of transferring the developed solutions to other economic systems.

The implemented process must have the following features, i.e.:

- adequacy, adequately reflecting the real state, must be resistant to manipulation and distortion of the result,
- topicality, the results obtained are up-to-date, and thus guarantee the usefulness of the assessment,
- comparability, the obtained results can be compared and compared with other results,
- understandable, the results obtained must be clearly understandable for all users,
- completeness, the assigned assessment applies to the entire fuel and energy system,
- costs and benefits, i.e. to guarantee appropriate relations between entering the system and its output, otherwise the selection made must provide tangible benefits.

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IMPROVING THE ECO-EFFICIENCY OF MANUFACTURING PROCESSES WITH THE USE OF INDUSTRY 4.0 TECHNOLOGIES IN THE CIRCULAR ECONOMY

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Purpose: The aim of the article is to analyze the implementation of the Industry 4.0 technologies to improve eco-efficiency of manufacturing processes from the perspective of the development of innovative IT technologies in the circular economy.

Design/methodology/approach: The research methods used in the article were desk research analysis of available source data on the functioning of Industry 4.0 technologies. Additionally, the author bases on the institutional and legal method. Analysis of selected documents and existing studies have allowed to obtain answers to the research questions and to describe the eco-efficiency of manufacturing processes.

Findings: The Industry 4.0 technologies in the circular economy can contribute to improve the eco-efficiency of manufacturing processes. However, there are still some difficulties in creating the fully efficient processes in the circular economy.

Research limitations/implications: The main limitation in carrying out the research is the difficult access to data about the quantity and quality of the eco-efficiency of manufacturing processes improving by the Industry 4.0 technologies.

Practical implications: The results of analysis and the conclusions in this article can be used by managers of the different types of companies involved in the circular economy. The research impact upon the enterprise concentrating on the raising awareness of the benefits of using wide range of the Industry 4.0 technologies for improving the eco-efficiency of manufacturing processes.

Originality/value: This article describes the benefits that can be obtained from the implementation of the Industry 4.0 technologies in the circular economy. The research issues related to development of the circular economy constitute a new area of research. The newly developed focus on improving eco-efficiency of the manufacturing processes by using the innovative IT technologies in the circular economy. The eco-efficiency of the manufacturing processes in the circular economy, examined from the point of view of the use of Industry 4.0 technologies, is an innovative research approach.

Keywords: Eco-Efficiency, manufacturing processes, IT technologies, Industry 4.0, circular economy.

Category of the paper: Viewpoint.

1. Introduction

The basic assumptions of the circular economy are based on the reduction of excessive consumption of resources, while increasing the efficiency of production processes and reuse of manufactured products. The main concern is not only about increasing the potential for recycling, but also about extending the value of circularity in the supply chain, translating into both refurbishing and repairing items, selling services instead of products, eco-design, and sharing economy (Kuzior, 2013). Implementing the principles of a circular economy requires the change in the perception of the mechanisms of manufacturing processes and using innovative IT technologies in order to increase their widely understood efficiency.

The definition of the circular economy was adopted by the Polish Council of Ministers in the *Roadmap for the transition to a circular economy* and is the concept that aims to keep the quantity of products, materials and raw materials in circulation for as long as possible and to minimize waste generation, applying management methods according to the waste hierarchy (Mapa drogowa, 2019).

2. IT technologies in Industry 4.0

The introduction of IT technologies in Industry 4.0 is based on innovation in the use of information and communication technologies (ICT – Information and Communication Technologies). The use of modern IT technologies combined with the skills and experience of the employees enables the development and implementation of effective models to control the production process (Kiełtyka, 2017).

Industry 4.0 is a concept currently being implemented for the production sectors, based on the use of innovative IT-supported tools. The focal points of Industry 4.0 are: Robotization and Automation, Digitization of Manual Processes, Telepresence, Machine Learning, IoT, Communication between Machines, 3D Printing as Additive Manufacturing, Image Recognition, Autonomous Vehicles, Mobile Devices, Intelligent Sensors, Virtual and Augmented Reality, Cloud Solutions, Cybersecurity Security.

There are different approaches to the definition of Industry 4.0. Hermann (Hermann, 2016) defines Industry 4.0 as a collective term for technologies for organizing the value chain, while Industry 4.0 components are categorized as Internet of Things, Cyber Physical Systems, Internet of Services and Smart Factory. Posada (Posada, 2015) gives a comprehensive overview of new technologies and explains that visual processing can be seen as a key element of Industry 4.0. Another researcher Sommer (Sommer, 2015) believes it is important to raise awareness of Industry 4.0 and its dimensions in order to increase the competitiveness of

companies. Yin and Kaynak (Yin, 2015) believe that intelligent systems and the data they generate play an important role in business efficiency, cost efficiency, quality and error-free processes.

It's worth mentioning that another scientist Yang with his colleagues analyze the challenges and opportunities for smart solutions in the regeneration sector. These challenges include lack of standardization, life cycle design and limited information exchange. Capabilities include increased efficiency and reliability of remanufacturing processes through Industry 4.0 'smart factories', as well as technologies such as additive and hybrid manufacturing, 3D scanning, Automated Transport Systems (ATS) and AR to lower costs and improve the quality of remanufactured products (Yang, 2018).

Kerin and Pham state that technologies such as the Internet of Things (IoT), additive manufacturing, collaborative robots (cobots), virtual/augmented reality (VR/AR), and data carrier technologies such as RFID are promising for the remanufacturing sector, because the operations in this sector still consist mainly of manual processes (Kerin, 2019).

For the efficient implementation of IT technologies in Industry 4.0 it seems necessary to use calculation algorithms and to visualize the manufacturing process accordingly, as well as to design a system for capturing and processing the information obtained. This is helpful in designing a sustainable business (Kuzior, 2019).

The use of IT technologies in the area of Industry 4.0 leads to many positive utility effects, including:

- the possibility of dynamic evaluation of quantitative indicators of the production process,
- the online access to data from the production process and remote management of production,
- the calculation and determination of the parameters of the production process: maximum and minimum values for predictors, changes in the quantity of predictors, changes in the number of simulants or destimulants forming a set of predictors, changes in the eco-indicator values, changes in the weights used in mathematical models,
- the collection of data on technologies in a relational database and dissemination via the Internet,
- searching the database on the basis of custom queries,
- the preparation of reports with the results of multidimensional data analyses, the results of database browsers or calculated evaluations of the eco-efficiency of the process.

3. Improving the eco-efficiency of manufacturing sectors

The implementation of Industry 4.0 technologies can be seen as another industrial revolution, making an important contribution to the ecological effects and increasing the eco-efficiency in most manufacturing sectors.

The Eco-efficiency (EE) can be defined as an approach to managing the manufacturing process and the provision of services at competitive prices, tailored to the needs of the customers and improving their quality of life, reducing the impact on the environment throughout the life cycle of a product or service (Asem-Hiablie, 2019; Basset-Mens, 2009; Burchart-Korol, 2016; Kuzior, 2014).

Manufacturing competitively priced goods and services, while reducing environmental impacts and maintaining consumption of natural resources at a level commensurate with the Earth's capabilities, is an undeniable challenge for the economy of every country (Berkel, 2007).

It can be said that eco-efficiency is a prerequisite for competitiveness, since only innovative companies can exist on the market that are responsible to the environmental society. The benefits of improving eco-efficiency include (Kleibera, 2011):

- energy savings,
- savings in raw materials,
- reducing the amount of waste,
- improving product quality,
- simplification of processes,
- improving the health safety of workers,
- improving the image of the company,
- increasing production capacity,
- savings in environmental fees,
- increasing competitiveness thanks to the new and improved technologies, products and services,
- reducing the risk of legal sanctions related to environmental compliance.

Business managers should regularly conduct the eco-efficiency analyses to reduce material consumption, to reduce waste and emissions, to achieve material savings, reduce pollution by reducing production costs and increase competitiveness (Ekins, 2005). In addition, the organic production of "green" products provides the marketing advantages and the greater consumer acceptance. The benefits of implementing and analyzing eco-efficiency are also the increased morale of employees, the increased attractiveness for investors, the greater acceptance of the local population and the self-esteem of managers.

4. Efficiency of the manufacturing processes

When analyzing the economic potential of a company, the efficiency of production processes is crucial, i.e. an orderly set of activities aimed at the production of a particular product. Analysis of the effectiveness of the production process should focus on all technological phases, like preparatory, manufacturing and final phases, as well as operations carried out, broken down by technological, control, transport and storage. This approach applies to all types of production: single series, series (small, medium and large series) and mass production. It should be emphasized that the use of innovative IT tools in highly mechanized production with a high degree of automation of the production workstations is particularly useful.

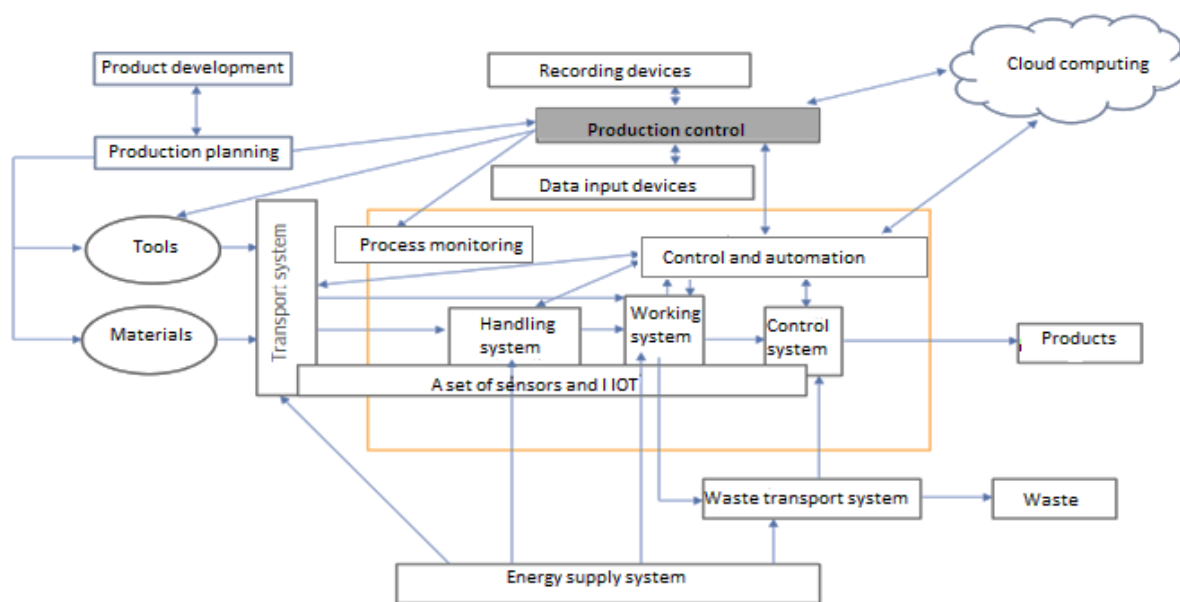


Figure 1. Manufacturing process with IT tools of Industry 4.0. Author's own elaboration.

One of the most objective and at the same time most universal indicators for assessing the efficiency of manufacturing processes and the level of use of production facilities is the OEE indicator (Overall Equipment Efficiency). This indicator can be calculated and interpreted in different ways. The quality of the data obtained in the performance analysis is decisive for its calculation. IT solutions in the area of Industry 4.0 can help in this respect.

It should be emphasised that this indicator reflects the functionality of the equipment, i.e. the machine, the plant assembly or the production line, but not the employees who use the equipment during the manufacturing process. This indicator is a key indicator for improving the production process using the Total Productive Maintenance (TPM) method. OEE requires comparing the current condition of the equipment with the ideal situation used as a reference.

This indicator is expressed in % and the maximum value it could reach is 100. If the OEE is 100%, the production plants are constantly in motion (without interruptions/stops) and work at constant speed (without any slowing down of the process) and generate only products that

fully meet the customer's needs (assumption of 100% quality). Such an ideal condition obviously does not exist, but it is a benchmark for verifying the actual condition of the plants and the entire production line.

The OEE index reflects the availability, efficiency and quality of the production facilities. The OEE can therefore be expressed as follows:

$$OEE = WS \times WW \times WJ \quad (1)$$

WS – The availability factor represents the degree of utilization of the time planned for production according to the following formula:

$$WS = \frac{\text{actual equipment working time}}{\text{projected equipment working time}} \quad (2)$$

WW – The productivity factor allows the verification of the speed of the production process, expressed as conformity with the given times of the production cycles.

$$WW = \frac{\text{min. cycle time} \times \text{number of units produced}}{\text{actual operating time of equipment}} \quad (3)$$

WJ – Quality factor represents the degree of conformity of the products with the needs of the customer, developed by the use of the existing equipment

$$WJ = \frac{\text{number of products according to customer request}}{\text{number of all products produced}} \quad (4)$$

The eco-efficiency index is used to measure progress towards cleaner production and sustainability. There are several definitions of the eco-efficiency index, of which the World Business Council for Sustainable Development definition is considered to be one of the most popular. According to this definition (Verfaillie, 2000), eco-efficiency is expressed as the ratio between the value of the product and the environmental impact caused by production.

$$\text{Eco - efficiency} = \frac{\text{product value}}{\text{environmental impact}} \quad (5)$$

Eco-efficiency indicators should be designed to (Huppel, 2005):

- address relevant parameters affecting the environment and human health,
- focus on measurable parameters,
- be clearly formulated, readable and verifiable,
- take into account the diversity of individual business activities,
- take into account the specifics of the company's operations,
- be traceable over time,
- provide resultant information to managers on what actions should be taken to improve efficiency,
- be understandable for all participants of the process.

IT tools used in industry allow the elimination of one of the biggest technical problems in the application of efficiency indicators, namely the large amount of work involved in collecting and processing data from the process in a dynamic system in order to ensure objective representation of the actual and complete impact of the process on the environment and human health. This allows the use of fewer simplifications in the model of the analysis of the eco-efficiency of the production process, and in the broader analysis of the impact of the product or service on the environment and human health.

However, the methodological problem for researchers remains the difficult comparability of the results of the eco-efficiency analysis for different production processes or products/services due to separate specificity, environment, detailed parameters.

5. Eco-efficiency in Circular Economy

Taking into account the requirement to carry out economic changes resulting from the need to reduce natural resources by introducing the concept of the Circular Economy, the use of tools to identify and improve the eco-efficiency of production processes seems to be even a necessity.

This direction is in line with the so-called EU Package for a Circular Economy consisting of the three Communications From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions (Kuzior, 2022):

- Towards a circular economy: A zero waste programme for Europe. COM(2014)398 final of 02.07.2014.
- Closing the loop – An EU action plan for the Circular Economy. COM(2015)614 final of 02.12.2015.
- Monitoring framework for the circular economy. COM(2018)0029 final of 16.01.2018.

The implementation of the circular economy model with the application of eco-efficiency solutions in production processes undoubtedly requires multilateral cooperation and involvement of many parties – both entrepreneurs and scientific entities, institutions of the educational system, non-governmental organizations, government bodies and also consumers.

The introduction of eco-efficiency solutions in a closed loop economy can be expected to bring multi-faceted benefits: economic, raw material, environmental and social (Report, 2016).

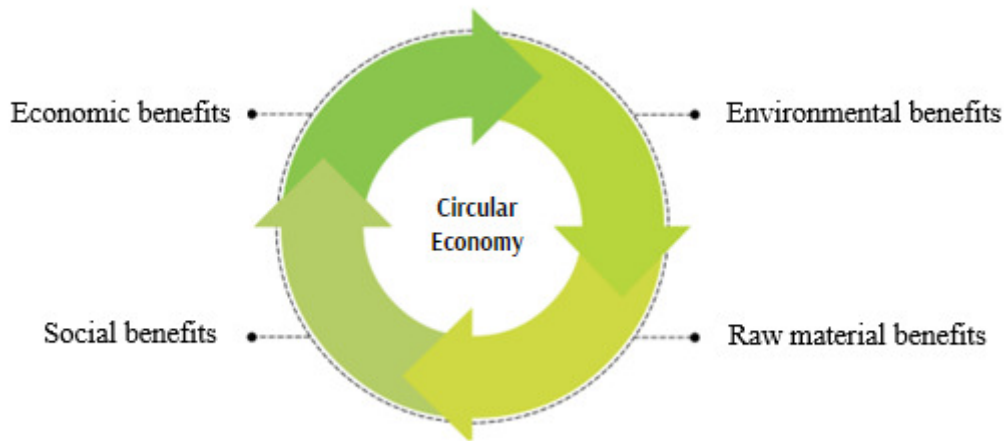


Figure 2. Benefits of Circular Economy. Adapted from: Report 2016.

Economic benefits

The essence of achieving economic benefits by applying the principles of the closed loop economy is to develop and use solutions in the production process that result in the generation of greater value, while minimizing production costs to produce products that meet consumer expectations.

Raw material benefits

With the aim of conserving natural resources, efficiency solutions contribute by design to ensure the production of high-quality products, the recovery of waste and the use of secondary raw materials.

Environmental benefits

At the core of the circular economy concept is the aim to minimize the negative impact of manufacturing on the environment and improve social welfare by making global production completely independent of resource and energy consumption. Among the objectives set by the European Commission for EU member states are: maximization of recycling of municipal waste, packaging waste with simultaneous minimization of the amount of landfilled waste and reduction of greenhouse gas emissions.

Social benefits

A wide range of social benefits based on sustainable consumption and "green" jobs are achieved through the use of the sharing economy, eco-design, reuse or recycling, among others.

6. Summary

Circular Economy, being an alternative to the traditional model of economy, includes a set of activities aimed at achieving economic, but above all ecological effects, like preventing waste of raw materials, extending the product life cycle, recovery of resources. The modern manufacturing companies increasingly use the innovative IT tools to increase the environmental

efficiency by integrating them with other production management methods in order to reduce the company's impact on the environment and increase economic performance.

Continuous improvement of products and technologies with the use of IT tools in the field of Industry 4.0 to achieve sustainable competitive advantage and improve the state of the natural environment. The feature of modern enterprise management systems is to focus on increasing the efficiency of workplaces and the entire production process, and thus to create an eco-innovative company that cares about the environment and most fully meets customer needs. Analysis of eco-efficiency in the company integrated with other methods of production management using IT tools serves to increase the level of innovation and implementation of clean technologies, contributing to sustainable development of the economy and respecting the principles of the idea of Corporate Social Responsibility (Kuzior 2022). Apart from economic rationality, ecological rationality and innovation prudence become important (Kuzior, 2019).

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THE INFLUENCE OF INNOVATIONS CO-FINANCED FROM THE EUROPEAN UNION FUNDS ON THE DEVELOPMENT OF HEALTH CARE INSTITUTIONS – A REGIONAL APPROACH

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Purpose: The article deals with the subject of innovation in theoretical and practical terms. The aim of the study was to determine the impact of innovations co-financed from EU funds on the development of the health care sector in the Łódź region.

Design/methodology/approach: The article is based on literature studies, the results of literary studies from empirical research and own research of the author. The aim was achieved by the use of CATI technique (*CATI – Computer Assisted Telephone Interview*).

Findings: Innovations in health care institutions are a necessary condition for overcoming the challenges of the contemporary environment. They contribute to the improvement of the quality of provided services, expansion of the examined entities (in terms of medical equipment and infrastructure) and increasing the level of accessibility to medical services.

Research limitations/implications: The primary limitation of the conducted research is the lack of possibility to generalize the results to the entire group of entities operating in Poland. The results may serve as an assessment of the current status regarding the functioning of health care institutions in the Łódź region.

Practical implications: The health level of a society is closely related to the level of economic development. A healthy, capable and long-living society is able to produce more goods and services, which has a direct impact on development, while a high level of development creates the possibility of allocating more resources to the health sector.

Originality/value: This article presents original empirical findings on the sources of funding, types and areas, and effects of innovation ventures in hospitals. The efforts to improve the understanding and implementation of innovation in hospitals are significantly hindered by the lack of solid scientific evidence. Therefore, a framework for further research has been created to confirm the urgent need for directions in the development of innovation in the health sector.

Category of the paper: Research paper.

1. Introduction

In a number of international rankings comparing health care systems, the Polish system takes one of the last places in the European Union. The document "Health at a Glance: Europe 2021", which is the result of continuous and close cooperation between the OECD and the European Commission to improve knowledge on health in individual countries and in the EU as a whole, within the framework of the Commission's cycle "State of Health in the EU", indicates that "the share of GDP dedicated to healthcare in Poland remains low, accounting for only 6.5% in 2020, and per capita funding for health is much lower than the EU average". And according to the "FutureProofing Healthcare" report, Poland was ranked only 25th in the Health Systems Sustainability Index among 28 EU countries. The COVID-19 pandemic has aggravated weaknesses in healthcare systems that existed prior to the outbreak. It has resulted in an increase in patients' health needs, while access to medical services has deteriorated. The current system is not patient-friendly, does not ensure the efficient use of public funds, and creates problems for the managers of health care institutions and the staff employed there. This suggests an urgent need for change in this sector.

The tendency to innovate is now recognised as one of the main attributes of economic competitiveness. According to Romer's new growth theory, technological progress is mainly the result of research and development activity of entities (Romer, 1990). The mentioned activity favours both the innovative activity of the organisation and the ability to incorporate innovations from outside. The innovation of the economy is primarily evidenced by the ability and motivation of organisations to continuously search for and use in practice new concepts, ideas and inventions, the improvement and development of existing technologies in the production and service sector, as well as the introduction of new solutions in management or the development of infrastructure. Numerous empirical studies validate the fact that the activity and level of innovation of organisations depends on both external factors related to the environmental impact (direct impact factors, sectoral factors) and internal factors (identifying resources, competences and motivation to undertake activity in the field of innovation) (NBP Report, 2016; Romanowska, 2016). While innovations can have an impact on improving patient care, it can also improve job satisfaction among medical staff. Research commissioned by the United Nations revealed that during a pandemic, access to health services worldwide decreased by 20% compared to pre-pandemic times (Lieberman, 2020).

The aim of the article is to determine the impact of innovations co-financed by the European Union on the development of health care institutions on the example of the Łódź region.

2. Teoretical background

The level of innovativeness of the health care system in Poland is still insufficient, and the reasons for that are varied. In international rankings comparing health care systems, the Polish system takes one of the last places in the European Union. Innovation may be one of the most important tools that can be used to develop the health system. This is due to the fact that through innovations occurs: improvement and modernization of procedures, increase of efficiency, capacity and quality of work, improvement of the form and value of goods and their competitiveness, development and increase of operating skills and work efficiency, elimination of restrictions and mobilization of resources, as well as improvement of working conditions (Ambler, 2004; Baruk, 2013; Pomykalski, 2013; Dąbrowska, 2018; Dejnaka, 2018). Most entities perceive innovation as something both new, which may include new applications of existing tools, and improved, that can simply signify a measurable advance over older alternatives (Matusiak, 2011; Czerniak, 2013; Kalowski, Wysocki, 2015; Sońta-Drączkowska, 2018; Głodek et al., 2018). According to a recent Deloitte research, only half of innovation efforts achieve the desired value, and organisations that are efficient in implementing innovation are characterised by unique features (Bechtel, Kark, Henry, 2021). An analysis of previous research indicates different funding models for innovation programmes, ranging from traditional top-down research and development allocations to bottom-up, immediate or project-based models (Bechtel, Kark, Henry, 2021).

Health care is a global priority, and as Eurostat demonstrates that while health care systems in European Union countries are organised and financed differently, their common goal is universal access to quality services that are accessible to both individuals and society (Eurostat, 2022). In 2015, the new 2030 Agenda for Sustainable Development was adopted, indicating up to 17 Sustainable Development Goals as directions for actions by the international community. Among the 17 goals, one of them concerns the area of health. Research results conducted so far indicate that the level of health of the society is closely related to the level of economic development. A healthy, capable of working and long-living society is able to produce more goods and services, which has a direct impact on development, while a high level of development creates an opportunity to transfer more funds to the health care sector. In 2004, upon joining the European Union, Poland obliged to adapt Polish policy, including health policy, to the provisions of the EU (Karski, 2005). Although health care has the smallest impact on health (10%), health care systems consume approximately 90% of all health care expenditures (Czupryna et al., 2001). Compared to other EU countries, the Polish health care system shows delays in the introduction of modern medical technologies, including the treatment of diseases, above all cancer and cardiovascular diseases. Poor organisation of the health care system does not ensure early detection of a disease. Only some providers, due to the scale of necessary investment outlays, are able to provide a wide range of both diagnostic and

therapeutic tests at the place of providing services. In addition, the scale of financing the health needs, expressed as a percentage of the health system expenditures to GDP, is low in comparison to other European countries. This leads to an insufficient supply of health services in comparison with the justified health needs of the society. The basic objective of the health care system ought to be achieving the maximum health outcome with the effective use of the available resources, which will translate into the prolongation of life in good health of the entire society. Achieving this objective will contribute to the improvement of the quality and availability of services, improve the effects of treatment and result in the increase of patients' satisfaction.

A necessary condition for an effective reform of the system is access to external sources of funding, which can be EU funds. EU funds not only contribute to the achievement of the European Union's development goals and improvement of financing in the area of innovation, but also support the creation of an innovative and competitive health care sector. According to the Europe 2020 Strategy, economic growth is achieved through more effective actions towards innovation. Such an assessment is also presented in the "Innovation Union" initiative – a flagship project implemented under the abovementioned strategy (EC, 2020). This means that efforts to create innovation-friendly ecosystems should be intensified. In 2014-2020, 30% of all funds were allocated to innovation development. The National Smart Specialisations (Krajowe Inteligentne Specjalizacje), which unlocked the innovation potential of European Union regions, contributed to this as well. In the analysed programme period, health innovation was dispersed among many projects requiring coordination of efforts to ensure and monitor their contribution to the health policy objectives contained in the National Strategic Framework – Policy paper for health care 2014-2020 (Ministry of Health, 2015). Innovation in the health sector continues to be an important issue in the next 2021-2027 programme period, where EU innovation priorities are expected to be achieved with a budget of almost €3 billion, an increase of almost €600 million compared to the previous funding period (Większy budżet na innowacje, 2021). However, despite many EU-funded projects in health, regions still differ in the accessibility of services, similar to how basic health indicators vary.

3. Material and methods

The research on the evaluation of the impact of the implementation of innovative projects co-financed by the European Union on the development of the healthcare sector was carried out in 2020 using the technique of computer assisted telephone interviews (CATI). The research was carried out on a sample of N = 45 hospitals operating in the Łódź region. The research scope included inpatient healthcare entities (Table 1 and Table 2), differentiated according to the organisational subordination of the service provider (e.g., the Ministry of Health, Medical

University, Ministry of the Interior and Administration, local government entities – provinces, districts or municipalities, etc.). Entities selected for the research were the beneficiaries of programmes co-financed by EU funds in the years 2014-2020. This selection criterion was intended to ensure the possibility of reaching out to inpatient treatment facilities involved in innovative processes. In view of the above, as well as with a view to obtain from hospitals reliable information and data characterising innovative activities, interviews were conducted with representatives of management staff involved in the implementation of innovative projects.

Table 1.

Number and structure of hospitals surveyed by owning authority

Owning authority	Number of hospitals where research was carried out	%
Ministry of Health, Ministry of the Interior and Administration	3	6,67%
Medical University	7	15,56%
Provincial-level local government	16	35,55%
District- and municipal-level local government	19	42,22%
TOTAL	45	100%

Source: author's own research.

Table 2.

Number and structure of hospitals surveyed by type of activity. Source: author's own research

Type of hospital activity	Number of hospitals where research was carried out	%
Mono-specialist	4	8,88%
Multi-specialist	41	91,12%
TOTAL	45	100%

4. Results and discussion

In the context of innovation implementation in inpatient healthcare institutions in Łódź region, it is worth emphasising that the initiators of innovation processes were mainly hospital managers, although local self-government authorities as founding authorities of hospitals also had a marginal share in inspiring such activities.

The entities indicated the Regional Operational Programme of Łódzkie Voivodship as the dominant source of financing regarding this area (68.6% of indications). This programme influenced the improvement of research and development facilities supporting innovative activities of healthcare entities, contributing to investments in the infrastructure of functioning of medical institutions and support for innovative medical services. Healthcare institutions also benefited from financing available under national programmes. 14.3% of hospitals benefited from the Knowledge, Education, Development Programme, and 11.4% from the Infrastructure and Environment Programme. The least reported source of funding for inpatient institutions

was the Accessibility Plus for Health Programme (5.7%). The low use of funds from the Accessibility Plus for Health Programme may be due to insufficient outreach to the programme's target groups. Moreover, the measures provided in the Accessibility Plus for Health Programme were also implemented under other programmes (Figure 1).

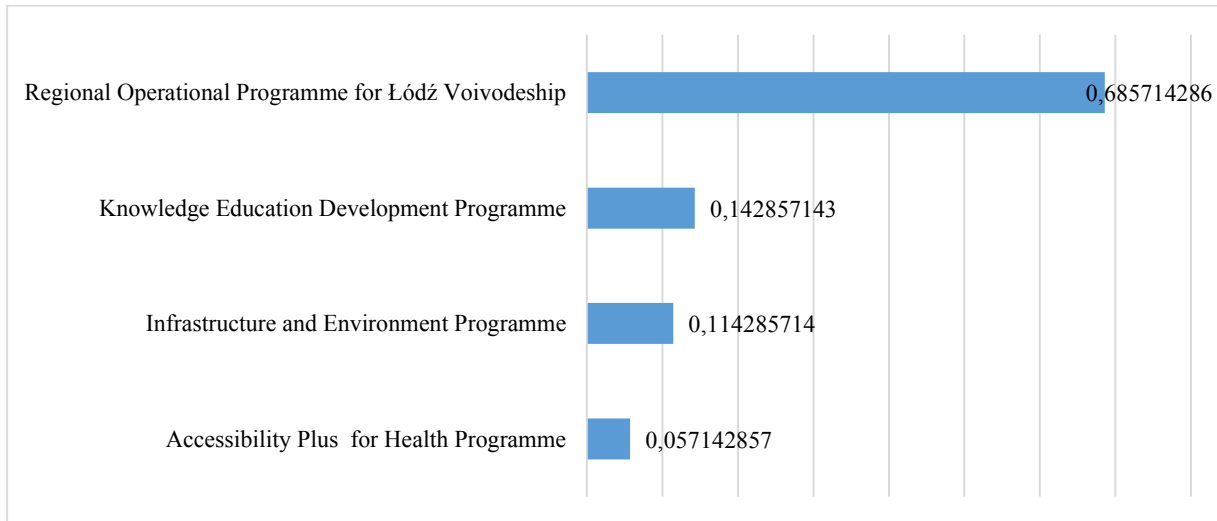


Figure 1. Sources of funding for innovative activities of inpatient healthcare institutions in the Łódź region in the years 2014-2020. Source: author's own research.

The answer to such a motivated approach to innovative activities is the nature of the implemented innovations described by their type.

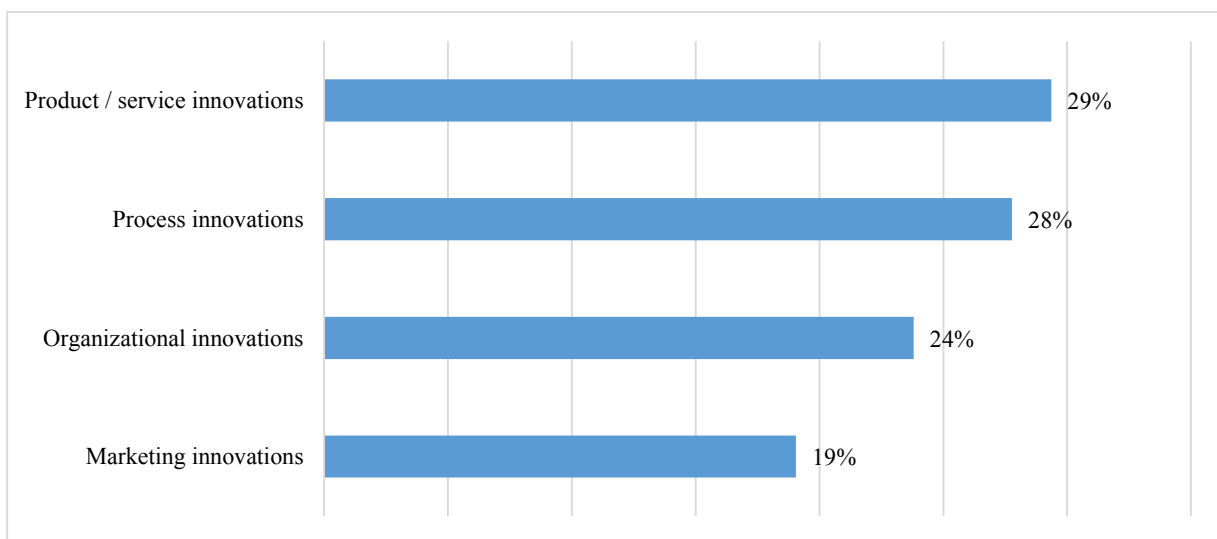


Figure 2. Types of innovations implemented in inpatient healthcare institutions in Łódź region in the years 2014-2020. Source: author's own research.

The conducted research indicates that the most frequently implemented innovations were broadly understood product/service or process improvements (Figure 2). They constituted almost 30% and 28% respectively. Organizational innovations also constituted a relatively large percentage of answers (nearly 24% of indications). Marketing innovations were selected by 19% of entities.

More detailed information on the type of innovation is presented in the table indicating the areas of activities included in particular categories (Figure 3). Among product and service innovations, investments in modern medical equipment for diagnostics, treatment and emergency services are predominant (39.3%).

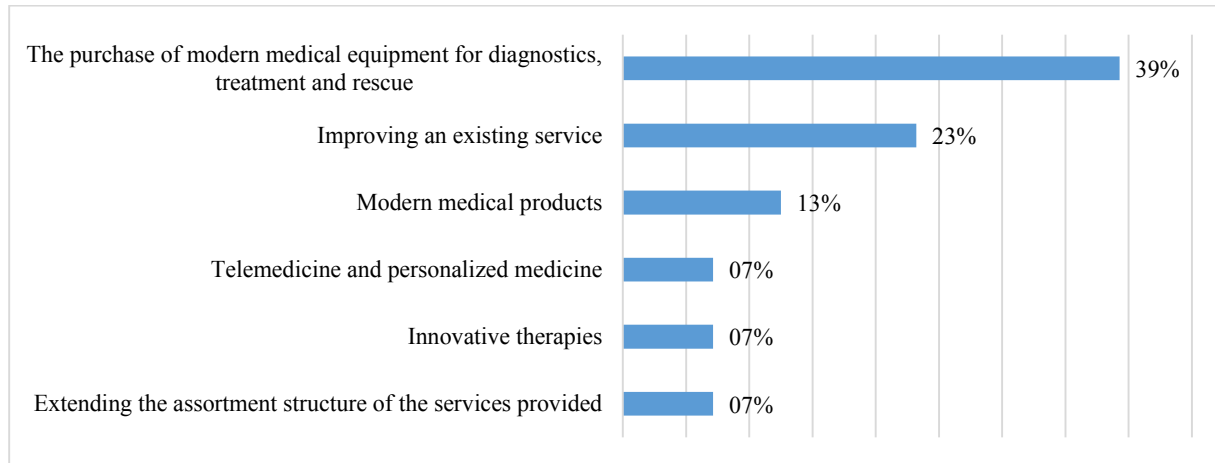


Figure 3. Areas of implementation of product/service innovations in inpatient treatment institutions from Łódź region in the years 2014-2020. Source: author's own research.

Therefore, it is possible to discuss the development of hospitals' services on the basis of technology acquired through projects, which was not previously present in the equipment of a given institution, or was outdated or insufficient in number. Some projects also involved the improvement of already existing services (23.2%). Hospitals focus either on obtaining existing technologies (modern medical equipment) from the external sources and using them for their own needs, or on developing and improving the services already provided in the hospital. It is worth emphasising that only one in five hospitals invested in the purchase of modern medical devices under projects financed from EU funds, which may be conditioned, among other things, by procedural and legal issues related to the lack of a clear and orderly procedure for including new technologies in the guaranteed range of benefits.

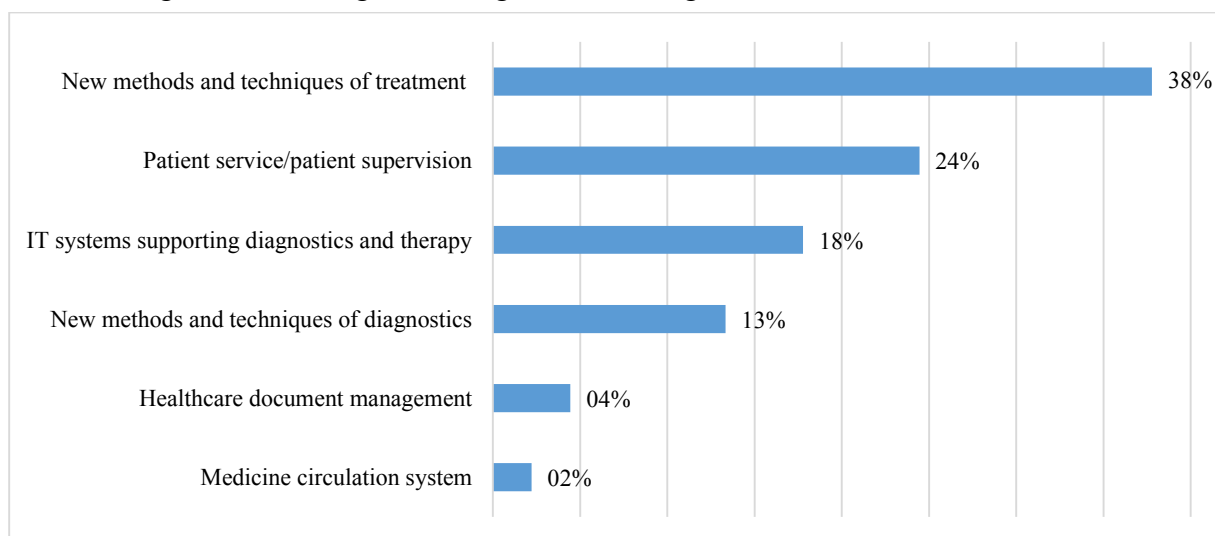


Figure 4. Areas of implementation of process innovation in inpatient healthcare institutions in Łódź region in the years 2014-2020. Source: author's own research.

In the case of the relatively most frequently indicated process innovations (Figure 4), approximately 38% are new methods and techniques of treatment, while about one third of the cases are activities leading to improvements in the process of patient service/supervision. A significant group also includes activities in the field of diagnostics in the broad sense. These are both new diagnostic methods and techniques, as well as improvements in diagnosis and therapy using IT systems. Many hospitals indicated the implementation of e-services as an innovation which improved the accessibility, quality and effectiveness of healthcare services provided and enabled integration with other IT systems. The outbreak of the coronavirus has increased the demand for electronic and online services. One of the examples – Electronic Platform for Collection, Analysis and Sharing of digital Medical Records, or P1 Project (Elektroniczna Platforma Gromadzenia, Analizy i Udostępniania zasobów cyfrowych o Zdarzeniach Medycznych; Projekt P1) – is the implementation of IT systems aimed at streamlining processes related to the planning and delivery of healthcare services, monitoring and reporting on their implementation, access to information on provided services and publishing information in the area of healthcare. The launch of subsequent public services within the P1 Project is a continuation of a long-term perspective of expanding access to public services provided via electronic means.

Based on emerging technology, it can be certain that digital transformation – enabled by radically interoperable data, artificial intelligence (AI) and open, secure platforms – will fuel much of the change in healthcare. In contrast to the current state, it is conceivable that care will be organised around the patient (consumer) rather than around the institutions that run the existing healthcare system. While it is unclear exactly how the future will unfold, one can look at the signals in the market and the forces of change in other industries to begin to paint a picture of the future of health. The future of health should focus on wellbeing and prevention rather than cure. Diseases cannot be expected to be completely eradicated, but the use of actionable health information – based on interoperable data and artificial intelligence – can help identify disease early, enable proactive intervention and improve understanding of disease progression. This can reduce health care expenditure. Technology could also aid in breaking down barriers, such as cost and location, that can limit access to healthcare professionals and specialists.

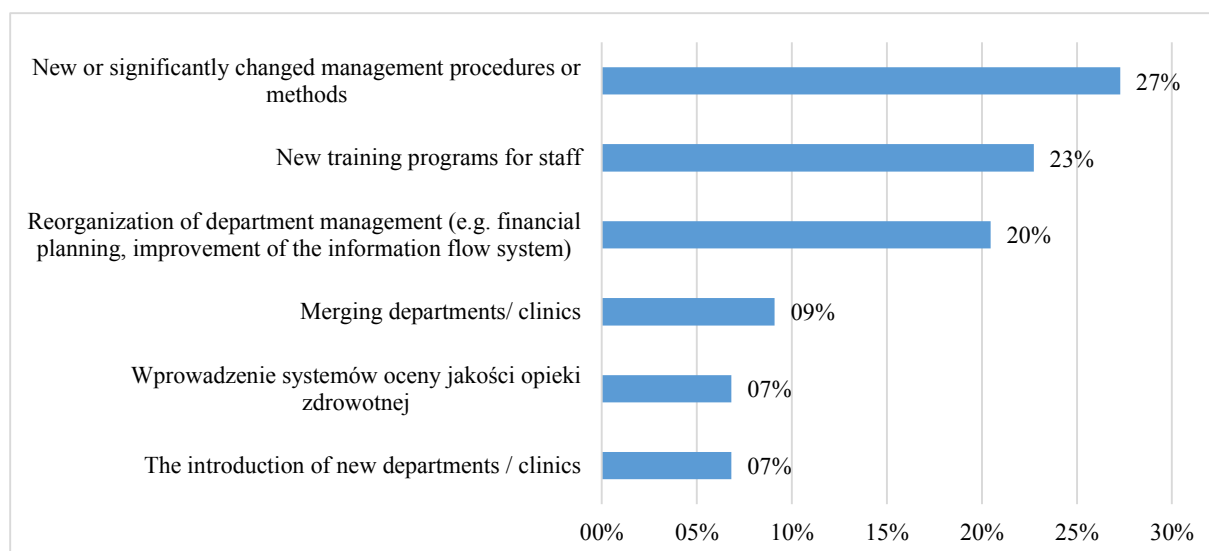


Figure 5. Areas of implementation of organisational innovations in inpatient healthcare institutions in Łódź region in the years 2014-2020. Source: author's own research.

In the area of implementation of organisational innovations in inpatient healthcare institutions in Łódź region in the period 2014-2020, the focus of hospital activities was primarily on changes in procedures or management methods (27.3%), reorganisation of ward management (20.5%) and merging (9.1%) and introduction of new wards and clinics (6.8%), such as e.g., Rapid Diagnostic Unit, Vascular Surgery Unit (figure 5). In addition, investments were made in improving staff qualifications through staff participation in new training programmes (22.7%). Training at this level was intended to initiate change in inpatient healthcare entities and prepare staff to implement innovations. Their main aim was to stimulate cooperation, exchange of experiences, combining skills to achieve a common goal, inspire good practices and awaken a sense of responsibility for implementing innovations.

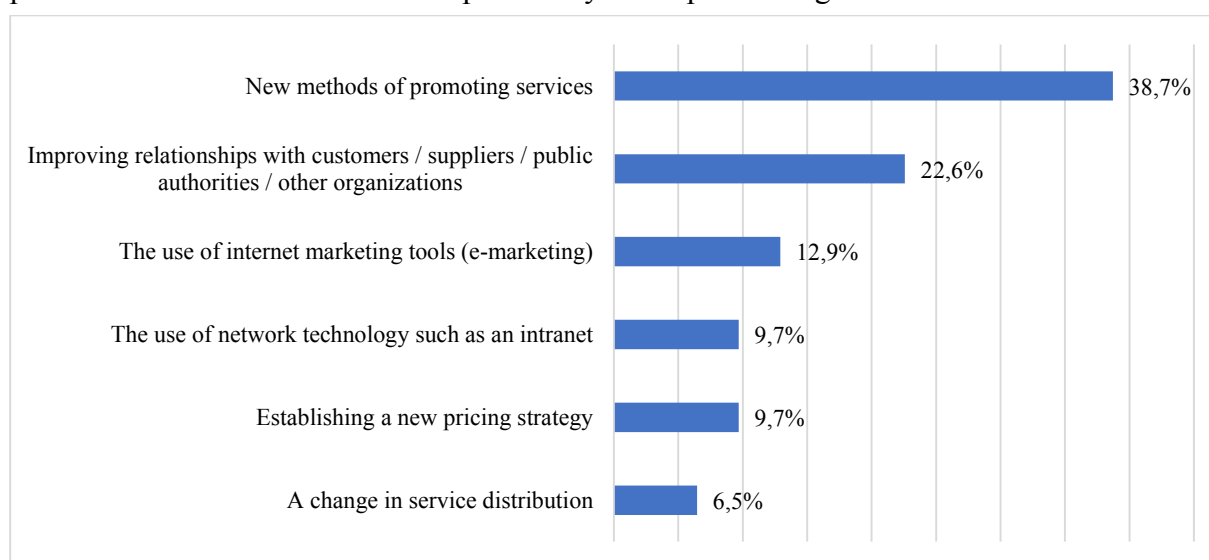


Figure 6. Areas of implementation of marketing innovations in inpatient healthcare institutions in Łódź region in the years 2014-2020. Source: author's own research.

Finally, in the marketing area, the primary focus was on new methods of promoting medical services (38.7%), as well as on improving relations with customers and cooperating entities (22.6%). The use of e-marketing tools defined as strategies and actions supporting the sale of services, products and creating a positive image of a given entity on the Internet was also indicated by the respondents (Figure 6). E-marketing is becoming more and more common due to the constant development of the Internet, technology, through the progress in digitalisation of society and the increasing presence of organisations and potential customers on the Internet.

While the areas of introducing product and process innovations are directly related to the quality and cost aspects of provided medical services, organisational and marketing innovations concern areas other than medical services and are mainly related to improving and enhancing hospital management. The impact of innovations in the context of their content may concern various functional areas of health care institutions. Product and process innovations directly influence the level of basic activities of entities connected with providing medical services. Organisational innovations concern improved methods of organisation and management of health care institutions, while marketing innovations concentrate their attention primarily on the operational level of the institutions' activities regarding new methods of promoting medical services and improving relations with the environment in which the studied entities operate.

The processes of innovation implementation were not without barriers. The presence of barriers in the implementation of innovations was reported by 88% of the institutions participating in the research. The main difficulties were related to the high costs of implementing innovations and the related lack of financial resources. Applying for EU funding itself is, in a sense, a response to this type of barrier. Another critical area related to the implementation of innovations is the issue of cooperation in terms of innovative activities.

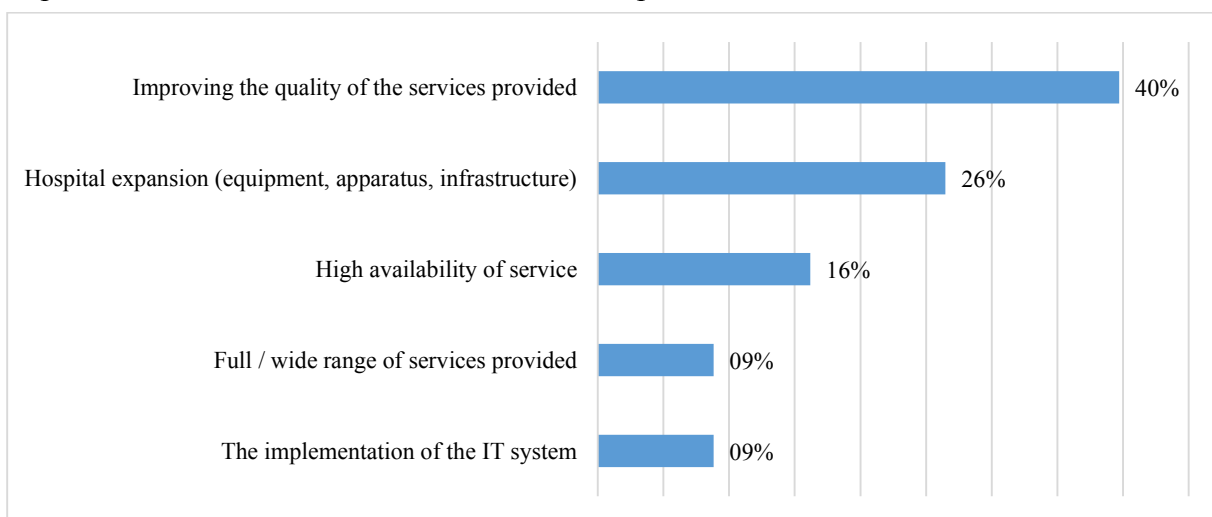


Figure 7. Effects of innovations implemented in inpatient healthcare institutions in Łódź region in the years 2014-2020. Source: author's own research.

The effects of innovations implemented by hospitals include especially improvement in the quality of medical services provided by hospitals (39.7%), expansion of the examined entities in terms of medical equipment and infrastructure (26.5%) and increase in the level of accessibility to medical services (16.2%) (Figure 7). The improvement of the quality of services provided, together with a desire to invest in medical equipment or apparatus, presumably provides opportunities to develop the range of services provided. This results in improved quality of life, more efficient treatment of diseases and their prevention. An important effect reported by respondents is also improvement in the area of operational capabilities related to work efficiency, comprehensive range of services provided and IT systems.

5. Conclusions

Implementation of innovations, as any investment consuming the organization's own resources, is aimed at achieving certain effects both for health care entities, as well as employees, patients, and the entire system. Improved quality, increased efficiency of provided services or reduction in labour costs are some of the effects that can be assumed for the innovative activities of entities.

As the above research suggests, the implementation of innovations in inpatient healthcare institutions in the Łódź region is targeted both at improving health results and the quality of provided services, as well as enhancing the functioning of the entities. This translates into benefits for the entire healthcare system.

The economic and social challenges related to COVID-19 pandemic have led to an acceleration of innovation implementation. The pandemic has aggravated health system weaknesses that existed prior to the outbreak and highlighted the need to recognise health system resilience as an equally important dimension of health system performance along with accessibility, quality of care and efficiency. The research demonstrates an increase in the digitalisation of the system. The COVID-19 pandemic influenced the further development of e-health. Due to the recent developments, nowadays it is possible to use e-referrals, e-referrals or e-prescriptions. The circumstances in which the whole world currently stands are difficult, however, it is also worth noting that they make it possible to accelerate the desired changes in healthcare. Digital solutions and technological innovations have supported the fight against coronavirus and, in the reality of an overburdened health service, have come into widespread use almost overnight.

The implementation of innovations in the health care system is determined greatly by the influence of the environment and the entities operating in it. The fact that hospitals from the Łódź region have implemented innovations so far does not rule out the existence of such plans for the future, which is confirmed by the results of the conducted research. This indicates that

the importance of innovative activities for the development of hospitals is recognised, but it might also be an effect of a step-by-step approach to financing innovations under subsequent projects. Incremental innovations dominate in hospital plans, as the institutions intend to focus mainly on the development of already existing technologies and provided services.

Innovations in healthcare lead to the reconstruction of the healthcare system in order to make it more transparent, provide better satisfaction of patients' health needs, and be financed more efficiently while ensuring the optimal use of resources.

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ORGANIZATIONAL CULTURE – ASIAN CONCEPTS OF KAIZEN, GONGFU AND XIUSHEN

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Purpose: The aim of the article is to present the organizational method of kaizen and Chinese concepts related to self-development – gongfu i xiushen, which are typical of Asian countries.

Design/methodology/approach: The method of desk research was used in the study. Kaizen, gongfu, and xiushen derive from the major premises and values of the organizational cultures in Japanese and Chinese companies. They are becoming more and more popular in Europe and the USA. They are essential in managing change as they can develop key values necessary for organizational improvement and support the implementation of organizational change strategies. Therefore, they increase companies' innovation on the market. The article presents a brief description of the organizational culture and the essence of the concepts of *kaizen*, *gongfu* and *xiushen*. It also presents a comparison of these approaches in terms of the cultural conditions of the Japanese and Chinese economies.

Findings: In the context of management science, in the literature, there is a lot of information on the Japanese concept of kaizen and very little of gongfu and xiushen. Although all of the concepts developed in Asia and are related to improvement, they differ from each other.

Practical implications: The possibility of a future increase in the attention of non-Asian managers on Chinese methods of improvement is recognized.

Originality/value: The new value is presenting the concepts of gongfu and xiushen within management science. As well as the comparison of concepts of kaizen, gongfu, and xiushen.

Keywords: organizational culture, *kaizen*, *gongfu*, *xiushen*, China, Japan.

Category of the paper: research paper.

1. Introduction

Nowadays, there are many management concepts and methods that enable companies to search for new better methods of improvement and development which enhance their competitiveness and innovation. Values adopted from organizational culture as well as systemic

solutions for continuous improvement become essential (Butler, Szwejczeński, and Sweeney, 2018) in improving the functioning and adaptation of the enterprise in the rapidly changing environmental conditions. The concepts of kaizen, gongfu and xiushen are typical of Asian cultures. The concept of kaizen is widely known in Japan and China whereas less known concepts of gongfu and xiushen along with their main assumptions and goals are presented in this article.

2. Organizational culture - general approach

In Every culture should be based on quality and improvement as well as safety, respect for work, ethics and trust. These are the essential foundations of a solid organizational culture. Without them it will be fragile and non-durable. Edgar Schein defines organizational culture as: “(...) the basic model assumptions of a given group discovered or developed in learning to cooperate with external adjustment problems and internal integration and that can be considered valid and therefore can be taught to new members as the correct way to perceive, think and feel in relation to those problems” (Schein, 2010; Witte and Muijen, 2010; Alvesson, 2011; Sikorski, 2008). Organizational culture is a valuable asset of every organization as it develops its potential, shapes its identity and earns internal and external recognition. Without developing the organizational culture it is difficult to persuade employees to change and improve. Both scientists and management practitioners point out that the strength or weakness of the organizational culture may depend on such values as clarity, i.e. employees’ understanding, behaviours desired in the organization and its standards. They may also refer to such aspects as the degree of popularization or the depth of being rooted in the national culture (Kostera, Kownacki, and Szumski, 2000; Schein, 2010). In case of the degree of popularization, the problem is the extent to which culture should be known and shared by employees. It is important that standards and adopted assumptions does not refer only to selected groups of personnel or top management, but are clearly communicated to all employees. In the case of the depth of being rooted, the difficulty may arise from the insufficient application of the norms and values that a given organization represents (Sikorski, 2008; Wiśniewska, 2021). Among the determinants of quality some “soft” factors, which also include cultural aspects, may be indicated. Therefore, meeting certain criteria requires focusing not only on the appropriate use of knowledge, skills and medical technology, but also on developing appropriate interpersonal relationships, working conditions necessary to develop employees’ talents, their competences that would allow them to properly develop and communicate, provide a sense of certainty and identity which as a result would improve the entire organization (Lucas, 2005).

There are many models that describe and identify the levels of organizational culture (Sikorski, 2008; Pałac, 2021). One of the most acknowledged theories developed by Edgar Schein, emphasizes the multi-level nature of organizational culture's structure. Artefacts are among the most visible and yet most demanding levels of organizational culture (Schein, 2010). They can be divided into linguistic artefacts (i.e. the manner and form as well as the language of communication between members of the organization); behavioural artefacts (e.g. organisational behaviours and customs) as well as physical artefacts (organization's logo, its trademark, characteristic equipment and elements of infrastructure, technology or other material objects associated with the specificity of a given organization (Kostera, Kownacki, and Szumski, 2000). Norms and values create a deeper and slightly less visible level of culture. They are more persistent than artefacts and at the same time only partially visible and partially realised. Norms and values are embodied in goals, strategy, quality policy, image and even in employees' characteristics of the organization. They are reflected in the company's relationship to the environment, in the features of the organizational structure and in the style of management. Quite often values associated with improvement are considered in terms of the national culture as they are embedded in widely acknowledged stereotypes and general social principles of a given country. Therefore, national aspect plays a significant role in differentiating improvement approaches, which are different in Japan and China. This issue will be discussed in more detail in the next part of the article. The deepest, completely hidden and unrealised level of the organizational culture is based on assumptions. Depending on what they refer to, assumptions may be divided into reality and truth – they are essential for the functioning of the organization and interpersonal relationships in it (Wiśniewska, 2021).

All the listed levels of culture are related to each other and create a relatively permanent structure. Organizational culture may vary in different national and social groups. For example:

- The Americans represent a pro-transactional, non-ceremonial, monochrome and diverse culture.
- Germany represents a protractive, moderately ceremonial, monochrome and restrained culture.
- The Poles are representatives of a moderately pro-partnership, ceremonial, poly-chronic culture, with unstable expressiveness.
- The Japanese are representatives of a pro-partnership, ceremonial, monochrome and restrained culture.
- The Chinese are representatives of a pro-partnership, ceremonial, monochrome and restrained culture.

On the one hand cultural differences are obvious – each country has its own specific culture. On the other hand, they significantly determine all socio-economic changes and their course. These changes may be evolutionary as in Japan. Japanese permanent cultural structure is based on traditional principles of collective cooperation and self-improvement (kaizen), derived from entrenched Confucian tradition over a long period of time (Calingo, 2002). Long-term

orientation or Confucian work dynamism is the extent to which society's cultural values reflect those of Confucianism. Long-term-oriented societies, or cultures high on Confucian work dynamism have greater concern with the future and value thrift and persistence. Such societies consider how their current actions could influence future generations. On the other hand, values in short-term-oriented societies are oriented toward the past and present. There is respect for tradition and fulfilling social obligations is a concern, but the here and now is most important. Similarly, Chinese cultural values are based on Confucianism. However, in China changes are extremely intense (due to the socio-economic revolution and organizational transformation).

The general idea of improvement is based on the verification of goals, mission, strategy, organizational structure and knowledge (Nadeau, 2020). Knowledge is a key factor of improvement. Since improvement is based on leadership styles and management of human capital, it is possible to create new levels of organizational culture and thus build a unique set of pragmatic values for the improvement of organizations and even entire societies. Hence the concepts/ philosophies of: kaizen in Japan and gongfu and xiushen in China.

3. Japanese *Kaizen* culture

The concept of kaizen originates from the traditional Japanese ethical code of warriors (samurai) – Bushido. This tradition has been reflected in all aspects of life including philosophy, care for physical health, professional duties, improvement of culture, work, faithfulness and courage. Even though samurai privileges were abolished in 1876, samurai code has been applied in Japanese industrial and military concepts developed in the early 20th century. Later, in the late 1940s, it was used in corporations and public administration offices.

The word “kaizen” is a combination of two Japanese words: kai – “change” – and zen – “good”. Literally translated, it means “change for the better”. There are many definitions of this concept in the literature on the subject. In the publication entitled “Quality Vademecum” (Vademecum Jakości) kaizen has been defined as “gradual orderly and continuous improvement, added value” (Pieczonka and Tabor, 2003, p. 86). According to another interpretation, it may be defined as “the concept of management based on the constant search and application of even the smallest improvements in all areas of activity, at every workplace. It aims at achieving great success with small steps” (Bernais, Ingram, and Kraśnicka, 2010, p. 164). However, the most significant explanation of kaizen refers to the human factor: “the striving of all employees at the decision-making and executive level to constantly improve all aspects of company's operations” (Mikuła, Pirtruszka-Ortyl, and Potocki, 2007, p. 217). This approach is consistent with the original meaning of this concept promoted by Japanese scientists: “Kaizen means improvement. In addition, it means continuous improvement in personal, domestic, social and professional life. In the company, kaizen means continuous

improvement of everyone – both managers and employees” (Brannem, and Kleinberg, 2000; Imai, 2012).

The spreading of the Japanese concept of TQM in the United States, in which kaizen was an essential element typical of Japanese quality management techniques (such as: zero defects, the Edwards Deming cycle, quality circles, the prevention system, just in time), was crucial for the development of this concept. According to this approach everything can be improved and small steps can lead to the desired results. Everything should be improved, and improvement itself should happen every day, by everyone, from small incremental improvements to big strategic changes (Piasecka-Głuszak, 2011, p. 372). Kaizen should encourage employees to improve the workplace, contribute to their greater independence and self-control. The basic goal of kaizen is to improve three parameters: quality, cost and delivery time. This means improving the quality of products and services, processes, as well as the final results, striving to reduce costs at every stage of the organization’s operations.

The main benefits of using kaizen, through the gradual improvement of all aspects of the company’s operations, include:

- cost reduction by reducing supplies, accelerating material flow, increasing labour productivity and spending less,
- improving the quality, efficiency and effectiveness of work,
- reducing the time of completing orders,
- reducing the number of mistakes,
- increasing the efficiency of machines and devices,
- maintaining production continuity,
- greater customer satisfaction,
- improving customer service,
- introducing clear, legible standards and work visualization,
- reducing or even eliminating the number of deficiencies, errors and corrections, and thus production costs,
- reducing changeover times,
- eliminating, simplifying, integrating and automating processes,
- improving traceability and response time to production and quality problems,
- optimising distribution of production resources for more effective use of production space,
- increasing the efficiency and comfort of work and others.

Improvement is the key element of the kaizen concept. It is slow and gradual, it applies to various areas of companies’ operations, but most of all it refers to people and innovations introduced by them (Negrão et al., 2017). The human factor is the most important aspect of the entire change process. The implementation of kaizen usually results in a new organizational culture focused on improvement. It is primarily based on feedback provided by employees,

who take the initiative in submitting new ideas. Therefore, it is essential to get feedback from employees even for the smallest improvements. The main idea of this approach is based on the assumption that everything in the company can be done better. One of the ways to achieve this goal is to develop an employee suggestion system.

Constant search for small adjustments in all business areas and in every workplace, may prevent companies from experiencing major problems in the future. Employees' commitment as well as intensive cooperation between superiors and employees stimulate further development. Therefore, improvement of the company should take place every day, involve all employees and range from small incremental changes to great innovations.

The company's adoption to kaizen requires the development of a new incentive system that includes training and evaluation of employees, verification of improvements and new solutions and defining rules for teams responsible for the implementation of individual tasks. The new system must be adjusted to the changes that occur during the implementation of kaizen. It is important to evaluate employees not only based on their results, but also their attitudes and the effort they put into achieving results. Regardless of the advancement of kaizen implementation, it is important to ensure that employees will benefit from their better and more efficient work, provide incentives that will encourage employees to become more involved in the process of permanent change. Material and non-material motivation plays an important role in proper and fair remuneration of employees, however, in many cases non-material motivation may be more effective. Non-material stimulus may increase self-esteem and sense of belonging, job satisfaction or the sense of participation in the success of the organization (Karaszewski, 2006, p. 288). This type of management may also increase the broadly understood knowledge and qualifications of employees, increase employees' awareness of the need for organisational improvements and allow to solve problems using new techniques and methods, which not only will recognize and eliminate unfavourable elements but also will help to learn from mistakes and create favourable conditions for implementing innovations and discovering new opportunities. Proper use of these opportunities gives the company "the ability to dynamically integrate, build, reconfigure internal and external competences in order to adapt to a rapidly changing environment" (Szuster, 2011, p. 183).

Regardless of the level of advancement and preparation of participants as well as the premises that drive enterprises to introduce changes, kaizen is generally recognized as very profitable and effective. The main goal of many companies – resulting mainly from the need to adapt to the changing environmental conditions – is to gain a permanent innovative advantage, which may be achieved by implementing kaizen (Negrão et al., 2017).

Important elements of kaizen concept ensure standardization and support system for managing the change. In practice, once standards are defined they must be constantly improved. This is the only way to upgrade existing conditions with continuous kaizen activities. Nevertheless, the application of this concept does not exclude radical innovations – in fact, they can be supported and strengthened by kaizen. It can affect not only the measurable economic

results but also the behaviour of employees, their knowledge, skills, openness and commitment. Therefore, the additional value of implementing kaizen is the increased awareness of employees about the improvement needs of the organization (Farris, Aken, Doolen, and Worley, 2009, p. 46). In this context, the combination of kaizen and improvement can be very rational, because: “kaizen is understood as maintaining and improving standards by means of small, gradual steps, and innovation is treated as a radical change related to large investments in technology and/ or equipment” (Imai, 2007, p. 18).

4. Chinese concepts of *gongfu* and self-cultivation *xiushen*

Chinese word *gongfu* or *kungfu* / *kung-fu* is most often associated with martial arts *wushu* (武术). This association has been so prevalent that the popular PWN Dictionary of the Polish Language defined *kung-fu* as exclusively eastern martial arts, primarily unarmed, designed to attack vulnerable points of the body (PWN Polish Dictionary). It derives from the exercises originally designed to strengthen health, fitness and focus, which were used by the monks of the Shaolin Temple in Henan Province (Tsang et al., 2008). For this reason this approach is also known as Shaolin *gongfu* (少林功夫). According to some studies the correct use of the expression *gongfu* should include the full name of a martial arts style, emphasizing the highly developed skills (Osuch, 2002; Ciembroniewicz, 2019). Some researchers, however, defend the independence of this category, emphasizing that it was and is used by Chinese practitioners who needed a new term to describe their own practices. (Partikova and Jennings, 2018).

The term *gongfu* is associated with martial arts, however, it does not only refer to physicality, but also to self-improvement via meditation (Brzozowski, 2017), combining external and internal forces. Hence, the reference to the concept of complementary opposites of yin-yang (阴阳). *Gongfu* has been associated with martial arts due to its exposure to popular culture at the turn of the 1960s and 1970s and the fact that *gongfu* as an oriental martial arts became a tool of cultural diplomacy (Eperjesi, 2004) or in other words soft power of influence in the international arena. The constant practice of a combination of soft and brute force has been reflected not only in sports but also in the business. Singapore Airlines, considered as the leader of innovation in the airline industry, may serve as an example of using *gongfu* in economy and management (Heracleous, Wirtz, and Johnston, 2005). In terms of business activity *gongfu* has been applied in both private and public sectors (e.g. academic advisors) (Yang, 2020).

Other popular application of *gongfu* is reflected in the phrase *gongfu cha* (功夫茶/工夫茶) that is the traditional way/style of brewing tea or even tea culture, which has been popular on the Internet. *Gongfu cha*, as a masterful, skilful style of brewing tea combines the technical

knowledge about brewing (procedure, application of given parameters, etc.) with the atmosphere and aesthetic values associated with it. It is practised mainly in Chaozhou, Fujian and Taiwan. There are three types of gongfu cha ceremonies: everyday (e.g. cultivating relationships with family, friends and colleagues), the so-called “sophisticated” and commercialized (d’Abbs, 2019). However, the word gongfu (功夫/工夫) has a much broader meaning than the two described above. It reflects potential skills and efforts necessary to acquire them. It is not limited to any specific scientific discipline or sphere of life. The first sign gong (功) reflects the results and effects of work (工) and strength (力), meaning diligent work and the effort associated with it. The sign fu (夫) indicates an adult male – manual worker. It suggests expertise and proficiency in a given field. Therefore, it indicates activities that require time, effort and patience (Berkshire Encyclopedia of China, 2009, p. 1413), as well as the desire to achieve mastery in a given area. This meaning is reflected in the Chinese phrase *zuo gongfu* (做功夫) which means practice; the phrase *zhua gongfu* (抓功夫) suggests finding enough time. The saying “constant grinding can turn an iron rod into a needle” (只要功夫深, 铁杵磨成针) shows that with hard work, perseverance and commitment, even very difficult tasks can be completed.

As discussed before, gongfu is not just about combat – aspects of defence, duelling and competition – but also about self-development (Nešković, 2020) and a much broader philosophical background – the teachings of chan Buddhism, Taoism and Confucianism (Ye, 2019). The Chinese philosophical aspect of improvement (self-cultivation) is often associated with the teachings of Confucius and his followers. Likewise, according to the main Taoist writing – *Daodejing* (《道德經》) – self-cultivation embodies inner power. Also, according to Buddhist teachings, personal improvement leads to a state of buddhahood (Tan, 2017).

Confucian ideal of self-cultivation – *xiushen* (修身) – can be considered as a gongfu since desires and preferences naturally align with the demands of reason and social norms (Wang, 2018). The philosophical aspect of gongfu of knowledge is related to the art of living, which requires developing practical skills and abilities rather than intellectual interpretations. It is not so much about reading and mechanically following specific instructions, but about understanding the content and going beyond the instructions. Gongfu of knowledge points out that a knowledgeable person should not only have an open mind but also an open heart. Therefore, this concept refers to the emotional aspect of the inner world. The essence of gongfu of knowledge it is not in knowing the truth, but in knowing the way (Ni, 2016, 2019; Li, 2018) – learning is knowing the Dao (道) (Tan, 2017).

The above-mentioned inner force can be seen as Confucian:

- developing moral nobility – a healthy personality (Zheng and Huang, 2007),
- developing character – cultivating such virtues as benevolence/ humanity (仁),

- ritual propriety (礼), wisdom (智), righteousness (义), and trustworthiness (信),
- self-reflection and a conscious attempt to change and improve (Berkson, 2021).

The values of change and improvement are related to modification (修) of man – his person, body/health (身). It is believed that an individual may at some point self-actualise, undergo moral transformation enhanced by rituals (Slote, 2020). Self-cultivation is considered as essential in keeping order in the family, the state and the whole world (Kim and Kim, 2014). This idea highlights the significance of morality and virtue embodied in interpersonal relationships which are harmonious when everyone acts virtuously. Harmonious relationships developed in family and in other social groups result in general social order. Harmonious social relationships are, therefore, a fundamental aim of xiushen (Yang, 2021). Similarly to the concept of gongfu, xiushen also emphasises the importance of considerable and sustained effort. Its goal is not to achieve fame and power, but to develop character, change perspective and behaviour. This transformation is enhanced by employing an elite group of officials (modern managers), selecting a virtuous ruler (superior) and providing access to education (Tan, 2017).

5. Comparison and conclusions

Undoubtedly, the concept of kaizen has been well known worldwide and has been recognized outside Japan, also in Europe. In case of the concepts of gongfu and xiushen, they are practised mainly in countries culturally influenced by the philosophical and religious teachings of Confucius and his followers. The differences in Japanese and Chinese concepts also become evident in terms of their availability. Kaizen and Confucian philosophy in general (xiushen is only one of its ideas) is widely available in many languages, also on the Internet. The available materials on gongfu discuss mainly martial art and brewing tea – gongfu cha, therefore, available resources are limited only to these two aspects.

Each of these concepts highlights continuous and long-term improvement, available to everyone regardless position and social role. It applies to every aspect (also professional) of life. However, due to the global popularization of kaizen it seems that it has become more popular than the Chinese ideas. Nevertheless, all of these concepts – kaizen, gongfu and xiushen – emphasize improvement and achieving better results. Moreover, each of them requires self-commitment, self-discipline and self-control (employee).

Chinese concepts focus mainly on self-improvement. Gongfu and xiushen are firmly rooted in the assumptions of the classical book of Yijing (《易經》), which introduces the Great Oneness divided into complementary elements of yin and yang and the fact that everything in the universe depends on their harmonious coexistence. Moreover, especially the concept of xiushen highlights the importance of developing moral qualities as it not only leads to personal

perfection, but also enhance harmonious social relationships, and harmonious society (also in companies). A detailed list of the main qualities of kaizen, gongfu, and xiushen concepts are presented in Table 1.

Table 1.

The main characteristics of the improvement concepts popular in Japan and China

Main characteristics	Japan	China	
	<i>kaizen</i>	<i>gongfu</i>	<i>xiushen</i>
Continuous improvement	x	x	x
Relating to every person and every area/aspect of life	x	x	x
Strengthening fitness and concentration		x	
Harmoniousness	x	x – assumptions based on the Book of <i>Yijing</i> – combining internal and external forces	x – assumptions based on the Book of <i>Yijing</i> – harmonious social relationships
High skill level, proficiency		x	
Striving for mastery, perfection	x	x	x
Results of work	x	x	x
Patience, time commitment	x	x	x
Strength and effort	x	x	
Energy	x	x	x
Going beyond the instructions, consciously changing		x	x
Moral nobility	x		x
Developing character		x	x
The importance of rituals			x
The social order	x		x
Motivation	x – Internal – External (new motivational system)	x – Mainly internal	x – Internal – External (other members of society)

Source: own elaboration.

All of the above-mentioned concepts result from the values adopted in Asian culture and principles offered by Confucian teachings. These values differ significantly from Western cultures. However, studies have shown they have been increasingly discussed in European and American management (Brannem and Kleinberg, 2000; Imai, 2012) since scientists and management practitioners consider the Japanese concept of kaizen as an effective method of improvement that can be successfully used in organizations with completely different cultural structures. Therefore, it can be assumed that in the upcoming years the attention of managers will also be focused on Chinese methods of improvement – perhaps it will be the concept of gongfu and xiushen, which will become completely new premises for developing key success factors in the international dimension.

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THE PERSONALITY MATURITY OF MANAGERS AND THEIR EFFECTIVENESS IN PERFORMING THEIR ROLE

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Purpose: The purpose of this article is to present the relationship between the level of a manager's maturity and their effectiveness in performing their role.

Design/methodology/approach: This article is an overview that presents a new perspective in the perception and assessment of managers' effectiveness, namely managers' personality maturity.

Findings: The conducted considerations show that the maturity of a manager's personality determines the maturity level of their personal behaviour, which creates space for effective managerial activities.

Research limitations/implications: It is recommended to continue empirical investigations using strong diagnostic tools, including personality diagnostics in a large research group of managers.

Practical implications: The relationship presented in this article between the level of managers' maturity and their ability to perform effective managerial behaviours at the organizational level creates a research area for determining the relationship between personality predispositions and their usefulness in the effective achievement of the tasks entrusted to managers. As a result, it is possible to shape the desired self-development conditions that are conducive to building and strengthening a mature personality.

Social implications: If introduced as a permanent category in assessing managers' effectiveness, *personality maturity*, understood as the ability to assume responsibility for one's personal self-development, can significantly incentivise organizations to create space for managers' psychological responsibility for the development of themselves and their employees.

Originality/value: A close relationship has been identified between personality traits and their development and managers' efficiency and effectiveness in achieving assumed goals. It is shown that a manager's mature personality increases their chances of fulfilling expectations regarding the ever-increasing and more complex demands of their role.

Keywords: maturity, personality, personality maturity, manager, effectiveness.

Category of the paper: review.

1. Introduction

A manager's work may be analysed from a number of different perspectives. This article suggests taking a closer look at maturity as an important – if not the most important – criterion in assessing managers. In this approach, maturity is understood as not only one's ability to assume responsibility for delivering tasks at work, but also the ability to go beyond one's own limits and manage subordinates so that they can develop in a favourable social environment and, ultimately, achieve their life goals with a sense of meaningfulness and complete self-fulfilment. Such a perception of a manager requires a very comprehensive description of this role; thus, we are forced to describe it as a whole. It is impossible to disregard managers' personality and its influence on the way they perform their managerial roles. This subject is described in more detail in the first chapter.

Managers' maturity must also manifest itself par excellence not only in the effective achievement of their core professional goals but also in the 'soft' objectives which are an essential part of a managerial role, such as management of a subordinate team, conflict resolution, or motivating people to develop. Efficiency in carrying out these tasks has always been regarded as essential for managers, and for years it has been considered the most basic criterion of their assessment. This point will be elaborated on more comprehensively in the second chapter of this article.

According to our approach, however, even a combination of these two areas of competence may not be sufficient to judge a manager's maturity. To do this, it is necessary to integrate their individual skills from the different activity areas mentioned above into a coherent whole that is consistent with their philosophy of life and the goals arising from this philosophy. Despite its enormous diversity, complexity, and changeability over time, this combination must then be harmoniously integrated into a coherent picture that is manifested in the activities of a mature manager. This is what the third part of the article deals with.

2. Effectiveness in a managerial role

The managerial profession did not appear until the end of the 19th century, which is why it still does not have an unambiguous and precisely defined position among other professions. Researchers of organization and management sciences treat the work of a manager as an art, a science, or a freelance profession (Pietruszka-Ortyl, Gach, 2005). Regardless of the preferred approach, however, the management process and its effects (understood as the implementation of organizational tasks and goals) require managers to have a good command of the roles assigned to this profession and the related skills (Penc, 2005).

Undoubtedly, **the development of enterprises depends to a large extent on the quality of fulfilment of managerial roles** (cf. Bacon, 2013; Blanchard, 2013; Kaplan, 2013). Thus, the actions of a modern manager must take the form of well-thought-out and conscious activity in order to intentionally and effectively influence the behaviour of their subordinates (Terelak, 1999).

The psychological concept of management defines a manager as a subject of a managerial situation conditioned by a number of factors (Bartkowiak, 1994):

- other people,
- tasks to be delivered (goals to be achieved),
- defined principles of cooperation,
- the organisation for which the manager works.

When functioning in this kind of framework, a manager must influence their subordinates in a way which will incentivise them to take actions that allow the organisation's goals to be achieved (Zieleniewski, 1978). Since achieving results is usually associated with a great team effort, of which the manager is obviously an integral part, success depends to a large extent on the manager's ability to activate employees' potential, which, as mentioned above, must be seen as a manager's basic resource. Managers are responsible for all of their organisation's resources and their effective use. Therefore, managers must be fully aware of their role, duties and powers (Stoner, Wankel, 1992).

The changeability, ambiguity, complexity and uncertainty of the situations in which managers operate require them to boast a wide repertoire of managerial skills that allow them to manage effectively. There is no doubt that "in order for a manager to be effective, they must master the roles assigned to their profession and possess the skills that determine this process" (Penc, 2005, p. 63). What should be understood by *managerial roles* is, to put it briefly, "organized sets of behaviours" (Griffin, 1998). A more complex definition of this role is suggested by Drucker, who assumes that "the role of a manager is primarily people management based on the cooperation of many people in a way which makes it possible to neutralize their weaknesses and make the best use of their talents and strengths" (Drucker, 1976, p. 76). In his opinion, managerial roles are most evident during the implementation of tasks in five basic areas of managerial activity: setting goals, organizing, motivating and informing, measuring and developing people (Drucker, 1994).

Another classification of managerial roles was put forward by Mintzberg (1973), whose juxtaposition is still quite valid and is the most frequently cited typology of roles. In his opinion, the functioning of managers boils down to three basic roles or, in other words, areas of activity:

- **Interpersonal roles** – activities related to the creation of interpersonal relations within the organization and with the external environment.
- **Informational roles** – activities related to processing, searching, analysis, transmission and dissemination of information.
- **Decisional roles** – activities related to making management decisions, resolving conflicts, negotiating, determining priorities and resources.

In all of these main areas, Mintzberg distinguishes ten specific roles that managers share in their leadership practice. They are presented in Table 1.

Table 1.

Basic management roles according to H. Mintzberg

CATEGORY	ROLE	TASK EXAMPLES
Interpersonal	figurehead	participation in a gala; opening of a new plant
	leader	encouraging subordinates to increase their productivity
	liaison	coordination of activities of two project groups
Informational	monitor	monitoring industry reports to keep up with the latest developments
	disseminator	sending out memos; presenting new organisational initiatives
	spokesperson	giving a speech; presenting growth plans
Decisional	entrepreneur	developing new and innovative ideas
	disturbance handler	resolving conflicts between subordinates
	resource allocator	reviewing and revising budget requests
	negotiator	negotiating an agreement with a key supplier or trade union

Source: Griffin, R.W. (1998). *Podstawy zarządzania organizacjami*. Warszawa: PWN.

The roles played by managers in an organization are conditioned by many factors, one of the most important of which is their place in the vertical structure of the organization. The three organizational levels most commonly distinguished in the literature on the subject are low, middle, and high. These levels have an important impact on the functioning of managers and largely determine the roles they play in their management practice (Hodgetts, 1977). The scopes of responsibility associated with these three levels are as follows:

- managers of the first (lowest) level are responsible for the work of line employees, and they are accountable for the effects of their work,
- middle-level managers are responsible for first-level managers (sometimes also for line employees) and report to senior (high) management
- high-level (senior) managers are responsible for the overall management of the organization, definition of its strategy, plus planning, organizing, and supervising the organization's relations with the external environment.

It transpires from the above that the position of managers in an organisation's vertical structure and the related scope of influence and responsibility make it possible to define the competences necessary for the effective fulfilment of their managerial functions. This relationship is presented in Table 2.

Table 2.

Competencies determining effective functioning at various management levels

SENIOR MANAGERS	conceptual skills		
MIDDLE-LEVEL MANAGERS		human skills	
LOW-LEVEL MANAGERS			technical skills

Source: Stoner, J.A.F., Freeman, R.E., Gilbert, D.R. (1997). *Kierowanie*. Warszawa: PWE.

As implied by the above considerations, the managerial roles that are most common at the lowest levels of an organisation's structures are largely associated with broader knowledge and technical skills; in contrast, the higher the management level is, the greater the importance of conceptual competences. On the other hand, middle management roles are characterised by a more significant component of human and interpersonal skills. Therefore, it can be assumed that it is human and interpersonal competences that constitute a bracket that binds together an organisation's management structure.

The above-presented concept of differentiating between the essence of managerial roles depending on the level in the organizational structure is consistent with the proposal of Katz, one of the most prominent management theorists. In his view, every manager should have three basic types of skills (after Łukasiewicz, 1998; Pietrański, 1994; Stoner, Freeman, Gilbert, 1997; Wajda, 1999):

- technical skills,
- human skills,
- conceptual skills.

According to Katz, every manager requires all three types of competence in their management practice, regardless of their management level, because in their everyday work they might have to perform tasks "at various *levels* of the organization and in various *areas* of its activity" (Stoner, Freeman, Gilbert, 1997, p. 31).

Summing up, these comments on managerial roles clearly indicate that people performing managerial functions should be characterized, above all, by great flexibility and versatility with regard to the range of roles they perform and how they fulfil them. On the one hand, what researchers particularly underline is the importance of work effectiveness and maximizing its efficiency (Sajkiewicz, A., Sajkiewicz, Ł., 2002). On the other hand, there is also an emphasis on the increasing role of interpersonal "soft" competences, the possession of which determines the achievement of the economic and technical goals of the enterprise.

In order to focus on managerial effectiveness, it should be noted that broadly understood effectiveness is usually defined in three areas:

- in economic terms, as the ratio of input versus achieved results,
- in terms of goal fulfilment, as the degree of the achievement of the assumed organizational goals,
- from a systemic perspective, as the extent of utilizing organizational resources and the quality of relations with the environment (Ziębicki, 2007).

The literature on the subject increasingly emphasizes the fact that *efficiency*, in its narrow, economic sense that is manifested in the profit generated by the organization, although very important, is no longer an absolute criterion. It turns out that it is much more advantageous to define the *efficiency* of an organization by means of systemic categories, as this approach allows for a more comprehensive and modern definition. As Kozusznik emphasizes, in the

contemporary market it is not profit that should be the sole criterion for assessing the effectiveness of an organization's operations, but rather the organisation's ability to adapt to changing market conditions and survive in these dynamic conditions. Considering the enormous dynamics of modern markets, a focus on short-term profit maximization may, if continued for a longer period of time, result in the abandonment of innovative and adaptive activities, thus ultimately eliminating the organization from the market in the long run (Kozusznik, 2002). Borowiecki and Jaki also emphasise the need for systemic changes. These authors emphasise that the development of enterprises in the current global reality requires systemic changes and modernization, in particular the reconstruction of management structures, the breaking of stereotypes, the implementation of innovative solutions, and new production and management methods (Borowiecki, Jaki, 2015). The required impulses and sources of energy for such changes and system innovations in modern and extremely complex organizations should be found in the internal resources of the organization (primarily employees of the company) or the external environment of the company (Zbiegień-Maciąg, 2008).

While performing their duties, managers face a fundamental dilemma of the right choice of efficiency model, as well as the correct determination of the criteria that will be used to measure the level of organizational effectiveness (Bratnicki, Kulikowaska-Pawlak, 2013). Zieleniewski points out that effectiveness is sometimes equated with notions such as economy, profitability, or efficacy, but it can also be understood as efficiency in a very universal sense (Zieleniewski, 1966; after Smolbim-Jęczmień, 1999). Due to the complexity and multifaceted nature of business processes, market dynamics and the internal organisational structures, it seems that such a universal approach is becoming increasingly important as it emphasizes the multitude of aspects and perspectives of looking at and measuring effectiveness. What is more, efficiency criteria based solely on the assessment of employees' performance should be considered severely lacking. What is becoming increasingly obvious is the necessity of studies concerning the conditions that influence the obtained effects, as well as multi-faceted cause-and-effect analyses of the changing factors that affect organisations and their human resources (Smolbim-Jęczmień, 1999). It is also worth emphasizing the impact of psychological (often referred to as 'soft') factors on the effects of work, understood here as emotions experienced at work, the workplace atmosphere, employees' personality traits, and their ability to deal with stress. These are important criteria for assessing work efficiency and should receive more attention in effective management models (Morgeson et al., 2007; after Nieckarz, 2014). An approach to effectiveness which takes into account both the economic and social aspects requires taking relevant action within organizational structures and the division of tasks and competences (Nogalski, 2009). The socio-economic nature of efficiency relates to the entire organization and the entities that can be distinguished within its structure. For an enterprise, these aspects may be increased profitability, improved competitiveness, higher quality of manufactured products or, for example, reduction of employee absenteeism. For employees, it may be improved remuneration, increased job satisfaction, or the possibility of professional and personal

development (Smolbikm-Jęczmień, 1999). For a manager, this may mean fulfilment of their aspirations, better managerial or personal competences, or achievement of their operational goals through personal effectiveness in management (Kraczla, 2013).

A very important factor influencing a manager's work efficiency is the stress experienced at work. As indicated by many authors, one of the greatest stressors is managers' responsibility for their subordinates (cf. Hallowell, 2011; Poczowski, 2003; Schultz, D.P., Schultz, S.E., 2006). According to Davenport and Harding (2012), this factor alone, i.e., the burden of responsibility for others, is why many people do not want to be in a managerial role. The unpredictability of the reactions of others, the lack of a full sense of control, and the uncertainty of achieving set goals all create an excessive emotional burden for many people.

The effectiveness of a manager's work is defined differently from the perspective of their employees, who might emphasize the importance of their managers in building up the commitment, energy and creativity of employees and focusing the team on success through a clear division of tasks and a precise definition of goals, as well as adapting these goals to the skills and personality predispositions of particular employees (Global Workforce Study Report, 2012; after Nieckarz, 2014). In this approach, the effectiveness of managerial work depends on the manager's ability to engage all their team members to achieve a common goal in a way that corresponds to their needs, aspirations and motivations (Poczowski, 2008). Moreover, it is now commonly emphasized that the effectiveness of a manager's work manifests itself not only in their own individual effectiveness but also in the entire team's. Only a combination of these two perspectives allows the organization's economic targets and social results in terms of employee satisfaction to be achieved (Kozak, 2007). Knowing the enormous influence of employee satisfaction on the effects of their work, managers must be aware of their subordinates' individual and group needs and expectations and address them in their daily team management practice. "They must be able to control not only their own stress, but also help their colleagues overcome their stress even if it is not always fully justified (...)" (Penc, 2000, p. 231).

It is also worth noting that effective performance of a managerial role requires continuous development of managers and their adaptation to constant social, cultural, organizational and technological changes (Penc, 2005). This, in turn, is possible only if managers have the right psychological conditions and are ready to develop and go beyond stereotypical or traditional behaviours.

The role of a manager's full engagement and self-fulfilment in assessing their professional effectiveness is also underlined by Strużyna. In his opinion, "today's image of organizations requires recognition of all employees' possibility of and right to full engagement, not only managers or leaders" (Strużyna, 2013, p. 46). This means that many organizations with a highly petrified hierarchical structure will have to introduce a number of changes aimed at increasing the subjectivity of their employees and shifting the burden of responsibility for the market situation of the organization, including its economic results, from the managerial staff to all the

employees (Strużyna, 2013). According to Juchnowicz (2001, p. 135), “the company of the future should be considered as a joint venture that brings benefits to contractors (...) employed by the company, who should be treated as co-owners, not as hired power”.

Therefore, managers’ effectiveness in the contemporary globalized labour market depends on their ability to manage subordinates in a way that guarantees their subjectivity and allows them to fulfil their individual goals and aspirations. This requires them to have a number of ‘modern’ competences which, when used in the course of team or organization management, would result in their subordinates’ active participation in decision-making and taking responsibility for the organization (Kraczlá, 2013). Expanding employee participation is a process that increases the socio-economic effectiveness of an organization and its competitiveness in the contemporary, dynamic, and extremely demanding global market (Juchnowicz, 2001). The most desirable managerial competences include creativity, independence, initiative, communication skills, emotional stability, change management, ability to take risks, ability to resolve conflicts, and focus on development. Additionally, other useful traits include adequate self-esteem, high morale, self-efficacy, a genuine ability to develop and support the development of subordinates, and the ability to develop a good work-life of both managers themselves and their subordinates (cf. Bacon, 2013; Kozak, 2011; Lewicka, 2010; Schultz, D.P., Schultz, S.E., 2006; Penc, 2000; Penc, 2005). What is more, the progressing globalization of economic processes forces managers to possess the knowledge and skills that are required to manage teams that are frequently culturally diverse. The complexity of economic projects and their increasingly global scale make the creation of international teams a necessity. The effective management of such teams requires specific, non-traditional competences that are related to the cultural differences that are reflected in people’s professed values, beliefs, and behaviour patterns, such as methods of communication. Professional management of such a team is associated with the need for different forms of communication, motivation, or control of people from different cultural backgrounds (Kostera, Śliwa, 2012).

It can therefore be said that the role of psychological factors in the efficient delivery of a managerial role, or more broadly, in the efficient management of an organization, is not only a postulate expressed by psychologists who take a specific perspective on the functioning of organizations. Increasingly, the importance of social competences is also emphasized by theoreticians and practitioners of organisational and management sciences, and even by representatives of economic sciences. All these groups agree that achieving an organization’s goals, including in the organizational, technological or economic dimensions, is impossible without strong interpersonal and social competences of managerial staff.

3. Personality potential

In psychological literature, *personality* is defined in many different ways, depending on the author's research perspective, beliefs or theoretical assumptions (Cervone, Pervin, 2011). Research into this subject conducted by G. Allport allowed him to distinguish over 50 definitions of personality (1937). Based on his analysis, G. Allport prepared his own interpretation, which is considered to be a classic definition of personality that has been described as "a dynamic organization of those psycho-physical systems of an individual that determine their way of adapting to the environment" (from Siek, 1982, p. 19). Following from this definition, personality should be thought of as "the range of ways in which a person reacts to and interacts with others" (Robbins, Judge, 2012, p. 44). Contemporary definitions of personality refer more precisely to its constituent elements. L.A. Pervin, for example, points out that "personality is a complex totality of thoughts, emotions and behaviours that gives direction and pattern (coherence) to human life" (Pervin, 2002, p. 416).

It is worth noting here that both the classic and contemporary definitions emphasize the integrating function of personality and expose its dynamic structure and holistic complexity (Oleś, 2003).

Much of the interest in personality psychology comes from the fact that it provides a basis for understanding human emotions, ways of thinking, and above all, behaviour. Usually, the area of research is centred around (1) what is common to all people, (2) differences between individuals, and (3) individual uniqueness. **"All personality psychologists use the term personality to refer to the psychological characteristics that contribute to the [relatively] persistent and distinctive patterns of feeling, thinking, and behaviour"** (Cervone, Pervin, 2011, p. 10). Personality can also be understood as the reason for characteristic human behaviours in various and often very diverse situations. McAdams and Pals (2006, after Zimbardo et al., 2010) put forward a definition of personality as the "default settings" of an individual's behaviour and reactions. In this approach, **personality** is perceived as the **"psychological properties that determine the continuity of an individual's behaviour in different situations and at different times"** (Zimbardo et al., 2010, p. 25).

As Argyle (2002) points out, people react differently to social life situations and differ in terms of their social behaviour style, and these differences can be accurately described and explained by means of people's personality traits. Personality traits are relatively constant psychological properties that determine the unique personality structure of an individual: they determine their social functioning and make up its uniqueness (Cervone, Pervin, 2011). Therefore, upon examination of one's personality traits, it is possible to predict the dynamics of the development of the entire psychological system of a given individual and determine the mechanisms that shape their behaviour and predispositions (Robbins, Judge, 2012). Although the concept of a personality trait is not defined unequivocally in the literature on the subject,

and heated discussions are still taking place around it, it is widely recognized that the pragmatic nature of the personality trait concept is so great that it is worth using it to analyse and describe people's personalities (Pervin, 2002).

Personality traits can serve as indicators for the description and analysis of one's personality, and they constitute certain constant dimensions that are unique for every individual. Therefore, they are a practical measure that makes it possible to describe people's behavioural tendencies as well as the intensity of these behaviours (Cervone, Pervin, 2011).

According to Siek (1986), psychological features are the foundations for the development of larger structures, referred to as personality types or personality dimensions. This notion is well described in the literature; it will not be the subject of broader analysis in this article as it seems that the concept of personality traits as basic indicators describing personality structure and development is sufficient on its own for the study of the personality correlates revealed in managers' behaviours.

The concept of personality is based on the assumption that personality is a relatively constant whole, which means "an individual's configuration of traits remains unchanged" (Pervin, 2002, p. 69). Of course, modern researchers also notice the variability of personality, its constituent traits, and the resulting variability displayed in one's behaviour in different situations and different periods of life. Therefore, it seems more important to determine "to what extent one's personality is stable or variable", and what level of intensity and constancy of a given trait should be assumed in order to claim that it underpins a given person's psychological structure and determines their behaviour (Pervin, 2002). This contrast between personality traits' stability and development over time is most often presented in two aspects. The first is personality stability, which is determined by the invariability of specific personality traits over time; the other is personality consistency, i.e., the fact that the same features are revealed in different situations (Pervin, 2002). In the subject literature, many studies indicate the stability of personality and its features even over the course of several decades (cf. Fraley, 2002; McCrae, Costa, 1994).

A lot more ambiguity, however, can be found in research results concerning personality consistency, i.e., expectations of the same reactions in different social situations. The difficulty of identifying identical or even similar reactions in different situational contexts led researchers to formulate the principle of aggregation, which claims that "a given personality trait is not expressed in a specific behaviour in a given situation but in various behaviours in various situations" (Pervin, 2002, p. 71).

In the light of the above considerations, it should be concluded that the most justified position is to acknowledge that a person's personality is relatively constant and stable, but this does not necessarily determine a full description of their behaviours as these can be either stable (the same) or variable. It should be also assumed that, apart from personality traits, the revealed behaviours are also influenced to a large extent by situational conditions, which may significantly affect people's behaviour in specific situations (Pervin, 2002). Factors specific to

a given situation may be a catalyst for the disclosure of a specific personality trait. If, on the other hand, no specific factors dominate in a given situation and do not determine it, it is one's personality traits that will directly influence one's behaviour (Chabris, Simons, 2011). It is also worth noting that people are not only passive objects influenced by situations, but they always contribute somehow to the creation of a given situation through their inevitable influence as a participant in it (Makin et al., 2000).

In general, contemporary personality psychologists agree that the theory of personality traits well describes a person's personality and its structure in a static sense. This approach makes it possible to describe a person's behaviour in terms of tendencies towards behaviours that are typical of this person. However, this theory does not describe their personality in a dynamic approach with regard to changeable situations and the resulting determinants of one's behaviour (Oleś, 2003).

When considering the question of personality in analysing a manager's functioning in their professional role, which is the core subject of these considerations, it should be assumed that a manager's personality is a factor which significantly influences their decisions and actions, even if the manager themselves is not at all aware of this. Apart from personality, the other factors influencing the manner and effectiveness of management include the features, behaviours and expectations of the manager's superior; the characteristics and behaviour of their subordinates; the behaviour and expectations of other managers; or their organisation's culture (Stoner, Wankel, 1995). Although this list (which is not exhaustive) shows that the functioning of a manager is conditioned by many dimensions, it is personality that is the basic determinant that correlates and provides dispositions that shape their behaviour, therefore it determines success or failure in the effective achievement of goals and people management (Smoleński, 1990). Actually, it seems that understanding managerial behaviour is even impossible without referring to their personality as the basic factor determining their functioning within the organisation (cf. Hughes et al., 1996). This is due to the fact that **personality influences the entire spectrum of dispositions in terms of thinking, feeling and behaviour** (Roberts, 2006). Analysis of a manager's personality traits and their interaction with the organisation's external environment allows the explanation and understanding of their preferred behaviours towards subordinates (Kozusznik, 1994).

About 30 years ago, organisations began to pay more attention to their employees' personalities and their role in the functioning of the organisation. Recruitment procedures started to use psychometric tools that allow, more or less professionally, to analyse employees' personality, especially managers, in order for an organisation to make good hiring decisions. Initially, the main focus was on the proper matching of an employee's personality to their future job position. However, it was quickly noticed that narrowing the scope of analysis of the prospective employee's personality to only the workplace is far from sufficient and does not explain a number of issues that are important from the point of view of the entire organisation. Therefore, the area of this research was expanded to include how an employee adapts their

personality to the organisation's structure and culture. Analysis of managers' behaviour in the context of their personality predispositions requires a good understanding of many dimensions of the managerial role. A manager's direct influence on their subordinates is commonly taken into account as the most obvious area of influence and an important dimension characterizing the managerial role. However, this approach seems to be oversimplified and an excessive focus on this element may pose the risk of overlooking other extremely important areas that are influenced by managers' personality, such as their relationships with other managers or their organisation's culture (Robbins, Judge, 2012). Nowadays, many authors even believe that a "manager's task in their organisation is to build culture, i.e., organizational identity, understood as common assumptions, norms, patterns of behaviour, and values (expressed through needs) that are universal and have a humanistic character" (Kozak, 2007, p. 142).

The role of a manager's personality in creating the value of the organisation is raised by many authors. A manager's behaviour, which is determined by their personality, shapes the cultural norms of the organization, its work standards, and the patterns that are followed, all of which are reflected in interpersonal relations (Adamska-Chudzińska, 2007, 2008; Kozak, 2007). Attention should be paid in particular to the personality determinants of managerial attitudes such as social responsibility and pro-social behaviour. These two attitudes, as "relatively constant elements of one's personality, are highly active in judgement processes and are visible as a motivation to act in a particular way" (Kozak, 2007, p. 277). Therefore, it is not a coincidence that many scientific studies raise the issue of managerial maturity, which refers not to managers' substantive (competence) maturity but to their personality maturity. As Banaszak (2007) points out, managers who are responsible for the launch, course and effects of all organizational processes have a key impact on shaping the work environment and the forms and levels of interpersonal cooperation. These processes can progress with mutual respect and recognition, which will lead to the development of the organisation. Unfortunately, they can also trigger pathological phenomena and, in some cases, even lead to the collapse of the organization. The key issue is that managers, and in fact their personal personality potentials, determine the course of the development of not only the competence but also the personality of the entire organization. Thus, a modern, conscious manager is expected to be a mature person who is focused on development and change.

4. Managerial maturity in the personality context

Currently, modern science assumes that managerial behaviour results from the mutual interaction between the organisational situation and the manager's personality. This interaction determines the end result of actions taken by the manager to achieve organizational plans and intentions (Gliszczynska, 1991, Osborne, 2015). For this reason, the manager's business and

organizational effectiveness is now understood as the effect of their expertise, skills, their own personality, their subordinates' personality and qualifications, and the situational variables that define the space for the management process (Jadwiga, 2008).

Nowadays, it is widely known that in order for a manager to achieve success, even their thorough technical knowledge or expertise is not enough. Most of all, an effective manager needs to be a mature person who, by means of their attitude and behaviour in everyday interactions with subordinates, is able to develop them, motivate them, and achieve organisational goals, and it is the manager who is ultimately responsible for this. This is not possible without a properly functioning and mature personality, which cannot be replaced by a large intellectual or knowledge potential.

Striving for a mature personality requires its development. This process may take place through changes resulting from the internal potential of the individual, or through changes originating from the outside world. One's internal development happens when, by the force of their will or through internal motivation, one tries to get rid of one's unfavourable features that cause ineffectiveness or lack of satisfaction with life. Personality changes that originate outside the individual are caused by their environment and cause changes in their value system and relationships with other people. Of course, in the real world, these two ways of development do not exist in their pure forms. And, even if they did, this would not be fully beneficial as people's internal development without a link with their external environment would mean improvement of only their psychological features. Such development would become an autotelic goal that is not connected with people's existential situation and does not make it possible to determine whether personality changes are going in the right direction. On the other hand, personality development that attempts to achieve maturity under the influence of external factors only without being grounded in psychological features might be very short-lived and would not give the individual a sense of meaning and satisfaction (Kozak, 2011).

There seems to be agreement in the literature on the idea that a mature personality has certain features that build it. A thorough review of such features was performed by Zamorski, who indicated those that most often make up a mature personality (Zamorski, 2003):

- openness to experience,
- no defensive attitude,
- clear and precise awareness of personality coherence,
- unconditional self-esteem,
- harmonious relationships with people,
- being guided by intuition rather than inference (although one's rational thinking allows one to amend one's intuitive behaviour),
- choosing experiences that allow one to develop and experience joy,
- flexibility and ability to correct attitudes by addressing both internal and external conditions.

An interesting concept of mature personality was presented by Allport. In his view, personality is a dynamic creation that is shaped by an individual's interactions with the surrounding environment. Development towards maturity is about choosing forms of behaviour that allow one to achieve consistency and stability, as well as set goals that are valuable to the given individual. Allport (1998) identifies six criteria of a mature personality:

1. **Expanding the range of one's 'sense of self'**, understood as searching for new experiences, curiosity in the world, and a constant search for information. A person who extends the range of their own 'sense of self' eagerly discusses with others, looks for new solutions, is not afraid of new knowledge and experiences, is flexible in thinking, and uses the knowledge and suggestions of others. This interpretation of expanding one's 'sense of self' is related to experiencing satisfaction when these experiences are consistent with the individual's views; however, it is also related to their frustration when these experiences are inconsistent and, for example, when they make it difficult to achieve goals or consolidate one's self-esteem. However, a mature person is not afraid of this kind of experience because they are able to accept failures or mistakes and different points of view. With regard to the role of a manager, expanding the reach of the 'sense of self' enables them to acquire new information about themselves and integrate it into a coherent whole. A manager's openness to discussion and confronting their visions and expectations with others, in particular with subordinates, makes it possible to set goals that are not only in line with their own needs and expectations but also take into account the needs of their employees.
2. **Warm relationships with others.** According to Allport, the maturity of a manager's personality is manifested in the creation of close emotional relations with their subordinates, great empathy, understanding, and patience for otherness. A mature manager turns to using their position of power only when managing people in critical situations, otherwise they prioritize influencing through persuasion and understanding their subordinates' needs. A manager's mature personality allows them to treat each subordinate as a valuable person with their own unique capital of subjective experiences and knowledge. A mature personality allows a manager to see others not as useful for their career, but as partners in mutual development and satisfaction in personal and professional life, thus a manager can subjectify their subordinates.
3. **Emotional security and self-acceptance** are very important features of a manager's mature personality. The role of a manager is associated with many situations in which there is the risk and uncertainty of generating stress and frustration. A manager with a mature personality is able to understand their own emotions and manage them properly. This manager does not suppress bad emotions and does not behave defensively. Instead, managers accept emotions as an inevitable part of their role and try to take actions that will eliminate the sources of negative emotions. Self-acceptance helps managers tolerate their own deficits and accept negative emotions without falling into excessive self-criticism, depression, and without covering up their negative

emotions with aggression. A mature manager is able to build a sense of emotional security in their team, which they manage by means of open communication and accepting the range of emotions that result from the practice of managing a group of people.

4. **Realistic assessment of the environment and of others** is another feature of a manager's mature personality. Mature managers are characterized by common sense and adequate assessment of events. On the one hand, they do not exaggerate things unnecessarily; on the other hand, they do not underestimate the potential and achievements of other people. They can live here and now without running away into dreams and confabulations when difficult situations occur. Although they do not lack imagination, they do not use it for defensive purposes but rather to boldly create new visions and projects which are realistically adapted to the existing possibilities. Thanks to the proper assessment of situations and the proper assessment of their own and other people's capabilities, a mature manager perfectly copes with the unpredictability and changeability of the conditions in which they have to achieve business goals.
5. **Self-objectification** is another criterion of a manager's mature personality. It means perfect knowledge of both oneself and the motives that push one to action. It also allows a manager to have some distance to themselves, which makes it easier to accept failures or one's own deficits. This distance is also a prerequisite of a sense of humour, which is also a feature of a mature personality. Humour is an expression of the joy of acting and being here and now; it is a manifestation of sympathy for people nearby. A mature manager is far from being malicious, aggressive or cynical. However, a manager's objective perception of themselves and recognition of their own negative qualities do not constrain their self-esteem and self-assessment; instead, this is an impulse to work on their development. Any feedback they receive from others can be helpful in this process as, thanks to their good insight into themselves, they accept it without escaping into defence mechanisms. Instead, it inspires them to work on improving and developing their own personality. Such an approach allows a manager to manage people autonomously without being subject to the pressure and expectations of the environment.
6. **A unifying philosophy of life** is another feature of a mature personality. It refers to the consistency between one's consciously recognized system of values and the activities that are undertaken in everyday life or professional practice. Integrating one's own short-term and long-term goals with the professed system of values gives one's life a sense of meaning and importance. It also allows for greater consistency in actions and prevents changes caused by random, short-term motivations. Although a mature manager is willing to discuss their own views and actions, their unifying philosophy of life is consistent with their values and gives them their own unique specificity, which is noticed by the people in the surrounding environment. It is also visible in the decisions that they make in the day-to-day management of their team of employees.

Summing up, it can be concluded that the maturity of a manager's personality manifests itself in many different dimensions. The most important one is the ability to make independent decisions without fear of making a mistake and without taking into account the expectations of the environment. Moreover, a mature manager maintains warm relations with other people, in particular with their subordinates. There is no need to seek the favour of others or take action aimed at winning the approval of others. This should not be necessary as a mature manager has adequate self-esteem which is not vulnerable to criticism they might receive from others. They have a good insight into themselves, which allows them to maintain distance from their own emotions and everyday events, or even to react with a sense of humour. A mature manager does not strive to prove their perfection to others. Instead, they are able to accept the necessity to continue working on themselves and be responsible for their own mistakes. They live here and now and gain satisfaction from what they are and the world around them. Mature managers are gifted with great imagination and creativity, but they do not run away from everyday problems into dreams. A mature manager is emotionally stable. They do not hide their emotions and can manage them in a manner which is consistent with the rational requirements of their professional role. They have a sense of security, which means that in the event of failures or criticism from others, they do not react using defence mechanisms and can accept responsibility for their mistakes. A mature manager has a relatively permanent value system that gives meaning to their life and is also visible in their managerial activities (Kozak, 2011).

A mature manager, like every other human being, has strengths and weaknesses. However, what distinguishes them from immature managers is their focus on developing strengths. Thanks to that, they can strengthen their independent 'sense of self', which allows them to create a sense of autonomy and conduct while managing their team in a way that is independent of external expectations but in line with their own will. By acting on the basis of their autonomous motivation, a manager identifies with the actions taken, willingly takes responsibility for them, and acts with passion and expectation of success (Kozak, 2007).

Focusing on one's strengths has another important correlate. It turns out that such people cope with stress much better and function better in a changing and unpredictable environment, as well as under time pressure. Under such conditions, they can choose strategies that better serve the achievement of goals, including (Kozak, 2011):

- accepting responsibility for solving problems,
- looking for information, help, support,
- creating realistic action plans,
- focus on implementing plans and postponing any activities that conflict with them,
- optimistic attitude to action.

A manager with a mature personality constantly strives for success and believes that its achievement is possible or, with adequate effort, certain, or at least more likely than failure. According to Markowski (2003), characteristic features of success are:

- no reliance on luck – success is a consequence of planned and deliberate actions,
- considerable effort, including creativity and perseverance, is involved when trying to achieve success,
- the inevitable uncertainty of achieving a given goal,
- sense of satisfaction when a goal has been achieved.

Success may be related to achieving goals in one's job position or by the entire organization. However, it can also relate to the internal development of a manager and may be seen as their desire to do better than in the past. By looking back on their own development in the past rather than that of other people, a manager can identify their own huge internal motivation resources, and this does not require confrontations or comparisons with others. A mature manager's pursuit of success is characterized by a constant critical overview of the undertaken actions. Thanks to their high self-esteem and faith in success, a mature manager does not dodge the need to change decisions, which might be necessary in order to improve their operational efficiency. On the contrary, their behaviour is constantly subject to a process of self-regulation through observation and evaluation of the effects of actions, and, if necessary, immediate correction aimed at improving the achieved results (Kozak, 2011).

An important feature of a mature manager is their self-efficacy. This can be understood as the feeling that they can control their own behaviour in a way which facilitates meeting the requirements of a particular situation and achieving goals. A manager's belief in their own effectiveness largely determines their determination to make persistent efforts to overcome obstacles that hinder the intended result. Achieving success causes an increase in self-efficacy in the long term (Bandura, 1981; as cited in Kozak, 2011).

Bearing in mind the purpose of this article and the considerations described so far, it seems justified to point to a direct connection between the issue of a manager's personality traits and maturity, and the effectiveness of their actions.

Based on a large amount of empirical evidence, it may be concluded that, among many other factors, it is personality that seems to be the strongest element that determines the effectiveness of a manager's functioning (Hogan, Kaiser, 2010). Many researchers also flag the problem of apparently insufficient reference to personality factors when trying to understand managers' behaviours (cf. Hughes et al., 1996; Kraczlá, 2016).

It is worth emphasising that the complexity of the conditions in which managers are forced to perform the role they have been entrusted with requires a suitable personality, which can be perceived as an internal source of the effectiveness or ineffectiveness of action (Osmelak, 2008). Personality is the foundation upon which a manager should be able to build strong and effective employee teams, with the aim of achieving bold organizational goals (Osborne, 2015). This is why recognition of both a manager's root personality factors and aspirations to strengthen them – as part of the process of shaping a mature personality – are crucial in explaining a manager's behaviour and are a condition for successful outcomes of their actions.

5. Conclusion

The aim of this article has been to demonstrate the relationship between the maturity of a manager's personality and the effects the manager produces. It is an attempt to present this relationship by analysing various professional roles that a manager plays in a contemporary organisation. A particularly strong relationship seems to occur between the maturity of managers and the social roles they play, as these factors are gaining increased importance for and influence on an organisation's success.

Analysis of the effective performance of managerial roles, however, would be incomplete if a manager's personality were not addressed. As shown in the article, there is a close relationship between a manager's personality traits and the personality development that occurs in interaction with the social environment on one hand, and the efficiency and effectiveness in achieving set goals on the other hand.

The complexity of a manager's work and the diversity of their character, combined with major changes in the challenges faced by contemporary managers, mean that even favourable personality traits and their dynamic development through interaction with the work environment are not sufficient. It seems that a manager's mature personality significantly increases their chances of meeting these greater, more complex, diverse and changing expectations. Therefore, the last part of the article focused on the description of a mature personality and its characteristic features and change dynamics. A manager's personality maturity results in consistent behaviours which comply with the values that they themselves endorse; this, in turn, allows for their self-fulfilment in performing their managerial roles.

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MODELLING OF MANAGERIAL COMPETENCES IN HEALTH CARE UNITS – PRELIMINARY ASSUMPTIONS

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Purpose: The aim of the article is to present the theoretical assumptions of the model of managerial competences in health care units. It was assumed that competences are a multidimensional concept and require an integrated approach that allows for the construction of a competency model that reflects their real complexity. A list of managerial competencies will be presented, which will be subject to empirical verification in the course of future research by the authors in order to identify key competencies.

Design/methodology/approach: The proposed lists of managerial competencies (six domains) were created and are based on the analysis of healthcare competencies models – the study of the literature – and one of the Authors' observations of the analyzed entities (as a consultant).

Findings: Presented model of managerial competencies in health care units contains six domains with 32 competencies. These domains capture the dynamics and complexity of health care unit's manager's role and reflect the dynamic realities in health leadership today.

Originality/value: An identification the managerial competencies of health care units managers significantly shaping competences of such organizations especially relevant in pandemic time.

Keywords: managerial competencies, modelling, health care units.

Category of the paper: Conceptual paper.

Introduction

Nowadays, among all the resources, no longer financial capital nor technology, but people are becoming more and more important resources. Their attitudes, behavior, ability to perform actions in a certain way become key factors for organizations. In today's world determined by globalization, volatility, uncertainty and complexity competences allow organizations to adapt to the individual requirements of the market and customers and to gain a competitive advantage.

Also the fact that acquiring employees with specific competences is currently one of the main challenges for corporate executives and was identified in terms of significance as the third HR trend in 2017. Statistics confirm employee shortages and difficulties in filling positions around the world (Kupczyk, and Stor, 2017). This trend also applies to healthcare entities and will most likely continue.

Health care units, like most organizations, function in a very unstable environment, and are formed by the determination of factors which refer to both distal and near surroundings (mostly because of underfunding, staff shortage, operating a social mission resulting from the nature of these units, etc.). Aspects like patient orientation and demands, high standards of medical services performed and the escalation of the performance of these organizations within the budget add to a growth of the conditions for medical units. Therefore the awareness and competences of the personnel engaged within these organizations are becoming more and more essential, because growing needs are characterized to help the change of research results to clinical and administration practice and the upgrading of policy and legal implications in this area, which should fundamentally alter to better achievements in the needs of patients, as well as expanding the competitiveness of these units (Krawczyk-Sołtys, 2018b).

According to Polish health policy the main objective of health care units is to ensure patients effective healthcare by providing medical services, considering patients' values and expectations. Such approach requires appropriate professional competencies of the employees, managerial competencies managing these organizations, as well as organizational competences.

Competency identification systems need to identify both – personal (professional and managerial) competencies and organizational competences (Boam and Sparrow, 1992). This article is focused on identification the managerial competencies of medical personnel and managerial competencies of health care units managers significantly shaping competences of such organizations.

Even though multidimensional concept of competency is not explicitly formulated in literature in the field of management sciences (Elleström, 1997; Robotham, and Jubb, 1996) J. Winterton, F. Delamare-Le Deist and E. Stringfellow (Winterton, Delamare-Le Deist, and Stringfellow, 2006) have attempted to organize the definitions and classifications of competences on the basis of the world's literature. Yet, despite attempts to organize and classify concepts by different authors, there is no compatibility in the literature as to the interpretation of the terms “competences” and “competencies”.

The roots of the term in Latin, English, French and Dutch have been explored by M. Mulder (Mulder, 2007) who also analyzed different ways of perceiving competencies in different conditions from the 16th century. Summing up, the conclusion is that this term is often understood in two ways – not only as a skill or ability to do something, but also as having the possibility to do it.

For the first time the term “competency” was used in management sciences to identify the characteristics which distinguish superior from average managerial performance (Boyatzis, 1982). “Competency” (plural “competencies”) referred to underlying characteristic of an individual that is casually related to effective or superior performance in job. The research pointed out that there is a range of factors, not a single factor, that differentiated managers superior from average ones. This term refers to the set of resources held by the organization, related to the performance of activities leading to achieving goals by the development of adequate capabilities to perform tasks (Guallino, and Prevot, 2008).

In conclusion it can be stated that “competences” – stand for the general ability (holistic development orientation), and “competencies” are components of competence.

The issue of professional competencies was popularized by D. McClelland (Mc Clelland, 1973), one of the founders of the Hay McBer, who postulated that in the aspect of predicting the future efficiency of people's work, one should not study their intelligence but their competencies. The list of competencies that distinguished effective managers was a substantial contribution to the development of research on managerial competencies made by R. Boyatzis (Boyatzis, 1982). His competency model includes: goals of action, leadership, human resources management, focus on others, specialist knowledge. But the first one who noticed organizational competences was the precursor of resource approach – E.T. Penrose (Penrose, 1959). According to Penrose in order to gain a competitive advantage, not only the organization's resources are important, but above all – the skills to use them in processes. Another supporter of resource based view (RBV) R.M. Grant claimed that the resources and capabilities can be tangible, intangible and human. All of them are important for ensuring the success of the organization activity but the largest attention, both in theory and practice, is assigned to human resources (Wright, Dunford, and Snell, 2001; Pfeffer, 1994).

Currently, the role of competencies become more significant in the context of services market (Walsh, and Beatty, 2007), mostly human-based services, such as health care services.

The aim of the article is to present the theoretical assumptions of the model of managerial competencies in health care units. It was assumed that competences are a multidimensional concept and require an integrated approach that allows for the construction of a competency model that reflects their real complexity. A list of managerial competencies will be presented, which will be subject to empirical verification in the course of future research by the authors in order to identify key competencies.

Competences and competencies - interpretation of the concept

The term "competence" is classified as a "fuzzy" concept, which is largely due to the multiplicity of approaches and schools dealing with this phenomenon. As a result, there is no single universally recognized definition of competence. Among the components of competences mentioned in various terms, three are dominant: knowledge, skills and attitudes. However, they create 'flat' images and do not fully reflect what competence actually is. In response to contemporary challenges related to the use of competencies in everyday management practice, it becomes necessary to search for a multidimensional model of employee competencies.

Today managerial competencies are a subject of research throughout the world, a fact reflected by the huge number of publications on the topic. The managerial competency list is a basic managerial competencies management tool that enables the identification, realization assessment and development of necessary managerial competencies. The list can be used to identify competency gaps among management staff (Tyrańska, 2016). Along with that if we look at the health systems we can see that it's being confronted with rapidly increasing demand generated by the COVID-19 outbreak and more recently, the influx of refugees from war-torn Ukraine. A well-organized and prepared health system has the capacity to maintain equitable access to essential service delivery throughout an emergency, limiting direct mortality and avoiding increased indirect mortality. As this situation creates the challenge, managerial competences become even more important.

The competences of healthcare organizations may be acquired from different kinds of knowledge. Some of them rely on "know-how" – practical forms of knowledge obtained through incremental advancements to medical services and processes, another – on "know-why" – theoretical forms of comprehending that allows the creation of new kinds of services and processes. Different healthcare organizations competences come from diverse levels of activity: some are determined broadly from the capabilities of these entities to create and provide definite types of medical services, another is implied to come from the abilities to plan and organize resources in new and powerful ways, others mostly rely on the potential of managers to build up new strategies for creating organizational value.

As this article focuses on the identification of managerial competencies of medical personnel health care units, the proposed lists of those competencies were created and are based on the analysis of competencies models – the study of the literature – and the authors of this papers observations of the analyzed entities.

The article assumes that managerial competencies are a combination of skills, knowledge, attitude, and behavior that a person requires to be effective in a wide range of jobs, and various types of organizations, in addition, may be a source of sustained organizational performance (Abd-Elmoghith, and Abd-Elhady, 2021). These competencies are used and developed in the process of providing medical services in order to achieve results consistent with the strategic intentions of health care units (Krawczyk-Sołtys, 2018a).

Managerial competences in healthcare entities – models review

Regardless of the area of operation managers at all levels must make various decisions while solving problems of their organizations. There are many different tools to solve problems arising in organizations but the question of 'how to select an appropriate method' remains. And that is when managerial competencies become really useful.

There are several universal managerial competences, such as leadership, building know-how, developing external cooperation skills, optimal use of opportunities created by the environment, creating a phenomenon called "team mind", stimulating the learning process in the organization, fast and flexible designing new products and services, building good organization image.

The presented list of managerial competencies in health care units was based on literature studies and own observations in the analyzed entities.

The first model of the Competency Task Force, was proposed in 2002 by The Healthcare Leadership Alliance (HLA) – a consortium of major professional associations in the healthcare field grouping more than 100 000 managers. Competences are understood as transcendent unique organizational settings and applicable across the environment (Ross, Wenzel, and Mitlyng, 2002). Five competency domains were identified to determine management competencies and settle how they could be used to advance the field (Stefl, 2003; Stefl, 2008):

1. Communication and Relationship Management – capability to communicate with internal and external customers to build and maintain relations and interactions.
2. Leadership – capability to inspire excellence (individual and organizational), to create and attain a shared vision, and to successfully manage change to attain the hospital's strategic ends.
3. Professionalism – aligning personal and organizational conduct with standards including responsibility to the patient, a service orientation, and a commitment to learning and improvement.
4. Knowledge of the Healthcare Environment – understanding of the healthcare system and the environment.
5. Business Skills and Knowledge – capability to apply business principles including systems thinking, to the healthcare environment.

The second model created by The Global Consortium for Healthcare Management Professionalization (International Hospital Federation, 2015) called Competency Directory Model derived from HLA summoned the Competency Task Force and categorized the competencies into five critical domains:

- Leadership (including: Leadership Skills and Behavior, Engaging Culture and Environment, Leading Change, Driving Innovation).
- Communication and Relationship Management (including: Relationship Management, Communication Skills and Engagement, Facilitation and Negotiation).
- Professional and Social Responsibility (including: Personal and Professional Accountability, Professional Development and Lifelong Learning, Contributions to the Profession, Self-Awareness, Ethical Conduct and Social Consciousness).
- Health and the Healthcare Environment (including: Health Systems and Organizations, Health Workforce, Person-Centered Health, Public Health).
- Business (including: General Management, Laws and Regulations, Financial Management, Human Resource Management, Organizational Dynamics and Governance, Strategic Planning and Marketing, Information Management, Risk Management, Quality Improvement, Systems Thinking, Supply Chain Management).

The third model – National Center for Healthcare Leadership (NCHL) Competency Model was created during research with practicing health leaders by the Hay Group. It incorporates benchmark data from other health sectors and insurance companies, and complex leadership competencies. The NCHL Competency Model contains three domains: Transformation, Execution and People, with 26 competencies (National Center for Healthcare Leadership, 2005).

Transformation is the first domain, which means visioning, energizing, and stimulating a change process that connects communities, patients, and professionals and includes competencies such as: achievement orientation, analytical thinking, community orientation, financial skills, information seeking, innovative thinking, strategic orientation. Execution, the second domain, contains competencies such as: accountability, change leadership, collaboration, communication, impact and influence, information technology management, initiative, organizational awareness, performance measurement, process management and organizational design, project management. Creating an organizational climate that values personnel from all backgrounds and provides an energizing environment for them, leader's responsibility to understand his/her impact on others and to improve own and others capabilities are gist of third domain – people and competencies like: human resource management, interpersonal understanding, professionalism, relationship building, self-confidence, self-development, talent development and team leadership.

Personal Competence Framework was also used when constructing the list of managerial competences in health care units in Poland. It is based on the results of the Professional Competence Survey (JCS) and consists of 45 competences in six areas (Sanghi, 2010): intellectual, personal, communication, interpersonal, leadership, results-oriented. This model was also used in creating authors' managerial competencies list.

In the next model (Kvas, Seljak, and Stare, 2013) created on the basis of analysis of theory of nursing, leadership, competency models and the results of researches carried out between 2000 and 2006 in Slovenia 18 medical care specific behaviors were added to the behaviors characteristic of leadership in state administration. Three groups of competencies considered to be characteristic of leaders in nursing were developed:

- ethical/unethical behavior (priority is not given to relatives, acquaintances and colleagues, violations of nursing regulations are reported, patient privacy is protected, patient is informed about nursing activities);
- interprofessional relationship indicating a correct understanding of the position of nurses in the health care system and their relationship with doctors (cooperation and communication with doctors on equal footing, differentiation between nursing and medicine, knowledge of nursing and its role in the health care system, taking responsibility for the sphere of nursing in the health care team);
- attitude of nurse leaders to the education of their subordinates and their own education, such as knowledge of work in the management and economics/business fields, ability to communicate in foreign languages, knowledge of work with new technologies, knowledge of quality standards, encouraging education of co-workers.

It can be stated that over time not only has the overall level required increased but the factors important for success now include increased cognitive skills (use of influencing strategies and pattern recognition) as well as particular personal traits (self-confidence, initiative).

It should be stated that the importance of managerial style is not a new matter and has long been recognized. The approach taken by Hay-McBer has been to describe the six styles of management which indicates the various nuances and modulations in the way A influences B, with or without hierarchical power – the nature of management (Martin, 1994):

- Coercive: The “do it the way I tell you” manager who closely controls employees and motivates by threats and discipline.
- Directive: The firm but fair manager who gives employees clear direction and motivates by persuasion and feedback on task performance.
- Affiliative: The people-first, task-second manager who emphasizes good personal relationships among employees and motivates by trying to keep people happy with fringe benefits, security and social activities.
- Democratic: The participative manager who encourages employee input in decision making and motivates by rewarding team effort.
- Pace-setting: The “do it myself” manager who performs many tasks personally, expects employees to follow his or her example and motivates by setting high standards and letting individuals work on their own.
- Coaching: The developmental manager who helps and encourages employees to improve their performance and motivates by providing opportunities for personal development.

To coach effectively the manager must identify the gap between actual and desired performance, be aware of the upside of improvement and potential downside of no change; ensure the employees' commitment to change; provide the type of support needed to help the employee bringing about the desired improvement and work with the individual to implement a plan of action.

According to Lakshminarayanan, Pai and Ramaprasad there are six main competency categories: analytic skills, self-management, relationship management, self-awareness, goal and action management, social awareness. In each of those categories several specific competencies can be found (Lakshminarayanan, Pai, and Ramaprasad, 2016).

And so among analytic skills there are: appropriate use of concepts, systems thinking, recognizing patterns in assorted data, building theory for process improvement and troubleshooting, using advanced technologies, analyzing data quantitatively, social objectivity, clearly communicating important aspects of tasks and responsibilities.

Second category, which is Self-management competencies include: demonstrate self-control, behavior driven by achievement and motivation, display adaptability in a dynamic work environment, showcase transparency in all work-related issues, taking initiative, evince optimism in all situations.

Relationship Management skills are: lead by example, positively influence and motivate co-workers, effectively manage conflicts, be a catalyst to change, develop others, promote teamwork and collaboration.

Relationship Management is followed by Self-awareness category which includes: self-understanding, self-assessment and self-confidence in all situations.

The fifth category is Goal and Action Management, which include competencies such as: plan each task meticulously, continuously strive to achieve efficiency, pay attention to minutest details, exhibit flexibility with regards to process and solutions.

Finally last, but not least is Social Awareness with highlighted competencies like: show empathy, display continuous orientation towards service, be aware of organization's processes, policies and rules.

Also, managerial competencies can be compactly listed as: building teams, caring for subordinates, leadership, delegating, motivating, organizing, managing change, project and process management, strategic thinking (Bieniek, Steinerowska, 2014).

The Authors' study adopts a gap analytic approach to discover training needs through competency assessment. Results indicate incongruence in perceptions of current expertise and importance across four competencies: analytic skills, self-management, relationship management and goal and action management. Within these competencies, ability to analyze data quantitatively, display adaptability, positively influence and motivate co-workers, change management, planning and execution attract maximum importance. Multivariate analysis provides evidence of self-management, relationship management and analytic skills to be the strongest predictors of job performance. This implies that individual's ability to manage

emotions, handle uncertainty, manage conflicts, influence co-workers, recognize pattern through data, technology usage, apply quantitative skills and solve problems, contributes considerably towards effective job performance. This necessitates an urgency on the part of organizations to focus on managerial competencies to derive maximum performance from its managers. On the other hand for the organizations, at an operational level, such findings can offer precise insights into the competency or training needs.

It should be also noted that mentors play an important role in the clinical setting, and an effective mentorship program is crucial in ensuring well preparation of future healthcare professionals (Karacay, and Karadag, 2019). Mentor's role had to be found in mentoring practice in the workplace with assigned recourses and required education of nursing students' clinical practice (Pramila-Savukoski et al., 2020). According to research (Mikkonen, Tomietto, Tuomikoski, Kaučič, Riklikiene, Vizcaya-Moreno, Pérez-Cañaveras, Filej, Baltinaite, Cicolini and Kääriäinen, 2021) age, work experience, frequency of mentoring and having completed mentoring training were associated with higher competence different areas of mentoring. Experienced and educated mentors need to be chosen to conduct the important task of mentoring.

In the last of presented models it's Authors demonstrate twenty-four managerial competencies (Huping, and Wenxuan, 2013): understanding self and others, communicating effectively, developing employees, building teams, using participative decision-making, managing conflicts, managing info/critical thinking, managing information overload, managing core processes, managing projects, designing work, managing across functions, developing /communicating vision, setting goals and objectives, designing and organizing, working productively, fostering a productive work environment, managing time/stress, living with change, thinking creatively, managing change, building/ maintaining one's power base, negotiating agreement/commitment, presenting ideas. Their research results indicate that, except for communication skills ("communicating effectively"), the self and supervisors' assessments are statistically different, based on the tests. Also, what's interesting the research results indicate that, in general, subordinates considered themselves more competent than their superiors. These findings suggest neither self-evaluation nor position-based evaluation is reliable in assessing managerial competencies.

An original model of managerial competences in healthcare entities

The proposed model of managerial competences in health care units was created as a result of studies of the literature of the subject conducted by the Authors and many years of direct observations of Agnieszka Krawczyk-Sołtys (as a consultant) in these entities (Krawczyk-Sołtys, 2018a, Krawczyk-Sołtys, 2018b, Krawczyk-Sołtys, 2019, Krawczyk-Sołtys, 2021, Krawczyk-Sołtys, 2022).



Figure 1. Model of managerial competences in health care units. Source: own study.

Presented model of managerial competencies in health care units (Fig. 1.) was created by Authors basing on the assumptions of the models presented above. It contains six domains with 32 competencies. These domains capture the dynamics and complexity of health care unit's manager's role and reflect the dynamic realities in health leadership today.

First domain (Leadership Competencies) includes:

1. leadership abilities and behaviors (clear communication of mission, goals and priorities of the organization; including concepts, methods and management techniques to manage the organization, detecting and analyzing organizational problems, encouraging creative solutions and giving support to employees to co-decision, adopting a leadership role);
2. leading change (promoting permanent learning and organizational improvement, responding to emerging needs of change and leading change processes);
3. encouraging employees to creativity, innovation and development;
4. management skills (planning, organizing, motivating, controlling);
5. mentoring (age, work experience, frequency of mentoring and having completed mentoring training).

Among the second domain – Communication and Relationship Competencies – were distinguished:

1. relationship management (showing correct interpersonal relations and the ability to maintain them in relations with all stakeholders, horizontal and vertical cooperation skills, openness, patient orientation);
2. communication skills (oral communication, written communication, listening, business communication - business reports, schedules, presentations, presenting analysis results in a reliable and understandable way for stakeholders, public relations);

3. facilitation and negotiation (conflict management through mediation, negotiation and other methods of conflict solving, improving problem-solving skills, building interdisciplinary teams established to solve organizational problems and participate in them);

The third domain – Professional and Social Competencies – introduces:

1. professionalism (promotion and participation in health policy initiatives, protection of patients' and their relatives rights and responsibilities, care for the quality of medical services and safety and social commitment in providing them, support and mentor high-potential talent within both one's organization and profession of healthcare management);
2. professional development and lifelong learning (commitment to self-improvement, reflection and personal development);
3. contributions to the development of management in health care (sharing knowledge and experience, developing others through mentoring, consulting, coaching and personal mastery, support and mentoring for potential talents);
4. awareness of goals, values, strengths and weaknesses (both in self-assessment and on the basis of the opinions of others);
5. ethical behavior and social awareness (demonstrating ethical behavior, transparency and responsibility for actions, balancing personal and professional responsibility, recognizing the most important need of patients and society);
6. ability to recognize common interests on organizational scale – empathy – ability to cooperate with people and have an effective influence on them – serving its interests and dignified representing the organization outside – ability to choose people for key positions in the organization.

The fourth domain – Cultural Competencies in health care tends to be seen as a way to increase access to quality care for all patient populations and as a business imperative to respond to diverse patient populations and attract new patients and market share (Betancourt, Green, and Carrillo, 2002) and can be described as follows:

1. creation of an organizational culture based on mutual trust, transparency and focusing on improving the quality of provided medical services (encouraging teamwork, supporting diversity, encouraging a great involvement of employees, openness to views, opinions and ideas of others, care for subordinates development, tolerance, raising trust);
2. the ability to provide care to patients with diverse values, beliefs, and behaviors, meeting patients' social, cultural, and linguistic needs;
3. delivering the highest quality of care to every patient, regardless of race, ethnicity, cultural background;

4. removing barriers, such as different perspectives on health, medical care, and expectations about diagnosis and treatment;
5. supplanting the current one-size-fits-all approach with a system more responsive to the needs of an increasingly diverse population.

The fifth domain – Sectorial competencies (concerning the health care system and its environment) involved:

1. knowledge of the functioning of the health care system and entities of this system (understanding the structure of the health care system, financing mechanisms and organization of medical services, balancing the interrelations between access to medical services, their cost, quality and allocation of resources, care for the health needs of society, perception of the managed organization and its effectiveness as a part of the health care system, using of monitoring systems to ensure the legality, ethicality, safety and highest quality of medical, administrative and business aspects of the managed organization, promoting and creating alliances and networks – both in the health sector and cross-sectorial, on national and global scale);
2. ability to optimize employment in the organization (taking into account the health needs of the society, shortages of medical staff, the scope of specialization);
3. personalizing health care (recognizing and promoting the opinions of patients and their relatives about health care, respecting the comments and opinions of patients, their relatives and public opinion in making decisions related to health care, taking into account cultural differences and respecting individual expectations);
4. public health competences (promoting disease prevention, promoting health and physical fitness through organized efforts for environmental hygiene, control of infectious diseases, spreading the principles of personal hygiene, organizing medical and care services for early identification, prevention and treatment, and developing such social mechanisms that will provide everyone with a standard of living enabling them to preserve and strengthen their health, the ability to use basic statistical data and basic health indicators to make decisions and analyze population health trends, risk management and risks during disasters and crises, evaluate key processes of the public health surveillance and control system, recognizing the local implications of global health events, understanding the interrelations of factors affecting the health situation of society).

In the sixth domain – Business Competencies – were described as:

1. knowledge of basic business practices and the ability to manage projects (creating an effective management system and its permanent improvement, collecting data and information, analyzing them and making the right decisions);
2. strict adherence to procedures, regulations and legal norms as well as the ability to create internal regulations on their basis;

3. financial management (effective application of accounting principles and financial management tools, budgeting, cost accounting, planning, organization and monitoring of the organization's resources to ensure the highest quality of medical services provided);
4. human resource management (analysis and planning, recruitment, selection, adaptation, motivation, assessment, staff improvement, coaching and mentoring, talent management);
5. strategic management (setting a vision and/or mission, determining the direction in which the unit should be aim to, analyzing the environment in order to identify existing, future or likely future opportunities and threats, analyzing resources and organizational skills, to establish its strengths and weaknesses, creating conditions and resources to take action to exploit emerging opportunities to succeed making on these grounds the selection of the most favorable strategy as well as the proper way of implementing the strategy chosen for implementation);
6. information and knowledge management (skillful using of data to evaluate effectiveness and monitor indicators and trends, ensuring compliance with applicable privacy and security requirements, creating and improving information management systems, creating and improving knowledge management systems, implementing key knowledge management processes: locating knowledge, its acquisition and developing, supporting for knowledge sharing and dissemination, using of knowledge and its preservation, implementation of knowledge strategy);
7. risk management (effective risk assessment and analysis as well as its reduction);
8. improving the quality of medical services (development and implementation of quality assurance programs, patient satisfaction and safety in accordance with applicable standards, development and monitoring of indicators for measuring the quality of medical services, patient satisfaction and safety, permanent improvement of the quality of medical services);
9. systems thinking (holistic understanding, not separate components, ability to perceive and analyze processes through the holistic view, noticing mutual relations and connections, and identifying the principles of the health care system).

Managerial competences seem to be crucial for recognizing the needs of the organization itself and its environment, as well as following new challenges and opportunities to deal with them.

Conclusions and Further Research

It is worth emphasizing once again that it is people and their knowledge and skills that are considered the key resource of the organization. There is also a clear shift of emphasis on the qualitative aspects of human resources as strategic element of the functioning of organizations that strive to develop the competencies of their employees. At the same time, the employees themselves acquire and improve competencies, thus increasing their value and importance on the labor market. This trend is a response to the increasing requirements for both employees and employers.

Relating to the health care units the competences of those organizations result from the people involved in the process, their skills and behaviors, in other words - their competencies. The achievements of such organizations (on top of the arrangements and actions that regulate them) come from the bodies who are connected to the process, the competence they undependably and together have to possess, and the attitude they have to implement (individually and interactively) to employ the process – their competencies (Krawczyk-Sołtys, 2019; Parker et al., 2020). Their importance in the management of health care units is becoming more and more noticed (Hein and Riegel, 2012) and is broadly highlighted in the literature on the subject (Liang et al., 2018; Leggat et al., 2011; Bartram et al., 2012; Clark, Armit, 2010; Richtie, Yen, 2013; Lewandowski, 2017).

Researchers and experts work in competency area shows the definite skills enforced by present medical staff to be more conscious of patient's needs (Halpern et al., 2001; Committee on Quality of Health Care in America, Institute of Medicine, 2001; Lewin et al., 2001; Mead and Bower, 2000; O'Neil, 1998; Stewart, 2001). That trend includes dividing power and duty with patients and caregivers; interacting with patients in a shared and entirely open manner; allowing for patients' individuality, introducing emotional requirements, ethics, and life issues; applying approaches to relate to those who can look after themselves, imposing approach which support the wider community, strengthening prevention and popularizing health. That includes personal protective equipment provision to health care employees during the pandemics. The research results (Krawczyk-Sołtys, 2021; Krawczyk-Sołtys, 2022) indicate that extra operational resources provide a significant role during a pandemic in reference to an initial estimation and pilot function. This is possible to aid to relieve not only the emergency services but also the medical facilities in charge of providing further care. The regulated dispatch query allows the connection with the applicable codes from the low-priority operational spectrum and support by a Tele-emergency physician lends extra professional competency to the emergency paramedics (Breuer et al., 2020; Dahmen et al., 2021; Gibson et al., 2020). The intension surmises proper competent competencies of the personnel employed in these units, managerial competencies regulating these institutions, as well as managerial competences.

As it was stated before, health care units function in constantly changing environment, some of the competencies are crucial in the terms of managing those changes. G. Boak in his research (Boak, 2008) defined seven competencies important in this process:

- Understanding complex social systems – an ability to understand the workings of the complex systems that make up health and social care (professional and social competencies).
- Achieving results – a concern for achieving sustainable results, usually directly and explicitly related to patient care, which was accompanied by skilled actions to seek potential improvements and to make progress in bringing them about (business competencies).
- Working collaboratively – the willingness and ability to work well with others (Leadership competencies and mentoring as well as communication and relational competencies).
- Understanding the perspectives and motivations of others – the ability to see situations from another person's point of view (cultural competencies).
- Establishing systems and structures – the ability to establish or adapt systems and structures effectively (sector competencies and business competencies).
- Orchestrating the team – the ability to work interdependently with one's immediate team to tackle issues and problems (Leadership competencies and mentoring as well as communication and relational competencies).
- Self-belief and self-management – the ability to remain self-confident in the face of difficulties, and to take action to develop oneself (professional and social competencies).

As we can see, managerial competencies can be considered as key factors in managing change as well as in every day functioning of health care units. Therefore, the following recommendations can be formulated (Abd-Elmoghith and Abd-Elhady, 2021):

1. Managerial competencies should be introduced during the development of curricula for medical students.
2. Health care units' managers should update their leadership competencies through ensuring that things are done right, and transfer of adequate knowledge, skills, and competencies through directing the work of other staff, in addition to have control over the work performed, exercises; examination and evaluation of staff performance.
3. Orientation training program for health care managers should be developed and should regard leadership, management functions and skills, and how to deal with different situations.
4. Opportunities for managers to practice leadership responsibilities should be provided as well as possibilities to master interpersonal skills.
5. Health care units' managers must be given appropriate and relevant knowledge, skills, and attitudes through leadership and management training to enable them to develop these critical competencies.

The issue of competencies and their importance in the management of healthcare entities arouses more and more interest, especially in the period of a pandemic. Yet, this area is not fully developed. Therefore, it seems necessary to conduct empirical and literature research in this area, which will enrich scientific knowledge, rationalize the research methodology, as well as allow to formulate recommendations for practice.

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CORPORATE GOVERNANCE AS A TOOL SUPPORTING MANAGEMENT DURING A CRISIS

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Purpose: The purpose of this paper is to show that the code of good practice and the recommendations concerning CG – corporate governance in listed companies, through increased transparency, can be a tool supporting management in the period of crisis.

Design/methodology/approach: The article is based on a critical analysis of the literature, mainly in the field of corporate governance, current press publications, as well as an analysis of secondary data of listed companies in the period June-September 2021.

Findings: The considerations presented in this paper show that CG can be perceived as a tool supporting management, especially in times of crisis which will enable the company to have better transparency. The principles contained in the code of good practice will serve as recommendations for companies in the CG area.

Research limitations/implications: The pilot study performed among all listed companies showed high compliance with companies with regard to the completion of the declaration on the use of CG in the light of the amended guidelines in 2021.

Practical implications: The presented considerations are partly theoretical but are supplemented with the results of the analysis of the actual activities of entities in the area of governance during the crisis. They can be useful in practice for managers of various enterprises because they present the tools of CG that can be effectively used to improve the functioning of a company in a crisis.

Social implications: Presenting governance in this light may raise greater interest in the concept. Its application in practice may have multifaceted beneficial social, economic, and even environmental consequences.

Originality/value: The study shows a specific approach to the issues of CG. It is not only a well-perceived code of good practice but above all a tool supporting management and recommending solutions to companies in a specific time of crisis. The paper fills the cognitive gap in the studied area.

Keywords: corporate governance, code of good practice, COVID-19.

Category of the paper: Viewpoint, General review, Research.

1. Introduction

In many areas of management, the experience of the financial crisis and the continuing economic slowdown is becoming a motivation to seek solutions and take actions aimed at restoring the growth of the economy and the development of societies. Corporate governance (CG), which is a set of mechanisms controlling and motivating shareholders and managers to build the company's long-term value is one of the areas where recipes for improving competitiveness are sought.

The modern market is dynamic, even chaotic, and recently, especially uncertain as a result of global changes caused by the Covid 19 pandemic. Therefore, the achievement of goals and changes in the organizational reality is accompanied by the need of stabilization and unchangeability of the basic rules of the organization's functioning. This results in an increase in the importance of non-economic aspects in management, as the issues of ethics and social responsibility are perceived by modern companies as sources of competitive advantage, while recognizing, at the same time, the supremacy of activities aimed at increasing the company's market value as the most important canon determining the company's operating strategy (Kwiecień, 2014). This statement provides the basis for presenting the concept of corporate governance as a tool that can improve the functioning of entities in a period of crisis (Donthu, Gustafsson, 2020; Susskind, Vines, 2020; Sachs, Horton et al., 2020; Parker, 2020).

The aim of this paper is to show that the code of good practice in the area of corporate governance and its recommendations for listed companies, through increased transparency, can be a tool supporting management in times of crisis.

The paper presents their versions from 2021 and their application in Polish companies that first implemented them in their reports. The research method used is the analysis of the content of the declarations of the studied 426 listed companies, especially with respect to the level to which they include the information specified in the scope of DPSN2021. The presented results are in line with the trend of research conducted in the area of corporate governance, contributing to the indication of recommendations supporting management in the period of crisis. The paper deals with current issues, while shedding light on the practices of listed companies that apply the principles of DPSN2021 (Best Practices of WSE Listed Companies, 2021).

The acquired knowledge may help other organizations consider the implementation of codes of good practice as recommendations in the area of corporate governance as they constitute a tool that can support management in times of crisis. It will enable greater transparency of the GRI organization in its sustainability reporting and will be useful for people dealing with this type of reporting. So far, in the Polish literature there has been little empirical research which comprehensively explore GRI reporting practices, the information about which is included in this paper. The research results may also constitute a starting point for further, more in-depth research in this field.

Thus, the assumption is made that the inclusion of the elements of corporate governance in management structures builds confidence in enterprises and becomes a prerequisite for achieving their goals in an uncertain environment, as well as it increases their chances of surviving the crisis. This was confirmed by a pilot study conducted on all listed companies (sample of 426) in the analyzed period of June-September 2021.

The analysis of good practices applied by all companies listed from June to September 2021 on the Warsaw Stock Exchange which were subject to this study was the source of the arguments.

2. Determinants of including the concept of governance in company management during the crisis

The turmoil on international markets observed in recent years, the economic crisis caused by the pandemic as well as the desire to ensure the stability of the financial market and foster economic growth have become an impulse to search for determinants to increasing the competitiveness of economies, while at the same time eliminating threats with a complete range of consequences resulting from them. In such circumstances, the discussion on effective management with the use of practices of corporate governance which considers the needs of all stakeholders from both the micro and macro environment is raised more often. At the same time, it is assumed that the effects that can be achieved in this way are beneficial for the entities that implement them and comply with them because they increase the level of trust in entities and affect their competitive position while increasing the valuation of the entire enterprise.

During the previous financial crisis that started in the United States in 2007, and which over time turned into a global economic crisis, opinions occurred that corporate governance had failed, and became one of the causes of the global financial crisis (Samborski, 2011, p. 233). Not only the effectiveness of the shareholder value concept (which is the basis of CG) was questioned, but also the economic and social sense of the whole concept (Aluchna, 2014).

The situation is different now. The spread of the coronavirus has contributed to the greatest economic crisis in recent years, which caused a sharp slowdown in economic activity in Poland and around the entire world affected by the pandemic. Thus, COVID-19 ended the longest boom in world history (Stravinsky, 2020; Donthu, Gustafsson, 2020; Susskind, Vines, 2020; Sachs, Horton et al., 2020; Parker, 2020).

Uncertainty occurred. Many industries were closed or had to significantly reduce their operation. Investors suspended the planned transactions and withdrew from the ongoing negotiations. Maintaining liquidity and, in some cases, the struggle to simply maintain business became a priority (Gałązka, 2020). In this situation, in many cases, the thought about the development of the enterprise was replaced by thoughts about survival and the search for

an answer to the question of how to do it? An exceptional mobilization of managers and employees was observed (JK, 2021). In this situation, the ways to overcome this unfavorable situation were sought, and changes in the management of entities proved to be one of the ways. Non-economic values and relations with the environment are of great importance for the functioning of entities in times of crisis, and in this area, CG may be of great importance.

Management as a continuous process refers to controlling the overall operation of an enterprise – its development or behavior in the environment (Olejniczak, 2012). However, there are some discrepancies in management methods, which relatively distinguish enterprises, and are determined by a different corporate culture, as well as compliance with the norms and values of business ethics in management (Łukasik, 2012). S. Ghoshal, Ch. Barlett, P. Moran (1999) emphasize that the new role of management cannot be created on the narrow economic assumptions of the past, but should consider the following facts:

1. modern enterprises are the main economic actors creating value and supporting economic development,
2. the growth and development of companies depend mainly on the quality of management,
3. a new "moral contract" between employees and society is the basis for the operation of a modern enterprise.

Thus, the enterprise can effectively conduct its business activity on the market, contributing to generating profits and increasing the value of the enterprise, while adhering to the moral and ethical principles that proved to be especially important in the crisis and could help maintain the market position.

Such an approach to management is compliant with the "3 E" rule, i.e., the effectiveness, efficiency and ethicality of the company's activities as values that are dependent on each other (Olejniczak, 2014). This concept confirms that a modern corporation is not only an economic institution but also a social institution. Its aim is therefore not only to maximize value for investors but also to maximize value for other interest groups (Jeżak, 2010, pp. 120-126). The idea of corporate governance is perfectly in line with such a concept of the functioning of entities and can be effectively used to improve the situation of an entity in a difficult, crisis market.

3. The essence of corporate governance – the soft aspect of management in the period of crisis

The idea of corporate governance seems to perfectly correspond to the needs of businesses and entire markets in times of crisis, as corporate governance consists in finding such a way to maximize wealth creation that does not overburden the entire society with inappropriate costs.

It is therefore an attempt to find a golden mean – a solution that would reconcile the financial aspirations of business entities with the expectations of stakeholders directly involved in its operation while maintaining the good of the whole society (Monks, Minow, 1996, p. 162). It is a perfect solution for the market where everyone is affected by the negative effects of the pandemic crisis.

Corporate governance is perceived as an element of a larger system of interrelations covering the legal or financial system, or as a subsystem of relationships between various areas linking elements of law, politics, economy, and the functioning of society. Regardless of the perspective, CG is perceived as activities that are reduced to overcoming collective problems and reconciling the interests of various parties (Adamska, Bohdanowicz, Gad, 2018; Wierzbicka, 2018; Aluchna, 2015; Adamska, Mesjasz, Urbanek, 2016; Mesjasz, 2011; Roszkowska, 2011; Jezak, 2010; Oplustil, 2010; Lis and Sterniczuk, 2005). Moreover, it is a very important aspect of the CG concept that the so-called good practices are the result of research conducted by organizations at the international and national levels, and the documents and codes created in this way do not constitute legal provisions and have no binding force but are only sets of recommendations (Blejer-Gołębiowska, 2010, p. 56). Defined good practices are not imposed on anyone and are not obligatory. They express values worth protecting and promoting, developed with the participation of the market and recommended to it by the market (Nartowski, 2016, p. 4). Their use is voluntary and reflects well on the entities that decide to comply with them.

Such an attitude is the basis for creating trust in an entity that declares and effectively applies the principles of governance, and trust is nowadays a key factor in creating relationships in modern business. Therefore, this category appears in considerations that seek the answers to the following questions: – what factors determine the company's success? – what stimulates the development of an organization nowadays? – what is the substance of a modern organization?

The company's transparency is now the key to building trust. It means sincere information about what is happening in the company, talking about difficulties and successes. Transparency makes the organization more honest because more of its members understand the essence of its activities (Bennis, Golemann, O "Toole, 2008). Furthermore, corporate governance also covers the structure through which the company's goals, the means of achieving these goals, and the means to track the company's performance are set (OECD, 2004). The main goal of good practice is to strengthen transparency in business. In this situation, the relationship between trust in the company and compliance with corporate governance rules seems obvious. Trust and transparency are closely related to each other and have an impact on the perception of the entity and its relationship with the environment.

According to the Edelman Trust Barometr report for 2021 (Edelman Trust Barometr, 2021), out of the four analyzed types of institutions, the only business recorded an increase in trust in the pandemic year (by 2% vs. 2020). The respondents indicated that they trust enterprises more than governments, the media, and even non-governmental organizations. This is considerable

confidence in this sector, which is related to the expectation that transparent social activities of enterprises during the pandemic will not prove to be incidental and will be continued in the coming years. This can be perceived as a premise for accepting the relevance of the statement that the application of the principles of governance is a management support tool that contributes to increasing confidence in business and supporting its activities during a crisis, especially during a pandemic.

The survey shows that business is not only the most trusted institution among the four studied but also the only trustworthy institution with a trust level of 61% in the world, as well as the only institution perceived as both ethical and competent (Edelman Trust Barometr, 2021). The high expectations towards businesses that concern with dealing with and solving today's challenges have never been more apparent.

It became clear that the functioning of the market requires the trust of not only large but also small investors, and broken trust in enterprises can seriously destabilize the entire system. This situation may also be influenced by recent years, which indicate the emergence of a new trend of increasing the transparency of companies through additional information disclosed in their annual reports. This is fully in line with what stakeholders currently expect, including investors, creditors, and other asset management institutions around the world. These companies expect additional information on environmental and social data, and above all in the area of management, i.e., those related to corporate governance. The consultations conducted at the request of the Warsaw Stock Exchange clearly show that the majority of global companies managing assets strive to fully include the indicated criteria in the investment process, which should affect the process of reporting by companies and response to global crisis phenomena.

The COVID-19 pandemic as a global phenomenon has made everyone aware of how much people and their actions affect the natural environment. Stock Exchanges around the world, as entities responsible for organizing trade, are most predisposed to respond to the changing needs and obligations in these areas. Warsaw Stock Exchange is also one of them. This is done by supporting sustainable investment, increasing its transparency, and building confidence in the capital market.

The European Union developed corporate governance regulations that have been successively implemented into the legal orders of the member states, including Polish regulations of a "soft" and "hard" nature (Gad, 2018, p. 39). The provisions of the Good Practices of Companies Listed on the Warsaw Stock Exchange require that each company declares in the annual report whether it applies all the rules or not. If some rules are not applied, the company is obliged to state the reasons for such a derogation (Ignys, 2017, p. 85).

The issue of good practices that requires a comment is the question of their freedom of application. According to the research, freedom in complying with the principles of codes of good practice, which companies do not have to agree to follow, and what is more, they can boycott the entire document, as well as selected recommendations, corresponds to global

practice, which shows that companies that are co-authors of good practices mostly apply the formulated rules. This approach is based on the conviction (confirmed by many empirical studies) that in the long term companies that adhere to the developed principles are better perceived by the market and seen as safer. It is worth adding that reputation in the capital market is of utmost importance. As a result, the companies are rated as those that better protect investors' interests, have lower risk, and can bring more value to shareholders. According to research conducted in many countries, companies following good practices record better results and increase value for shareholders.

The Best Practices of WSE Listed Companies, as a set of corporate governance principles and rules of conduct that affect the relationship between listed companies and their market environment, are a crucial element in building the competitive position of these companies and significantly contribute to strengthening the attractiveness of the Polish capital market. The application by companies of the corporate governance principles contained in the Best Practice of Listed Companies is voluntary, however, informing about their application is the responsibility of each listed company, provided for in the WSE Rules. The BPLC2021 collection is the result of the work of experts who are members of the GPW Corporate Governance Consulting Committee, which represents the interests of various groups of capital market participants. This is another version of the set of corporate governance rules applicable to companies listed on the WSE Main Market since 2002. The "Best Practices of WSE Listed Companies 2021" and the related disclosure obligations became effective on July 1, 2021. WSE-listed companies should publish information on the current state of application of the principles of BPLC2021 by the end of July 2021, therefore the authors analyzed the companies in detail after that date.

Stock exchange issuers should cooperate with the Stock Exchange in this respect, providing, upon its request, information enabling verification of both the very explanations and the state of application of the BPLC2021 rules. The companies' care for the best quality of corporate governance will contribute to strengthening communication with stakeholders.

Declarations of companies from the Warsaw Stock Exchange regarding compliance with the code of "good practices" of listed companies in Poland, which is BPLC2021, are presented in figure 1. This figure presents the results of a pilot study on company statements regarding compliance with corporate governance principles in the version proposed by the stock exchange¹.

¹ The statements of the companies were checked on the websites of the WIG-20 sub-index companies, on the website of the Stock Exchange, and in particular in the EIB reporting system. Relatively often companies do not publish them or present them in outdated versions. Information on this subject can be found in the reports of the general meeting of companies, supervisory boards of companies, management board reports and annual reports. This document is available on the WSE website, in the thematic portal devoted to corporate governance issues, and due to lack of space, it is referred to in the paper by referring to the document posted on the website of the Warsaw Stock Exchange (WSE, 2021).

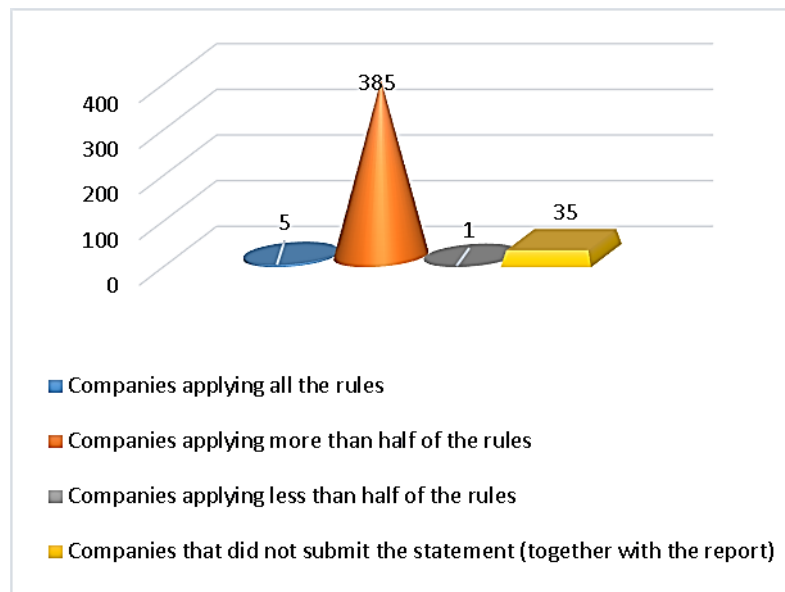


Figure 1. Compliance with corporate governance rules in companies listed on the WSE in Warsaw. Source: own study based on declarations of companies.

The disclosure obligations of listed companies with regard to the application of the principles of corporate governance are specified in the Stock Exchange Regulations. Each company is obliged to publish up-to-date information on the application of individual rules in the manner specified by the Exchange Management Board. If any of the rules is not followed by the company, the company should explain the circumstances and reasons for this in the disclosed information. The explanations should be exhaustive enough to provide a factual explanation of the reasons for not applying a given rule and allow for an assessment of the company's approach to the application of the Best Practices and care for a high level of corporate governance. Regardless of the above, an incidental breach of the principle, despite the previously submitted declaration of its permanent application, results in the company's obligation to immediately inform about this fact, which will increase the company's transparency in the eyes of interested stakeholders.

In the light of the above considerations, an attempt was made to analyze the situation of Polish listed companies declaring and applying in practice the principles of "soft" CG law in order to verify whether the management of entities based on these principles supported management and, thanks to the developed trust, strengthened the effectiveness of these entities during the pandemic crisis.

Based on the presentation of corporate governance data, the level of "good or bad practices" applied by companies can be assessed in public companies listed on the Warsaw Stock Exchange. The subject of the study was the practices of listed companies as applied on the basis of BPLC2021², i.e., based on the so-called "Soft law". The study was conducted on the

² With the entry of BPLC2021 (Code of Best Practice for WSE Listed Companies 2021) into force, the principles of informing about the application of Best Practices, set out in § 29 of the Stock Exchange Regulations, were also changed. The companies inform not only about the permanent non-application or incidental violation of the

population of 426 public companies listed on the Warsaw Stock Exchange in the period from June to December 2021, and more precisely in the first year of their application, which was also the second year of the pandemic.

In the course of the research, the answers to the following research question were especially sought:

- Have the companies complied with the fulfillment of the requirement to publish information on the current state of application of the BPLC2021 rules by 31.07.2021?
- Do listed companies respect, and if so, at what level, the rules set out in BPLC2021, i.e., do they comply with the requirements of the so-called "Soft law"?
- Which areas of BPLC2021 are considered by listed companies as the most important in their assessment?

The inspiration to analyze the indicated problem was the observation of achievements of public companies in social areas and the assumption that the issuers are more advanced in the implementation of codes of good practice in the area of corporate governance, which may become a tool of management support in times of crisis.

The study covered corporate documents available in the public domain, both on the website of the Warsaw Stock Exchange and on the websites of investor relations of companies. The analyzed documents included:

- company statutes, available on the website of the Warsaw Stock Exchange,
- statements on the implementation of corporate governance principles, i.e., the application of the principles of the code of good practice at the Warsaw Stock Exchange, constituting an element of the company's annual report and available on the companies' investor relations websites.

The principles of corporate governance adopted in the formula of the so-called codes of good practice are based on the principle "comply or explain" and are transformed into legal provisions over time. Therefore, areas that were regulated by separate provisions of acts, including those that fell within the scope of the act on statutory auditors or the act on public offering were removed from the set of Best Practices of Listed Companies 2021.

rule, but also publish comprehensive information on the application of the rules. Amendments to the Stock Exchange Regulations result in the necessity to publish a report on the scope of application of the Best Practices by all listed companies under the name "Information on the state of application by the company of the rules contained in the Code of Best Practice for WSE Listed Companies in 2021". In order to ensure current updating of this information the Stock Exchange Rules oblige companies to publish information about a change in the scope of application of the rules or the occurrence of circumstances justifying a change in the content of explanations regarding the non-application or the manner of applying the principles of Best Practice 2021. Thanks to the changes in the scope of disclosure obligations of companies, the presumption that the company has not published any report will no longer be justified on the basis of the Stock Exchange Regulations, which means that it applies all the rules.

Therefore, the pilot study covered all companies listed on the Warsaw Stock Exchange in June-September 2021. It checked whether they comply with corporate governance principles, informed about this fact in the statement on the application of corporate governance, and if so, whether they did so in 6 areas of general principles in accordance with BPLC2021 which cover:

1. Information and Investor Communication Policy.
2. Management Board and Supervisory Board.
3. Internal Systems and Functions.
4. General Meeting and Relations with Shareholders.
5. Conflict of Interest and Related Party Transactions.
6. Remuneration.

Therefore, Figure 1 presents a sample of 426 companies from the Warsaw Stock Exchange and their decisions regarding the fulfillment of 6 general principles in accordance with BPLC2021.

The research results presented in figure 1 show the division of the examined sample of 426 listed companies, by the completion of declarations related to the fulfillment of corporate governance principles:

- companies applying all the rules – 5,
- companies applying more than half of the rules – 385,
- companies applying less than half of the rules – 1,
- and companies that did not submit the statement (together with the report) – 35.

Figure 1 shows that only 35 companies did not submit a report, which is only 8% of the surveyed population. However, when it comes to the number of companies that complied with all 6 principles and objectives set out in them, there were only 5 such companies, which is over 1% of the surveyed sample. Over 90% of the surveyed population of listed companies, as many as 385 respect more than 50% of the principles and goals defined in BPLC2021, i.e., they follow the rules of "soft law", which thus indicates high compliance among companies. This part of the study answered the first two research questions, i.e.:

- Did the companies comply with the fulfillment of the requirement to publish information on the current state of application of the BPLC2021 rules by 31.07.2021 – they complied despite the ongoing pandemic.
- Do the listed companies respect, and if so, at what level, the rules set out in BPLC2021, i.e., do they comply with the requirements of the so-called "Soft law" – yes, they do, showing high compliance, because as many as 385 companies out of the surveyed sample of 426 companies respect these rules, which represents 90%.

On the other hand, the third interesting issue is the question of how companies perform these activities and which areas of BPLC2021 are considered by listed companies as the most important in their assessment. The answers are presented in Figure 2.

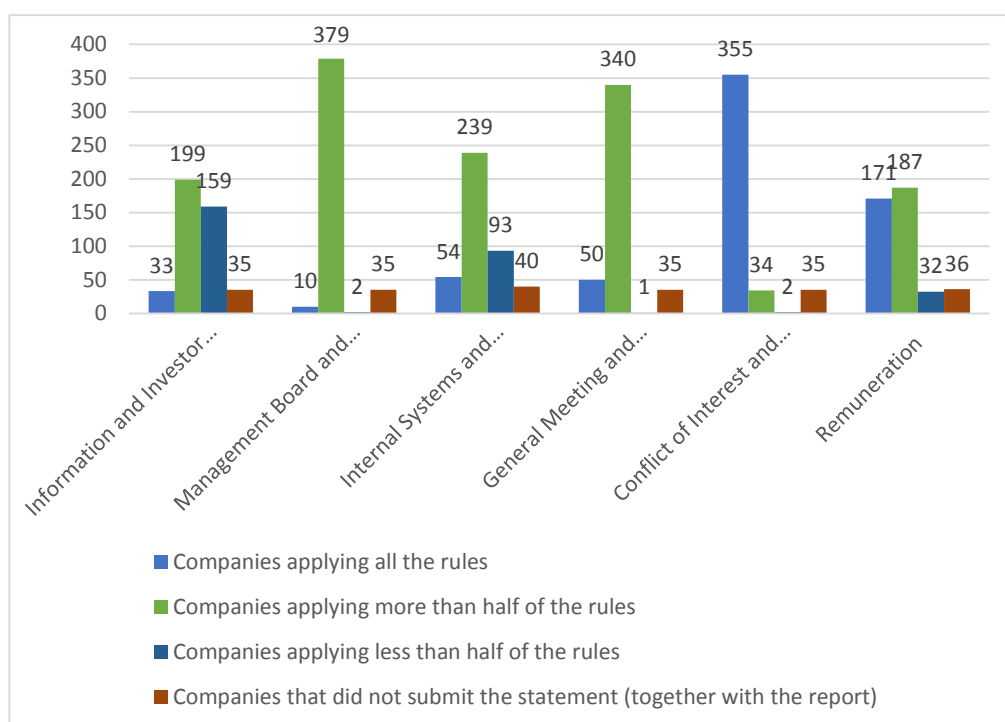


Figure 2. Level of respect for the corporate governance rules on the Warsaw Stock Exchange³. Source: own study based on declarations of companies.

Figure 2 presents the level of compliance with 6 corporate governance rules by listed companies on the Warsaw Stock Exchange. These principles and their goals result from the BPLC2021 code and may constitute a recommendation for a tool supporting management in times of crisis. Figure 2 presents the results of the study on company statements regarding compliance with corporate governance principles in the version proposed by the stock exchange. The companies' statements were checked in the EIB reporting system, available on the Stock Exchange website.

Rule No. 1 Information and Investor Communication Policy of BPLC2021 applies to all market participants who, for their own purpose, ensure proper communication with stakeholders, pursuing a transparent and reliable information policy. The level of respect for this area is as follows:

- companies applying all the rules – 33,
- companies applying more than half of the rules – 199,
- companies applying less than half of the rules – 159,
- companies that did not submit the statement (together with the report) – 33.

Rule no. 2 The Management Board and Supervisory Board of BPLC2021 indicates the achievement of the highest standards in the scope of performing their duties and fulfilling them in an effective manner by the company's management board and supervisory board. Only persons with appropriate competences, skills and experience are appointed to the

³ Assessment made on the basis of publicly available reports published by companies and their websites - checking the statements of the examined sample of companies in the EIB on the website of the Warsaw Stock Exchange.

management Board and the supervisory board. The members of the management board act in the interest of the company and are responsible for its activities. The management board is responsible, in particular, for leadership in the company, commitment to setting its strategic goals and their implementation, as well as ensuring the company's efficiency and security. In the scope of their function and duties in the supervisory board, the conduct of members of the supervisory board, including decision-making, is guided by independence of their own opinions and judgments, acting in the best interest of the company. The supervisory board works in a culture of debate, analyzing the company's situation against the background of the industry and the market, on the basis of materials provided to it by the company's management and internal systems and functions of the company, as well as obtained from outside, using the results of the work of its committees. The supervisory board, in particular, gives opinions on the company's strategy and verifies the work of the management board in terms of achievement of the established strategic goals, as well as monitors the company's results.

The level of observance of this area in Figure 2 is as follows:

- companies applying all the rules – 10,
- companies applying more than half of the rules – 379,
- companies applying less than half of the rules – 2,
- companies that did not submit the statement (together with the report) – 35.

Rule no. 3. Internal systems and functions BPLC2021 applies to efficiently operating systems and internal functions, which are an indispensable tool for supervising the company. The systems cover the company and all areas of operation of its group that have a significant impact on the company's situation.

Figure 2 also shows the level of compliance with rule 3 and presents as follows:

- companies applying all the rules – 54,
- companies applying more than half of the rules – 239,
- companies applying less than half of the rules – 93,
- companies that did not submit the statement (together with the report) – 40.

Rule no. 4. The General Meeting and Relations with Shareholders of BPLC2021 recommends how the management board of a listed company and its supervisory board should encourage shareholders to become involved in the company's matters, primarily expressed through active, personal or proxy participation in the general meeting. The general meeting should respect the rights of all shareholders and should strive to ensure that the resolutions adopted do not infringe the legitimate interests of individual groups of shareholders. Shareholders participating in the general meeting exercise their rights in a manner that does not violate good manners. The participants of the general meeting should come to the general meeting prepared.

Figure 2 also presents the level of compliance with rule 4. It is as follows:

- companies applying all the rules – 50,
- companies applying more than half of the rules – 340,
- companies applying less than half of the rules – 1,
- companies that did not submit the statement (together with the report) – 35.

Rule no. 5. Conflict of interest and transactions with related entities BPLC2021 according to which the company and its group should have transparent procedures for managing conflicts of interest and concluding transactions with related entities in conditions of possible conflict of interest. Procedures should provide for the ways to identify such situations, disclose them and how to proceed in the event of their occurrence. A member of the management board or supervisory board should avoid engaging in professional or non-professional activity that could lead to a conflict of interest or adversely affect their reputation as a member of the company's governing body and should disclose it immediately in the event of occurrence of the conflict of interest.

Rule No. 5 and the level of its compliance by listed companies, shown in Figure 2, is as follows:

- companies applying all the rules – 355,
- companies applying more than half of the rules – 34,
- companies applying less than half of the rules – 2,
- companies that did not submit the statement (together with the report) – 35.

Rule no. 6 Remuneration of BPDPSN2021, according to the rule, the company and its group care for the stability of the management team, including through transparent, fair, consistent and non-discriminatory principles of remuneration, reflected, among others, in equal pay for women and men. The remuneration policy for members of the company's governing bodies and its key managers adopted in the company defines in particular the form, structure, as well as remuneration method of establishment and payment.

Rule No. 6 and the level of its observance by listed companies is presented in Figure 2 is as follows:

- companies applying all the rules – 171,
- companies applying more than half of the rules – 187,
- companies applying less than half of the rules – 32,
- companies that did not submit the statement (together with the report) – 36.

The presented considerations based on a pilot study of companies listed on the Warsaw Stock Exchange in the period from June to September 2021 focused on their compliance with the CG rules. The level of results in this study was more than satisfactory, because out of 426 companies only 35 did not take a position, i.e., did not submit a report (together with a statement on the application of corporate governance principles), which is only 8% of the surveyed population. Thus, the research conducted by the authors confirmed the study presented

by Edelman Trust Barometer 2021. It indicated the increase in transparency of companies, i.e., the companies that apply the principles of CG, through the application of the principles of "soft law", i.e., BPLC2021 and the identification of 6 areas that can be used as a support tool in crisis management.

4. Conclusions

The current economic crisis caused by the coronavirus pandemic may last much longer than the health crisis. Its effects may reach far into the future (Ramotowski, 2020). The Actors must struggle with the effects of the crisis in order to survive. Currently, corporate governance, by ensuring full transparency, should be a tool that supports management and reduces the risk of operations, constituting the basis for creating a level of trust in the company and its activities. In the light of the presented considerations, a certain sequence of events can be suggested, namely, corporate governance generates transparency in business and requires compliance with the highest market standards, both in terms of human capital management and product quality. These factors are the principles perceived by the authors as the main guidelines for the study. They are Information and Investor Communication Policy, Management Board and Supervisory Board, Internal Systems and Functions, General Meeting and Relations with Shareholders, Conflict of Interest and Related Party Transactions as well as Remuneration. The aforementioned principles were treated as factors, and are demonstrated by a code of good practice, developed and provided for implementation for listed companies in the analyzed period. These factors create an atmosphere of trust in the company and, as a result, are a factor supporting effective functioning in times of crisis. The (pilot) study performed by the author confirms the high compliance of listed companies, close to 90%, with regard to filling in the declaration on the application of corporate governance in the light of the code of good practices applied by listed companies. The only limitation in the research process was the time of the crisis, i.e., the COVID-19 pandemic and the schedule for introducing a new set of good practices for listed companies. Subsequent studies will allow for a comparative analysis of companies in the period before, during, and after the pandemic

In conclusion, the presented pilot studies on a sample of 426 listed companies confirmed the thesis presented by the Authors that the code of good practice and its recommendations for listed companies in the area of corporate governance, through increased transparency, maybe a tool supporting management in times of crisis.

The analysis of companies after the implementation of these changes and relating them to the post-pandemic period may be an interesting and important topic of future research, from the point of view of practice.

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THE ROLE OF HUMAN CAPITAL IN RECOVERING FROM CRISIS

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Purpose: Paying attention to the determinants of the growing role of people and their knowledge as factors supporting the development of entities in the period of recovery from the crisis.

Design/methodology/approach: the study is based on a critical analysis of the literature, and due to the topicality of the analyzed issues, also on the basis of press publications and internet sources. The subject area includes issues related to human capital in the situation of recovering from the crisis and changing the strategy.

Findings: The considerations presented in this study show that appropriate human capital management is a factor supporting the change of strategy towards development in the period of recovery from crisis.

Practical implications: Theoretical considerations are supplemented with the results of world research in the field of human capital management. As a result, the current trends recommended in this area of management are indicated. They constitute the guidelines for managers on how to deal with human capital so that it supports the development of the enterprise.

Social implications: Recognizing effective ways of managing human capital may have multifaceted beneficial socio-economic consequences. Overcoming the crisis and entering the phase of redevelopment is important both for the state and for society.

Originality/value: The study shows a specific approach to human capital, which not only determines the effective management of a company in a crisis situation, but when properly managed it supports the transition from crisis-related stagnation to the strategy of re-development after the crisis.

Keywords: human capital, crisis, management, development.

Category of the paper: Viewpoint, General review.

1. Introduction

The declaration of the coronavirus pandemic and the introduction of restrictions by most developed countries caused the global economy to stand still. There was uncertainty, and general economic crises started. The crisis brought many doubts and uncertainties for entire economies and individual companies in all areas of their activity.

Maintaining liquidity and, in some cases, the struggle to maintain business became a priority (Gałązka, 2020). Poland faced a recession that had not been observed in our country for decades. In this situation, in many cases, the idea of the development of the enterprise gave way to thoughts about survival and the search for an answer to the question of how to do it?

Now, the situation is slowly stabilizing. The time has come for organizations to change their approach, and depart from the focus on survival, towards further development and searching for determinants which are crucial for the organization in this situation. Contemporary organizations and enterprises operating in the conditions of the economy recovering from the crisis must seek factors and tools that would enable them to improve their competitive position and achieve success. Human capital is undoubtedly one of important factors determining the functioning of the organization. Its role may also prove to be crucial in terms of overcoming the crisis.

The crisis of an organization can be overcome through the creativity and entrepreneurship of people associated with it. Caring for people and managing modern human capital effectively is the basis for this. The contemporary environment that is extremely dynamically changing requires a certain amount of courage, a sober view, and flexibility, i.e., purely human features.

In the light of these considerations, the study presents the fundamental issues important in the context of human capital management in the current situation of recovery from the economic crisis.

The purpose of the study is to draw attention to the determinants of the growing role of people and their knowledge as factors supporting the development of entities in the post-crisis period.

The study is based on a critical analysis of the literature, and due to the topicality of the issues, it also uses internet sources.

2. Determinants of the growing role of human capital

There are several factors that emphasize the vital role of human capital in the functioning of enterprises and economies of the modern world.

Since the 1980s, the world economy has been referred to as the New Economy, i.e., the knowledge-based economy. It is based on human capital, i.e., knowledge, skills, competences and capabilities of individuals, which constitute value for enterprises and have an impact on their innovativeness. Moreover, since the beginning of the century, all member states of the European Union have been implementing the assumptions of the so-called Lisbon Strategy, with the aim of building the most competitive and dynamic economy in the world. Highly qualified human capital was to be the main source of competitiveness in this economy. Over time, it was replaced by the strategy "Europe 2020 – a strategy for smart, sustainable and

inclusive growth". It was another long-term program of socio-economic development of the European Union for 2010-2020 which was continuing the assumptions of the previous strategy. Finally, the "EU Strategy for Youth" which also emphasizes the importance of human capital, knowledge and learning for increasing the level of commitment was created for the period 2019-2027 (Luo, 2021).

If we add that the current economy is at the stage of recovering from crisis, and the crisis of the organization can be overcome through the creativity and entrepreneurship of people associated with the company, the current situation undoubtedly explains the dominant role of human capital in returning to the development path by companies that are recovering from the crisis. The innovativeness required today is also associated with human capital, as it is just the talented and creative individuals who contribute to the creation of innovative solutions which allow enterprises to break the bad streak and return to the development path (Olopade et al., 2020).

In a situation where the company's successes and its competitiveness are to a lesser extent based on the allocation of physical (material) and financial resources and are mainly based on the use and management of knowledge (Jaruga, Fijałkowska, 2002), the employee is perceived as the best investment made in company.

The role of human capital cannot be underestimated. It is one of the few intangible assets of the company that influences others, such as leadership, strategy implementation, communication, reputation, networks and alliances, technologies and processes, as well as organization and culture in the workplace and innovation. Now, the appreciation of human resources in companies is becoming increasingly visible. This mainly applies to the knowledge factor which gives companies a competitive advantage. Competitive advantage is an important category from the point of view of managing and implementing business models.

Moreover, flexibility of operation is the essence of the success in a modern company. Organizations must be flexible in all respects as flexibility enables proper fulfillment of management functions. Therefore, it is necessary to be able to create a structure (system of connections) ensuring skillful adaptation to the dynamically changing situation (environmental conditions) and the company's expectations, depending on the adopted market situation.

Certainly, human resources should be considered the most flexible element of the organization, hence the development of the concept of management of this resource is now so dynamic and perceived as a pillar supporting enterprises in overcoming the crisis. Appropriate management of human resources, considering knowledge as the basic resource, improves the management of an organization, as it allows for constructing, maintaining and developing appropriate organizational systems in the company (Rosińska, 2007).

Today, many companies are struggling with the effects of the crisis and are trying to move from a survival strategy forced by the crisis to re-development after the crisis and thus achieve success. In this situation, the analysis of the "formula for success" proposed by D.N. Sull (Sull, 2006, p. 90) can be a summary of the considerations on the determinants of the growing role of

human capital in overcoming the crisis. The formula of success is a set of the elements which are unique for a given entity and support the achievement of the set goals. They include:

- strategic framework, understood as ways of perceiving the competitive environment,
- resources, i.e., the means facilitating the competitive struggle,
- processes, i.e., methods of performing operations,
- relations, understood as durable relationships with external stakeholders, and contacts between functional units,
- values, i.e., factors that inspire, unify and shape the identity of the organization.

Each company should define its own formula for success based on the above criteria. This will allow for effective use of possessed strengths, organizing activities and strengthening relationships. However, it can be assumed that human capital and its knowledge appear in all organizations and are related to all areas listed in the success formula. This results from the fact that people are a strategic resource of the company. They shape the processes in the enterprise and its strategic framework, they establish relationships, and through the recognized values, they shape the identity and organizational culture of the entity in which they work. Therefore, human capital is the basic factor supporting the achievement of the company's goals, which are now associated with the wish to return to the path of development to a substantial extent.

3. Modern human capital

Human capital is created by people and their competences, i.e., the whole of features and properties embodied in people (knowledge, skills, opportunities) that have a specific value and constitute a source of future income for both the employee who owns human capital and the organization that uses this capital in certain conditions. The specificity of this capital is expressed, among others, in the fact that its individual elements are unique and difficult to imitate by the competitors (Pocztowski, 2007), which increases their value.

The quality of human capital is largely a derivative of education, skills and competences, while knowledge is its key element. Attention should be paid to the fact that the knowledge which is the basis of modern economy is contributed by people, therefore they should be perceived as a pillar of the functioning of a modern enterprise in the time of crisis. It is about a new type of not only a worker but the knowledge-based society having the ability to assimilate, understand, teach, create new values, and design communication based on data and information (Grudzewski, Hejduk, 2004). Knowledge workers have a high level of specialist knowledge, education or experience, and their work requires the creation, distribution and use of knowledge (Davenport, 2005). They earn a living by thinking, their mind is their tool of work, and any effort related to their profession is intellectual (Davenport, 2007). Moreover, such workers are able to properly use modern technology.

Creating an economy that is based on more and more effectively created, assimilated, transferred and used knowledge requires stimulating and permanent development of human capital.

Among all the features of human capital, creativity plays a special role in the recovery period. Creativity is evidenced, among others, by such features as openness to changes, flexibility, lack of prejudices, willingness to learn new things, readiness to improve mental abilities, ability to critically assess reality, as well as willingness to share knowledge and experience (Baruk, 2005). These features characterize knowledge workers. Creative people are of great value to the company as they directly contribute to the creation of innovative solutions. A creative person is not only the one who has specific personality features, but also shows high cognitive flexibility. The unique features of a creative person include, among others: talents, intellectual and cognitive values, a tendency to deal with complex problems and phenomena, commitment to work, striving for success, perseverance, independence of opinion, independence and unconventional thinking, autonomy, easy adaptation and improvisation, self-confidence and a tendency to take risks. The cognitive flexibility of a creative individual can be recognized in understanding the complexity of phenomena, abstaining from expressing opinions, multifaceted thinking, accurate memory, and breaking paradigms (West, 2000). Creativity is a creative effort whereas innovation is the product of creativity. While creativity exists by itself, innovation will not arise without creativity (Niklewicz-Pijaczyńska, Wachowska, 2012).

A full success of enterprises is undoubtedly related to human capital, as it depends primarily on the size and quality of knowledge resources and the ability to use knowledge in such a way as to generate creativity, which is so important in making brave decisions that change the specificity of the functioning of entities recovering from crisis.

4. Specificity of human capital management

In a situation where the success of the company and its competitiveness are based mainly on knowledge use and management, the perception of the employee as the best investment made in the company is spreading. Today's environment which is extremely dynamically changing requires a certain amount of courage, a sober view and flexibility, i.e., purely human features. It is a paradox that sometimes overcoming a crisis in a company requires taking actions opposite to common-sense or instinctive (i.e., those related to costs, remuneration, training), i.e., investment in human capital. Modern human capital management involves investing in it.

Contrary to what might be expected, the period of overcoming the crisis is therefore a suitable time to increase the volume of investments in human capital. Decisions relating to them are then taken in conditions of uncertainty, and therefore human resources management

is exposed to a certain degree of risk that cannot be eliminated. When undertaking them, the company has two perspectives ahead, because it will either increase its chances of survival and development, or it will lose them, which eventually may even lead to its collapse.

Investing in people brings immeasurable benefits in many respects. A person's sense of value increases, their dignity is protected, they feel fulfilled personally and professionally, thus showing greater involvement in the matters of the organization (Jagódka, 2011). Investments in human capital should be understood as organizational expenses that lead to the accumulation of human capital or an increase in its productivity (Jaruga, Fijałkowska 2002; Jagódka, 2011). They result in the transformation of labor resources (primarily in terms of quality). They significantly, if not decisively, improve the company's market position and its market value. Internally accepted values are of great importance for transformations, because if skillfully used, they cause such effects as team solving of more difficult tasks, more efficient communication between people in the enterprise, informatively prepared decisions, faster and more effective implementation of changes, and the use of non-material motivating employees (Sajkiewicz, 1999).

In a situation like today (recovery from the crisis), all efforts (including training efforts) to increase the efficiency, quality and organization of work, including time management and effective change management, which proved to be particularly important during the crisis, are invaluable (Kwiecień, 2021). Training issues related to leadership, motivation, entrepreneurship and operational efficiency should be of interest. When most companies reduce employee wages and abandon earlier declarations of investing in employees, it is worth going against the crowd. An investment in an employee will, on the one hand, increase the efficiency of employees' work, affect morale and motivation, strengthen their sense of security, but, on the other hand, it will also significantly affect the positive perception of the company on the market.

In times of crisis, tensions, and dynamic changes in the environment, almost every organization is faced with the need to perform personnel processes that will affect the condition and structure of human resources. When undertaking them, we should think that investments in human capital are a better recipe for a crisis than layoffs (Piasecki, 2009), while expenditure on human capital, such as training, should be considered an investment, not a labor cost. They differ in many respects from other investments, including the fact that they are burdened with substantial risk resulting from the autonomy of the investment object and a rate of return that is difficult to calculate. Investments of this type do not have to be typically material in nature, very often there is a need to invest in the atmosphere of the workplace through a sense of trust and partnership in action.

Considering the fact that human capital is the basis, it is extremely important to maintain an appropriate level of its management and adhere to quality standards in this area. High quality of management processes reduces the possibility of emergence of negative risk effects. The principles of human resource management in the company should be consistent with the

strategy of management by quality (TQM – Total Quality Management). European TQM standards indicate the following requirements which are important for human resources: improvement through life-long learning within the training and coaching program, commitment of the top management, participation of all employees, appropriate and open communication inside companies. TQM philosophy emphasizes the importance of every employee in the organization. This is related to the belief that providing the best services to internal clients – employees (e.g., appropriate remuneration, methods of motivation, training, etc.) is the basis for providing external clients with services at an equally good quality level (Sikora, 2015). Investments in human capital should seek to create such conditions and opportunities that would release the potential in people. Its proper use may contribute to the achievement of the goal and the transition to a development strategy for the company.

However, when the company is unable to maintain the planned level of investment in human capital, it should focus more on employee motivation. The aim of the action will be to obtain the highest possible efficiency and commitment to work. Then, it is worth rewarding employees for above-average results. Of course, there are many ways of influencing the employees and each company needs to find the most appropriate, possible and adapted to its current situation e.g., changing the incentive system by introducing rewards for good ideas that improve work and translate directly into increasing the company's business efficiency. Development training conducted by company managers-employees, and not by external trainers may be another way. But if the company creates the right incentives, it will thus motivate employees to engage and motivate key talents, increasing their voluntary contribution to the company's success.

Therefore, effective motivating of today's knowledge workers who are often demanding may be the challenge. This means encouraging them to be creative and use resources they own that the company may not even know exist.

Today's market is competitive in virtually all aspects of its operation. Enterprises compete with each other, not only for market position, but also for employees. Some of the solutions from the times of the pandemic crisis (e.g., remote work) increase the risk of high mobility and independence of modern employees. The important level of mobility of knowledge workers is a derivative of professionalism based on individual competences, perfection in action and intellectual activity. The time and place of work do not matter anymore, because the knowledge worker, having the means of transport and communication, as well as the desired competences, can work anywhere (Männasoo et al., 2018).

When looking for the right tools of motivation, it should be remembered that in order to understand an employee and their needs, first the person and their "human" needs, goals and motivations must be understood. Man is a being who needs a sense of meaning of their actions, a goal they strive for, and which motivates and drives them to effective and high-quality work (Gronert, 2020). It is worth investing in expertise and investing in training, thus strengthening employee motivation. Of course, everything should be supported by an economic calculation.

Therefore, it should be remembered that employees want to work for an employer who will enable them to develop, improve their skills, to stay competitive with their colleagues from other companies. That is why it is so important to create certain advantages related to work in a given company and such human resources management that will allow employees and their knowledge to be retained in the company. In this situation, every employer should take care of partner relations with their employees, invest in the development of organizational culture and human resources in order to obtain long-term employee satisfaction. This is because the knowledge of employees is the main driving force of competitiveness. A partnership relationship will help create loyalty based on trust and an incentive system.

There is a feedback loop between human resource management and the crisis that can be used to the benefit of people and organizations. Therefore, emerging crisis situation can be used for the growth of the organization. A company affected by a crisis or unforeseen situation should meet them in the approach to human resources management (Stańczyk, 2013).

5. Perspectives in the area of human capital management

Every crisis ends, so a company needs to be prepared for further actions. It is necessary to draw conclusions, introduce changes and move from a survival strategy forced by the crisis to a development strategy. Global trends should be sought to make this possible.

The Global Human Capital Trends study (GHCT Report, 2020, 2021) conducted by Deloitte in 2020 and 2021 in the area of human capital management confirmed that the pandemic showed that, despite the crisis, people and organizations are able to set themselves and achieve new, and often surprising goals by adopting the right attitude.

The 2020 Report encouraged organizations to view their employees through the prism of three areas: purpose, potential and perspective, going beyond the alleged conflict between people and technology. The results from 2021 showed that considering the human factor when making decisions about jobs and employees gives the companies better protection against sudden changes. Nowadays, more than ever, the application of three basic elements: purpose, potential and perspective (GHCT Poland Report, 2021) is necessary to create an organization that is able to prosper in an unpredictable environment with a vision of an unknown future, taking into account the coexistence of people and technology.

The 2020 report (GHCT Poland Report, 2020) establishes the guidelines for the course of action that will enable companies to rebuild and return to the development path. The elements of the DNA of a responsible and ready-to-develop company as well as trends supporting the implementation of the development strategy are presented in Table 1.

Table 1.
Elements of the DNA of a responsible company

Elements of the DNA of a responsible company		
GOAL	POTENTIAL	PERSPECTIVE
rooting mission and values among teams, individual employees and in the very work environment	stimulating the capabilities hidden in the employees so that they can prove themselves in new areas	making brave decisions in a time of continuous change
TRENDS supporting the implementation of strategy elements		
A sense of belonging: from the sense of security – to the impact on the safety of others	Super Teams: Introducing AI to Your Business	The wage dilemma: principles of a more human approach
Work model focused on employees' well-being: private life and work at its best	Knowledge management in the world connected by a global network	Talent management strategies: getting latest information and getting better results
A multigenerational team: from millennials to employees with many years of experience	More than retraining: investing in the future	Ethics and shaping the future of work

Source: Raport GHCT Polska (2020). Global Human Capital Trends 2020: Firmy odpowiedzialne w praktyce. Retrieved from <https://www2.deloitte.com/pl/pl/pages/human-capital/articles/raport-trendy-hr-2020.html>, 30.04.2022.

Contemporary human capital management is multi-faceted. Leading trends comprise many issues, from developing a sense of belonging, through knowledge management and super teams, i.e., cooperation of people with modern technology, to pay dilemmas and ethics.

The results of the research on the Polish human capital market show that Polish companies still have a lot to do in this area, because the answers of many respondents indicate that in the case of most trends it is important to understand their importance and positive impact on the company, but the issue of their real application seems worse. The results of this part of the study are presented in Table 2.

Table 2.
The results of the research on the perception and implementation of trends

Trends	Level of acceptance in %	Level of understanding of positive impact in %	The level of readiness for implementation or the level of effective use in %
GOAL			
Sense of belonging	69	95	14
Work model	97	71	10
Multigenerational team	55	53	10
POTENTIAL			
Super-teams		72	51
Knowledge management	48	48	63
More than retraining	27	-	13
PERSPECTIVE			
Wage dilemma	63	-	69
Talent management strategies	40	37	18
Ethics and shaping the future of work	92	-	36

Source: Raport GHCT Polska (2020). Global Human Capital Trends 2020: Firmy odpowiedzialne w praktyce. Retrieved from <https://www2.deloitte.com/pl/pl/pages/human-capital/articles/raport-trendy-hr-2020.html>, 30.04.2022.

The analysis of the presented results allows to confirm that in the case of several trends the level of their actual application or even the willingness to implement them is very low. The trends related to the goal area come worst in this respect. The level of understanding in this area is high, but only 14% of companies are express full readiness to implement an approach based on a sense of belonging, and in the case of implementing a new work model, only 10% declare their readiness; similarly (only 10%) of companies declare that they have the resources enabling effective management of multi-generational teams of employees.

The best situation is in the case of real application of knowledge management. Here 48% of companies declare that building and protecting the knowledge base in the face of changes taking place in the area of talent management is important for their success in the next 12-18 months, and 63% declare their willingness to modernize knowledge management strategies to increase the potential of people, enabling both employees and the very organization to develop further.

The situation is similar with the wage dilemma. 63% of organizations have made changes to their remuneration strategy in the last 3 years, and 69% plan to modify it again. Following the rules that take this aspect into account will enable companies to make brave decisions, not only on the basis of calculations, but also conclusions reflecting how organizations value employees and how employees value organizations.

In general, the research results for the Polish market can be described as positive in terms of acceptance and understanding of the new values of human capital management and its impact on organizations. We can conclude that in terms of actual implementation, the situation will favorably change in the coming years, because companies, realizing the positive impact of human capital on the condition and development of the enterprise, will soon undertake actions aimed at increasing the level of real application of the indicated trends.

In a situation where organizations switch from the "survival" mode to the "development" mode, dynamic solutions are necessary to further support the indicated trends in human capital management.

The report from 2021 supports the recommendations of human capital management through the prism of goal, potential and prospects. The leading trends in human resource management (GHCT Poland Report, 2021) included:

- Well-being of the employees.
- More than retraining: releasing the workers' potential.
- Super-teams - a new model of work based on the cooperation of people and technology.
- Talent management strategies: setting new directions in the field of work and employees.
- Accelerating the process of redesigning the work model.

Therefore, further investments in human capital are necessary. The less investment in human capital, the worse the development prospects.

It is worth working on this topic and writing about a modern approach to human capital management, because the behavior of the Polish private sector indicates that it does not appreciate the role of human capital. The results of the analyzes show that the majority of private sector investments are directed to physical capital (machines, buildings, infrastructure). In the case of investments in human capital, the vast majority of them are expenditure of the public sector. In the EU countries, investments in physical capital constitute 20.5% in relation to GDP, of which as much as 86% comes from the private sector. On the other hand, when it comes to investments in human capital, they amount to 11.2% of GDP, of which as much as 80% comes from the public sector (Leśniewicz, 2021).

Recently, in our home market, there has been a clear tendency to positively emphasize the role of human capital and investments related to it at the present time, when we are struggling with the consequences of the pandemic crisis. In the report of the Polish Economic Institute (Leśniewicz, 2021), the authors request that investment in human capital be included in the official definition of public investment in order to change its face, to see the potential of return on such investments, and not to perceive them as unnecessary costs in tough times (Balicka-Sawik, 2021).

This proposal is of particular importance at the time of creating plans for the recovery of economies after the crisis. These plans should focus not only on the construction and modernization of infrastructure, but also on human capital investments.

6. Conclusions

Conclusions that result from the crisis for company managers include the need to adopt a long-term perspective in terms of planning and maintaining employment and shaping people management tools that would respond to the needs of the organization, regardless of the market situation.

"A crisis is a chance for success that a company must be able to take advantage of – a crisis can be creative," said Lee Iacocca (Smolarska, 2009) and it is difficult to disagree with this statement, especially taking into account human capital in times of crisis. The appropriate personnel strategy used in the company is a long-term concept of employee resources, aimed at their proper shaping and involvement in order to support the organization in the transition to a development strategy after a crisis stagnation.

To sum up, it is worth focusing on what is most important in the company in terms of development – on resources, which are people, because the development of human capital determines the development of knowledge and the development of enterprises.

The era of intellectual resources of organizations which must coexist with modern technology has come. This determines the success of an organization (Perechuda, Stosik, 2008). Among them, knowledge, perceived as a flexible substance resulting from the mental processing of information possessed by a human is in the leading position (Mikuła, 2007). However, it is people – knowledge workers who are the main carriers of this knowledge in the company, which means that the development of human capital determines the development of knowledge and the development of the entire enterprise.

Acquiring knowledge workers is nowadays a necessity for an organization, and managing them - a challenge, because employees are well aware of how valuable and unique capital they are. It can be said that full commitment of all employees is the key to the success of modern companies. The key to full employee involvement is, above all, orientation on employees and creating opportunities for their fulfilment and development in the enterprise. In proper management, it may be helpful to take into account the right trends in human capital management through the prism of purpose, potential and perspectives.

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CORRELATIONS BETWEEN TRUST, COOPERATION, NORMS AND VALUES IN HIGH-TECH ENTERPRISES IN WIELKOPOLSKA REGION

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Purpose: The aim of the article is to analyze the results of research on the interdependencies between cooperation, trust, as well as norms and values, as key elements of social capital in high-tech enterprises in Wielkopolska Region.

Design/methodology/approach: The analyzes carried out covered 51 enterprises belonging to advanced technology industries, including 41 small and 10 medium-sized ones. The research was conducted using the interview method, using a questionnaire and supported by the CATI technique. The obtained data were subject to further analysis and statistical inference. They consisted in determining the mutual dependencies for the three resources of social capital, i.e. trust, norms and values as well as cooperation (jointly creating the social capital of these enterprises) and their components. The relationships were determined based on the calculated Pearson's linear correlation coefficients.

Findings: Based on the conducted analyzes, it is legitimate to conclude that the designated level of cooperation, norms, values and trust are closely related. For all combinations of the indicated resources, the determined Pearson's linear correlation coefficients are statistically significant with a probability of 0.05. Also, many combinations of the components of these resources are correlated with each other.

Practical implications: The application dimension of the article is perceived in at least two possibilities. Firstly, for business representatives, it can be a valuable source of information on the key factors in the appreciation of social capital in a company. Secondly, on the basis of the calculated correlations, the article gives the opportunity to review the most important relationships between these components, which may also be useful from the point of view of the appreciation of social capital in the enterprise. It is also worth emphasizing the interdisciplinary nature by combining the scientific and application aspect, which can be used at the level of company management.

Originality/value: This work deals with an original approach to social capital, both due to the conceptualization of the concept of social capital and its components, as well as the interrelationships between its components. It is also worth emphasizing the interdisciplinary nature of the work, combining the scientific and application aspects that can be used at the level of company management. Moreover, the methodology described in the research process may be used in enterprises operating in industries other than high-tech.

Keywords: trust, cooperation, norms and values, social capital.

Category of the paper: research paper.

1. Introduction

The existing fragility, inconsistency and instability of the socio-economic and the geopolitical order of the world mean that enterprises constantly need a new philosophy of business and shaping new value on the still globalizing market and taking such decision-making or regulatory solutions that will create new value for customers and business, raise the competitive position, and also limited uncertainty and risk (Janasz, Janasz, 2017). Thus, the paradigms of modern management are gradually being redefined. Building a competitive advantage based on material factors becomes insufficient. It is necessary to extend them with such strategic and intangible elements as: trust, loyalty or credibility as well as social norms, collectively referred to as social capital.

Moreover, in the face of the unpredictability of the sphere of management, the importance of the category of entrepreneurship increases, which is the ability to use the opportunities and predispositions to meet specific expectations, which lead to the creation and multiplication of new values. The use of these possibilities depends on the understanding of what is the role of non-material conditions, and also on how these conditions can be used or gradually modified (Kwiatkowski, 2000). The aim of this article is to present the results of research on the components of social capital, i.e. trust, cooperation, norms and values, as well as their mutual correlations in high-tech enterprises in Wielkopolska Region.

2. On social capital once again

Currently, social capital is a very attractive phenomenon for many researchers. Although the term has been known for over a hundred years, it has only been used in management science for a decade. One can indicate at least several reasons for this state of affairs. Firstly, it is about the inherent imperative of social capital, which is trust and its role, which is seen as a significant role in the processes of shaping information societies, the growing importance of knowledge and its transfer in an enterprise, as well as cooperation and its networking, taking into account the nature of relations (formal and informal) (Grudzewski et al., 2010). Secondly, Poland, as a country that has undergone a system transformation and is currently in the convergence phase, experiences globalization and integration processes of particular importance for the directions of changes in the economy. It is indicated here that social capital has a significant impact on shaping institutional factors, and also "is an important element of the reconstruction of the social order" (Przybysz, Sauś, 2004, p. 32). It should be noted that, despite the success in assessing Poland's economic development in this period, it is indicated that one of the three barriers to further development that we will face by 2050 is the lack of trust (Kozmiński,

4.10.2018, p. 22). The validity of this thesis seems to be also confirmed by the opinions of other researchers in Poland, including government reports, which are the main source of knowledge about social capital for the country. They indicate a low level of social capital for the country, and thus the need to create conditions for the development of its new forms, other than survival and adaptation capital, in order to avoid the so-called "Development drift" (see Polska 2030..., 2009). The existence of the social capital gap can be seen both vertically (state and society) and horizontally (between individuals) (see Gajowiak, 2010; Hausner, 2009). Secondly, the literature on the subject indicates numerous benefits of creating and using social capital in enterprises. The most important of them are:

- facilitated information transfer in the existing networks of connections (Serageldin, Grootaert, 2000; Beugelsdijk, van Schaik, 2005);
- creating a partner organization that uses social capital in the short term as a factor of success and in the longer term as a "vehicle for entrepreneurship", through the e.g.: increasing the effectiveness of the organization's functioning, viability and longevity, increased risk taking, revival of entrepreneurship (Bratnicki et al., 2002);
- reduction of transaction costs in the process of finding contractors, monitoring work and business relations as well as enforcing obligations and contracts thanks to increased trust in business partners. We can talk about the costs of e.g. notaries 'and lawyers' remuneration, the costs of arbitration and trials (Sztompka, 2016);
- support for teamwork and effective sharing of private goods, including knowledge (Dyduch, 2001);
- pro-innovation action through "creation, diffusion and use of new knowledge by and for organizations" called "social innovative capital" (McElroy, 2002).

In the light of the above, it should be admitted that all studies on the conceptualization and operationalization of social capital as well as the search for ways of its appreciation are important and desirable not only from the point of view of filling the cognitive (scientific) space, but also the economic development of the country in the micro, meso and macro scale.

In this article, the following definition of social capital was adopted, recognizing that it is "the resultant of trust on each side of relations, norms and values, and cooperation, hidden in internal and external social relations, which allow both individuals and groups to benefit from that they create" (Libertowska, 2020). The selection of the components of the phenomenon in question, i.e. trust, norms, values and cooperation, was made on the basis of an analysis of domestic and foreign literature on the subject (see, among others, Bourdieu, 1986; Coleman, 1988; Putnam, 1995; Fukuyama, 1997; Grootaert, van Bastelaer, 2002; Dash, 2004; Lin et al., 2001; Knack, 1999; Skawińska, 2012; Grudzewski et al., 2009; Januszek, 2004; Matysiak, 2008). The selection of the indicated elements of social capital was part of a wider research conducted and published by the author on the level of social capital and its impact on the value management of high-tech enterprises in the region of Greater Poland (see also Libertowska,

2020). The research results presented in this article on the interdependencies between the distinguished elements constitute a secondary analysis to the above-mentioned studies.

2.1. Trust

Based on the analysis of the literature on the subject, trust was assigned such features as: certainty (predictability), competences (knowledge, skills and abilities), consistency, reliability, building attachment, responsibility and fairness. On the basis of these features, a set of factors assigned to the trust in the enterprise resource and subjected to the assessment by the respondents was distinguished. Belong to them:

- 1.1. Friendship/friendliness of relationships with colleagues.
- 1.2. A sense of stabilization at work (in terms of health, social and living, etc.).
- 1.3. The level of trust in colleagues.
- 1.4. Keeping secrets by most co-workers.
- 1.5. Employee skills.
- 1.6. The level of mutual trust among employees.
- 1.7. The level of trust in management.
- 1.8. The content of organizational knowledge in databases, procedures, internal materials.
- 1.9. The degree to which the trust of business units in the company increases the exchange of resources (knowledge, information, skills) between employees.
- 1.10. The degree to which trust determines the level of cooperation of the enterprise with other entities.
- 1.11. Applying high security to new customers (e.g. first payment only in cash, etc.).

2.2. Norms and values

In the literature on the subject, norms and values are identified with such features as: openness (information, ideas, solutions), truthfulness, acceptance of being different, willingness to express principles, respect for moral principles, and respect for property rights. As part of this phenomenon, the following were assessed:

- 2.1. The employee's feelings about being a valuable member of the organization.
- 2.2. Justifying the breach of formal procedures by colleagues?
- 2.3. Performing activities outside the employee's duties that, in his/her opinion, should be done.
- 2.4. The importance of the value system of colleagues.
- 2.5. Sharing the empowering stories between employees, supporting the value system in the organization.
- 2.6. Employees prioritize the common good over their own good.
- 2.7. The degree of proper use of skills and individual predispositions of employees at work stations.
- 2.8. The level of employee openness to new information, ideas, solutions.
- 2.9. Having valuable ideas by the company's organizational culture how to do business.

2.10. Multifaceted problem analysis.

2.11. Diversification of cultural and moral principles among employees.

2.3. Cooperation

The phenomenon of cooperation was described by features such as: joint projects, readiness to expand the contact base, sharing knowledge, supporting creativity/entrepreneurship, openness to negotiations, solidarity. Its scope includes such features as:

3.1. Organizing integration meetings in the company.

3.2. Participation in integration meetings (if organized).

3.3. The frequency of conflicts between employees.

3.4. The repetitive nature of cooperation within the organization (formal or informal).

3.5. Abilities of employees to cooperate in diagnosing and solving problems.

3.6. Ability to share information, knowledge and learn from each other.

3.7. The degree to which the number of contacts between employees and management influences the creation of new organizational, technological, production solutions, etc.

3.8. The degree to which the strength of employee relationships influences on new ideas and solutions.

3.9. The extent to which companies in the industry collaborate to benefit from participation.

3.10. Fostering the formation of a network of appropriate links in the organization.

3.11. Fostering teamwork.

3. Methodology

The research population is made up of small and medium-sized enterprises (with employment from 10 to 249 employees)¹ operating in the high-tech industries in the administrative area of the Greater Poland.

In the studies, the methodology defined by Eurostat, based on the statistical reporting of the Member States, candidate and European Free Trade Association (EFTA) and third parties²,

¹ The distinction between enterprises into small and medium-sized enterprises was made on the basis of the Recommendation of the Commission of the European Communities No. 2003/361/EC of May 6, 2003 concerning the definition of small and medium-sized enterprises. 2003, p. 36.

² According to this classification, advanced technology industries, in accordance with the Polish Classification of Activities (PKD 2007), include (Nauka..., 2012, based on Eurostat data):

- production of basic pharmaceutical substances as well as medicines and other pharmaceutical products (C 21),
- production of computers, electronic and optical products (C 26),
- production of aircraft, spacecraft and similar machinery (C 30.3),
- activities related to the production of films, video recordings, television programs, sound recordings and music (J 59),
- broadcasting free and subscription programs (J 60),
- telecommunications (J 61),

was adopted as the basis for the classification of advanced technology fields. The choice of high industries for the implementation of the research process resulted from at least two reasons. Firstly, it is an industry whose business profile is predestined to have a high level of social capital. A high level of trust is strongly correlated with organizational innovation (Grudzewski et al., 2009). The tendency to trust, self-credibility and adherence to informal rules and standards of operation result in the achievement of better results in the field of innovation of enterprises (Sankowska, 2011). Secondly, the high level of technological advancement is the result of activities based on cooperation with research and development centers, high qualifications of employees, high risk of investments and high tendency to internationalize activities. The bond that creates the technological potential and value of these organizations can be social capital, based not only on trust in external partners but also in relation to internal relations established in the company.

On the basis of the above criteria, the size of the surveyed population consists of 263 enterprises (GUS database, as of July 31, 2013). Out of this group, 51 effective interviews were obtained (agility rate at the level of 19.4%), of which 41 entities were qualified as small (employment at the level of 10-49 people), and 10 as medium (employment at the level of 50-249 people). The interviews were conducted using the CATI technique (computer assisted interview). The gender structure of the respondents was 27 women and 24 men. The survey was addressed to: heads of departments related to personnel management (35%), directors and employees of departments dealing with human resources management (23 and 20% respectively), business owners (12%), presidents (6%), members of the Supervisory Board (4%).

Each of the distinguished elements, i.e. trust, norms and values as well as cooperation, was assigned 11 questions (described in sections 2-4), formulated in the course of an in-depth literature analysis. The grades were assigned on a 5-point ordinal scale, and the corresponding statements, depending on the question posed, were as follows:

- 1 – definitely not/very rarely or zero/negligible/very low phenomenon,
- 2 – rather not/rarely/rather low,
- 3 – hard to say/average,
- 4 – rather yes/often/rather high,
- 5 – definitely yes/very often/very high.

-
- activities related to software, consultancy in the field of computer science and related activities (J 62),
 - information service activities (J 63),
 - research and development work (M 72).

The above-mentioned areas have been distinguished based on the measurement of the content of the R&D component in the conducted activity. The following indicators are used as measures of the intensity of this component (Nauka..., 2012):

- ratio of direct expenditure on R&D to added value,
- ratio of direct expenditure on R&D to the value of production (sales),
- relation of direct expenditure on R&D activity increased by indirect expenditure "incorporated" in investment goods and semi-finished products to the value of production (sales).

The assessment of the relationship between individual variables was made based on the Pearson correlation coefficients r . The correlation coefficient r is determined by the formula (1) (Józwiak, Podgórski, 2012):

$$r = \frac{c_{xy}}{s_x s_y} \quad (1)$$

where:

c_{xy} – covariance in a two-dimensional empirical distribution,

$s_x s_y$ – the standard deviation in the empirical boundary distributions of the variable X and Y.

The correlation coefficient r takes values within the range $\langle -1; 1 \rangle$. It is equal to 0 when the features are not linearly correlated. The modulus of the correlation coefficient r is 1 if and only if there is a linear functional relationship between two features (Józwiak, Podgórski, 2012). Pearson's correlation coefficient was used for the features of the empirical representation in the form of a numerical scale. The strength of the relationship between the features was assessed based on the following classification (Guilford, 1942):

- $|r|=0$ – no correlation,
- $|r| < 0,2$ – no linear relationship,
- $0,2 < |r| < 0,4$ – weak correlation,
- $0,4 < |r| < 0,7$ – moderate correlation,
- $0,7 < |r| < 0,9$ – quite strong correlation,
- $|r| > 0,9$ – very strong correlation,
- $|r|=1$ – full correlation.

4. Results

Based on the obtained assessments of phenomena, it is possible to make a preliminary assessment of the interdependencies of the studied phenomena in high-tech enterprises, i.e. trust, norms and values as well as cooperation. For this purpose, the scatter plots for the examined variables were made. The results are presented in Figures 1-3. As it results from the conducted analysis, positive linear relations are visible among the examined variables. This applies to all the phenomena presented. This means that:

- an increase (decrease) in norms and values in an enterprise is correlated with an increase (decrease) in trust,
- an increase (decrease) in norms and values is correlated with an increase (decrease) in cooperation
- an increase (decrease) in trust is correlated with an increase (decrease) in cooperation.

In order to supplement the preliminary assessments of the scatter plots, an analysis of the correlation of the studied variables was carried out on the basis of the Pearson's linear correlation coefficients. The results are presented in Table 1. The table contains only the values of the correlation coefficients for the aggregated values of trust, norms and values, and cooperation. Due to the extensive data on the values of correlation coefficients for the components of these phenomena (discussed in sections 2.1-2.3), the content of the article discusses the main conclusions drawn from the analyzes. In the detailed interpretation for the calculated correlations between the components, the relationships of features with the values of correlation coefficients lower than 0.5 were omitted, considering them to be less significant.

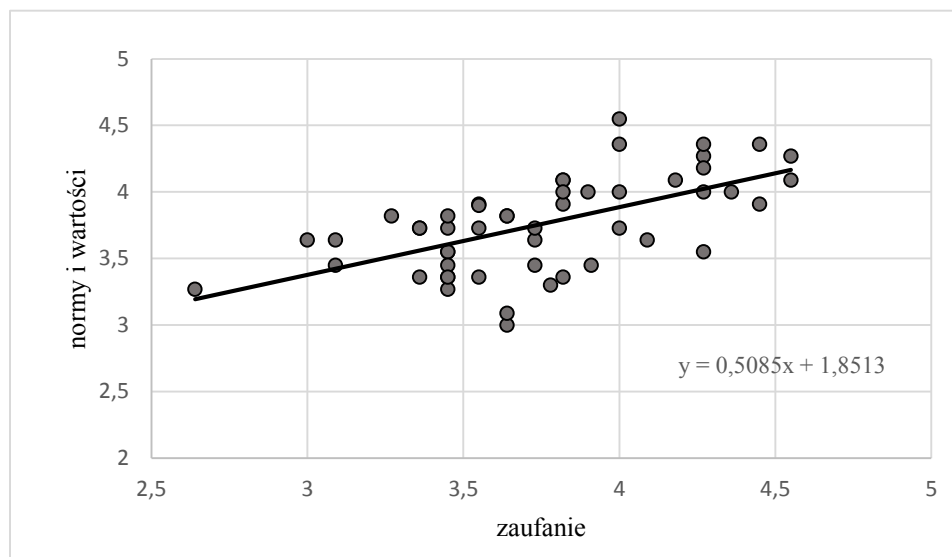


Figure 1. Scatter plot of the level of norms and values in relation to the level of trust in the surveyed group of enterprises. Source: own study.

Trust and norms and values correlate with each other at the level of $r = 0.6$. It is a dependency which, according to the adopted classification, can be considered moderate. Trust is indicated in the literature dealing with social capital as its main building component. Among the variables assigned to the resource of norms and values, trust correlates most strongly in the studied group with factors 2.8 (the level of employee openness to new information, ideas; $r = 0.72$), 2.6 (Employees prioritize the common good over their own good; $r = 0.55$) and 2.10 (multifaceted problem analysis; $r = 0.52$). It becomes justified to conclude that a higher level of trust in a company is conducive to the level of employees' openness to new challenges, putting the group's needs above their own, and a multi-level analysis of emerging problems. On the other hand, the general level of norms and values correlates most strongly with factor 1.9 ($r = 0.53$). Therefore, it should be assumed that the higher the level of moral and ethical principles represented by employees, the higher the level of trust favoring the exchange of resources in the enterprise.

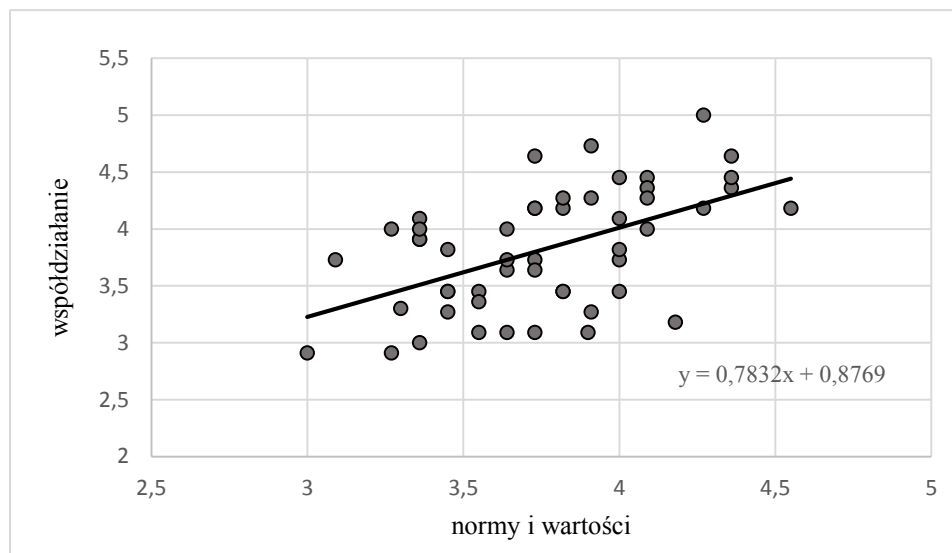


Figure 2. Scatter plot of the level of cooperation in relation to the level of norms and values in the examined group of enterprises. Source: own study.

Aggregate ratings for cooperation as well as norms and values (as arithmetic averages of respondents' ratings) correlate with each other at a moderate level, with the value of the correlation coefficient $r = 0.53$. There are several positive correlations between the general level of cooperation and the individual components of the resource of norms and values. The most important are the relations of cooperation with the following factors: 2.10 (multifaceted problem analysis; $r = 0.66$), 2.9 (having valuable ideas by the company's organizational culture how to do business; $r = 0.62$) and 2.8 (the level of employee openness to new information, ideas; $r = 0.52$).

Among the data on the correlation of norms and values with individual variables regarding cooperation, the most important correlations with the following factors should be considered: 3.6 (ability to share information, knowledge and learn from each other; $r = 0.54$) and 3.10 (Fostering the formation of a network of appropriate links in the organization; $r = 0.50$). As a result of these analyzes, it should be concluded that bringing together a group of employees by promoting appropriate attitudes and behaviors as well as commonly shared norms is conducive to the flow of knowledge in the organization and the creation of appropriate channels.

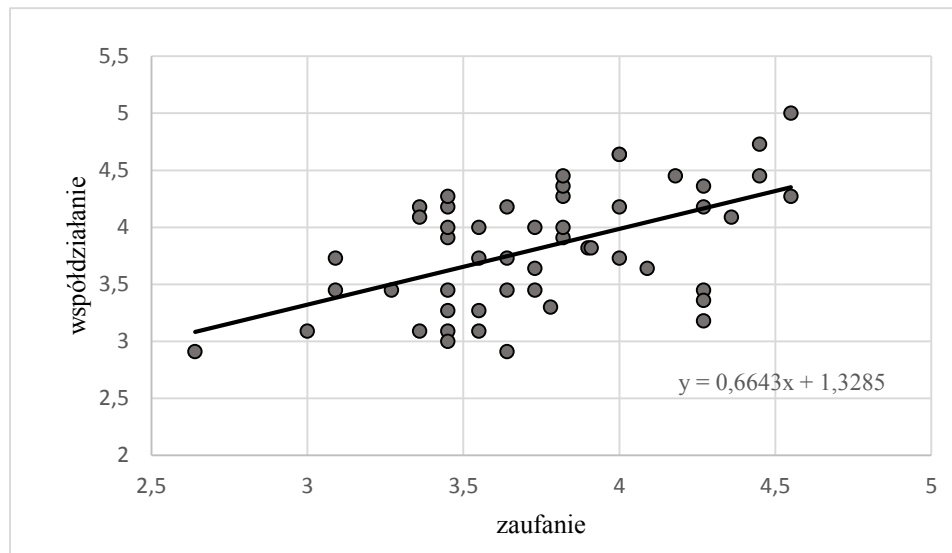


Figure 3. Scatter plot of the level of cooperation in relation to the level of trust in the examined group of enterprises. Source: own study.

Among the set of cooperation resource variables, the overall level of trust is most strongly correlated with the ability to share information, knowledge and learn from each other ($r = 0.52$). As for the components of trust, none of the Pearson's correlation coefficients in relation to the cooperation resource exceed the value of 0.5. The highest value of this coefficient was recorded for factor 1.8, i.e. the content of organizational knowledge in databases, procedures, internal materials ($r = 0.43$).

Table 1.

Values of Pearson's correlation coefficients for social capital resources

	Trust	Norms and values	Cooperation
Trust	–	0,602902339	0,53390211
Norms and values	0,602902339	–	0,53089953
Cooperation	0,53390211	0,530899529	–

Note. All given correlation coefficients are statistically significant with $p < 0.05$ ($N = 51$). Source: own study.

Taking into account the values of the correlation coefficients between the components of the distinguished resources of social capital, two pairs of variables deserve attention. In both cases, we can talk about a fairly strong relationship between them (values of correlation coefficients above 0.7). The first pair of variables includes factors related to the organization and participation in the so-called integration events in the company (3.1 and 3.2). The observed linear relationship between the grades awarded is not surprising ($r = 0.7$) and means that the more such events are organized, the greater the number of willing participants. The second pair of strongly correlated variables concerns factors with numbers 3.10 and 3.11, i.e., respectively: fostering the formation of a network of appropriate connections in the organization and fostering teamwork ($r = 0.78$). This dependence confirms the theoretical findings, promoting teamwork by caring for proper internal and external relations in the organization. Therefore, taking care of the working atmosphere, creating conditions based on trust, mutual acceptance and respect have a strong impact on the readiness to work in a team, sharing your ideas, creating

new value of work, which in the long term contributes to increasing the competitiveness of enterprises.

5. Summary

Summarizing, it can be stated that there are relations between cooperation, trust and norms and values, the reflection of which can be found in the calculated values of Pearson coefficients. This article is an attempt to supplement the knowledge with the aspect related to the synthetic conceptualization of social capital and its components, along with the determination of the characteristics/behaviors specific to them, as well as the determination of the interdependencies between them. Conclusions contained in this paper regarding particularly delineated correlations may be an important aspect for deepening managerial knowledge. It discovers areas in the enterprise concerning the structure of relations in which it is worth investing in order to build social capital.

Based on the adopted research methodology, the future direction of research may be a comparative analysis on a group of enterprises belonging to other industries or regions. On the basis of the conducted considerations, it is also possible to develop a tool to control the current level of social capital in the enterprise, which may strengthen investing in non-material resources of the enterprise, and in the long term – increase its competitiveness.

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COMMUNICATION AND BUILDING POSITIVE RELATIONSHIPS WITHIN PROJECT TEAMS IN NON-GOVERNMENTAL ORGANIZATIONS

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Purpose: The aim of the study was to understand the role of communication and building positive relations in the NGO project team and to answer the following questions: (1) what factors and behaviors influence positive relations in the NGO project team? and (2) to what extent direct and indirect communication affect the efficiency of information flow?

Design/methodology/approach: The authors conducted a case study in a selected project team operating in a non-governmental organization in Poland.

Findings: The results of the study allow one to better understand the specific challenges the selected NGO project team was facing. Thus, they add new knowledge to the issues on effective communication and building positive relationships in NGO project teams. Moreover, the case study outcomes set the guidelines for further in-depth studies of a quantitative nature.

Research limitations/implications: Being aware of the limitations resulting from the deliberate selection of the project team for the study, an analysis of the answers obtained was undertaken, the results of which allow one to present the issues of communication and building positive relationships within project teams in non-governmental organizations. In order to make generalizations, further in-depth research in this area should be carried out.

Practical implications: In non-governmental organizations, authorities and project managers should increase their competences in the field of effective communication and building positive relationships in project teams in order to successfully implement projects.

Social implications: Knowledge of the methods of effective communication and building positive relationships in project teams allows to increase awareness among members of non-governmental organizations of how the ways of working and team involvement affect the success of projects.

Originality/value: A case study was conducted in a selected project team operating in an NGO on the importance of communication and building positive relationships. The article is addressed to people involved in NGO project management research and to third-sector entities.

Keywords: communication, relationship, project team, project management, non-governmental organizations.

Category of the paper: Case study.

1. Introduction

Non-governmental organizations (NGOs) operate in the economy alongside public administration and the private sector and form a separate community (Drucker, 1990; Etzioni, 1973; Marciszewska, 2017; Moroń, 2012; Ortega-Rodríguez et al., 2020). Increasingly, they achieve their goals through unique and complex endeavours, which are called projects (Marciszewska, 2019a, 2019b). Projects in non-governmental organizations slightly differ from those implemented in commercial entities. First of all, they are distinguished by the goal that is achieved in the project, values and motivation to act (Bogacz-Wojtanowska & Wrona, 2016; Stankiewicz & Seiler, 2013). The main goal of projects implemented by non-governmental organizations is to supplement activities for society, meet their needs or the needs of the members of the organization, and not monetary profit which, even if it appears, is not redistributed among the members of the organization (Anheier, 2005; Anheier & Kendall, 2000; Kwiecińska, 2008; Major & Spalek, 2019; Nanus & Dobbs, 1999; Trzeciński, 2017a, 2017b). NGOs provide social services by raising funds from external sources or own profits generated (Herman & Heimovics, 1991). Peter Drucker has already stated that studies on management in entities of other sectors do not meet the needs of NGOs due to their specific nature. He drew attention to, inter alia, volunteers who operate in organizations next to paid employees and do not collect monetary remuneration for their work, the issue of their development, motivation and leadership of the team to which they belong (Drucker, 1990). An important element that arises in each project team are relationships that occur between individuals. They affect the flow of communication, cooperation, trust and the final result of the project. Building positive relationships, team integration and clear rules for the flow of information are especially important in project teams where people operate on a voluntary basis, because they allow the project team to unite and maintain the commitment of members throughout the project's duration (Trzeciński, 2017a).

In the work of a project team, interpersonal relationships are just as important as in any other area of life, although they do not relate to one another in a natural way, and of the necessity to work with people who contribute to it. Members of the project team have no influence on who they will be working with, and thus with whom they will be communicating and forming relationships. The common goal pursued by the project team becomes the foundation of their interaction (Spalek, 2014). The balance between pursuing a set goal and maintaining positive relationships within the team makes the team work effectively (Bolstad, 2015). Relationships exist when basic conditions are met: people need to be aware of and count on one another, there must be some degree of mutual influence, social forms and expectations for one another must be agreed upon (Berger, 1993). Relations should be mutually satisfying, based on clear expectations, reciprocity and trust. The quality of relationships affects (Hamilton, 2008):

- Job satisfaction.
- Employee morale.
- Ability to meet the communication needs of others.
- Commitment to and knowledge of the enterprise.
- Improving creativity.
- Level of efficiency.
- Level of support.

Interpersonal relationships can also be defined as a set of communication relationships. Communication is a means of transmitting information for the implementation of the project. Communication management "includes processes required to ensure timely and correct planning, collection, creation, distribution, storage, retrieval, management, control, monitoring and final disposal of project information" (Project Management Institute, 2013, p. 281). The essence of project communication is to provide the right people with the right information at a given time, using the help of properly selected means (Wysocki & McGary, 2003). Thanks to communication, people influence and understand one another better and build relationships, groups and communities. Mutual understanding, control of emotions, compliance of verbal and non-verbal messages and trust promote the development of correct relationships and are the basis of good communication within the project team (Kandefer-Winter & Nadskakula, 2016; Stoner et al., 1995).

Proper communication management of the project ensures effective cooperation of project team members and eliminates problems and conflicts (Trocki, 2012). The project manager, by using appropriate communication tools, is to build a strong, integrated and motivated project team with positive interpersonal relationships (Król, 2017; Musioł-Urbańczyk, 2010; Podgórska, 2018). Communication allows you to build a positive relationship, maintain it and inform you of changes occurring within it by conveying its character and essence. Each message contains content and a relational dimension. The relational dimension informs people about the relations and feelings that occur between the interlocutors. Relational messages meet social needs such as closeness, belonging, respect and control. Interpersonal relationships, in which a free and friendly atmosphere of action and supportive communication are important, ensure that the psychological and social needs of team members are met. Communication skills are important in maintaining positive relationships within the project team and in creating a climate of trust, cooperation and openness. Project teams that feel supported through a positive team atmosphere are more efficient (Hamilton, 2008). Factors influencing relationships are:

- Manner of delivering a message (verbal and non-verbal communication).
- Communication channel (direct and indirect communication).
- Type of relationship (official, unofficial).
- Attitude towards the team member (positive, negative).

There are 6 types of behavior supporting communication and 6 types of defensive communication (Gibb, 1961). Types of communication that support the achievement of project goals are: communication describing situations and feelings, commitment to joint problem solving, openness and honesty, empathic communication, equality of all team members and the open exchange of ideas. Defensive communication is characterized by: assessing, controlling and manipulating the activities of project team members, lack of interest and cooperation within the group, lack of trust among project team members, assigning power, status and value to selected people or ideas and a lack of flexibility towards new ideas. Defensive communication intensifies unhealthy competition, arouses negative emotions in the members of the project team and hinders the achievement of the goal.

The authors conducted a case study in a selected project team operating in a non-governmental organization regarding the importance of communication and building positive relationships. The purpose of the article is to present the importance of project implementation based on communication and the positive relationships of team members.

2. Materials and methods

The research was undertaken in the form of a case study within a specifically selected project team. The team was selected for research according to the following criteria: 4-6 people, people participating in the project acted on a voluntary basis, the team was constant throughout the project implementation period, the project involved direct and indirect communication, the project lasted from 2 to 4 months and was implemented in an association operating in Poland, having been present on the market for at least a year, in which at least 3 projects are implemented annually. The studied project team consisted of 5 people. The respondents implemented a social project as part of the Free Tea Association (FTA), which operates in Poland. The FTA has been a formally registered, non-governmental organization since 2017 and cooperates with domestic, foreign and international non-governmental organizations, public and private, as well as any other entities that support or want to support activities in accordance with the Association's articles of association. It bases its activities on the social work of members and volunteers. The Free Tea Association conducts activities for the development of ecological awareness and promotes pro-ecological behavior, the idea of sustainable development, social integration, and counteracts all types of discrimination. The FTA carries out an average of 6 projects a year and ensures that their activities reflect the beliefs of their members.

A survey among members of the project team was adopted as a research tool. The survey consisted of three parts: metrics, assessment of relationships among project team members, and an assessment of communication among project team members. The survey was conducted electronically. The examined team implemented a project regarding the organization of workshops and lectures on zero waste at the University of Silesia in Katowice. The project lasted 3 months and was successful in that all its goals were achieved and the results met the expectations of the project's stakeholders. The beneficiaries of the project were residents of the Silesian province that wanted to broaden their ecological knowledge. The following are the main characteristics of the selected project team:

- The team consisted of people aged 26-35, with varying levels of experience in project implementation.
- Relations between team members and the project manager were informal, all team members have equal rights.
- The role of the project manager is to coordinate activities, ensure timely implementation and formal closure of the project.
- The composition of the project team was consistent throughout the project's implementation period and consisted of 5 people.
- Team members belong to the NGO known as, 'The FTA' The project implemented by the team was part of the organization's statutory activity and was based on their knowledge and experience obtained in other projects. The project was financed by the Micro Grant program implemented by Katowice City of Gardens - Institute of Culture. No personal costs were incurred.

3. Results

The first part of the survey concerned the assessment of relationships within the project team under scrutiny: factors that shape relationships within the project team, behaviors and types of messages that shape relationships within the project team.

Figure 1 presents the assessment (average number) of the impact of selected factors on the development of positive relationships within the project team. Respondents stated that the greatest influence on shaping relations within the project team was the freedom to express opinions (5), forge a cordial atmosphere conducive to effective cooperation (4.8) and foster a degree of trust within the team (4.6). Team members rated the impact of all team members' involvement in the project higher (4.4) than their own (4.2). The respondents rated the degree of support within the team the lowest (4.2) and the sense of security in the project in the context of impact on relationships within the project team (4.0).

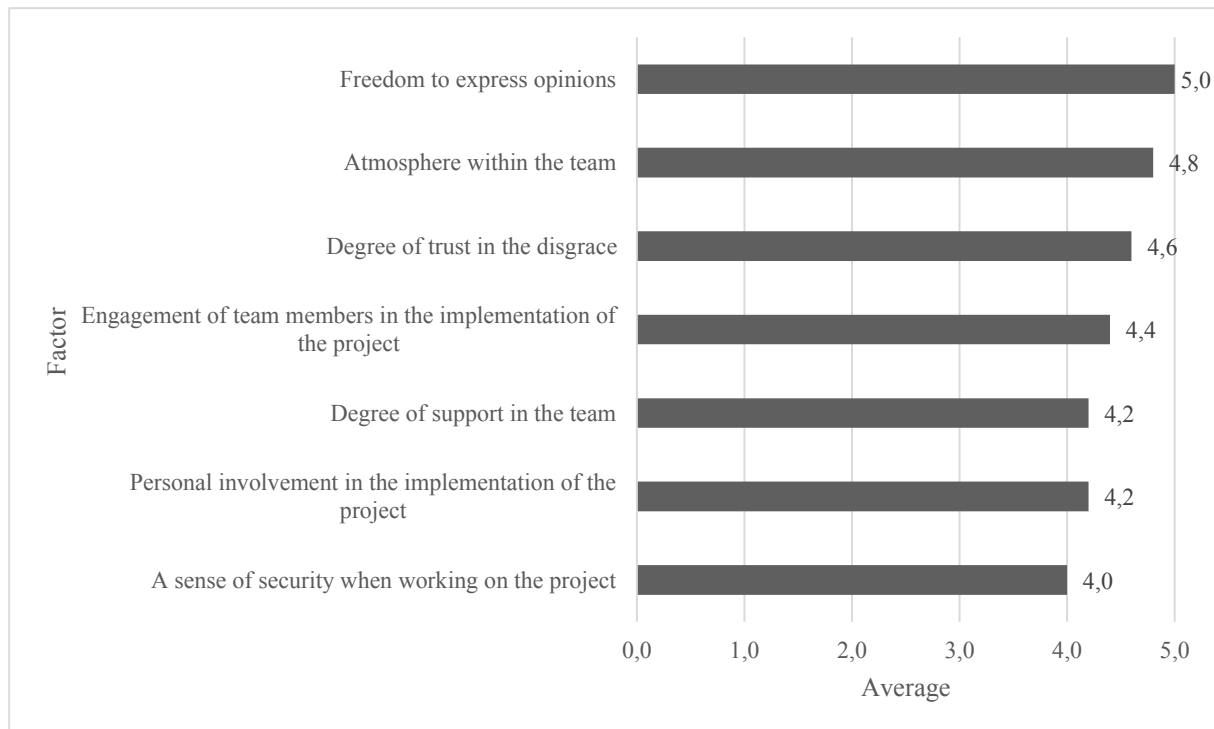


Figure 1. The average level of impact of selected factors on the formation of positive relationships in the team implementing the project under the Free Tea Association. Source: own study.

In the next question, the respondents had a choice of 23 statements that described both behaviors shaping a positive atmosphere of cooperation and supporting communication, as well as shaping a negative atmosphere of cooperation and characterizing defensive communication. All team members expressed that they felt appreciated, listened to and respected and that an open exchange of ideas and conversations among team members was conducted in an open and free manner. All team members associate positive project relationships with project success. 4 out of 5 members felt acceptance among the rest of the team and recognized that the project was oriented towards joint problem solving, openness, honesty, sharing information and that there was a positive cooperation environment. Three out of four team members said they felt support and empathy from other team members and that there was equality for all team members and a high level of trust. 2 out of 5 team members said that the degree of security in the project was high, communication was based on the description of the situation and feelings, and conflicts were resolved on an ongoing basis. The same number of people asserted that they contributed significantly to the project's results. The team did not examine: the assessing of the activities of project team members, controlling the activities of project team members, manipulating the activities of project team members, lack of interest from the project manager and lack of cooperation within the group, lack of trust between project team members, assigning power, status and values to selected people or ideas, lack of flexibility towards new ideas. Based on the choice of statements regarding the respondents' responses, it can be determined that the project only contained behaviors shaping a positive spirit of cooperation and supporting communication.

In the next part of the survey, the respondents expressed that the specificity of the project they carried out required direct and indirect communication from team members. Direct communication is face to face contact. Indirect transmission of information is carried out by means of electronic devices (Adams & Galanes, 2006). It is important whether the communication takes place directly or by using tools supporting distance work. The reception and impact of the message displayed on the computer screen is different, and different when we have personal contact with the caller. The frequency of use and effectiveness of individual communication channels were examined.

Table 1.

Evaluation of the frequency of use and the effectiveness of various communication channels as a team implementing the project within the framework of the FTA

Item	Communication	Responses	
		evaluation of the frequency of use in the project where 1 is not used at all, 5 are very often used	evaluation of effectiveness, where 1 is ineffective, 5 is very effective
1.	Direct communication (face-to-face meetings)	3,8	4,2
2.	Indirect communication		
3.	E-mail	4,8	4,0
4.	Telephone calls	4,8	4,0
5.	Virtual disks	4,8	4,0
6.	Video calling	4,8	3,4
7.	Online messengers	4,8	4,0

Source: own study.

The results presented in Table 1 show that in the examined project team, indirect communication (4.8) was used more often, which was conducted using emails, phone calls, virtual discs, video calls and online messengers. In terms of effectiveness, respondents rated video calls as a form of indirect communication (3.4). Other forms of communication were equally effective (4.0). Direct communication was used less frequently in the project (3.8) despite the fact that it was rated higher in terms of effectiveness (4.2) than any of the above-mentioned forms of indirect communication. Indirect communication dominated the project because in the organization, the majority of projects are implemented by means of remote communication due to care for the natural environment. Good practices in this area concern allowing employees to work remotely in order to limit the number of trips to meetings. The respondents admitted that they were aware and see differences in the effectiveness of using indirect communication, but the specificity of work on social projects does not allow its limitation, and even forces it to be used to a greater extent. In this case, the lower assessment of the effectiveness of indirect communication did not affect the success of the project. Team members emphasize, however, that complete elimination of direct communication is not possible because it is the team's face-to-face meetings that are the basis for building positive relationships within the team and involvement in the project. The board of the organization is constantly working to improve indirect communication and increase its effectiveness in subsequent projects.

4. Discussion and summary

This article attempts to answer the first research question 1) What factors and behaviors influence positive relations in the NGO project team? In the examined project team, the respondents indicated that freedom in expressing opinions, a positive vibe of cooperation and a high degree of trust within the team are the three most important factors shaping positive relations among its members.

Hamilton, in his research emphasizes that project teams that feel supported by a positive team atmosphere are more efficient. A feature that makes project teams succeed is the positive climate of cooperation which is created, amongst other things, by the ability to effectively communicate within the project team and to instill trust and mutual support. Positive relationships contribute to an increase in the sense of security and trust, making the expression of opinions and feelings happen more freely. Respect and active listening are the basic elements influencing good relations within the project team. Lack of respect and the inability to listen actively lead to ignorance or interruption of the interlocutor's statements. These behaviors negatively affect the atmosphere in the project team and cause communication disruptions. Negative relationships cause suspicion and distrust (Hamilton, 2008).

Freedom in expressing opinions, a positive vibe of cooperation and a high degree of trust are in line with the ideas of non-governmental organizations' activities mentioned in the literature on the subject. Bogacz-Wojtanowska in her research defined the features that characterize non-governmental organizations and they include, among others: the attitude of trust, participation and willingness to act together (Bogacz-Wojtanowska, 2006).

In the examined organization, in all implemented projects there was an informal type of contact between employees, equality between all members of the project team, friendly relations and a limiting of the role of the project manager to the coordinator of activities, which ensures the timeliness of their implementation and formal closure of the project. This approach is conducive to cooperation, proper understanding of the project goals, building positive relationships within the team and exchange of information. In addition, it makes ideas, opinions and views easy to readily exchange, during conflicts it is easier to get support and understanding and employees are more open and have a sense of collective responsibility for the project. The voluntariness of joining the organization, identifying each member with the organization's activities and prevailing positive relations in projects allows the creation of a friendly place for development, exchange of knowledge and self-fulfillment on various planes. Adler & Elmhorst in their research emphasize that the synergy of correct communication, relationships, cooperation and coordination leads to the success of the project. This approach most supports members' involvement in the project (Adler & Elmhorst, 2005).

It can be seen that in the studied project team, there were only behaviors shaping a positive sense of cooperation and supporting communication. In each case, positive responses were marked by at least two members of the project team. Morreale and all have shown in their research that the increase in positive interpersonal relationships increases the number and quality of relayed messages (Morreale i in., 2007). Negative behaviors and manifestations of defensive communication were not indicated by any study participant.

Another activity undertaken in this study was to obtain an answer to the second research question (2) to what extent direct and indirect communication affect the efficiency of information flow? Respondents contended that direct communication was more effective in the implemented project than indirect communication and greater supported building relationships within the group. Research confirms the achievements of other researchers in this area (Adler & Elmhorst, 2005; Kandefler-Winter & Nadskakuła, 2016; Major & Spalek, 2017).

The results of research in the field of communication and building positive relationships in project teams in non-governmental organizations extend the existing literature on the subject to include this issue. The authors, based on a case study conducted in a non-governmental organization, focused on the specificity of third sector organizations. The success of projects depends, to a large extent, on the way the teams work and are involved. In order to implement the project, members of project teams interact and enter into relationships with one another. In projects run by NGOs, aspects such as communication and positive relationships within a team are of particular importance. Members of social projects often do not receive remuneration for their work, so they should be motivated to act in a different way. Being aware of the limitations resulting from the conscious selection of the project team for the study, in order to make generalizations, further in-depth research in this area should be carried out.

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LEADER-MEMBER EXCHANGE AND LEARNING CLIMATE IN INCREASING EMPLOYEE MOTIVATION: A POST-PANDEMIC PERSPECTIVE

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Purpose: The paper tries to answer the following question: what are the relationships between the quality of leader-member exchange (LMX), learning climate, and employee motivation in public administration? Its purpose is to identify the relationships between LMX, learning climate, and employee motivation in public administration organizations.

Methodology: The paper presents the results of a survey carried out in the Górnośląsko-Zagłębiowska Metropolis (Metropolis GZM), i.e. the metropolitan association located in the area of Upper Silesia. The sample consisted of 153 employees in all of 41 municipal offices of the Metropolis GZM. A model of relationships between LMX, learning climate, and employee motivation was proposed and tested using Structural Equation Modeling (SEM).

Findings: It was found that the quality of LMX positively affected learning climate, which in turn influenced employee motivation. Analysis proved that learning climate mediated the relationship between LMX and motivation of public administration employees.

Research limitations/implications: The study focused only on the municipal offices in the Metropolis GZM and its results cannot be generalized. However, it implies that public administration organizations can create the learning climate by improving relationships between supervisors and subordinates to increase employee motivation.

Practical implications: The results obtained indicate that in the contemporary public administration, a traditional approach to motivate employees should evolve and move towards an approach based on positive social relations, mutual trust, and leaders' developmental support.

Originality/value: This research has provided empirical evidence regarding the relationships between the quality of LMX, learning climate and employee motivation which was hitherto absent from public administration.

Keywords: leader-member exchange (LMX), learning climate, employee motivation, public administration.

Category of the paper: Research paper.

1. Introduction

The COVID-19 pandemic resulted in a deep sense of uncertainty of many employees, not only regarding their health but also jobs and financial situation. In response to the prevailing conditions many public organizations have rapidly begun to introduce new forms of work organization, information technologies and remote work. This situation has accelerated the process of informatisation of many public services, particularly in public administration (e.g. e-administration). Public employees had to face new workplace challenges, sometimes being forced overnight to learn new technologies to adjust to the situation. These dynamic changes have led to a growing sense of insecurity of many employees, frequently accompanied with the decrease of their commitment, motivation and job performance.

Concurrently, the development of IT technology, COVID-19 pandemic and the rise of knowledge society pose new challenges for public organizations. This problem particularly concerns local government administration whose performance determines providing the fundamental municipal services. New concepts of public management emphasize the significance of human capital and social aspects of organizational performance for the quality of public services. These ideas lead to the increased interest in the issues of organizational climate, employee motivation and impact of leaders on them. However, most of the empirical studies are conducted in business organizations and are focused on motivational effects of leadership styles. In this context an important research aim becomes identification of relations between relational aspects of leadership and employee motivation in the public administration. Special attention should also be paid to the significance of the quality of relationships between leaders and followers (LMX) and its impact on organizational climate.

The paper tries to answer the following question: what are the relationships between the quality of leader-member exchange (LMX), learning climate, employee motivation in public administration? This aim will be reached by presenting the results of empirical research concerning these phenomena carried out in all of 41 municipal offices in the Metropolis GZM. The model of relationships between LMX, learning climate and employee motivation was tested with the use of Structural Equation Modeling (SEM). This study not only highlights the significance of the LMX quality in motivating employees but also reveals a mediating role of learning climate in this process. On this basis some practical implications for motivating employees are also provided for the post-pandemic workplaces.

2. Literature review and hypotheses development

2.1. Employee motivation and its antecedents

Diverse theories and approaches have been applied to explain the process of human motivation. Moreover, the literature on the subject has also distinguished a variety of factors influencing employee motivation. In some studies the impact of various characteristics of leadership on employee motivation has been explored but mostly they have only stressed the influence of leadership style on employee motivation. Much less attention has been paid to its relational aspects and the significance of the quality of relations between leader and his/her followers on employee motivation.

The Deci and Ryan's (2000, 2002) Self-Determination Theory (STD) provides a valuable framework for examining and understating the essence of these relationships, its motivational effects and impact of learning climate on employee motivation. The STD theory applies the cognitive evaluation theory to explain relationships between external incentives and intrinsic motivation what allows to discriminate between external and intrinsic motivation (Chrupała-Pniak, and Grabowski, 2016). The STD theory also indicates a multidimensional and complex nature of employee motivation. It uses the needs theory which is widespread in the literature on employee motivation but in contrast to the traditional approach, in this theory, human psychological needs are considered as innate necessities rather than acquired motives of actions, which are crucial for employees' psychological growth, integrity, and well-being (Deci, and Ryan, 2000). A fundamental assumption of the STD theory is that an individual is naturally oriented to actively engage in development, psychological and social integration.

Deci and Ryan (2000) distinguish two basic types of motivation, i.e. intrinsic motivation and extrinsic motivation. Intrinsic motivation concerns an active engagement in activities which an individual considers as interesting, hence they support his/her individual development. Extrinsic motivation encompasses diverse kinds of motivation, which vary regarding the level of internalization of social expectations and rules by an individual, i.e. an external regulation, introjected, identified and integrated regulations. They represent a specific continuum of extrinsic motivation. On one end of this continuum, the external regulation is a typical example of extrinsic motivation, when human behaviors are controlled by external conditions. On the other, at the integrated regulations, people accept and fully identify with the values which are the core of these regulations and treat them as their own despite their external nature.

Adopting this theory, employees possess a potential to perform autonomously, to regulate their behaviors and to develop. Moreover, striving for this development is a natural process enhancing their well-being. It enables them to satisfy such fundamental human needs as autonomy, competence, and relatedness. Neither of these needs should be neglected because all of them are nutriments without which the processes of intrinsic motivation as well as integration of extrinsic motivational regulations will not operate optimally (Deci, and Ryan, 2000).

It should be noticed that in contrast to the traditional approach, pursuing to meet these needs is not the basic aim of employees but they endeavor “to act in the direction of increased psychological differentiation and integration in terms of their capacities, their valuing processes, and their social connectedness” (Deci, and Ryan, 2000, p. 230). A consequence of adopting this perspective is also that such organizational characteristics as learning climate enhanced with the high quality of relationships with leaders, will facilitate employees to meet their psychological needs of autonomy, competence, and relatedness and will enhance their optimal performance, well-being and job satisfaction. Outcomes of employee efforts will positively influence their intrinsic motivation if employees pursue the aims and relationships allowing them to satisfy their psychological needs. Therefore, adjustment of organizational conditions regarding these characteristics to employees’ expectations is needed for increasing their motivation and optimal performance in the organization.

2.2. Leader-Member Exchange

Some argue that many of the contemporary commonly-accepted theories of leadership are rather based on psychoanalytically-driven approaches than on real leaders’ experiences (Cunliffe, and Eriksen, 2011; Carroll et al., 2008; Lawler, 2005). In this context Cunliffe and Eriksen (2011) point out to the significance of a relational leadership theory which is embedded in everyday practice that leaders follow, emphasizing that attention should be given to explain “how leaders construct organizational ‘realities’ and identities in social-psychological processes occurring in relation to other people” (Cunliffe, and Eriksen, 2011, p. 1429). Relational approach to leadership is crucial to understand how specific features of the relationship of leaders with their followers can affect employees’ behaviors (Lavie, Haunschild, and Khanna, 2012).

The relationship of the leader with his/her followers is often conceptualized in terms of leader-member exchange (LMX) relationship (Thrasher et al., 2020). The LMX theory demonstrates the role of interpersonal processes between the leader and his/her follower (Erdogan, Kraimer, and Liden, 2004). An essential assumption of the LMX theory is that outcomes of leadership depend on the quality of a dyadic relationship between the leader and members of an organizational unit (Alo, and Arslan, 2022). The quality of this relationship decides about the intensity of the process of mutual exchange of tangible and intangible resources (Marzec, 2019; Erdogan, Kraimer, and Liden, 2004). According to the LMX theory, leaders build two kinds of relationships with followers in an organizational unit, i.e. a high and a low quality exchange. In the high-quality LMX, the process of mutual exchange is intensive, which means that e.g. an employee takes the initiative to complete tasks which require more effort, even exceeding his/her job responsibilities. In return, the leader provides the member with, e.g. bigger autonomy, support in career advancement, access to information, and development, etc. (Balasundaram, and Sathiyaseelan, 2016). Contrary to this kind of relationships, in the low-quality LMX, the exchange between the leader and the subordinate is

limited and strictly based on their formal responsibilities arising from an employment contract. One of the most commonly accepted and empirically tested models is proposed by Liden and Maslyn (1998), which includes such LMX dimensions as:

- contribution, which concerns the perception of an employee's work effort, and quality, as well as his/her input in the achievement of mutual goals,
- professional respect, which refers to the mutual respect of professional competences and expertise,
- loyalty, which is the extent to which the leader and subordinate are loyal to each other and they offer support to one another,
- affect, which concerns their mutual affection, based more on the perception of personal attractiveness than on their professional values.

The quality of LMX affects various aspects of an individual and organizational performance. It influences employees' perception of their work environment (Kheng, and Mahmood, 2013). Moreover, also some empirical research suggests that there is a relationship between the quality of LMX and learning climate. In the study conducted in Polish enterprises it was found that the quality of LMX influenced employees' commitment and career satisfaction (Marzec, 2015). Other previous research showed that there was a relationship between employees' evaluation of organizational climate and the quality of LMX (Cogliser, and Schriesheim, 2000). The survey conducted in Malaysia revealed that there were significant relationships between pro-innovation organizational climates, leader-member exchange and the innovative work behavior of knowledge workers (Kheng, and Mahmood, 2013). Based on the foregoing, the following hypothesis has been formulated:

H1: The quality of LMX will be positively related to the learning climate of municipal offices.

To conclude, based on the previous studies on LMX and learning climate it is reasonable to assume that the quality of relationships between leaders and employees influences employees' possibilities of learning and development in public municipal offices. In turn it is also logical that opportunities of professional development may affect employees' perception of learning climate of an organization. However, hitherto this relation has not been empirically examined in the Polish municipal offices in the Metropolis GZM.

2.3. Learning climate

It should be noticed, that although the quality of LMX has been already linked with employee motivation in some studies, the mediating role of learning climate in this relationship has still been overlooked in the empirical research carried out in the public organizations. Despite the fact that the concept of the organizational climate was introduced by Lewin, Lippit and White (1939) into social science in the late 1930s, it has received more attention of researchers on management only in the 1970s along with a growing interest in an organizational culture's phenomenon with which it has still been wrongly equated or considered as its element.

Since then, a wide variety of definitions, approaches and methodologies to the examination of organizational climate have emerged in management studies. In contrast to organizational culture, many theorists emphasize subjective aspects of organizational climate, e.g. Gustafson, Pomirleanu, and Mariadoss (2018) describe organizational climate as the perception of organizational policy and practice. Organizational climate is mostly conceptualized as employees' perception of specific features of organizational context, i.e. the characteristics of process and practices taking place in the organizational environment. It is stressed that this perception strongly influences employees attitudes and behaviors (Van der Heijde et al., 2018). Although undoubtedly the concepts of organizational climate and culture are closely related, many researchers also stress differences between them (e.g. Goh et al., 2020). An organizational culture encompasses values, norms and expectations shared by employees which are often hidden and difficult to identify but guide employees' behaviors, whereas organizational climate concerns the subjective perception of organizational environment features and events occurring in this environment (Rowold, Hochholdinger, and Schilling, 2008).

It should be noticed that today, in the knowledge-based economy, these features of an organizational climate which enhance individual and organizational learning as well as initiative and creativity of employees, arouse special attention of theoreticians and practitioners of management both in the private and public sectors. A learning climate concerns the employees' shared perception of how the organizational, procedures, policies and practices in their work environment support their learning behaviors (Van der Heijde et al., 2018; Nikolova et al., 2016; Mikkelsen, Ogaard, and Lovrich 2004). Abbas et al., 2011 maintain that learning climate is a "bridge" between learning and development of employees and knowledge acquired by the organization, hence organizations which create learning climate are able to maximize their advantages obtained from investments in employee development. Van der Heijden et al. (2009) argue that employee learning and their development are strictly related to learning climate in an organization. In organizations creating a learning climate, value of learning and employees' rights to comprehensive professional development are commonly accepted. In the learning climate employees give value and weight to the learning. They perceive processes and practices related with learning as a way to achieve a career success. This approach leads to integration of individual and organizational aims and results in a balance of employees' well-being and organization's success.

There has been a great deal of studies supporting the idea that organizational climate has a significant impact on employee behaviors, their job performance, commitment, motivation and job satisfaction (Zhang, and Liu, 2010; Obeng et al., 2021). In the Polish private organizations it was found that learning climate influences employee development and subjective career success (Marzec, 2015). Similar results were obtained in the study conducted in the German service sector, which showed that learning climate led to an increase of employees' participation in developmental practices (Rowold, Hochholdinger, and Schilling, 2008). Moreover, this study revealed positive relations between employees' participation in developmental practices, learning climate and employees' job performance.

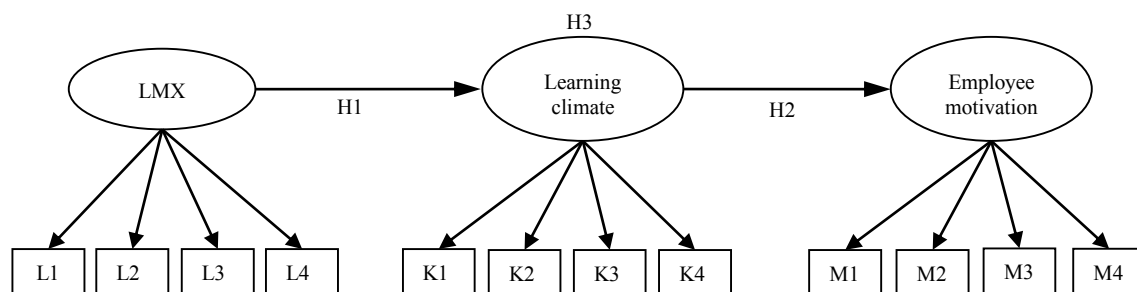
According to the SDT theory, cultural values, reflected in the organizational climate, affect meeting individual psychological needs. Aims and values complying with psychological needs may be integrated by an individual what results in his/her motivation and well-being. Gagné and Deci (2005) argue that, a supportive organizational climate should enable employees to satisfy their psychological needs such as autonomy, competence, and relatedness. In the learning climate the value of learning and growth is stressed. Employees perceive the organization and its leaders as supporting their competence development. These suppositions are justified by results of some previous empirical studies. The survey conducted among employees of a university in Iran revealed that organizational climate influenced employees' job motivation (Ghanbari, and Eskandari, 2014). Similar findings were reported by Tyagi (1982), who discovered that organizational climate contributed to intrinsic and extrinsic motivation of salespersons. In turn Rusu and Avasilcai (2014) discovered that the organizational climate influenced employee motivation in industrial firms in Romania. In a study carried out at a Spanish university, it was found that learning climate enhanced intrinsic motivation of teachers (Calderón, Meroño, and MacPhail, 2020). Consequently, it is reasonable to formulate following hypothesis:

H2: The learning climate of municipal offices will be positively related to motivation of public administration employees.

The hypotheses H1 and H2 are directed towards a mediating role of the learning climate in the relationship between the quality of LMX and employee motivation. Moreover, this supposition is supported by a previous study carried out in Malaysian banking industry, which revealed that organizational climate mediated the relationships between leader-member exchange and employee citizenship behaviors (Vasudevan, and Mahadi, 2019). Therefore, the following hypothesis was proposed:

H3: The learning climate will mediate the relationships between the quality of LMX and motivation of public administration employees.

Based on the conceptual framework derived from the literature study, a model of relationships between the phenomena examined was constructed (Figure 1).



L_i , K_i , M_i – dimensions of the latent variables.

Figure 1. The proposed conceptual model of relationships.

The conceptual model presents the relationships between LMX, learning climate and employee motivation (Figure 1). It assumes that the quality of LMX affects employee motivation indirectly, i.e. through its impact on learning climate in organizations, which next influences employee motivation. Therefore, according to the proposed model, learning climate will be a mediator of the relationships between the quality of LMX and employee motivation. Next, the model needs to be tested across municipal offices in the Metropolis GZM.

3. Research method

3.1. Procedure and participants

The survey was carried out among 153 employees of municipal offices in the Metropolis GZM. The study encompassed all of 41 municipal offices in the Metropolis GZM. The number of employees examined was dependent on the number of inhabitants of the commune (from 3 to 5 employees in each of the municipal offices), i.e. 66 respondents were employed in communes with less than 20 000 inhabitants, 12 respondents in communes from 20 001 to 50 000 inhabitants, 30 respondents in communes from 50 001 to 100 000 inhabitants, and 45 respondents were employed in communes having above 100 000 inhabitants.

Due to the specificity of employment in municipal offices the sample included 31 men and 122 women. Mean age of respondents was 41.3 years ($SD = 8.8$). Because of legal requirements regarding educational qualifications of employees in public administration, most of the respondents held a Master's degree (81.7%), only 11.8% a Bachelor's degree and 6.5% of the employees had post-secondary education.

3.2. Measures

Leader-Member Exchange (LMX) was measured using the modified Liden and Maslyn's (1998) scale that encompassed four dimensions, i.e. affect, professional respect, loyalty, and contribution scored on a seven-point rating Likert scale (ranging from 1 – strongly disagree to 7 – strongly agree). The value of Cronbach's alpha coefficients of subscales ranged from 0.79 to 0.95 what indicates high internal consistency of the scale.

Learning climate was assessed with Hult, Ketchen and Slater's (2002) instrument that contained four subscales representing its dimensions, i.e. team orientation, system orientation, learning orientation, and memory orientation. Each subscale encompassed four items. The value of Cronbach's alpha coefficients varied from 0.72 to 0.91, what indicated high homogeneity of the scale.

Employee motivation was measured with the modified scale elaborated by Tremblay et al. (2009). Its four subscales were used to assess employee motivation. To enhance the user-friendliness, the number of subscales was reduced after the content analysis conducted by an experts' team (Van der Heijde, and Van der Heijden, 2006). Based on Deci and Ryan's approach, motivation was measured by intrinsic motivation, and three types of external motivation representing different stages of internalization of external regulations, i.e. integrated regulation, introjected regulation, and identified regulation. Cronbach's alpha coefficients of the subscales ranged about 0.66. It needs to be stressed that in order to increase the validity of the results all scales applied, were previously tested and validated in the Polish studies (e.g. Chrupała-Pniak, and Grabowski, 2016; Marzec, 2015; Turek, and Wojtczuk-Turek, 2014). Scales of employee motivation and learning climate were also scored on the seven-point Likert's scale.

4. Results

In order to test the hypotheses formulated, at first descriptive statistics and Pearson's correlation analyses were applied. The SPSS 27.0 and Amos 27.0 were used to process data collected. The results demonstrated a relatively high level of motivation of the surveyed employees: their average general motivation was 5.04 points on the 7-point scale (ME = 5.08; SD = 0.73) (tab. 1). The primary analysis also revealed that in general the employees highly rated the quality of their relationships with supervisors (LMX): the mean was 5.49 points on the 7-point scale (ME = 5.63; SD = 0.97). The level of the learning climate was also assessed high, its mean was 4.99 points on the 7-point scale (ME = 5.19; SD = 0.91) (table 1).

Table 1.
Descriptive statistics of the variables examined

Variable	Mean	Median	Standard deviation	Range	Minimum	Maximum
Affect	5.56	5.67	1.15	6.00	1.00	7.00
Professional respect	5.64	6.00	1.27	6.00	1.00	7.00
Loyalty	4.94	5.00	1.19	6.00	1.00	7.00
Contribution	5.66	5.75	0.93	4.25	2.75	7.00
LMX (generally)	5.49	5.63	0.97	5.40	1.60	7.00
Team orientation	4.86	5.00	1.12	6.00	1.00	7.00
System orientation	5.14	5.25	1.07	6.00	1.00	7.00
Learning orientation	5.36	5.50	0.96	4.75	2.25	7.00
Memory orientation	4.58	4.75	1.21	6.00	1.00	7.00
Learning climate (generally)	4.99	5.19	0.91	5.13	1.88	7.00
Identified regulation	4.74	5.00	0.98	6.00	1.00	7.00
Intrinsic motivation	5.29	5.33	0.88	4.33	2.67	7.00
Integrated regulation	5.25	5.33	0.85	4.67	2.33	7.00
Introjected regulation	4.85	5.00	0.80	4.67	2.33	7.00
Motivation (generally)	5.04	5.08	0.73	4.42	2.58	7.00

Then, the relationships between the examined phenomena were analyzed (table 2). Pearson's correlation analysis showed that there were significant positive correlations between learning climate and employee motivation (0.384; $p < 0.01$) as well as between the quality of LMX and learning climate (0.438; $p < 0.01$), hence it was reasonable to conduct the SEM analysis

Table 2.

Pearson's correlation rates between the variables examined

No.	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Identified regulation	-														
2	Intrinsic motivation	0.524**	-													
3	Integrated regulation	0.530**	0.634**	-												
4	Introjected regulation	0.694**	0.585**	0.612**	-											
5	Motivation (generally)	0.835**	0.819**	0.826**	0.859**	-										
6	Affect	0.186*	0.188*	0.280**	0.154	0.242**	-									
7	Professional respect	0.125	0.088	0.234**	0.110	0.166*	0.779**	-								
8	Loyalty	0.176*	0.140	0.235**	0.102	0.197*	0.667**	0.646**	-							
9	Contribution	0.335**	0.334**	0.419**	0.338**	0.427**	0.630**	0.590**	0.459**	-						
10	LMX (generally)	0.230**	0.207*	0.332**	0.194*	0.289**	0.908**	0.899**	0.827**	0.760**	-					
11	Team orientation	0.382**	0.134	0.233**	0.217**	0.295**	0.357**	0.376**	0.380**	0.295**	0.417**	-				
12	System orientation	0.330**	0.103	0.247**	0.227**	0.275**	0.295**	0.319**	0.327**	0.296**	0.364**	0.765**	-			
13	Learning orientation	0.455**	0.362**	0.419**	0.388**	0.489**	0.228**	0.310**	0.178*	0.358**	0.310**	0.513**	0.501**	-		
14	Memory orientation	0.296**	0.111	0.166*	0.272**	0.255**	0.297**	0.333**	0.338**	0.284**	0.369**	0.693**	0.563**	0.529**	-	
15	Learning climate (generally)	0.432**	0.203*	0.309**	0.325**	0.384**	0.354**	0.401**	0.372**	0.366**	0.438**	0.896**	0.847**	0.743**	0.849**	-

Note. * $p < 0.05$; ** $p < 0.01$

In the next step, the posed hypotheses and the assumed model of the relationships between LMX, learning climate and employee motivation were tested by means of Structural Equation Modeling (SEM) analysis using the generalized least squares method (Figure 2). Due to the number of variables the SEM analysis was conducted with the mean scores of the scales (Van der Heijde et al., 2018). In order to examine the fit between the model assumed and the data, such traditional indicators of goodness of fit as χ^2 , χ^2/df , Root Mean Square Error of Approximation (RMSEA), and the Goodness of Fit Index (GFI) were applied.

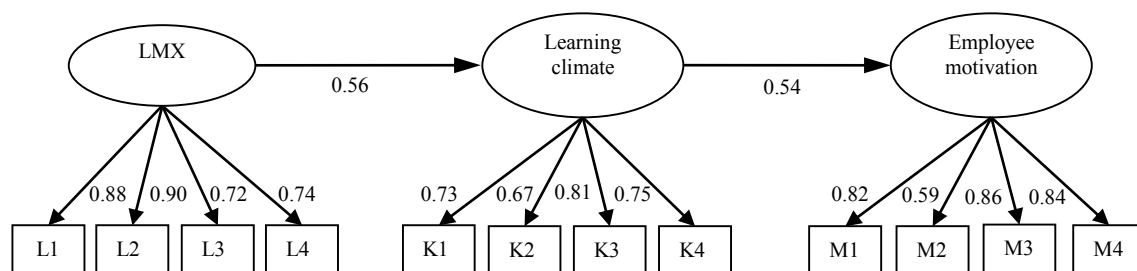
The SEM analysis confirmed the correctness of the model (Model 1), which had reasonable fit ($\chi^2/df = 1.69$; $GFI = 0.91$; $RMSEA = 0.067$) (Table 3).

Table 3.

The goodness of fit of the estimated models of relationships between LMX, learning climate, and employee motivation

Model	χ^2	df	p	χ^2/df	GFI	RMSEA
Model 1	79.298	47	0.00	1.69	0.91	0.067
Model 2	78.041	46	0.00	1.70	0.91	0.068
Independence model	238.856	66	0	3.62	0.74	0.131

It was found that LMX had a positive impact on learning climate ($\gamma = 0.56$; $p < 0.01$) (H1). In turn learning climate positively affected employees' motivation ($\beta = 0.54$; $p < 0.01$) (H2). Both relationships examined were statistically significant (Figure 2). Next to test the third hypothesis, an alternative model additionally including the direct impact of LMX on employee motivation was analyzed. Judge and Colquitt (2004) proved that a mediation is confirmed if adding a direct path between the variables examined (i.e. between LMX and employee motivation in this case) will not significantly improve the quality of the model and will make an indirect path statistically insignificant (Figure 2). However, further analysis showed that the direct relationship between LMX and employee motivation was not significant ($\gamma = 0.15$; $p = 0.166$) and it did not improve the quality of the model (Table 3; Model 2). Therefore, there were no reasons to reject the third hypothesis (H3).



L_i, K_i, M_i – dimensions of the latent variables examined.

* Note. In the model the standardized regression weights are presented. In the model only the key relationships are shown for reasons of simplicity. All factor loadings are significant at the 0.001 level.

Figure 2. The model of the relations between variables examined.

Subsequently, in order to increase validity of the results, the Sobel test was also conducted to test the mediation effect of learning climate (H3). The test confirmed its mediating impact (full mediation), i.e.: $Z_3 = 3.35$ ($p < 0.001$).

5. Discussion

The results obtained do not give reasons to reject the posed hypotheses H1-H3. The model tested illustrated how the quality of LMX influenced learning climate, which in turn affected motivation of public administration employees. In line with the previous studies, the relationships between the quality LMX and learning climate, as well as between organizational learning climate and employee motivation were confirmed. Generally, these results proved that the quality of personal relations and organizational climate are important factors in increasing employee motivation in contemporary public administration organizations.

The study offers an important input to HRM theory by providing insight into the relationships between the quality of LMX, learning climate and employee motivation in public administration organizations. It showed that the quality of LMX had a significant role in contributing to learning climate in municipal offices. The results obtained also imply that these organizations should create the learning climate by improving relationships between supervisors and employees to increase employee motivation because employees' perception of learning climate involves the quality of their relationships with leaders, which includes leaders' support for learning and development. It needs to be mentioned that an important contribution of the study results from the fact that its subject concerns human capital of public administration, whose distinctive features are emphasized in the literature on the subject (e.g. Blom et al., 2020). Simultaneously, due to its specificity, practical adaptation of a new approach to motivate employees becomes a particularly important aim of HRM in public organizations. An extended hierarchy, formalization, rigid rules of promotion, limited flexibility of rewarding which are accompanied with high politicization and uncertainty of the organizational environment can decrease employee motivation. Therefore in the context of ongoing changes in the public administration and the fundamental role of human capital in this process, a significant challenge for HRM has started to be creating such organizational climate which encourages learning of employees, enhances positive personal relationships and increases employee motivation. These findings also suggest that an important step in this process should be developing a high quality of relationships between subordinates and supervisors, who ought to support employees' learning and growth. Today, in the postindustrial economic era, the role of leaders is also changing in the public sector. In order to develop learning climate, public leaders should rather build their relations with employees upon mutual trust, empathy, respect, and developmental support, than on top-down control and a position in the organizational hierarchy.

The conducted study had some limitations that need to be discussed. These limitations also point out the possible directions of further studies. First of all, the study focused on the public administration. The survey was conducted only in the municipal offices in the Metropolis GZM, thus the results obtained cannot be generalized. Furthermore, due to specificity of employment in the public administration the sample was homogenous as regards demographic characteristics of the respondents. Therefore, they could not be considered as potential moderators of the analyzed relationships. Moreover, in this research only the quality of the relationship between supervisors and subordinates was examined. In a more comprehensive study, the impact of lateral relations on organizational climate and employee motivation should be analyzed too. Moreover, the impact of other organizational features, especially these characteristic of public administration, on organizational climate and employee motivation should be investigated.

6. Final conclusions

It is commonly accepted that employee motivation plays an essential role in achieving high organizational performance, because it affects employees' attitudes and behaviors which externalize in their efforts to achieve organizational goals (Rusu, and Avasilcai, 2014). Contemporary public administration organizations need highly motivated employees who want to learn and develop to deal with uncertainty of the environment and dynamic changes in public administration. Therefore, specific focus should be given to organizational conditions which enhance motivation of employees enabling them to face challenges in the environment. Dynamic changes and threats such as the COVID-19 pandemic, the war in Ukraine and the wave of refugees related to it imply new responsibilities and obligations for the public administration (Iwaniuk et al., 2021). To meet these obligations, competent and highly motivated employees are needed. Consequently, developing a new approach based on high-quality LMX and learning climate to motivate employees in public administration should become an inherent element of creating human capital of contemporary public administration.

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DETERMINANTS OF PARTICIPATION IN COLLABORATIVE FASHION CONSUMPTION – PROVIDER PERSPECTIVES

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Purpose: The development of digital technology is one of the most important factors driving changes in consumer behavior in the 21st century. Today, the sharing economy covers more and more areas of consumers' daily lives. Using online apps to exchange, sell, buy or rent clothes has become one of the most popular ways of consuming fashion around the world. The main objective of this paper is to assess the importance and estimate the impact of the determinants (motives and unpleasant user experience) of providers' engagement in collaborative fashion consumption (CFC).

Design/methodology/approach: The study was conducted using an online survey with 420 respondents in Poland – users (providers) of CFC platforms. A confirmatory factor analysis (CFA) and structural equation model (SEM) was performed using AMOS 21.0 version. The conducted research allowed to identify the importance and to determine the influence of examined factors on attitudes toward CFCs and willingness to use CFC apps in the future.

Findings: Economic motives did not outperform non-economic motives to participate as a provider in CFC. Pragmatic motives were by far the most important determinants of fashion sharing. Environmental factors are an important reason for providers to participate in CFC but they may not be a direct motivation for CC participation. Social motives recorded the lowest average importance rating in the context of participation in CFC. Unpleasant user experience negatively influence both the attitudes toward using CFC apps and the willingness to use them in the future

Research limitations/implications: The research was conducted only on Polish users, so due to cultural differences, the meaning and impact of the motives of using these apps may be different in other countries. Due to the method of sampling and sample size, the results cannot be treated as representative for the population of Polish users of CFC platforms. Future research could include conducting cross-country research and one may attempt to broaden the scope to

include other categories of motives. Future research could also extend the scope of unpleasant user experience with other factors.

Practical implications: The results of research on the motives of users' use of CFC apps should be useful for enterprises in the context of designing activities in the field of marketing communication.

Originality/value: The paper fills a research gap in the field of research on the determinants of Polish providers' engagement in collaborative fashion consumption (CFC).

Keywords: sharing economy, collaborative fashion consumption, CFC, consumer behavior, motives, structural equation model (SEM), sustainable consumption

Category of the paper: research paper.

1. Introduction

Sharing economy, emerging over the past decade, has experienced explosive growth (Acquier et al., 2017). On the one hand, this is due to global changes – increasing environmental awareness (including ecological footprints) and consumer awareness (manifestations of responsible consumption). On the other hand, the reason for such growth is the rise of the digital economy and mobile technologies (Lee, Jung, & Lee, 2021; Brydges et al., 2021). The sharing economy is defined as a peer-to-peer activity through which access to goods and services can be provided, obtained and shared by coordinating the acquisition and distribution of a resource (Belk, 2014; Hamari et al., 2016). At the individual level, the sharing economy is believed to promote sustainable consumption, human interaction, flexible employment, equal access to products and services and economic income. Driven by the sharing economy, the consumption model moves away from purchase towards temporary access (Li et al., 2021). In this sustainable consumption model, the right to use unused resources can be transferred from the owner to other consumers (Hamari et al., 2016). Both owners and consumers obtain a value; owners can earn extra money by sharing unused resources, while consumers can save money by obtaining resources at a low price. With a more democratic approach to business, the sharing economy plays an important role in connecting individuals and communities, encouraging cooperation, and strengthening the position of citizens (Martin, 2016).

The popularity of the sharing economy has significantly increased due to the development of digital platforms. By creating a two-sided marketplace, digital platforms connect consumers seeking resources with resource owners (Guo et al., 2019). The sharing economy in recent years has given rise to many new concepts used in sharing resources (Jin and Chen, 2020; Brydges, 2020). Thanks to the rapid development of digitization, the sharing economy is covering more and more industries (Arrigo, 2022). It has gone beyond transportation (e.g., Uber and DiDi), hotel industry (e.g., Airbnb, Couchsurfing), education (e.g., Thinkdoor), knowledge

(e.g., XBJ.com), and healthcare (e.g., AliHealth and WeDoctor), eventually reaching the apparel market (Plewnia and Guenther, 2018). Thanks to the popularity of smartphones, the development of mobile technologies, Internet accessibility, and the proliferation of online payment, the sale/purchase/rent/exchange of goods and services has never been so easy and widespread (Muangmee et al., 2021; Kapoor and Vij, 2020). More and more platforms for sustainable consumption of fashion have emerged, and continue to emerge, in the mobile app market. There are apps with thousands or even millions of sustainable fashion consumers around the world, such as Rent the Runway and Lending Luxury (USA), Share Wardrobe (India), Secoo Holdings Limited and Ycloset (China), GlamCorner (Australia), Dress & Go (Brazil), Girls Meet Dress and HURR (UK), Vinted and E-Garderobe.com (Poland) (Lee, Jung and Lee, 2021). These platforms provide a space for sharing products or services. Sutherland and Jarrahi (2018) point out the key roles played by these digital platforms, including generating flexibility, matching providers and consumers of products and services, increasing reach, managing transactions, developing trust and facilitating interpersonal relationships, and building communities.

Digital technology in the 21st century has become the driving force behind the sharing economy. Clothing sharing is based on a coordinating digital platform in which idle resources are effectively redistributed by matching supply and demand. Sort and match functions have therefore become one of the advantages of digital platforms (Sutherland & Jarrahi, 2018), as automatic matching helps reduce transaction costs. In the fashion industry, the sharing economy can refer to activities such as swapping, renting, and reselling, which are methods of gaining access to already existing products instead of buying new ones. At its core, the fashion sharing economy is about fulfilling the original purpose of clothing, which is simply to be worn. When it is shared rather than simply sold and bought, the life cycle of the garment is significantly extended, in line with the concept of a closed-loop economy. One thing to note, however, is the potential downside of developing digital platforms in the clothing sharing economy – sharing economy platforms encourage participants to trade with strangers (Richardson, 2015), which may pose transactional risks. As the sharing economy business grows, institutional flaws such as personal security, loss of property, privacy disclosure, and interest disputes are also gradually revealed (Lu et al., 2016; Yi et al., 2020), which reduces individuals' intentions to participate in the sharing economy. It is also worth noting that fashion platforms are unique in the potential challenges they face given the specific nature of the product itself – clothing. These include hygiene and health risks – associated with the direct contact of clothing with skin; psychological and social risks – associated with social standing, or, lack of trust in the supplier. Some of those challenges have been compounded since the COVID-19 pandemic outbreak (Brydges, 2020).

The development of information technology, primarily the Internet, influences the dynamic development of clothing exchange in the online domain. There are many diverse forms of clothing sharing economy utilizing online relations¹:

- a) Clothing exchange through websites and apps – Nuw and The Dress Change, which operate on a credit system so you can upload as many clothes as you like and use your rewards to "spend" on other clothing products. In Swopped, subscriptions are offered with a limited number of similar items for a set amount per month, while Swap Society sets the minimum price at \$3.99 per item. Big Sister Swap sends consumers a personalized package of "new" clothes in exchange for old ones, and Reshash allows users to submit swap requests for specific items they are looking for.
- b) Websites of nonprofit organizations providing opportunities to obtain clothing for free – Freecycle, Ubrania do oddania (Clothes to Donate), and local Facebook community groups – offer mutual aid by exchanging various items, including clothing.
- c) Platforms that allow consumers to resell clothing, based on online apps – Vinted and ThredUp; for luxury items, Vestiaire Collective. Another option is the Depop app, where many users are provided with the opportunity of direct swapping their favorite clothes, rather than just buying and selling.
- d) Online platforms that allow you to rent clothing on a short-term basis – ByRotation. For men, The Devout was created, where you can get a monthly wardrobe set of five different items, and Seasons is a members-only app for renting designer menswear, with free dry-cleaning included in the price. When it comes to luxury occasion wear, Rent the Runway has the largest selection of clothing rentals on the market and regularly partners with department stores. Wardrobe lets you rent luxury fashion straight from other women's closets.
- e) A platform for reselling previously rented clothing, Onloan showcases a range of designer products – as part of the system, users are allowed to test certain clothing items before making a purchase.
- f) Apps and websites of fashion brands providing product service systems such as repair services, take-back schemes and rental options – (Nuuly – rental of Urban Outfitters, Anthropologie and Free People clothing via subscription – six products for a monthly fee. Mud Jeans – option to lease jeans every month or buy a pair of pants and then exchange them for others and recycle the clothing. Levi's Secondhand offers customers the option to exchange old products for gift cards and then resell the used denim. The brands Eileen Fisher and Filippa K offer to sell through their websites used and altered garments from previous season's collections. Patagonia brand offers clothing restoration and reselling services through its Worn Wear program, which aims to provide a range of services to extend the life of Patagonia products – for example,

¹ Analysis based on information from <https://ecocult.com/>.

it offers items made from recycled waste (ReCrafted collection); outdoor brands such as Arc'Teryx and The North Face also run their own clothing repair and take-back programs extending the life cycle of garments.

2. Theoretical Framework

Sharing economy is the globally spreading phenomenon, and is considered as an integral part of the circular economy (Nguyen and Chuang, 2021). The circular economy (CE) is defined as an industrial system that is restorative or regenerative by intention and design, which uses and reuses natural capital as efficiently as possible, and finds value throughout products' life cycles (McKinsey, 2019; Koszewska, 2020). It also involves the introduction of principles such as sustainable design strategies, zero-waste design, product-life extension, resource recovery, repair and remanufacture services (Boiten et al., 2017). As Koszewska mentioned (2020), the limits of the present linear economy model (take-make-waste) are well illustrated by the textile and clothing sector, an essential consumer goods industry (Koszewska, 2020).

Sharing economy fosters the optimizations of the resources by sharing, reusing, or redistributing idle resources and underused goods and services (Hammari et al., 2016; Shrivastava et al., 2020). The list of resources to be shared between peers across various platforms and companies could be further continued and seems to be growing each day. The main thing that all these sharing economy businesses have in common, is that they use information technology to enable the sharing of resources (Spindeldreher et al., 2018). The main idea of the sharing economy is to realize value from underutilized resources (Lee et al., 2018). This emerging trend is powered by advanced digital technologies and innovative business models, (Lee et al., 2018), thus making collaborative consumption possible (Styven and Mariani, 2020).

As Botsman and Rogers (2010) mention, the sharing economy is also referred to by other terms such as "collaborative economy" (Botsman and Rogers, 2010) and "sharing services" (Andersson et al., 2013) and enables peer-to-peer sharing of resources through the use of information technology (Täuscher and Kietzmann, 2017). Collaborative consumption/collaborative economy is about "creating value out of shared and open resources in ways that balance personal self-interest with the good of the larger community" (Botsman and Rogers, 2010). The most important aspect of the collaborative consumption interest concerns the needs to scrutinize the potential benefit as its environmental potential and efficiency of resources (Armstrong and Park, 2017). Collaborative consumption (CC) and sharing economy (SE) are two of the most popular new forms of consumption within the Web 2.0 context. Awareness and participation in CC have been increasing year after year, and the SE is expected to grow from \$15 billion in 2014 to \$335 billion in 2025 (PWC Report, 2019, Minami et al., 2021).

Belk (2013) makes a clear distinction between marketplace exchanges, gift-giving and sharing, but as mentioned before, Botsman and Rogers (2010) use all these concepts interchangeably, including CC and SE. Having noticed this semantic confusion, Benoit et al. (2017) proposed a theoretical framework using three characteristics that distinguish different possible modes of exchange, i. e., buying, renting, non-ownership/access-based services, CC and sharing or co-owning. The proposed classification is based on the following attributes: (1) the number and type of actors, (2) the nature of the exchange, and (3) the directness of exchange (Benoit et al., 2017). From the literature review it is understood that in SE no monetary compensation takes place in the exchange of goods and services (Belk, 2007); on the other hand, in CC, there is monetary compensation involved (Benoit et al., 2017). Minami et al. (2021) contended that the expansion of digital technology resulted in two changes to the traditional format of SE: a) besides individuals, SE based businesses can now involve digital platforms and platform providers but, differently from CC, those are not-for-profit; and b) sharing can now take place on a global scale, not being confined to individuals' neighborhoods (Minami et al., 2021). To sum up:

- sharing economy consists of the practice of using and sharing products or services between two or more individuals with the support of the Web 2.0, and that does not involve any form of material compensation. The exchange typically takes place locally, between members of a community, but as a result of technology development, it can also occur between individuals in different neighborhoods or even countries;
- collaborative consumption consists of the practice of using and sharing products or services with the support of the Web 2.0 and between a platform provider, a peer service provider and a customer (user) – three-way exchange – in exchange for monetary compensation. There is no transfer of ownership, and the exchange can take place locally in the community or neighborhood where the involved peers live or work (Minari et al., 2021).

The definitions connected to CC and SE are presented in Table 1.

Table 1.
Concepts of SE and CC

Author	Concept	Definition
Belk (2007)	Sharing economy	Sharing as the act and process of distributing what is ours to others for their own use as well as the act and process of receiving something from others for our own use.
Bardhi and Eckhardt (2012)	Access-based consumption	Transaction that may be market-mediated in which no transfer of ownership takes place.
Belk (2013)	Sharing economy Collaborative consumption	Collaborative Consumption involves coordinating the acquisition and distribution of a resource for a fee or other compensation. This definition excludes sharing activities, in which there is no compensation involved.

Cont. table 1

Botsman (2013)	Sharing and collaborative consumption	Collaborative consumption is "an economic model based on sharing, swapping, trading, or renting products and services, enabling access over ownership". Sharing economy is "an economic model based on sharing underutilized assets from spaces to skills to items for monetary or non-monetary benefits. It is currently largely talked about in relation to P2P marketplaces but equal opportunity lies in the B2C models".
Scaraboto (2015)	Hybrid-economy	Hybrid-economy is the coexistence of multiple modes of exchange, guided by the logic of market-based exchange, sharing, gift-giving and others.
Hamari, Sjöklint and Ukkonen (2015)	Sharing and collaborative consumption	Collaborative consumption is the peer-to-peer-based activity of obtaining, giving or sharing the access to goods and services, coordinated through community-based online services. Sharing economy is an emerging economic-technological phenomenon [...], growing consumer awareness, proliferation of collaborative web communities as well as social commerce/sharing.
Dillahunt and Malone (2015) Henten and Windekilde (2016) Täuscher and Kietzmann (2017)	Sharing economy	The main value proposition of sharing economy businesses is to enable the use of underutilized resources.
Bocker and Meelen (2017)	Sharing economy	Sharing economy as "consumer granting each other temporary access to their under-utilized physical assets ('idle resources'), possibly for money".
Benoit et al. (2017)	Sharing and collaborative consumption	Sharing as an exchange between two or more individuals, with no ownership transfer, but usually with a shared ownership. No mediation through market, but by social mechanisms. Collaborative consumption as a three-way exchange among a platform provider, peer service provider and the customer. There is no transfer of ownership, but use of an underutilized asset for an agreed (short) period. It is mediated through market mechanisms.
Torrent-Sellens (2019)	Collaborative behavior and the sharing economy	Collaborative consumption as "the new form of mass sharing between and among people, principally through peer-to-peer (P2P) digital platforms".

Source: own study based on (Minami et al., 2021).

Fashion is one of the **industries** that has the most negative impact on the environment (Pal and Gander, 2018; Vehmas et al., 2018). While clothing and footwear is the eighth largest category in terms of household expenditure in the European Union (Eurostat, 2018), it is the ranked fourth in terms of its impact on the environment (WRAP, 2017).

There are three powerful innovation trends that will impact the fashion industry in the coming years, all of which are very closely related to the new circular (i.e. closed-loop) economic model (Koszevska, 2020; Walter, 2016):

- digitization of products, their design, manufacturing, distribution and retail processes, consumer/end-user interaction, factories, workplaces and supply chains,
- sustainability, circularity and resource efficiency of materials, processes and overall business operations;

- new business and consumption models based on the sharing of productive resources and final products, servitisation, pay-per-use or subscription models, all moving us towards collaborative or sharing economy.

In recent years, production and consumption of clothes has increased extensively (Nguyen and Chuang, 2021). The dominant business model in the clothing industry takes a linear approach wherein the products have a short life cycle, and limited or no end-of-life recovery (Nielsen and Gwozdz, 2018). The alternative business model is designed to intensify the utilization of clothes and enable sharing activities and collaborative consumption (Bocken et al., 2016). This model provides consumers with an alternative to the common practice of purchasing new, inexpensive, low-quality clothing to use for a short period (Iran et al., 2019). Sharing economy in the clothing sector offers consumers alternative fashion consumption options such as: clothing libraries, fashion rental, fashion leasing, swapping market, online reselling platforms, incentivized take-back services, traditional repair services and repair services in-store (Nielsen and Gwozdz, 2018; Arrigo, 2021). Collaborative economy in fashion is fostered by digitalization. The complexity of match service providers and users have been reduced due to the Internet. In recent years it has drawn attention again, having new product types and service concepts integrated with digital technology and has fostered consumer adoption (Nguyen and Chuang, 2021). One of the key activities in line with the principles of sustainable development and circular economy on the clothing market is the purchase and sale of second-hand clothing within the framework of sharing economy. The secondhand market for clothes could outgrow fast fashion within the next 10 years (McKinsey, 2019). CC of clothing items via SE platforms thus has the potential to play an important role in achieving sustainability goals (Lang and Joyner Armstrong, 2018).

In the fashion retail industry, examples of entrepreneurial initiatives that adapt the concept of sharing and collaborative consumption to the fashion context, by providing clothing and luxury item reselling, renting or swapping, have raised rapidly before the emergence of coronavirus disease in 2019 (COVID-19) (Adam et al., 2018); ThredUp, 2020), due to the diffusion of digital platforms (Trabucchi and Buganza, 2020). Collaborative fashion consumption concerns people sharing and collaborating to meet specific needs (Camacho-Otero et al., 2019; Stal and Jansson, 2017; Pedersen and Netter, 2015). With the advent of information technology, collaborative fashion consumption forms have evolved from physical and local marketplaces to global online communities with larger economic, environmental and social effects (Botsam and Rogers, 2010). Iran and Schrader (2017) defined Collaborative Fashion Consumption as a consumption trend "in which consumers, instead of buying new fashion products, have access to already existing garments either through alternative opportunities to acquire individual ownership (gifting, swapping, or second hand) or by using options for fashion products owned by others (sharing, lending, renting, or leasing)". Collaborative fashion consumption is generally studied alongside sharing economy (Belk, 2014), prosumption (Ritzer and Jurgenson, 2010), sharing (Belk, 2010; Lamberton and Rose, 2012), access-based

consumption (Bardhi and Eckhardt, 2012) or connected consumption (Schor and Fitzmaurice, 2015). Even though all of these concepts promote alternative consumption patterns, they are characterized by minor differences. For instance, in connected consumption the emphasis is put on the social aspects of the sharing economy, the term prosumption assumes an active role of consumers and promotes their integration in the process of making the products. Access-based consumption promote the idea of ownerless consumption as used fashion items are transferred to the next consumer (for instance, in a clothing-swapping event). The different forms of CFC (e.g. gifting, swapping, or second hand, sharing, lending, renting, or leasing) can be broadly categorized into two types: peer-to-peer (P2P) and business-to-consumer (B2C) (Iran and Schrader, 2017). For instance, swapping parties can be organized by the consumers themselves (P2P), or they can be organized by an organization (B2C). Various B2C and P2P forms of the CFC are differently accepted and practiced by consumers.

3. Hypotheses Development and conceptual model

Along with the growing popularity of solutions related to the broadly understood sharing economy, the interest of researchers on the topic of users motivation to participate in it has also increased (e.g. Perlacia et al., 2017; Benoit et al., 2017; Bucher et al., 2016; Hamari et al., 2016; Ertz et al., 2016; Angelovska et al., 2020; Bellotti et al., 2015; Grybaitė & Stankevičienė, 2016). Many studies were devoted to providers' motivation to share their resources in various types of P2P sharing - mainly car/ride sharing platforms (Raza et al., 2021; Jiang et al., 2021; Hawlitschek et al., 2016; Wilhelms et al., 2017; Angelovska et al., 2021) and accommodation sharing platforms (e.g. Sung et al., 2018; Ikkala & Lampinen, 2015; Lang et al., 2022; Bremser & Wüst, 2021; Möhlmann, 2015; Urbonavicius & Sezer 2019; Hawlitschek et al., 2016; Angelovska et al., 2021; Kim et al., 2018). Less attention has yet been paid to recognizing the main motivators for resource providers for using online fashion sharing platforms for swapping and reselling clothing (e.g. Netter et al. 2019; Armstrong & Park, 2020; Philip et al., 2019; Matthews & Hodges, 2016). Using online clothing swapping and reselling platforms is a form of sustainable product (clothing) disposal; therefore, in order to recognize the motives for using these types of platforms, the findings of studies on the motives behind the usage of clothing disposal forms (e.g. Soyer & Dittrich, 2021; Lai & Chang, 2020; Joung & Park-Poaps, 2013) were also analysed.

Notable differences have been observed in the motivations for sharing between sectors, which indicates that sharing economy is not one coherent phenomenon (Böcker & Meelen, 2017). Furthermore, participation in the sharing economy is of course country-specific, e.g. the Urbonavicius & Sezer (2019) cross-country research has shown the differences in motivations of the Turks and Lithuanians to participate in C2C accommodation platforms as

providers, hence the need to conduct research in individual countries. While there are many potential motives for engagement in sharing economy (e.g. Hawlitschek, et al. (2016) have listed 24 of them) based on the literature review and given the nature of the sharing domain, this study attempts to investigate the influence of (1) economic (ECO), (2) pragmatic (PRA), (3) sustainability (SUS) and (4) social motives (SOC) on both attitudes toward using collaborative fashion consumption apps/platforms and the willingness to use them in the future. We also attempt to investigate the role of (negative) unpleasant user experience (UUX) on attitude towards CFC platforms and the willingness to use them in the future.

3.1. Economic motives

Participation in CC as a provider is very often related to potential economic benefits. While many studies were conducted on the influence of economic motives on participation in CC as a provider, the overall findings are ambiguous. Economic motives can exert a strongly significant effect on attitudes towards sharing (Bucher et al, 2016) and can be one of the leading factors for using CC platforms (Grybaitė & Stankevičienė, 2016). In a study focused on motivations for the use of peer-to-peer services Bellotti et al. (2015) reported that user-providers are highly motivated by payments. The research of Hamari et al. (2016) has shown that economic benefits do not positively influence attitude towards CC, but they positively influence behavioral intentions to participate in CC. On the one hand, some studies suggest that economic motives outperform non-economic motives to participate as a provider in the sharing economy (accommodation and transportation C2C platforms) (Angelovska et al., 2021). On the other hand, research findings indicate that financial motives inversely predict consumers' participation in the sharing economy as a provider (Angelovska et al., 2020). In a cross-country study, monetary motives positively influence the intention to provide accommodation in Turkey, however its influence on intentions in Lithuania was not significant (Urbonavicius & Sezer, 2019). Economic benefits seem to positively affect the provider's intention to engage (Wilhelms et al., 2017; Raza et al., 2021) and continue to participate (Jiang et al., 2021) in peer-to-peer ride-sharing services. In the case of C2C accommodation sharing platforms' financial benefits seem to be the initial drive of becoming a provider (Ikkala & Lampinen, 2015; Lang' et al., 2022) and they positively impact provider attitudes to supply CC platform (Sung et al., 2018). When it comes to using mobile-enabled fashion redistribution (reselling and swapping) platforms, sellers use them to earn money online or recoup value for unused or under-used clothing (Armstrong & Park, 2020).

Based on a review of past research, the authors propose the following hypotheses.

Hypothesis 1a (H1a). Economic motives positively influence the attitudes toward using CFC apps/platforms.

Hypothesis 1b (H1b). Economic motives positively influence the willingness to use CFC apps in the future.

3.2. Pragmatic motives

Pragmatism understood as the opportunity to (e.g.): dispose of items that are no longer used, no longer have to maintain under-used items, free up space, the possibility of being able to free up space in an intelligent manner and being able to easily dispose of items that are no longer of value, seems to be an important motive for engaging in collaborative consumption (Ertz et al., 2016). As mentioned before, sharing/reselling clothing using online platforms is a sustainable way for item disposal. The intention to donate used clothing was primarily motivated by the need to clean out the closet (Ha-Brookshire & Hodges, 2009). Fashion sharing/reselling is seen as convenient means of disposing items as well as remaining fashionable by cleaning out one's wardrobe from out-of-style or/and no longer needed clothes (Netter and Pedersen, 2019). Studies suggest that consumers can be drawn to the practice of online swapping because of space-saving motivation (Philip et al., 2019). Sellers see online clothing resale (OCR) platforms as a good method to dispose of unwanted goods/downsizing the wardrobe (Armstrong & Park, 2020).

Based on a review of past research, the authors propose the following hypotheses.

Hypothesis 2a (H2a). Pragmatic motives positively influence the attitudes toward using CFC applications/platforms.

Hypothesis 2b (H2b). Pragmatic motives positively influence the willingness to use CFC apps in the future.

3.3. Social motives

Social motives are embodied e.g. in the ability to meet other people that share similar desires (Benoit et al., 2017). Providers can be highly motivated to participate in sharing-economy peer-to-peer services by social connection involved – the desire to build social relationships (Bellotti et al., 2015). The study of Angelovska et al. (2020) suggests that motives like meeting people and social responsibility are significant predictors of participating in sharing economy as a provider. Social motives seem to positively impact providers' attitudes or/and willingness to share their resources in peer-to-peer accommodation and transportation sharing domain (Sung et al., 2018; Urbonavicius & Sezer, 2019; Raza et al., 2021; Jiang et al., 2021; Kim et al., 2018).

When it comes to CFC - swapping can satisfy the need for community and social interaction (Philip et al., 2019). Socializing is an important factor both in in-person clothing swapping, as well as in the online clothing swap environment (Matthews & Hodges, 2016).

Based on a review of past research, the authors propose the following hypotheses.

Hypothesis 3a (H3a). Social motives positively influence the attitudes toward using CFC apps/platforms.

Hypothesis 3b (H3b). Social motives positively influence the willingness to use CFC apps in the future.

3.4. Sustainability motives

Collaborative consumption constitutes a part of ethical consumerism, and participation in it can be seen as a form of sustainable consumer behaviour (Perlacia et al, 2017). Reselling, passing along, renting or donating unwanted/unneeded clothes contributes to the extension of product lifetime, clothing manufacturing reduction and fashion waste (Perlacia et al, 2017; Sarigöllü et al, 2021). It should be emphasized, however, that the results of many studies do not fully confirm the seemingly obvious hypothesis regarding the positive impact of sustainable motives on attitude towards CC and participation in CC or/and choosing a sustainable product disposal method. While research findings by Sung et al. (2018) confirm that sustainability positively impacts provider attitudes towards supplying resources in CC, the study of Jiang et al. (2021) has shown that providers' perceived sustainability does not positively influence attitudes toward sharing economy, but it significantly affects providers' intention to continue participating in peer-to-peer ride-sharing services. According to the study by Hamari et al. (2016), perceived sustainability significantly influences attitude to CC, however it does not positively influence the behavioral intentions to participate in CC. Findings from the study of Raza et al. (2021) indicate that sustainability does not positively affect the provider's intention to engage in peer-to-peer ride-sharing. Research by Sarigöllü et al. (2021) shows that general environmental concern does not significantly influence consumer's method of product disposal (reselling, passing along or donating rather than hoarding). However, waste aversion is found to be positively related to the odds of choosing those three redistribution options. When it comes to clothing, according to Philip et al (2019), swappers are motivated by perceived sustainability benefits of swapping although it may not be a direct motivation for CC participation. In a study by Soyer and Dittrich (2021), their hypothesis stating that motivation type sensation/anticipation (i.e. worrying about the pollution, climate change and importance of sustainable disposal) has a positive effect on sustainable disposal, is not supported. Lai & Chang (2020) indicate, that environmental values were not a significant factor influencing Taiwanese consumers' choices regarding clothing resale. On the other hand, Joung & Park-Poaps (2013) identified that clothing resale behaviour is influenced by environmental concerns.

The literature review findings regarding the impact of sustainability motives on attitudes toward SE/CC and participation in SE/CC are ambiguous, which justifies the need for further research in this area. The authors propose the following hypotheses.

Hypothesis 4a (H4a). Sustainability motives positively influence the attitudes toward using CFC apps/platforms.

Hypothesis 4b (H4b). Sustainability motives positively influence the willingness to use CFC apps in the future.

3.5. Unpleasant user experience

Participation in sharing economy as a consumer or a provider can end in an unpleasant experience, resulting from i.e. an unpleasant interaction between users (Köbis et al. 2021), bad experience with C2C platform's customer service personnel (Sthapit & Björk, 2019) or C2C platform failure/malfunction. In terms of facing discomfort, it should be noticed that providers' profiles are usually more visible (than consumers' ones) which may lead to potential privacy and safety concerns (Köbis et al., 2021). An essential factor of sharing economy is trust between users. Ratings and review systems implemented by C2C platforms, play a key part in trust creation process (Cockayne, 2016). Some studies indicate that providers (i.e. crowdworkers) have a critical attitude towards ratings systems due to the fear of fake reviews (Al-Ani & Stumpp, 2016). It is safe to assume that consumer reviews can be unfair and can undoubtedly be a source of unpleasant experience for providers.

Hypothesis 5a (H5a). Unpleasant user experience negatively influences the attitudes toward using CFC apps/platforms.

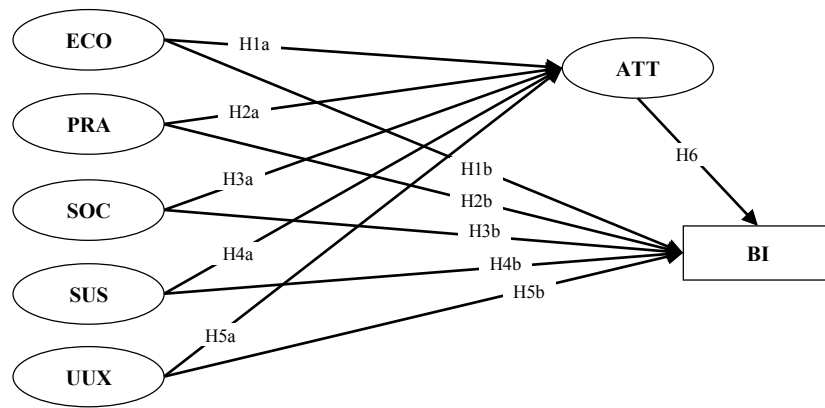
Hypothesis 5b (H5b). Unpleasant user experience negatively influences the willingness to use CFC apps in the future.

3.6. Attitude

Based on the theory of planned behaviour (TBP) (Ajzen, 1991), the attitude toward the behaviour is one of the major determinants of individual's intention to perform the behaviour. This theory is supported by prior study findings on the influence of attitude toward sharing on sharing intentions in various sharing domains. According to Hamari's et al. (2016) study, positive attitude towards CC positively influences behavioural intention to participate in CC. Study by Becker-Leifhold (2018) shows that the more positive the attitude toward clothing rental, the stronger the intention to engage in this activity in the future. Study by Sung et al. (2018) found that provider's attitude toward Airbnb affects the intention to use this platform. Attitudes toward the sharing economy significantly affect providers' intention to continuously participate in peer-to-peer ride-sharing services (Jiang et al., 2021). Based on a review of past research, the authors assume that the attitude toward CFC positively affects behavioral intention, and propose the following hypothesis.

Hypothesis 6 (H6). The attitudes toward using CFC apps/platforms positively influence the willingness to use them in the future.

The following conceptual research model is proposed (Figure 1).



Constructs: Motives: **ECO** – economic; **PRA** – pragmatic; **SOC** – social; **SUS** – sustainability | **UUX** – unpleasant user experience | **ATT** – attitude towards using CFC (collaborative fashion consumption) apps/platforms | **BI** – behavior intention | **ATT** – attitude.

Figure 1. Proposed theoretical model. Source: own research

4. Materials and Method

The data was collected through an online research panel (Nationwide Research Panel Ariadna) with the use of an online survey in 2021 on a total of 420 Polish respondents. The dataset was created with IBM SPSS 27. A confirmatory factor analysis (CFA) and structural equation model (SEM) was performed using AMOS 21.0 version. Based on prior studies, a multi-item measurement scale was developed to measure motives, user experience and attitude. Economic motives were measured with three items, pragmatic motives with two items, social motives with four items, sustainability motives with four items, user experience with five items, attitude with four items and behaviour intention with one item. All items were measured utilizing a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

The selection of the research sample was carried out by the quota method (selection criteria: sex, age and place of residence). The structure of the research sample is presented in Table 2.

Table 2.
Structure of the research sample

	Frequency	%
Sex		
male	213	50.7
female	207	49.3
Age		
18-24 years	57	13.6
25-34 years	94	22.4
35-44 years	77	18.3
45-54 years	76	18.1
55-64 years	76	18.1
65 years or more	40	9.5

Cont. table 2

Place of residence		
village	155	36.9
small city (to 20 000 residents)	59	14.0
medium city (from 20 000 to 99 000 residents)	86	20.5
big city (from 100 000 to 500 000 residents)	72	17.1
very big city (above 500 000 residents)	48	11.4
Number of household members		
1	32	7.6
2	95	22.6
3	123	29.3
4	107	25.5
5 or more	63	15.0

Source: own research.

5. Results

5.1. Measurement Model

Table 3 shows the results of confirmatory factor analysis (CFA) including factor loadings and descriptive statistics. As for the components for which the mean values are above 3, the motives to participate as a provider in the sharing economy are of relatively high importance – economic (ECO), pragmatic (PRA) and sustainability (SUS). When it comes to social motives (SOC) the mean values are below 3. The attitude of the respondents (ATT) and their unpleasant experiences (UUX) are also of great importance – as for experiences, there is an inverse relation between the role of these experiences and participation as a provider in the sharing economy.

Table 3.
Constructs and Items

Constructs	Items	Loadings	Mean	St. dev.
economic motives (ECO)	ECO1. to have an additional source of income	0.87	3.21	1.11
	ECO2. to improve my material situation	0.91		
	ECO3. because it is a simple way to make money	0.86		
pragmatic motives (PRA)	PRA1. because it is a good way to get rid of things that I do not use anymore	0.89	4.21	0.77
	PRA2. because it is a good way to keep my wardrobe tidy/refresh my wardrobe	0.90		
social motives (SOC)	SOC1. because I want to be part of a group of people with similar interests	0.90	2.77	1.18
	SOC2. to meet new people	0.88		
	SOC3. because they are fashionable	0.91		
	SOC4. so that other people see that I follow the trends	0.89		
sustainability motives (SUS)	SUS1. to conserve energy sources and natural resources necessary for the production of new fashion products	0.90	3.79	0.97
	SUS2. to protect/care for the natural environment	0.92		
	SUS3. to limit excessive consumption	0.92		
	SUS4. to extend the life of the products	0.76		

Cont. table 3

Unpleasant user experience (UUX)	UUX1. there are problems (on the part of delivery companies) with delivering my shipments to customers	0.75	2.41	0.94
		0.81		
	UUX2. frequent failures of services/apps	0.85		
	UUX3. I have frequent contact with unpleasant customers	0.82		
	UUX4. customer ratings are often harmful/unfair	0.82		
	UUX5. buyers often resign and want to return the things ordered from me			
Attitude (ATT)	ATT1. using these apps is wise behaviour	0.83	3.98	0.70
	ATT2. using these apps is something positive	0.89		
	ATT3. using these apps makes a lot of sense	0.89		
	ATT4. using these apps is something good	0.85		

Source: own research.

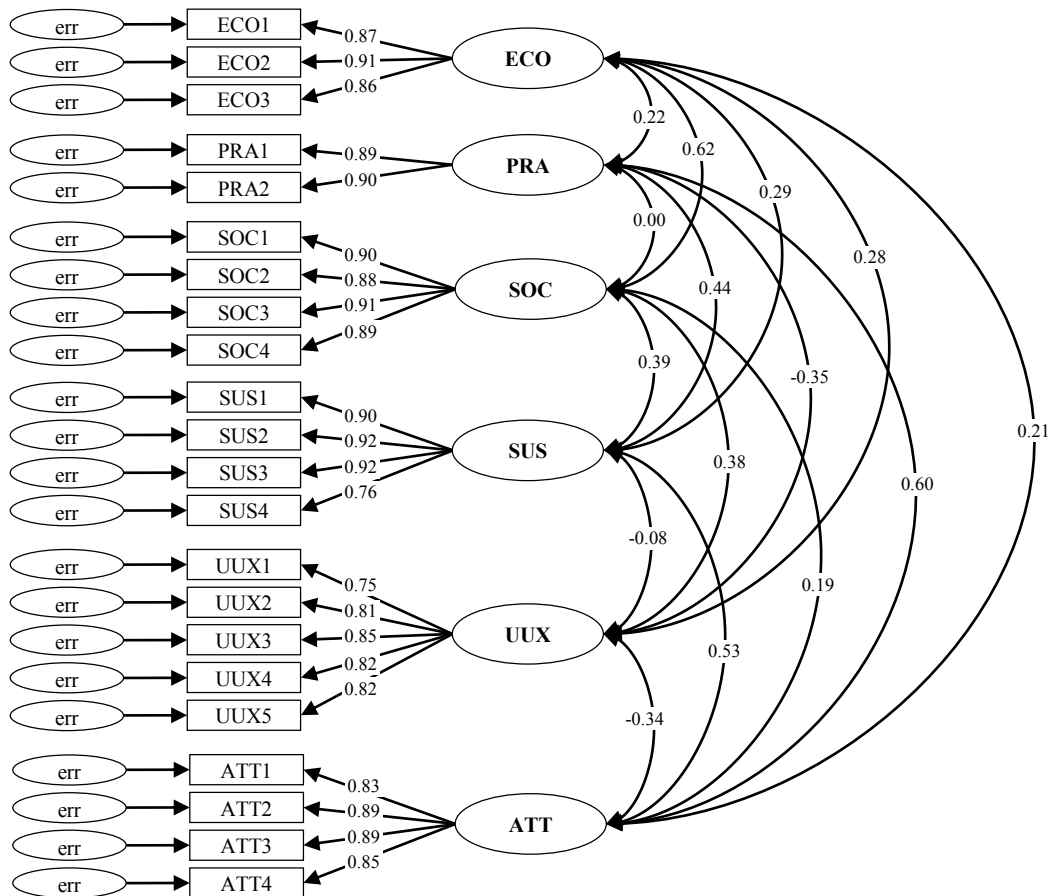
The structural equation model consists of a structural and a measurement part. The structural part of the model describes the theoretical cause-and-effect or correlation between the studied phenomena. The measurement part occurs when the analyzed phenomena are not directly measurable, therefore they are represented in the constructed model by unobservable (latent) variables. This means that before starting the estimation of the structural equation model, its measurement part should be determined and verified. One of the methods of verification of the measurement model is the use of confirmatory factor analysis (Bedyńska, Książek, 2012, pp. 219-223). The reliability of measurement instrument was tested using Confirmatory Factor Analysis (CFA), where the results showed acceptable model fit indices.

Table 4.

Fit indices of CFA model

Measure	Abbr.	Recommended threshold
Chi-square/df (CMIN/DF)	CMIN/DF	<3.0
Comparative Fit Index	CFI	>0.90
The Normed Fit Index	NFI	>0.90
Goodness of fit	GFI	>0.90
Adjusted Goodness of fit	AGFI	>0.80
Root Mean Square Residual	RMR	<0.08
Root Mean-Square Error of Approximation	RMSEA	<0.08

Source: (Ode and Ayavoo, 2020) and own research.



Constructs: Motives: **ECO** – economic; **PRA** – pragmatic; **SOC** – social; **SUS** – sustainability | **UUX** – unpleasant user experience | **ATT** – attitude towards using CFC (collaborative fashion consumption) apps/platforms.
 Fit indices: CMIN/df = 1.945, RMSEA = 0.048, NFI = 0.953, CFI = 0.977, GFI = 0.927, AGFI = 0.904, RMR = 0.043.

Figure 2. Measurement model. Source: own research.

In order to evaluate the overall measurement model and to assess the reliability and validity of the constructs, a confirmatory factor analysis was performed. In the process of evaluating the measurement model, the discriminant and convergent validity was verified. The discriminant validity measures the extent to which the factors intended to measure a specific construct are actually unrelated (Wang and Wang, 2012). For the assessment of discriminant validity, the Fornell and Larcker approach (Fornell and Larcker, 1981) was used – according to this approach, the AVE for each research construct should be higher than the square of the correlation between the construct and other constructs (Ode and Ayavoo, 2020). The diagonal (shown in bold with asterisks – *) elements shown in the table are the squares of multiple correlations between the research variables. As shown in the table, the AVE ranges from 0.66 to 0.80, while the diagonal values range from 0.81 to 0.89, indicating that the diagonal variables are higher than the AVE values (in rows) – suggesting that all constructs have the appropriate discriminant validity. The data presented in the table show that the measurement model has a satisfactory discriminant validity.

Table 4.*Reliability and Validity Measures of the Measurement Model*

CR	AVE	MSV	MaxR(H)	Estimates	Construct	ECO	SOC	SUS	UUX	PRA	ATT
0.91	0.78	0.39	0.92	<0.87, 0.91>	ECO	0.88*					
0.94	0.80	0.39	0.94	<0.88, 0.91>	SOC	0.62	0.89*				
0.93	0.77	0.28	0.94	<0.76, 0.92>	SUS	0.29	0.39	0.88*			
0.90	0.66	0.14	0.91	<0.75, 0.85>	UUX	0.28	0.38	-0.08	0.81*		
0.89	0.79	0.36	0.89	<0.89, 0.90>	PRA	0.22	0.00	0.44	-0.38	0.89*	
0.92	0.75	0.36	0.93	<0.83, 0.89>	ATT	0.21	0.19	0.53	-0.34	0.60	0.87*

Notes:

CR – composite reliability; **AVE** – average variance extracted; **MSV** – maximum shared variance; **Estimates** – standardized factor loadings; **MaxR(H)** – maximum reliability.

Constructs: Motives: **ECO** – economic; **PRA** – pragmatic; **SOC** – social; **SUS** – sustainability | **UUX** – unpleasant user experience | **ATT** – attitude towards using CFC (collaborative fashion consumption) apps/platforms.

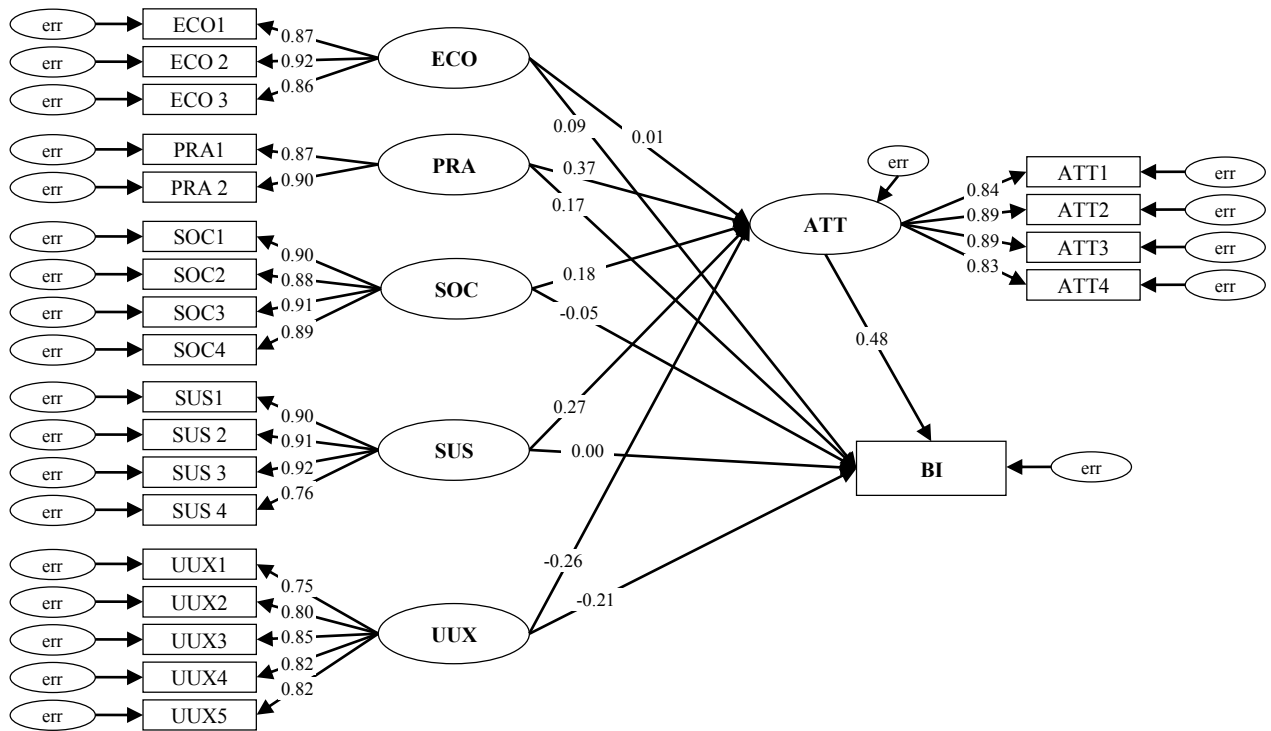
* – squared multiple correlations between the research variables.

Source: own research.

Convergent validity measures the degree to which the factors measuring single constructs are consistent with each other. Convergent validity was assessed using composite reliability (CR) and average variance extracted (AVE). The thresholds adopted in the analysis were such that AVE should be greater than 0.5 (Fornell and Larcker, 1981), factor loadings should be greater than 0.6, and CR should be greater than 0.6 (Hair, Black, Babin and Anderson, 2009; Ahmed, Romeika, Kauliene, Streimikis and Dapkus, 2020; Popa and Dabija, 2019; Szczepańska-Woszczyzna, 2021). On the basis of the obtained results, all three thresholds were reached, which suggests that the reliability and validity of the model and the constructs used are satisfactory.

5.2. Structural Model

Based on the research conducted in the literature review, the results of confirmatory factor analysis (CFA) and the proposed hypothesis, a research model was developed and is graphically illustrated in the Figure below.



Constructs: Motives: **ECO** – economic; **PRA** – pragmatic; **SOC** – social; **SUS** – sustainability | **UUX** – unpleasant user experience | **ATT** – attitude towards using CFC (collaborative fashion consumption) apps/platforms | **BI** – behavior intention | **ATT** – attitude.
 Fit indices: CMIN/df = 1.795, RMSEA = 0.044, NFI = 0.952, CFI = 0.978, GFI = 0.928.

Figure 3. Proposed structural equation model. Source: own research.

All the fit indices of the structural equation model allow us to proceed to the verification of the research hypotheses.

5.3. Testing Hypothesis

The hypothesis test results are shown in Table 5. The results indicate that ATT was influenced by: PRA ($\beta = 0.368, p < 0.001$), SOC ($\beta = 0.178, p = 0.006$), SUS ($\beta = 0.270, p < 0.001$) and UUX ($\beta = -0.255, p < 0.001$). We found that PRA ($\beta = 0.173, p = 0.02$), UUX ($\beta = -0.210, p < 0.001$) and ATT ($\beta = 0.479, p < 0.001$) influenced BI. ECO have been found to be neither significantly associated with ATT, nor with BI. Our findings indicate that SOC and SUS did not significantly affect the BI.

Table 5.
Effects of independent variables on the dependent variable

Relationship	Beta (β)	S.E	CR	p-Value	Hypothesis	Testing Results
ECO → ATT	0.012	0.042	0.192	0.848	H1a	Not Supported
PRA → ATT	0.368	0.054	6.306	***	H2a	Supported
SOC → ATT	0.178	0.039	2.737	0.006	H3a	Supported
SUS → ATT	0.270	0.037	4.958	***	H4a	Supported
UUX → ATT	-0.255	0.038	-4.801	***	H5a	Supported
ECO → BI	0.088	0.046	1.603	0.109	H1b	Not Supported
PRA → BI	0.173	0.063	3.133	0.002	H2b	Supported

Cont. table 5.

SOC	→	BI	-0.053	0.044	-0.895	0.371	H3b	Not Supported
SUS	→	BI	0.001	0.042	0.021	0.983	H4b	Not Supported
UUX	→	BI	-0.210	0.043	-4.248	***	H5b	Supported
ATT	→	BI	0.479	0.070	8.382	***	H6	Supported

Constructs: Motives: **ECO** – economic; **PRA** – pragmatic; **SOC** – social; **SUS** – sustainability | **UUX** – unpleasant user experience | **ATT** – attitude towards using CFC (collaborative fashion consumption) apps/platforms | **BI** – behaviour intention | **ATT** – attitude.
*** *p*-Value is smaller than 0.001.

Source: Own research.

5.4. Discussion

The conducted research allowed to identify the importance and to determine the influence of unpleasant user experience, as well as economic, pragmatic, social and ecological motives on attitudes toward using CFC apps/platforms and willingness to use them in the future.

The results of our study suggest that **economic motives** are not among the most important factors determining the use of CFC platforms as a provider. These conclusions are thus different from the studies on the use of CC platforms (not related to fashion) by Grybaitė & Stankevičienė (2016) or Bellotti et al. (2015). Economic motives did not outperform non-economic motives to participate as a provider in the sharing economy, as in the study conducted by Angelovska et al. (2021) on the users of accommodation and transportation C2C platforms. Interestingly, economic motives did not significantly affect the attitude towards CFC apps, nor the willingness to use them in the future. It should be recalled that overall findings of prior studies in this area are ambiguous, but many studies have shown a positive impact of economic motives on provider behavioral intention to engage and/or to continue to participate in C2C sharing economy platforms (e.g. Hamari et al. 2016; Wilhelms et al., 2017; Raza et al., 2021; Jiang et al., 2021; Ikkala & Lampinen, 2015; Lang et al., 2022). Our results thus confirm that sharing economy is not one coherent phenomenon (Böcker & Meelen, 2017), hence the need for research in different domains of sharing economy.

Regarding the importance and impact of **pragmatic motives** on attitude toward CFC platforms and behavior intention, the results of our study as well as other authors' (e.g. Ertz et al., 2016; Ha-Brookshire & Hodges, 2009; Philip et al., 2019; Armstrong & Park, 2020) confirm the importance of those motives in fashion sharing. Pragmatic motives had a significant influence both on attitude toward CFC platforms and on the intention of using them in the future. Pragmatic motives were by far the most important determinants of fashion sharing (mean = 4,21).

Previous research on **social motives** indicated that they may positively impact providers attitude and desire to share their resources in non-fashion domains (e.g. Sung et al., 2018; Urbonavicius & Sezer, 2019; Raza et al., 2021; Jiang et al., 2021; Kim et al., 2018). Social motivation also seems to play an important role in online and offline clothing swapping (Matthews & Hodges, 2016). Our findings suggest that social motivation has a positive and

significant influence on attitude toward using CFC platforms but it does not have a significant influence on willingness to use them in the future. It is important to note that of all the motive groups, it was social motives that recorded the lowest average importance rating in the context of participation in CFC.

Participating in collaborative consumption is considered to be a form of sustainable consumer behaviour (Perlacia et al, 2017). As with economic motives, also in relation to **sustainability motives**, the findings of prior studies on their impact on attitudes toward SE/CC and participation in SE/CC seem to be ambiguous. Our findings suggest that the environmental motives for participating in CFC as a provider were rated relatively high (mean = 3,79), and they have a positive and significant influence on attitude toward using CFC platforms. In our research, sustainability motives did not significantly influence the willingness to participate in CFC as a provider in the future. According to the declarations of users, environmental factors are an important reason for them to participate in CFC but they may not be a direct motivation for CC participation.

As assumed, **unpleasant user experience negatively** influence both the attitudes toward using CFC apps/platforms and the willingness to use them in the future.

5.5. Limitations and future research

The research has several limitations. First, due to the method of sampling and sample size, the results cannot be treated as representative for the population of Polish users of CFC platforms. It should also be taken into account that due to cultural differences, the meaning and impact of the motives of using these apps may be different in different countries, so it would be a good idea to conduct cross-country research. It should be kept in mind that the spectrum of motives for participation as a provider in SE is extremely wide; therefore, in future research one may attempt to broaden the scope to include other categories of motives. The research concerns one of the forms of sharing economy, but it should be remembered that the determinants of participation in different forms may differ. Thus, it should be remembered that the possibility of inference is limited only to CFC platforms. Despite potential differences in user motivation due to the nature of each form of CC, a determinant that seems to be common to them all is user experience. In our study, we attempted to assess the importance and impact of unpleasant user experience on attitude toward CFC platforms and willingness to use them in the future. An interesting solution would be to compare the importance and impact of this determinant on user (provider) behavior when using other SE domains. The next stage of the research could be to extend the scope of unpleasant user experience with other factors and assess their importance and influence on consumer fundamentals and behavior. Research focused on pleasant user experience is also worth considering. It is also worth exploring the impact of CFC participation determinants on other types of consumer behavior, e.g. consumer engagement. CFC is currently in its development phase in Poland, so it should be assumed that with further increase of its popularity, new types of behaviors will appear among consumers,

e.g. related to co-creating value. It is worth considering conducting comparative research in the following years, which will make it possible to verify the importance and determine the dynamics and direction of change of particular determinants of users' attitudes and behaviors.

6. Conclusions

Collaboration consumption is one of the key economic models in the fashion segment today, engaging both consumers selling and buying clothes/accessories. The results of our research conducted in the group of users-providers showed that despite a relatively high rating of the importance of environmental motives and their (positive) impact on the attitude towards CFC apps, they do not affect the willingness to use them in the future. As for social motives, on the one hand, their influence on the attitude towards CFC was noted, but on the other hand one should notice the low rate of importance and lack of influence on the willingness to use these apps in the future. Economic factors did not positively influence the attitude towards CFC, nor the willingness to use them in the future. Clearly, pragmatic motives are the most important in the context of CFC use and they influence both the attitude and the declaration of future use. We should also emphasize the influence of unpleasant user experience on shaping attitudes and market behavior of the surveyed users. Regardless of the motives of consumers, it should be recognized that CFC is an activity that clearly fits in the philosophy of sustainable consumption as well as the principles of circular economy, so it is advisable to design and implement CFC support solutions, such as mobile applications or dedicated websites.

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WASTE MANAGEMENT IN POLISH ORGANISATIONS PARTICIPATING IN EMAS

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Purpose: The purpose of this paper was to present the activities undertaken in the area of waste management by Polish enterprises participating in the EMAS system, operating in the water supply, sewage and waste management and remediation branches.

Design/methodology/approach: The grounds for the assumed research method was the analysis of secondary sources in form of environmental statements. The selection of sample was targeted, the research was complete and included 19 companies participating in EMAS, dealing with water supply, sewage and waste management and remediation. Based on the analysis, groups of most frequent activities in the area of waste management have been determined and specific solutions implemented in each group have been presented.

Findings: Polish enterprises mostly performed activities relating to: public educational campaigns, use of a system of measurable indicators, waste treatment or disposal and modification of waste treatment installations. It has been found, despite the fact that research has been made among organisations whose activity mainly involves positive environmental impact, that presented solutions could be implemented or inspire not only businesses with a similar profile, but also those whose operations entail producing and introducing waste to the environment.

Research limitations/implications: A certain limitation of the research is the fact that information in environmental reports is not uniform, which makes it difficult to analyse. Not every organisation includes data on specific implemented activities in their environmental reports. The areas of further research may include analysis of solutions implemented by Polish manufacturing companies participating in EMAS, relating to waste or energy efficiency.

Practical implications: The key input of the described research includes examples of specific actions that could be implemented by organisations dealing with various types of activity in order to prevent production of waste or reduce the volume of waste.

Social implications: This paper describes exemplary solutions that could help organisations in improving their environmental performance relating to waste.

Originality/value: The results of conducted research may supplement the previous research concerning the EMAS system. This paper contains guidelines and examples of specific activities that organisations could implement in the field of waste management.

Keywords: EMAS, waste management, waste hierarchy.

Category of the paper: Research paper.

1. Introduction

Over the last few years, waste management has become a key issue on the EU agenda, discussed in all member countries, including Poland. According to Directive 2008/98/EC, that is a primary legal act in the EU concerning waste management, a shift towards the "recycling society" is expected, in which the starting point for any activity would be preventing the generation of waste and using waste as a resource (Directive 2008/98/EC, 2008). In order to reach this goal, adopting a systemic approach will be essential, including development of relevant legal regulations, both on the EU level and in individual member states (e.g. national programmes to prevent waste production).

Considering the waste hierarchy, preventing the generation of waste is a priority (Directive 2008/98/EC, 2008; Dz.U. poz. 21, 2012). Taking specific preventive actions depends on the type of waste and the type of operations. These activities may include implementation of the eco-management and audit scheme (EMAS), which currently is the most credible and transparent environmental management system. The basic goal of this system is to support organisations in achieving continuous improvement of their environmental performance in various environmental areas, including waste management. The significance of this tool in preventing waste production has been emphasised both on the EU level (Directive 2008/98/EC, 2008) and also in key legal documents relating to waste management in Poland (Dz.U. poz. 1688, 2015; Dz.U. poz. 21, 2012; Dz. U. poz. 888, 2013; M.P. poz. 784, 2016).

This paper is an attempt to fill the cognitive gap in the knowledge concerning the activities undertaken by Polish organisations participating in EMAS to reduce the negative impact or increase the positive impact of their operations in different environmental areas (e.g. related to waste). Eliminating this gap will allow to present solutions to be implemented in enterprises in order to meet high EMAS requirements, present environmental practices that may be implemented in organisations with different profiles (participating and not participating in EMAS) in order to improve their environmental performance, and also to present specific activities in waste management, performed by organisations in practice.

2. EMAS significance in waste management hierarchy

Waste is defined as any substance or object which the holder discards or intends or is required to discard (Directive 2008/98/EC, 2008). Directive 2008/98/EC defines the following waste hierarchy, including: prevention, preparing for re-use, recycling, other recovery (e.g. energy recovery) and disposal. This hierarchy is also valid in Poland, since the obligation of each EU member state is the transposition of Community legislation into national law.

According to the defined hierarchy, the key method of waste management should be reduction or total prevention of waste production, as possible. This principle implies that every organisation whose activity causes or can cause production of waste, should properly plan, design and conduct these activities. In order to achieve that, adequate forms of service, production or use of resources and materials should be considered, to prevent generation of waste or reduce its volume, and also to reduce the negative environmental impact (in manufacturing operations, entire product life cycle must be considered). Waste that cannot be avoided, should undergo recovery processes. Here, the possibility to prepare for re-use should be considered in the first place. If not possible, recycling is the following method in the hierarchy. If this waste management method is not possible as well, other means of recovery should be considered. Waste streams for which recovery is not possible due to technological or economic reasons, should undergo disposal processes. Disposal methods are used when all recyclable waste components are separated (Dz.U. poz. 21, 2012).

It must be noted that the purpose of the waste hierarchy mentioned above is reaching the best overall outcome in terms of environmental protection by all member states. It means that for specific waste streams, departing from these priorities is possible, when justified for reasons of possibilities technical feasibility, economic viability and environmental protection (Directive 2008/98/EC, 2008).

Beside the waste hierarchy on the EU level and in individual member states, also exemplary actions that could be implemented in each mentioned waste treatment area are presented. For preventing the generation of waste, which is the priority, significance of implementation of credible environmental management systems has been emphasised, in particular EMAS (Directive 2008/98/EC, 2008; Dz.U. poz. 21, 2012). The importance of this instrument in reducing the volume of waste or preventing its generation results mainly from very strict requirements, imposed by EMAS on organisations intending to participate or maintain their participation in the scheme. It particularly concerns the requirement to achieve continuous improvement of environmental performance in six areas indicated in the EMAS Regulation, one of which relates to waste (Regulation (EC) No. 1221/2009, 2009). This requirement somehow forces organisations whose activity contributes to the generation of waste to seek solutions to eliminate or reduce waste. It also applies to organisations whose activity involves positive environmental impact (e.g. treatment of waste received from other entities). In order to improve their environmental performance, they seek solutions that allow increasing the volume of received waste or conducting more efficient waste treatment processes.

Improvement of environmental performance is assessed using environmental efficiency indicators (Commission Regulation (EU) 2018/2026, 2018). For organisations whose activity entails generation of waste, an indicator representing the "total annual generation of waste" in the given area is applicable, broken down by type (Commission Regulation (EU) 2018/2026, 2018). The organisation should focus on reducing the value of that indicator. Organisations whose activity has a positive environmental impact (e.g. dealing with waste treatment) can use

other or additional indicators. These may concern the scale of recycling processes, increase in the number of clients who transfer the recycling and recovery obligations, and also the number of conducted training activities, etc. It should be mentioned that the EMAS requirement to use indicators is consistent with the assumptions of Directive 2008/98/EC, where the measures to prevent waste production include, among others, development of indicators of the environmental pressures associated with the generation of waste (Directive 2008/98/EC, 2008).

In the context of waste management, also significant is the EMAS requirement to maintain conformity with legal regulations. It means that organisations are obliged to monitor and implement on time any changes in all relevant legal acts, including those relating to waste. It is important both for organisations whose activity is associated with the generation of waste (helps them maintain conformity e.g. with permits) and also organisations conducting activity associated with waste management (helps them maintain conformity with relevant EU and national regulations).

3. Review of previous research concerning EMAS

The requirement to improve environmental performance on a regular basis stimulates organisations registered under EMAS to seek solutions that help fulfil this condition. Specific solutions implemented by companies can be perceived a positive effect of EMAS implementation. The research has indicated that some of them can be considered environmental product innovations (Hoffmann et al., 2003; Salomone, 2008; Nycz-Wróbel, 2016) or technological innovations (Braun, Grotz, 2002; Rennings et al., 2006; Nycz-Wróbel, 2016). It needs to be emphasised that the previous research concerning the effects of EMAS implementation focused mainly on determining whether and what general environmental effects were achieved by the companies after participating in the system. The research shows that most frequently indicated benefits concerned systematisation and arrangement of previous environmental activities (Freimann, Schwaderlapp, 1996; Hillary, 1998; Bohne, 2000; Steger, 2000; Umweltbundesamt, 2000; Kossler et al., 2002; Morrow, Rondinelli, 2002; Hyršlova, Hajek, 2005, 2006; Abeliotis, 2006; Ministerio De Medio Ambiente, 2006; Nycz-Wróbel, 2016a), limiting the negative environmental impact mainly through the reduction of generated waste and the usage of resources and energy (Bültmann, Wätzold, 2000; Schucht, 2000; Umweltbundesamt, 2000; Braun, Grotz, 2002; Wenk, 2004; Hyršlova, Hajek, 2006; Vernon et al., 2009; Nycz-Wróbel, 2016a) and also improvement of environmental performance (Hillary, 1998; Morrow, Rondinelli, 2002; Hillary, 2004; Daddi et al., 2011; Merli et al., 2014; Nycz-Wróbel, 2016a). More specific activities planned or implemented in order to improve environmental performance have been indicated in the research conducted among German and French companies. These included introduction of technical upgrades in existing facilities and

installations, optimising or implementing new technological processes, replacement of problematic materials or introducing environmental product improvements (Bültmann, Wätzold, 2000; Schucht, 2000). Other available studies indicate enterprises reporting financial outcomes through savings as a result of improvements introduced in the area of waste management. In a study conducted among German companies, savings in this area have been reported by the majority of participants (Umweltbundesamt, 2000). In other studies, enterprises indicated waste management among a few areas in which most savings were achieved. These were the result of a reduction in the quantity of generated waste, or occurred by re-using and recycling of resources (Iraldo et al., 2005) or materials recovery and packaging management improvement (Strachan et al., 1997; Strachan, 1999). The study concerning French enterprises also indicated reduction of costs related to waste removal (Schucht, 2000).

Based on the listed studies, it can be concluded that environmental benefits are among the most frequently reported results achieved through EMAS implementation. Popularisation of such research results may contribute to the promotion of the EMAS scheme, which is recommended e.g. in the key European and Polish legal acts, relating to waste management (Directive 2008/98/EC, 2008; Dz.U. poz. 21, 2012). No studies are available, however, to provide specific activities initiated to achieve improvement in various environmental areas, including those associated with waste. This paper is an attempt to fill this gap. Presenting the outcome of such research will be important for wider promotion of EMAS and will also complement the previous studies, providing examples of specific solutions to be adopted in organisations from different countries, dealing with various types of activity, to improve their environmental performance and maintain conformity with the scheme requirements.

4. Aim and method

The aim of this paper was to present the activities in the area of waste management, performed by Polish enterprises registered under EMAS, dealing with water supply, sewage and waste management and remediation. The theoretical part presents the waste hierarchy introduced in the European Union, valid in all member states. It also lists EMAS requirements important for improvement of organisations' environmental performance in the waste area. The results of previous desk-research analysis regarding the EMAS system have also been presented, indicating a cognitive gap in the knowledge on particular activities implemented by the analysed companies in order to improve their environmental performance.

The empirical part presents the results of author's own research conducted among Polish enterprises registered under EMAS, dealing with water supply, sewage and waste management and remediation. The grounds for the assumed research method was the analysis of secondary sources in form of environmental statements. It should be noted that the analysis of environmental statements had been used as the grounds for the research in previous studies concerning the EMAS scheme, among others in the study on the effect of EMAS implementation on the improvement of environmental performance (Daddi et al., 2011; Matuszak-Flejszman, 2019; Heras-Saizarbitoria, 2020; Nycz-Wróbel, 2020). Environmental statements can provide valuable information on technical innovations. Enterprises can use statements of other organisations to collect ideas for innovative technical solutions feasible at their facilities (Rennings et al., 2006).

Environmental statement is a type of an environmental impact report that is obligatory for organisations participating in EMAS and must be regularly published and updated. The EMAS Regulation defines it as exhaustive information provided to the society and other interested parties, concerning the type of activity, implemented programmes, environmental goals and tasks, environmental effects, etc. (Regulation (EC) no 1221/2009, 2009). It is worth mentioning that environmental statements are credible sources of information as the data provided in those documents are regularly verified in terms of correctness, reliability, credibility and conformity with the EMAS Regulation requirements by an independent third party, that is the environmental verifier (Regulation (EC) no 1221/2009, 2009).

Environmental statements were downloaded from the Polish EMAS website. The basis was the EMAS listing dated 18 Feb 2021. The selection of sample was targeted, the research was complete and included 19 companies participating in EMAS, dealing with water supply, sewage and waste management and remediation.

The characteristics of individual enterprises in terms of size and type of activity is presented in Table 1.

Table 1.
Characteristics of individual enterprises participating in the study

No.	Designation for study purposes*	Size of organisations	NACE code
1	A	Large	36; 37
2	B	Medium	35.11; 35.21; 38.1; 38.2; 38.32; 39.0; 81
3	C	Medium	36; 37
4	D	Medium	38.32, 70
5	E	Large	36; 37
6	F	Small	38.1; 38.3; 39.0; 71.2; 81.3
7	G	Micro	38.32; 70
8	H	Micro	38.32; 70
9	I	Medium	38.1; 38.2; 38.3; 81
10	J	Small	38.1; 38.2; 39.0
11	K	Small	69.20; 38.32
12	L	Medium	38.1; 38.3; 39.0; 71.2; 81.3
13	M	Medium	38

cont. Table 1.

14	N	Micro	38.32; 70
15	O	Large	38.1; 38.3; 39.0
16	P	Large	37; 38; 81
17	R	Small	38.22
18	S	Small	37; 38.2; 46.9; 47.9; 49.5
19	T	Medium	38.1; 38.3

* In order to present the results of the study, companies participating in the study have been coded with letters A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, R, S, T.

Source: individual research based on analysis of environmental statements.

Considering the size of organisations, the structure of the analysed population included 4 large, 7 medium, 5 small and 3 micro enterprises. The type of activity has been presented using the statistical classification of economic activities in the European Community (NACE codes). The NACE code indicates the basic scope of activity for which an independent environmental verifier evaluates the implemented EMAS scheme.

Table 2 presents detailed characteristics of NACE codes, with the number of organisations performing each type of activity.

Table 2.

Detailed characteristics of activity performed by the analysed enterprises

NACE code	Characteristics	Number of enterprises
35.11	Production of electricity	1
35.21	Manufacture of gas	1
36	Water collection, treatment and supply	3
37	Sewerage	5
38	Waste collection, treatment and disposal activities; materials recovery	2
38.1	Waste collection, treatment and disposal activities; materials recovery Waste collection	7
38.2	Waste treatment and disposal	4
38.22	Treatment and disposal of hazardous waste	1
38.3	Materials recovery	5
38.32	Recovery of sorted materials	6
39.0	Remediation activities and other waste management services	5
46.9	Non-specialised wholesale trade	1
47.9	Retail trade not in stores, stalls or markets	1
49.5	Transport via pipeline	1
69.20	Accounting, bookkeeping and auditing activities; tax consultancy	1
70	Activities of head offices; management consultancy activities	4
71.2	Technical testing and analysis	2
81	Services to buildings and landscape activities	3
81.3	Landscape service activities	2

Source: individual research based on analysis of environmental statements.

The majority of the analysed enterprises dealt with waste management (NACE codes: 38, 38.1, 38.2, 38.22, 38.3, 38.32, 39.0). The other three types of activity conducted by a larger group of research participants were categorised with NACE codes 70, 81 and 37. The activity defined with NACE code 37 involved sewage collection and treatment (A, C, E, S), water supply and sewage infrastructure management (A) and sewage disposal services (P).

The research was conducted between 01 March 2022 and 30 April 2022. An in-depth analysis of entire environmental statements of individual companies participating in the study has been conducted. The analysis allowed identification of all activities performed by the analysed enterprises in the field of waste management. Next, the identified activities have been arranged and grouped. The results have been presented in a table form. Table 3 presents the most frequent activities. Tables 4 to 7 list specific solutions used by the analysed enterprises as part of individual forms of activity.

5. Results

Table 3 presents the types of the most frequent activities in the field of waste management, undertaken by Polish enterprises dealing with water supply, sewage and waste management and remediation.

Table 3.

Most frequent activities in the field of waste management, undertaken by Polish enterprises

Activities	Number of enterprises
Ecological education of society	12
Waste treatment or disposal	9
Modernisation of installations used for waste treatment	5
Other	13

Source: individual research based on analysis of environmental statements.

Most enterprises performed activities related to ecological education of society (12). Waste treatment or disposal was performed by 9 enterprises, while 5 organisations modernised their installations used for waste treatment. A group of "Other" activities has also been distinguished, including any other activities relating to waste reported by the analysed companies (13).

Table 4 presents the forms of educational activities undertaken by Polish enterprises.

Table 4.

Forms of educational activities concerning waste management, undertaken by Polish enterprises

Public educational activities	Enterprise	Number of enterprises
Educational actions for the society (for kindergartens, schools and adults)	B, D, F, G, H, M, N, P, S, T	10
Ecological actions and projects	D, F, H, K, P, R, S	7
Trainings, conferences, seminars	D, G, H, K, N, S	6
Educational social campaigns	D, G, K, N, S	5
Ecological and educational workshops	B, G, K, N	4
Eco open-air events	F, G, K, N	4
Ecological contests	B, H, R	3
Press articles, publications, website or own educational materials	B, K, N	3
Ecological advisory	K	1

Source: individual research based on analysis of environmental statements.

The analysis of environmental statements leads to a conclusion that the analysed enterprises organised various forms of ecological education for the society, relating to waste management. One of the most preferred forms were educational and informative actions (10). In this area, three companies (D, F, M) educated the adults and kindergarten/school children, four enterprises performed activities dedicated for kindergarten and school children (H, N, P, S), while the other three (B, G, T) reported educational actions without a specified age group. The organised forms of education also included ecological actions and projects (7). Among them were waste packaging collection in enterprises, schools, institutions and municipalities, collection of renewable resources, hazardous waste or used electric and electronic equipment, cleaning illegal dump sites, rivers, forests and also introduction of sorted waste bags marking in municipalities where waste collection services were provided. One of the most interesting projects encompassed production of educational materials (in form of press articles, educational video materials broadcast in media, printed folders and booklets), workshops for children, youth and adults, design and placement of information boards on educational paths and installation of sorted waste bins and crushers in school buildings. The group of analysed enterprises also included those involved in organising and conducting free or paid training events, conferences or seminars (6). These concerned the environmental protection legal system (in particular waste management). Beside that, a training cycle for farmers was organised in order to promote compost products obtained in the processes of waste treatment. Among the most popular events were also educational campaigns (5). They accompanied mass events in towns, municipalities or educational facilities. Environmental statements also provide examples of specific organisations or social groups collaborating with the analysed companies in the field of education, including: educational facilities, universities, ecological organisations, enterprises, representatives of local administration, municipalities, municipal services companies, church organisations, residential area administration, district council representatives and town councils, etc. The group of research participants also included organisations partially transferring their educational activities to municipal operators, based on partnership agreements (K).

Since the majority of the analysed enterprises operated in the area of waste management, their activity also included waste treatment or disposal. Nine of them provided examples of specific solutions applied in this area in their environmental reports (Table 5).

Table 5.*Waste treatment and disposal operations performed by Polish enterprises*

Waste treatment and disposal processes	Enterprise	Number of enterprises
Mechanical and biological waste treatment	B, F, L	3
Using biodegradable waste from gardens to produce compost	B	3
Waste composting (sewage, green collected from residents, biodegradable from the food, paper and wood industry and from agriculture)	S	
Production of high quality, certified fertilisers based on organic refuse		
Municipal waste recovery to produce compost	J	
Plan to classify compost from kitchen refuse as a product		3
Mechanical treatment of non-recyclable waste – production of alternative fuel (RDF)	B	
Recovery of municipal waste to obtain an RDF component	J	
Production of alternative fuel from waste remaining after sorting of recyclable materials	O	2
Disposal of waste 17 05 04 by means of recovery for backfilling and terrain levelling	A	
Disposal of waste generated in the sewage treatment process by using it for reclamation of degraded post-industrial land (e.g. heaps)		
Disposal of non-hazardous waste by using it for slope construction or as insulation layers	B	2
Returning post-processing refuse from mechanical and biological treatment of municipal waste for further processing to obtain a product or recyclable material	B	
Municipal waste recovery processes to separate recyclable materials	J	1
Recycling of non-hazardous waste generated at the technical and office facilities (e.g. steel scrap, non-ferrous scrap, packaging waste)	A	
R5 treatment of waste 20 03 06 – "recycling or recovery of other non-organic materials"		1
Using fermentation biogas generated in the methanogenesis of biodegradable waste and kitchen refuse, to be used as a fuel in co-generation processes	B	
Recovery of waste by transferring waste to other entities	I	1
Use of modern technologies to recover multiple material fractions	J	1
Municipal waste recovery to separate biostabiliser		
Operating multiple waste recovery plants (e.g. installation with the status of a Municipal Plant, construction and industrial waste sorting station, waste shredding plant)	L	1
Waste recovery and recycling	D	1

Source: individual research based on analysis of environmental statements.

Research participants mostly reported the following waste treatment processes: mechanical and biological waste treatment (3), composting processes (3) or RDF fuel production processes (3). Other processes included waste disposal (2) and recovery to provide recyclable materials (2). Some solutions reported by the analysed enterprises were innovative. One of them, implemented by enterprise B, consisted in using an organic fraction dry fermentation system in the biological part of the mechanical and biological treatment process and a biodegradable fraction preparation unit for the methanogenesis processes. Another innovative solution has been implemented by enterprise S. It consisted in using refuse sewage sludge as a raw material for production of high quality fertilisers. This company has developed an aerobic/anaerobic composting method with artificial aeration. It is a patented technology, already popularised in Poland. Certain solutions applied by the research participants were consistent with the “circular economy” idea. As an example, enterprise L

operated several waste recovery installations. Recovered paper, glass or plastics are transferred to recyclable materials distributors, to be used in manufacturing of paper, glass or plastic products. This company also recycles PET containers (e.g. for production of clothes). Other waste (so-called ballast) is recycled as alternative fuel, further used at industrial plants, mainly cement producers.

The described analysis also allowed to identify certain improvements of the previously used systems (Table 6).

Table 6.

Solutions used by Polish enterprises in modernisation of waste treatment installations

Modernisation activities	Enterprise	Number of enterprises
Expanding an existing anaerobic fermentation plant with a sorted biodegradable waste preparation unit	B	1
Construction of a water trap sludge desanding station	E	1
A plan to build a construction debris storage and cleaning yard and boxes for sorted waste	I	1
Modernisation of sorting line	J	1
Expansion of waste shredding plant (production of alternative fuel)	L	1

Source: individual research based on analysis of environmental statements.

Examples of specific solutions in modernisation of waste treatment installations were reported by 5 enterprises. The aim of the improvements was: increasing the share of processed biodegradable waste in production of power and thermal energy through intensification of methanogenesis (B); reducing the volume of sludge accumulated in water traps through sludge treatment and changing the refuse management method with the possibility of reuse (E); more efficient sorted waste collection with focus on cleanness required by recipients at glassworks, metal plants, paper mills and plastics processing plants (I); achieving required recycling efficiency (J) and improving the quality of produced alternative fuel (L). The reported modernisation activities consisted in installing an additional pneumatic optical sorting machine as well as new technological solutions to improve the system throughput (J), or additional conveyors, NIR sorter, another end shredder and boxes (L).

Other activities in the field of waste management, performed by the analysed enterprises, are listed in Table 7.

Table 7.

Other activities in the field of waste management, performed by Polish enterprises

Other activities	Enterprise	Number of enterprises
System of measurable indicators	D, F, G, H, J, K, L, N, O, S, T	11
Obligation for employees to sort waste in the workplace	B, K	2
Launching an application with a free waste collection schedule for the area operated by the company	B	1
Introducing a waste catalogue for residents, containing information on how to sort waste properly and providing location of waste collection points		

cont. Table 7.

Using technologies that do not generate hazardous waste	R	1
Systematic supervision of recipients authorised to receive non-recyclable waste		
Establishing a Research and Development Centre, dealing with new technologies of waste treatment and recycling		

Source: individual research based on analysis of environmental statements.

Among other activities, the most frequently used solution was the introduction of a system of measurable indicators, allowing the evaluation of environmental performance. The indexes used by the analysed organisations can be divided into two major groups. One group concerned educational actions. This type of indicators has been used by 8 enterprises (F, G, H, J, L, N, O, T). The other group, introduced in 11 enterprises (Table 7), concerned waste treatment processes. Among the used indicators were: mass of collected waste, waste package recycling, increase in the number of clients transferring the recovery and recycling obligations and mass of compost produced from the stream of municipal waste. Other activities concerned waste sorting obligation in the workplace (B, K) and implementation of a systematic supervision of waste recipients, using both legally required documents (waste transfer sheet/BDO register) and operating measures consisted in controlling the recipient's loading procedures (R).

6. Discussion

First, it should be mentioned that the research has been conducted among enterprises whose activity mainly involves positive environmental impact. These were companies dealing with water supply, sewage and waste management and remediation, with the majority involved in waste management. As regards the last of these groups, its activities are focused on reducing the volume of waste transferred to landfills and increasing the amount of recycled waste. Thus, the operations performed by this type of enterprises, as identified on the basis of this research, can differ from the activities undertaken by companies whose operations entail generating waste and introducing waste to the environment. The research indicates that activities undertaken by its participants to improve waste management most frequently consisted in: ecological education of the society, waste treatment and disposal processes, modernisation of waste treatment plants and use of measurable indicators to evaluate their environmental performance. Considering the small scale of previous research indicating specific solutions implemented by enterprises registered under EMAS, it is difficult to compare particular activities. However, we can identify two types of activities most frequently implemented to improve environmental performance. These include implementing or optimising modern technological processes and technical improvements of the existing plants or installations. This type of activity has been performed by the Polish enterprises participating in this research, as well as French and German companies, participating in previous research.

Two enterprises participating in the research applied innovative solutions in the performed waste treatment processes, which also confirms the conclusions of the previous studies, indicating that EMAS stimulates organisations to seek innovative solutions relating to already used technologies.

As it has been mentioned above, waste management should basically involve preventing the generation of waste or reducing the volume of waste. In this regard, research participants were involved in public education of the society. Although in organisations dealing with recycling of packaging materials or electric and electronic equipment this type of activity is enforced as a statutory obligation, related with funding and conducting public educational campaigns (Dz.U. poz. 1688, 2015; Dz.U. poz. 888, 2013), these activities can be undertaken by any organisation, even at a smaller scale, e.g. addressed to its own employees. As regards preventing the generation of waste and reducing its volume, another activity introduced by the research participants should be mentioned, namely the system of measurable indicators. The obligation to use environmental indicators is also enforced under EMAS. However, only one indicator relating to waste is proposed in the Regulation (what is significant, it concerns organisations that generate waste). The analysis of environmental statements enabled listing other indicators that could be used not only by organisations dealing with waste management.

This research allowed to formulate the following recommendations, worth considering by managers seeking specific solutions in the waste management field to be possibly implemented in an organisation:

- First, waste hierarchy is essential, which says that preventing the generation of waste or reduction of waste volume is a priority. In this particular area, organisations (both releasing waste and dealing with waste treatment) should primarily seek feasible solutions. One of the activities that might be helpful, is the education of various social groups, and also using a system of indicators for evaluation of organisations' progress in reducing the negative impact (of operations involving the release of waste) or the positive impact (of waste management). Already used technological processes are also worth a closer look. If possible, improvements should be made in order to reduce the amount of generated waste or to increase the efficiency of waste treatment.
- Indicators listed as a result of the described research, used mainly by organisations dealing with waste management, can be introduced also in other enterprises. This paper presents examples of specific indicators concerning waste treatment processes that can also be used, without changes or after modification, by other organisations dealing with waste management (e.g. from other countries) or any organisation dealing with waste treatment, intending to improve their performance. Another indicator used by the analysed organisations concerned educational campaigns. It can also be used in enterprises whose operations entail the generation of waste. However, in that case, this indicator may refer to the number of training sessions, or the number of employees trained in waste management.

- Specific solutions presented herein, concerning waste treatment or disposal processes and modernisation of plants, can be introduced in other organisations with a similar profile (e.g. from other countries). A valuable suggestion for enterprises whose operations entail the generation of waste is that as they move towards the reduction in the volume of waste, they should seek solutions to improve their existing technological processes or related installations and equipment.
- Furthermore, it is worth mentioning that the entities with whom enterprises releasing waste to the environment cooperate must be authorised to receive and manage waste.

As it has already been mentioned, the outcomes of this research may supplement the results of the previous studies concerning environmental performance of enterprises registered under EMAS and provide examples of specific solutions implemented by the analysed organisations. A certain limitation of the research is the fact that information in environmental reports is not uniform, which makes it difficult to analyse. Not every organisation includes data on specific implemented activities in their environmental reports. However, the described analysis enabled identification of activities that could exemplify or be implemented also in other organisations intending to improve their performance in waste management.

7. Summary

The purpose of this paper was to present the activities in the area of waste management, performed by Polish enterprises registered under EMAS, dealing with water supply, sewage and waste management and remediation. The described research allowed to identify examples of specific activities most frequently undertaken in the field of waste management. These included: various forms of public educational campaigns, using a system of measurable indicators to evaluate the effects of educational campaigns and waste management, waste treatment and disposal processes and modification of waste processing plants. The key input of the described research are examples of specific actions that could be implemented or inspire organisations in their activity to prevent generation of waste or reduce the volume of waste. It is particularly important in the context of the EU and national policy on waste management. Despite the fact that research has been made among organisations whose activity mainly involves positive environmental impact, presented solutions can be implemented or inspire not only businesses with a similar profile, but also those whose operations entail generation and introducing waste to the environment. This paper supplements the previous studies concerning the EMAS scheme, providing examples of specific solutions allowing to improve environmental performance among the analysed enterprises.

It should be noted that the described research is not sufficient to fill the gap in the knowledge concerning the activities undertaken by Polish organisations participating in EMAS to reduce the negative impact or increase the positive impact of operations in different environmental areas. Consequently, another research areas should be identified in this field, e.g. relating to activities performed by Polish manufacturing enterprises to reduce the volume of produced waste or to improve their energy efficiency.

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THE IMPACT OF THE PANDEMIC ON THE FUNCTIONING OF BUSINESS MODELS WITH AN EXAMPLE OF SELECTED FAMILY BUSINESSES

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Purpose: The purpose of the study was to indicate the impact of the COVID-19 pandemic on the functioning of business models of selected companies. The analysis of the operation and direction of changes in the business model was carried out with an example of two family businesses. Conducting research on the impact of the COVID-19 pandemic on the change in business models of companies is important due to the fact that the pandemic forced changes in the operation of many plants, which could affect the functioning of the business models adopted so far. For entrepreneurs, it is important to indicate how to modify and create business models that will work in different conditions. A good business model concept not only allows the company to gain better insight into its own business, but also allows for improvements and innovations.

Design/methodology/approach: Business model analysis is based on one of the most popular business model templates, which is the Business Model Canvas. Changes in the functioning of the business model before the pandemic in 2018 and in 2021 were assessed. Nine elements of the business model were analysed, i.e. customer segments, value proposition, channels/communication, distribution, sales, customer relations, revenue streams, key resources, key activities, key partners, cost structure. The analysis was based on literature studies on the subject discussed and on the basis of data obtained during interviews with business owners.

Findings: When analysing the examples of companies and their business model, it can be concluded that the changes in the elements of the business models of the surveyed enterprises were both quantitative and qualitative. Companies have made the most changes in the following elements: key resources, key activities, key partners, cost structure. Other elements included in the Business canvas model have only partially changed, such as customer relations. During the pandemic, another important aspect was noticed in companies, related closely to employees. The lack of an employee due to illness or the lack of a replacement for such an employee generated big problems, confusion at the level of customer relations, customer contacts, contacts with partners, timeliness of production and delivery, etc. The author proposed modifications to the existing BUSINESS CANVAS MODEL by adding the “employees” element. An analysis of this additional element in the model already at the stage of creating a business model can help new companies build a stable business model that will work in difficult situations. In crisis situations, such as the Covid-19 pandemic, employers should quickly plan the division of responsibilities in accordance with the principles of safety and

prevention of infection, and make efforts to restore a normal, healthy rhythm of their company as soon as possible. Therefore, it is necessary to develop and implement new strategies and additional activities to ensure the safety and productivity of people and thus build a business-resilient company.

Practical implications: Implementation of a new business model modified by the author of the publication will help new companies build a stable business model that will work in difficult situations such as the pandemic.

Originality/value: The research is aimed primarily at owners of family businesses. The added value to the article is an attempt to identify elements of the business model that should be paid special attention to when creating new business models. The operation of business models during the pandemic requires a broader analysis and the presented research results contribute to reducing the cognitive gap in this area. Analysis of business models of the sample companies may constitute an introduction to broader research on the creation of innovative business models that will be able to work in the rapidly changing conditions of the company's environment.

Keywords: business models, family businesses, pandemic.

Category of the paper: Case study, Research paper.

1. Introduction

During the pandemic, governments around the world introduced restrictions and limitations related to the daily life of residents and business activity. Prolonged restrictions have increased the risk of a massive wave of bankruptcies and layoffs, the negative economic and social costs of which are very difficult to estimate. Social isolation has influenced the diversification of people's value system, leading to the emergence of new business models, forcing faster adaptation of some industries and enterprises to the diversified and increasingly sophisticated expectations of customers. The need to change business models or create new models is very important, because many companies are currently going through a serious crisis and want to reactivate their operations as soon as possible.

Companies were forced to re-examine their business model in order to be able to adapt it to the expectations and requirements of the customers in the new conditions. During the pandemic, supply chains were disrupted, which is why modifications to existing business models proved to be very difficult. The article focuses on the analysis of family businesses. Family businesses in our country account for 36 percent of all enterprises, generating almost a fifth of the GDP (data obtained from the Family Business Institute).

The purpose of this publication is to identify key elements of the business model with an example of a selected company and to capture key changes in the business model resulting from the pandemic (COVID-19). To analyse the business model, one of the most popular business model templates was used, namely the Business Model Canvas. Changes in the functioning of the business model before the pandemic in 2018 and in 2020 were evaluated.

The analysis was based on the concept of a business model according to A. Osterwalder and Y. Pigneur, for whom the business model describes the premises behind the way in which an organisation creates and provides value, while deriving profits from it. On this basis, A. Osterwalder developed the business model canvas as a practical and simple business model design tool that is extremely popular among business practitioners.

Nine elements of the above-described business model were analysed, i.e. customer segments, value proposition, channels/communication, distribution, sales, customer relations, revenue streams, key resources, key activities, key partners, cost structure. The analysis was based on literature studies on the subject discussed and an analysis of business models of selected two family companies from the Silesian Voivodship conducting production and trade activities.

2. Business models – theoretical approach

The term “business model” is not old. We can find interest in business models in the 1990s.

However, the concept of business models is not interpreted unambiguously. According to Gajda, “the disagreement on the interpretation of the term 'business model' is due m.in to the different context in which the term is used” (Gajda, 2014). Kardas, on the other hand, suggests that “a review of the different definitions of business models indicates that the definitions of business models are very similar. Nevertheless, it still does not mean that there is no single, generally accepted definition” (Kardas, 2016). Brzóška notes, however, that “both definitions and general concepts of business models show great diversity, which seems obvious given the epistemological and ontological complexity of the issue” (Brzóška, 2009). In turn, Afuaha defines that the business model is “a set of activities that the company conducts, methods and ways of conducting them, as well as the time of their execution, to provide the customer with benefits and ensure profit” (Afuaha, 2004; Grabowska, 2019; Gajdzik, Grabowska, 2018). Another definition is presented by Doligalski, who states that “by the concept of a business model we mean a general concept of value creation in a company, taking into account the relationships between different stakeholder groups” (Doligalski, 2013).

The most well-established term is that of A. Osterwalder and Y. Pigneur, who state that “the business model describes the rationale behind the way in which an organisation creates, delivers and profits from that value produced” (Osterwalder, Pigneur, 2010). On this basis, A. Osterwalder developed the business model canvas as a practical and simple tool for designing a business model. Business Model Canvas (BMC) is a strategic management and business model starter template (<https://artradarjournal.com/...>). It is a visual chart consisting of nine blocks. Individual elements describe the position of the company's or product's values, infrastructure, customers and finances (table 1).

Table 1.*Characteristics of the elements included in the Business Model Canvas*

Element Model Business Canvas	Characteristic
CUSTOMER SEGMENT	It contains various groups of people, organisations to whom the activities of the project will be directed.
VALUE PROPOSITION	This is what is offered to customers, what distinguishes the company from what the competition offers. These are the benefits that the customer will receive.
CHANNELS	Channels are a way to reach the customer, how you can reach them and sell the product.
CUSTOMER RELATIONSHIPS	Characteristics of the relationship with the customer.
REVENUE STREAMS	Indication of how the product or service will generate revenue. It may vary for each customer segment.
KEY RESOURCES	The company's resources that are necessary for the functioning of a given business, both tangible and intangible.
KEY ACTIVITIES	The most important activities that a company needs to perform in order to provide added value, establish a customer relationship and generate revenue.
KEY PARTNERS	Business partners, without whom the business could not function, are usually sellers, suppliers and subcontractors.
COST STRUCTURE	All expenses incurred in connection with the functioning of the business model

Source: based on: Osterwalder, Pigneur, 2010.

Despite different approaches to the issue of creating and applying business models, you can find common elements in most of them. First of all, the model is perceived as a kind of a "road map" for the company, as a specific way of thinking about the company's business. Secondly, the model contains elements of operationalisation, i.e. a way of converting the concept of business into specific actions. Thirdly, the model determines how to create value for the customer. (Jabłoński, Jabłoński, 2019; Schulte, 2013; Gajdzik, Grabowska, 2018).

When analysing individual elements of business models in companies before and after the pandemic, it can be stated that the pandemic has become another determinant of a new quality of processes, phenomena and business models. This is indicated by the research conducted by many authors (Szarucki et al., 2021; Liguori, Pittz, 2020; Ritter, Pedersen, 2020; Seetharaman, 2020).

3. Methods

A case study method was used to identify changes in business models. J. Walton (1992). It is believed that this method is suitable for understanding the development of phenomena in a certain context (Yin, 2009). The framework for the prepared interview was set by the Business Model Canvas (BMC) concept (Figure 1) (Osterwalder, Pineur, 2010).

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	CUSTOMER RELATIONS	CUSTOMER SEGMENTS
	KEY RESOURCES		CHANNELS	
COST STRUCTURE			REVENUE STRUCTURE	

Figure 1. Canvas Business Model (Osterwalder, Pineur, 2010).

The research was carried out in 2021-2022 on the basis of data obtained during interviews with the owners of two production companies operating in the Silesian Voivodship. A common feature of the analysed companies is the fact that they belong to small family businesses that started their activity in 1993.

Company A – a family business established in 1993. Since then, the Company has been developing, changing the registered office from the place of residence of the owners to the current headquarters in Koniecpol, where the production plant is located, as well as expanding the business with wholesale services in Częstochowa. In 2018, the Company changed its legal form to a limited partnership. The company's activity is based on the manufacture of its own products, i.e. workwear and sales of OHS products. The company's priority is to meet customer requirements and offer products of the highest quality. The company provides retail and wholesale services.

Company B – a company with many years of experience, dealing with the production and sales of candles and paraffin cartridges. It is a small family business. The company was established in 1993 with its registered office in Bargły, Poczesna commune. The company's priority is to meet customer requirements and offer products of the highest quality. The company provides retail and wholesale services. It cooperates with the largest manufacturers of glass containers, as well as with suppliers of the highest quality paraffins from Europe. It owns an extensive machine park, including its own production line.

The research assessed changes in the functioning of the business model before the pandemic in 2018 and in 2021. Nine elements of the business model were analysed, i.e. customer segments, value proposition, channels/communication, distribution, sales, customer relations, revenue streams, key resources, key activities, key partners, cost structure. Then, the results of research on changes in elements of business models in accordance with the Business Model Canvas structure were presented. The obtained results allowed to determine the methods of responding to the crisis caused by the COVID-19 pandemic and to assess the adjustment flexibility of the analysed enterprises. On the basis of the analysis and evaluation of the activities of companies during the pandemic, it was suggested to expand the business model with the "employees" element.

4. Results and Discussion

In order to prevent or limit the negative effects associated with the development of the pandemic and numerous restrictions as much as possible, the analysed companies undertook numerous actions to adapt to the situation on a daily basis. The problems of companies during the pandemic are indicated by the authors of numerous publications (Szarucki et al., 2021; Seetharaman, 2020). The managers of the analysed companies were most afraid of delays or interruptions in the supply of raw materials, changes in demand from customers, increased costs, difficult situation on the logistics market resulting in delays in the completion of orders or issues related to occupational health and safety. The most important actions taken by the studied companies during the pandemic are presented in Table 2.

Table 2.
Actions taken by companies during the pandemic

Actions	Company	Reference of individual activities to BMC areas
Information on the epidemic and the resulting threats was analysed on an ongoing basis and all issues related to occupational health and safety (masks, monitoring of employee illnesses, cleaning and disinfection of rooms, etc.) were introduced.	A,B	Key resources Cost structure
Ongoing, accurate information of all employees about possible changes in the organisation of work resulting from the pandemic.	A,B	Key resources
Consultations between members of the company's management board were intensified, joint discussion of problems, searching for the best solutions in the new reality.	A,B	Key resources
Limitation of direct contact with recipients of goods and other people, remote communication has been developed.	A,B	Channels Key activities
Remote work has been introduced in the possible extent	A,B	Key activities
For the protection of employees, additional office space was ensured.	A	Key resources
Possible changes in the supply of materials, stability of the supply chain were considered and analysed.	A,B	Cost structure Key partners
Possible changes in the sale of the company's products resulting from changes in consumer demand were identified and analysed.	A,B	Customer segments Channels
Possible disruptions on the part of supply and demand were analysed and assessed on an ongoing basis.	A,B	Revenue streams Cost structure
Some changes have been made to advertising and online contacts have been expanded.	A	Value proposition Customer relationship
Due to the situation, a new procedure for the distribution of clothing was carried out.	A	Value proposition
All contracts were analysed, especially those whose performance had become uncertain and arrangements were made with the parties to the contracts in order to limit potential losses.	A,B	Key partners Key activities
Government activities were monitored on an ongoing basis and the possibility of using aid funds was analysed, and possible financial support of the company was requested.	A,B	Revenue streams
The international situation of import and export of materials was monitored, as they could have a negative impact on production and trade, creating a risk of losses.	A,B	Key partners Key resources
The production and commercial offer was expanded. In response to the demand, the plant additionally undertook the production and sale of protective masks.	A	Value proposition

Source: own study based on an interview with business owners.

After analysing the data obtained during interviews with the owners of companies (elements included in the Business Model Canvas), it can be noticed that the pandemic unfortunately forced changes in many areas included in the Business Model Canvas. Some of the areas, such as customer relationships, have only changed partially. Fortunately, in both companies contacts with customers via email, telephone, skype, etc. were already present and functioning well. Analysing the possibilities of building and encouraging customers to build relationships through contact via, e.g. Skype, online, email, regular mail will also allow to maintain good relations, e.g. during such a difficult period of the pandemic, where direct contact for various reasons will be limited. When building business models, it is also worth analysing this area of Model Business Canvas. During the pandemic, the owners of both companies analysed customer segments, new possibilities of acquiring customers were analysed.

Channels are how we reach the customer, how we can reach them and sell the product. Here in both companies, commercial agreements for a given year or longer were valid. Therefore, when creating a business model, it is very important to reach out to customers with whom you will be able to conclude longer business contracts. The consequence of this is a relatively stable revenue structure despite the changing environment or unpredicted situations such as a pandemic.

As many authors emphasize, a very important element in the business model is the value proposition for the client (Manninen et al., 2018). Modern solutions and benefits offered to customers are the basic analysis of further elements in the business model. During the pandemic, Company A introduced changes in the value for customers, adapting production and sales to the changed demand. The plant that produced protective clothing became a mask manufacturer and a supplier of hand sanitizer. Both companies had to adjust the channels through which the products were delivered. Companies analysed and assessed possible supply and demand disruptions on an ongoing basis. The company's key resources and key activities were analysed and modified to match the situation.

Possible changes in the supply of materials and the stability of the supply chain were identified and analysed. Adjustments were made in this respect on an ongoing basis.

Although the analysed companies operate in different industries, both of them survived the crisis caused by the pandemic. A great success of both companies is to keep the business in good economic and organisational condition while maintaining continuity and stability of operations. This was possible thanks to the targeted actions of the managers and the support of the government. These companies survived the crisis primarily thanks to numerous remedial actions taken by the owners, which include:

- Quick diagnosis of a new situation.
- On-going analysis of threats to the company resulting from the pandemic.
- Monitoring and assessment of the situation in the country and internationally.
- Extensive consultations between the members of the company's management board and with cooperating companies.

- Development and implementation of changes to ensure continuity of the company's operations.
- Adaptation of production and customer service to the changing situation and current recommendations.
- Monitoring the situation in the company and responding quickly to changes.

The adoption of appropriate business models enabling a quick response to unusual threats has generated success to the analysed companies. The basis is undoubtedly the diligence, resourcefulness and creativity of business owners in such difficult conditions. It should be emphasised that the quick response and implementation of such large changes was possible thanks to good relationships between family members. In both companies, two generations work and manage the company, i.e. parents and adult children, which allowed for a broader view of the situation as well as flexible and courageous actions leading to the necessary changes.

During the pandemic, business owners were severely affected by the simultaneous absence of many employees due to illness or quarantine. Absence of an employee or the lack of a substitute for his/her role generated major problems, such as confusion at the level of customer relations, customer contacts, contacts with partners, etc., especially in small companies. There was a lack of employees handling individual roles, which slowed down and even interrupted production for a short period, especially since employees were often on sick leave for more than 14 days. In the past, such a situation has not occurred in the analysed companies on such a large scale, as emphasized by the owners. Employees were not prepared (trained) for the possibility of taking over the duties of another person.

This is why, when analysing the actions taken by companies during the pandemic and the Business Model Canvas, it is possible to suggest a modification of the above model by adding the “employees” element. (Figure 2).

EMPLOYEES				
KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	CUSTOMER RELATIONS	CUSTOMER SEGMENTS
	KEY RESOURCES		CHANNELS	
COST STRUCTURE			REVENUE STRUCTURE	

Figure 2. Business Model Canvas after the introduced modification (own elaboration).

The change regarding the Business Model Canvas would relate already at the very beginning to the creation of a business model subjecting the company's employees to a special analysis in the following aspects:

- skills and flexibility of employees to take on new duties, in the absence of an employee, to be able to smoothly replace them in order to ensure continuity of production and supply and to ensure contact with the customer at the highest possible level;
- an analysis of the possibilities of extending training for employees in order to develop a possible change of the role in a crisis situation or to quickly start working remotely;

- providing employees with adequate health protection during a crisis situation such as a pandemic (additional social rooms, additional workstations, masks or other protective clothing, sanitizers, etc.)

Employee qualifications, the ability to adapt to a crisis situation, creativity play a huge role in creating all other elements of the Business Model Canvas. This role is also confirmed by other authors, pointing out that in the new knowledge-based economy, attention should be paid to the flexibility of employees, broad profiling while employment should be perceived as an investment (Zelek, 2003; Duczkowska-Piasecka, 2012). Without permanent, qualified employees, the company emphasises that they would not survive this difficult period.

Implementing the proposed solution in the form of supplementing the model with an element of “employees” can help new companies develop a stable business model that will work in difficult situations.

Summary

Companies must be prepared for emergency situations where they should establish or improve action plans and management systems to protect themselves against hazards.

The COVID-19 pandemic caused significant disruptions and difficulties in the functioning of many companies and even led to their collapse. On the one hand, the pandemic has changed plans of companies, made it difficult to operate, and on the other hand, it has become a driving force, contributing to the introduction of numerous changes to business models of companies. The new conditions meant that employers had to take up new challenges, e.g. to ensure health safety to their employees and customers and to create sanitary conditions at points of sale or to ensure continuity of supply and production. Numerous restrictions during the pandemic and problems have created new ideas that form the basis for implementing the necessary changes. These changes include a wide range of solutions from the creation of a website and social channels to marketing and sales. Customers were more likely to combine online shopping with shopping at physical shops. Based on the analysis of the work of the analysed companies, it should be stated that the resilience of companies and adaptation to a crisis situation depended on previous experience and long-term functioning on the market in various situations, but above all on a rapid response and expansion as well as the introduction of new activities. The owners emphasised that in such a situation it is very important to ensure communication with employees and care for people who work for a given company as well as its surroundings. To achieve these goals, company managers must develop or adapt and implement their strategies, ensuring the safety and productivity of people and thus building a business-resilient company.

Business managers were forced to transform their business models to be able to create value in new conditions. When analysing the business models of the surveyed companies, it can be stated that the changes in the elements of the business models of the surveyed companies were both quantitative and qualitative. Companies have made the most changes in the following elements: key resources, key activities, key partners, cost structure. Other elements included in the Business Model Canvas have only partially changed, e.g. customer relations. During the pandemic, another important aspect was noticed in companies, related closely to employees. Absence of an employee due to illness or lack of a replacement for his/her role as well as reduced work efficiency caused major problems. In addition, new work rooms had to be organised to maintain safe distances and new workplaces. So far, on such a large scale, such a situation has not occurred in companies, as emphasised by the owners. Most employees were not prepared (trained) for the possibility of taking over the duties of another person, which was the reason for the downtime. In addition, during a pandemic, such as Covid-19, workers were exposed to increased stress due to new procedures, increased workload or fear of losing their jobs, concerns about their own health and the health of their family. Fatigue and stress can reduce work efficiency and increase the risk of injuries and accidents at work.

Therefore, when analysing the actions taken by companies during the pandemic and the Business Model Canvas, the author suggested to modify the above model by adding the element “employees”. It seems necessary to adapt Business Models to new crisis situations, taking into account the special role of employees. The experiences during the pandemic confirmed that people are the most important resource in every company. Therefore, comprehensive satisfaction of different needs of employees when compared to the usual needs and taking care of them in crisis situations constitutes the basis for proper functioning of the company. Paying more attention to good human capital management and, in particular, care for the development of team competences and good communication, additional health protection of employees are elements of creating some protection in times of crisis. On the one hand, employers should quickly identify and mitigate workplace hazards resulting from the outbreak of an epidemic and promote occupational health on the other hand, while ensuring the continuity of the company's operations in situations of increased absence of employees. In the event of an emergency, the crew should be well prepared, e.g. through regular training on procedures for prevention, readiness and response in emergency situations. This regularity may suggest that well-planned elements analysed before starting a business activity, such as: value proposition, customer segment, distribution channels, revenue structure and the new element of the business model proposed by the author, namely employees, can be a guarantee of survival and good functioning of the company even in such difficult conditions as a pandemic. It can be concluded that the analysed plants have adapted to the new difficult situation during the pandemic. They have made some changes to business models and created a “contingency plan” for such situations. Running a business requires constant observation of what is going on around you and adapting your actions to the changing expectations of the market. Efficiency in responding to these

changes has a decisive impact on the success of the project. The presented research may initiate further research, which will confirm the identified ways of behaviour and response to the crisis caused by the COVID-19 pandemic.

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PERSPECTIVE OF FUTURE USE OF AUTONOMOUS ROBOTS IN E-COMMERCE

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Purpose: Identification of the barriers and determinants of the use of autonomous robots in e-commerce.

Design/methodology/approach: The research procedure included a review of Polish and foreign literature and survey research. The paper presents the results of a Delphi study among 25 experts of courier services.

Findings: The use of autonomous robots may be one of the solutions that will contribute to the improvement of the functionality of processes in enterprises. The process of implementing autonomous robots is associated with building a relationship based on trust between the user and technology

Research limitations/implications: Limitations of the conducted research reflects to only one Delphi round.

Practical implications: The results of the study may be helpful for transport companies and courier companies in improving the process of delivering parcels. They can be used for elaboration policy, tools and instrument for the purposes of limitation identified under the study main barriers of the application of autonomous robots in the e-commerce.

Originality/value: The presented research and conclusions provide practical tips for transport and delivery companies on how to use autonomous robots to improve the process of delivering parcels in the e-commerce sector, based on the results obtained from the Delphi study.

Keywords: autonomous robots, logistics, e-commerce, modern technological solutions.

1. Introduction

The field of E-commerce is an integral part of everyone's everyday life. Nowadays, more and more people are shopping online, which is associated with the intensive development of e-commerce (Szymański, 2013). The often-quoted definition is the one that was defined by Central Statistical Office – “E-commerce is the buying or selling of products or services through computer networks, but payment and delivery does not have to be done online” (Central Statistical Office, 2022).

In 2020, during of the global Covid-19 epidemic (SARS-CoV-2), entrepreneurs did not expect such dynamic changes associated with the development of e-commerce. Online retail markets have changed rapidly (Kunnappadeelert et al., 2021). Due to the restrictions and limitations put in place to fight the coronavirus, it caused many more people to start buying online for security reasons (Szpilko et al., 2021). Companies, in order to stay in the market, had to switch from the traditional form of doing business to the electronic one (Batuhan and Taskin, 2020). As a result, e-shopping has become a common form of sales transactions until today (Al-maitah et. al., 2021).

Nowadays, the delivery market for courier services is developing dynamically all over the world (Ejdys and Gulc, 2020). The dynamics of e-commerce development makes global markets able to rely only on selling their products or services online (Sinha and Tanty, 2020). Moreover, the current situation, which prevails in the world as well as in Poland, shows faster digitalization and technological progress. One of the solution which can improve the delivery process in the e-commerce sector are autonomous robots. The definition of autonomous robots was proposed by Bekey – “Autonomous robots are intelligent machines capable of performing tasks in the world by themselves, without explicit human control” (Bekey, 2017). The robot’s function through a preloaded camera system, so they can easily reach the designated locations. Moreover, they are fully disposable, low in maintenance and can bring a quick return on investment.

A McKinsey Report predicted that by 2025 autonomous robots will deliver nearly 100% of parcels from business customers to individual customers (Joerss et al., 2016). Other researchers have also reported that autonomous robots will make 400 million deliveries in Germany by 2030 (Rai et al., 2022). Delivery automation has evolved a lot during the pandemic, as can be seen by the steps taken in Asia or North America. In North America, Nuro tested two driverless vehicles due to a shortage of drivers and for driverless delivery services (Crowe, 2022.05.19). In Asia, Unity Drive Innovation's autonomous vehicles have been used in a variety of cities to transport food to places that have been cut off from supply chains, making over 2,500 rides (Ramey, 2022.05.19).

With the advancement of technology, there is a growing awareness among customers who value their safety in receiving their shipments. According to Pani, Mishra, Goliias and Figliozzi, people are willing to use courier services through autonomous delivery (Pani et al., 2020). The aim of this research is to identify perspectives on the use of autonomous robots in the e-commerce in order to understand the state of practice and future potential of autonomous robots for e-delivery.

This article continuous with Section 2, that presented the literature review on autonomous robots and its application in the future in e-commerce. The third section presents a research method. The fourth section presents the results, while the fifth section focusses on discussion. The sixth and final section ends with concluding final conclusions.

2. Literature review

The e-commerce sector requires several IT systems, warehouses, transport companies, couriers, parcel machines, online payment systems, product description specialists, packaging and returns services to enable customers to choose and buy goods conveniently, safely, without moving from home. This powers a whole industry specialising in technologies for e-commerce. Technology trends in e-commerce can be differentiated in terms of three logistics processes: warehousing, transporting and e-selling (Table 1).

Table 1.

Examples of innovative ICT to support e-commerce processes in warehousing, transport and e-sales

Innovative ICT solutions in the process:		
warehousing	transporting	e-sales
<ul style="list-style-type: none"> • electronic RFID tags • warehouse information system (WMS) 	<ul style="list-style-type: none"> • use of autonomous courier robots • using drones to transport shipments • determining routes for couriers using machine learning as part of Business Intelligence 	<ul style="list-style-type: none"> • Perovskite Electronic Shelf Label – electronic price and advertising labels • Mobile applications • Augmented Reality technology • Voice commerce • Freshdesk service • Live Chat service

Source: own study.

Innovative solutions in the field of warehousing make it possible to control stock levels or support the process of placement of goods on shelves. By using a modern IT system it is possible to make the warehouse process more effective and to eliminate errors that occur in the completion of parcels for customers (Borowska and Parakiewicz, 2017). Due to the Covid-19 pandemic, there is a growing need for contactless delivery which has contributed to the development of autonomous drone or robotic transport technology (Kunovjanek and Wankmüller, 2021). Autonomous robots or drones are expected to support drivers in the delivery of parcels and relieve their workload. For many years, experts also have been aiming to revolutionize the e-commerce market using artificial intelligence which can improve the process of picking shipments (Bawack et al., 2022). New technologies are also associated with the support of the e-sales process. In the age of digitization, technologies such as mobile applications or voice commerce make it possible to reach a larger group of customers and sell more goods online (Xiong et.al., 2020). Technologies like livechat or Freshdesk can also be used to improve communication between the customer and the seller (Ding and Zhao, 2021). Augmented Reality technology makes it possible to present a given product in digital space, so consumers will be able to match their purchase preferences and complete the online transaction safely (Pieczarska, 2019). In addition, the breakthrough solution is Perovskite Electronic Shelf Label (PESL) which will help in the digital transformation of commerce.

They will make it possible to effectively sell products with expiry dates (Sauletech, 2022.05.12).

An innovation in the field of transport is the autonomous robot. These robots are programmed to do tasks without human control. According to Fitzgerald and Quasney there are five most important achievements in the field of autonomous robots: artificial intelligence, navigation, cost reductions, sensors and response capabilities, regulatory reform and public policy (Fitzgerald and Quasney, 2017). Due to the advancements in technology, autonomous robots will be more common in human life (Tammvee and Anbarjafari, 2020). Benefits of using autonomous robots include improving safety, productivity, quality of work and include reducing risks of human errors (Kückelhaus & Chung 2018). Companies are looking for solutions to eliminate the human factor in some operations (Tubis and Poturaj, 2021). This is confirmed by research presented by Čámská and Klečka, in which the authors proved that companies can achieve higher profitability by replacing human labor with robots and other new technologies (Čámská and Klečka, 2020).

Investing in autonomous robots should be considered in a high priority in order to reach competitive advantage. Modern technologies are becoming increasingly developed; therefore, many enterprises have opportunity to implement new solutions (Szymańska et al., 2017). It is noted that rapidly changing demands are a precursor to the implementation of new technologies in enterprises (Siderska, 2020).

Nowadays, autonomous robots are used in fields like: industry, agriculture, healthcare, logistics, retail and hospitality, smart cities. Autonomous robots are used on factory floors and in warehouses in many operations such as receiving, shipping and storing (Peyas et al., 2022). In agriculture, autonomous robots are used to support farmers to harvest crops faster and more efficiently. Agricultural robots can assess ripeness, remove leaves or branches from the path and harvest the crop precisely (Beloev et al., 2021). In medicine, autonomous robots are also used to deliver medicines, disinfect surfaces in order to improve the quality of life of patients (Zaouter et al., 2020). In logistics, robots help to deliver goods quickly and efficiently for example in warehouses. They also help to process products, speed up operations and improve accuracy (Zabih and Srikanth, 2021). Furthermore, in retail and hospitality, autonomous robots are being used to automate warehouse processes, to clean various rooms or to assist customers (Bogue, 2019). Moreover, autonomous robots are being used to create smarter and safer cities.

However, there are many concerns about the implementation of autonomous robots. Tammvee and Anbarjafari stated that autonomous robots can only be allowed if they ensure safety for humans (Tammvee and Anbarjafari, 2020). The other research conducted by Dabrowski shows that, the implementation of modern technological solutions is conditioned by the cost. A factor determining the implementation of a new solution is most related with the subsidies for companies (Dąbrowski, 2016). According to Buldeo Rai, Touami and Dablane, the costs associated with investing in autonomous vehicles are keeping companies from investing in autonomous robots (Buldeo Rai et al., 2022). In Poland, from the beginning of

2022, the Ministry of Development and the Ministry of Finance introduced a relief for robotisation, which will allow companies to increase productivity and competitiveness in domestic and international markets (GOV, 2022.05.12). This is an opportunity for many companies to develop, but the implementation of autonomous robots also comply with many legal obligations.

According to Kukielka, the most significant barrier to the development of robots in medicine is distrust of technology especially if this is connected to facilities that are to interact with the human body (Kukielka, 2019). Authors Ejdys and Halicka also stated that the implementation of new technologies depends on cultural factor like trust in technology (Ejdys and Halicka, 2018). Autonomous robots need to be tested and their decisions studied in different scenarios to ensure safety for humans (Sartori, 2019). According to the latest research, robots were shown to have benevolent stated social intentions (Lyons et al., 2022). However, adoption of a new technology requires more researches to explain trust and the public's perception of risk (Baganzi and Lau, 2017). According to report by the Global System for Mobile Association (GSMA), new technology should also create societies that are environmentally balanced (GSMA, 2017).

Considering the current use cases of autonomous robots and the growing interest in this technology, this research focuses on determining the possibilities for the implementation of autonomous robots in the e-commerce delivery sector. All the factors and barriers were the starting point for the development of the Delphi study.

3. Research Method

Data was collected with the help of a survey, which was conducted using the Delphi method. The Delphi method is a type of expert research, in which the opinions of experts are treated as a significant contribution in determining a vision for the future of the research subject (Breńko and Kononiuk, 2021). The Delphi procedure requires respondents to reply to several questionnaire iterations with subsequent rounds containing previous round feedback (Barnette, et al., 1978). The positive aspect of using this method is that the experts can express their opinions without direct interaction (Kowalewska and Głuszyński, 2009).

In this research, one round was carried out using the Delphi method. Due to the risk of obtaining a small number of experts and the time needed to carry out the survey, the second round was not carried out. The detailed research methodology consisted of six steps (Figure 1):

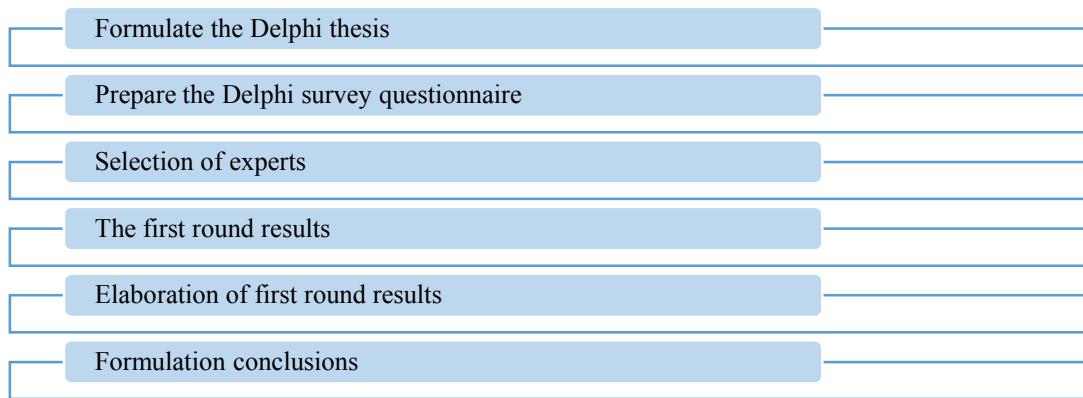


Figure 1. Six steps of the research methodology. Source: own study.

Under the research three theses were considered:

Thesis 1. The dynamics of online shopping will cause a significant increase in the use of robots in courier services.

Thesis 2. Autonomous robots will be the main method of courier delivery.

Thesis 3. Autonomous robots will eliminate human labor in courier enterprises.

For each thesis, the same set of four supporting questions was prepared:

- 1) How do you assess the relevance of the thesis for the development of e-commerce?
- 2) When and how probable do you think the thesis will be realized or when the phenomena/processes described in the thesis will happen?
- 3) To what extent do you think the following factors/activities support the thesis?
- 4) To what extent do you think the following factors/barriers hinder the realization of the thesis?

A link to electronic questionnaires was distributed to individual academic teachers, students and to representatives of courier companies via the university e-mail system. Questionnaires were distributed between February and April of 2021. In total, 25 completed questionnaires were received by: 7 academic teachers – experts in logistics, 3 representatives of courier companies and 15 users of courier services. The structure of the group of experts participating in one round by: education, age, and gender is presented in Table 2.

Table 2.

Structure of the group of experts in the first round of the Delphi research

Specification	First round	
	number	%
Qualification, degree		
Secondary education	3	12
Higher bachelor's or engineering degree	12	48
Higher Master's	3	12
Doctoral degree	7	28
Age		
18-25 years	16	64
26-40 years	2	8
41-60 years	7	28

Cont. table 2.

Gender		
female	16	64
male	9	36

Source: own study.

The most represented group in the Delphi research were experts with higher education of Bachelor's or Engineer's degree (12 experts). All of experts had knowledge of logistics, e-commerce and the development of new technologies. Education with a doctoral degree was represented by 7 respondents, and master's degree and secondary education were represented by 3 respondents in each group. The dominant proportion in the structure of the surveyed experts were people between 18-25 years of age. They accounted for 64% of the respondents. The age of 41-60 years was represented by 28% of the respondents, while the age of 26-40 years was 8%. 16 (64%) of respondents were women, and 9 (36%) were men.

4. Results

The results contain following empirical responses about:

- the relevance of the thesis to e-commerce development,
- the probability of realization of the phenomena described in the theses,
- factors and actions conducive to the realization of theses,
- barriers to the realization of theses.

The first question of the questionnaire concerned the relevance of each thesis to the e-commerce area. All the theses were rated highly in terms of relevance to the e-commerce area as evidenced by the responses of "very relevant", "relevant", and "rather relevant".

In order to determine the relevance of each thesis for e-commerce area, significance indexes (WI) were calculated according to the formula (Ejdys, 2013):

$$W_I = \frac{n_{VR} * 100 + n_R * 75 + n_{RR} * 25 + n_{NR} * 0}{n - n_{NO}} \tag{1}$$

where:

- n_{VR} – number of "very relevant" responses,
- n_R – number of "relevant" responses,
- n_{RR} – number of "rather relevant" responses,
- n_{NR} – number of "not relevant" responses,
- n_{NO} – number of "I have no opinion" responses,
- n – number of all responses.

The indicator is expressed in the range of 0-100. The higher the value of the indicator reflects the greater the significance of the thesis for a particular area (Figure 2).

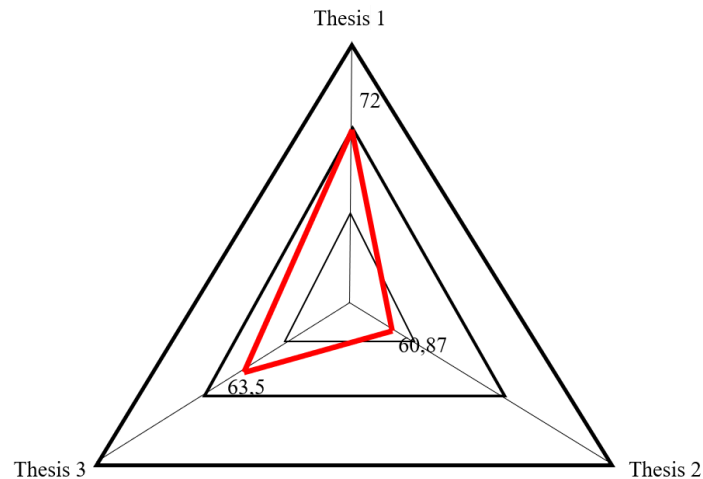


Figure 2. Thesis relevance indicators for the e-commerce sector. Source: own study.

Experts believe that the most relevant is thesis 1, which indicates the relationship between the dynamics of the development of online shopping and the increase in the use of robots in courier services. Less important for the development of e-commerce is thesis 2 and 3, for which the level of the index did not exceed 70. Taking into account the calculated indicators, it can be concluded that thesis 1 is characterized by the highest relevance for the area of e-commerce. The expert assessment of the probability of realization of thesis 1 is presented in Figure 3.

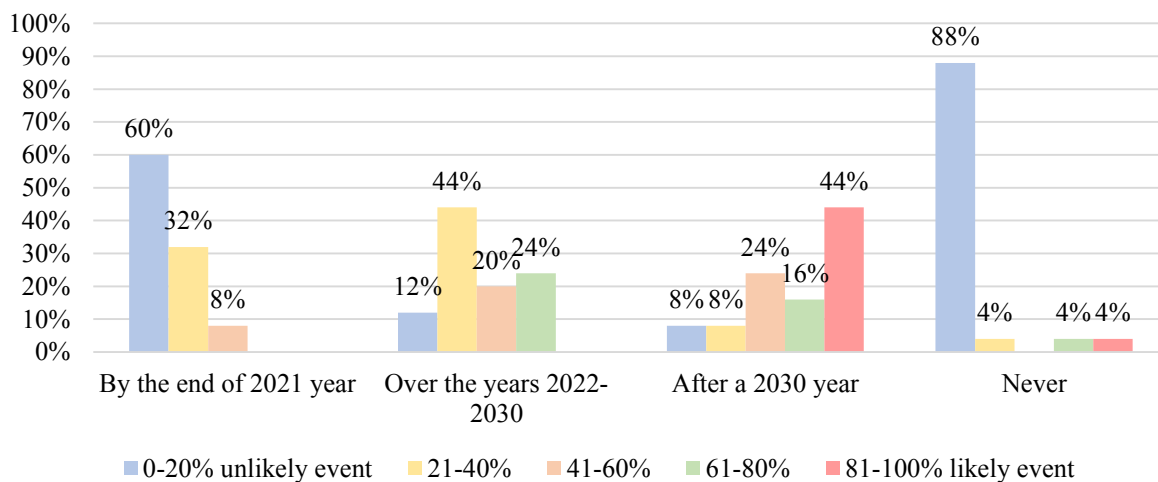


Figure 3. Assessing the probability of thesis 1 for the e-commerce field. Source: own study.

In assessing the probability of realization of thesis one, respondents considered it 60% improbable that this thesis will be realized by the end of 2021. Furthermore, as many as 88% of respondents felt that the thesis would never come true, rating it as an improbable event. Only 8% indicated that the thesis has a medium chance of coming true by the end of 2021. About 44% of the respondents indicated that the thesis has a higher chance of being realized between 2022 and 2030. The farther future, i.e., the time of realization of the thesis after 2030, is indicated by 44% of the respondents with the determination of a certain event. The probability assessment of the realization of thesis two is presented in Figure 4.

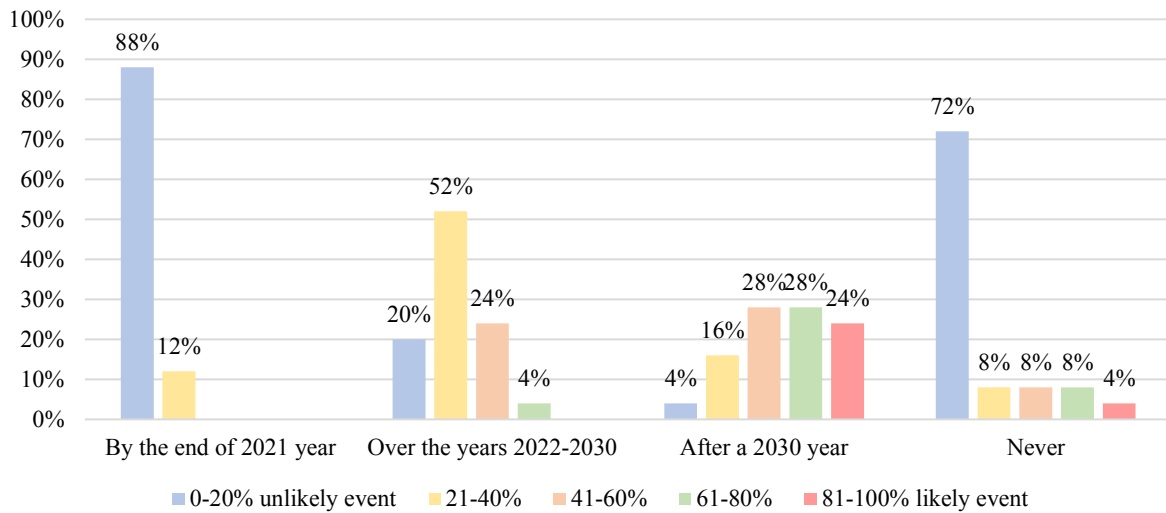


Figure 4. Assessing the probability of thesis 2 for the e-commerce field. Source: own study.

When evaluating the probability of the second thesis being realized, the respondents stated that it is 88% unlikely that the thesis will be realized by the end of 2021. More than half of the people surveyed said that the probability of thesis 2 being realized is possible between 2022 and 2030, while 24% of those surveyed said that this event is certain to occur after 2030. Moreover, as many as 72% of respondents believe that this thesis will be realized in the future. The expert assessment of the probability of thesis 3 coming true is presented in Figure 5.

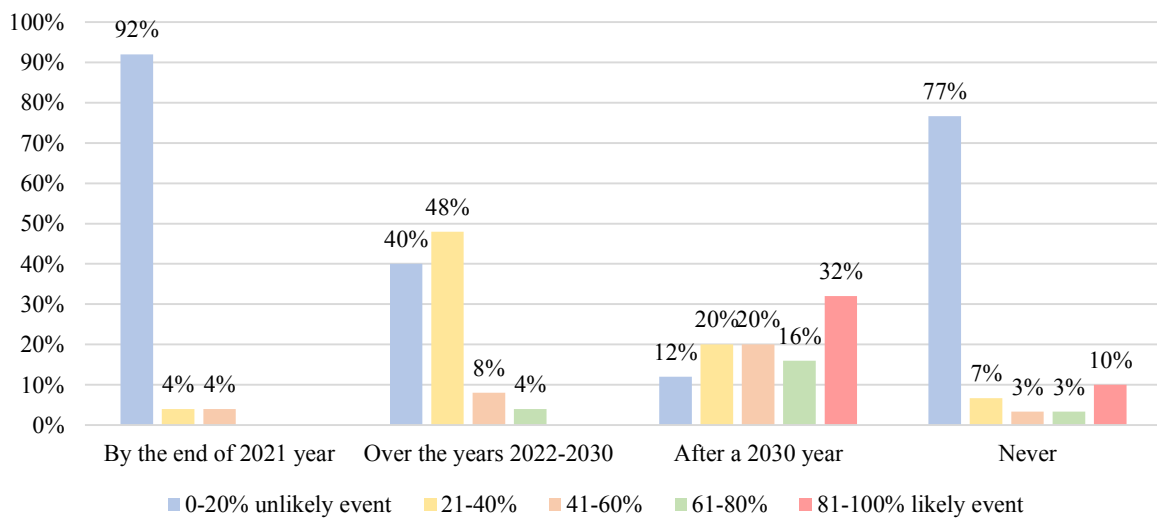


Figure 5. Assessing the probability of thesis 3 for the e-commerce field. Source: own study.

In assessing the probability of the realization of thesis 2, the respondents found that the realization of the thesis by the end of 2021 is 92% improbable. About 48% of the respondents indicate the period after 2030 as the most likely time for the realization of thesis three. Moreover, as many as 77% of the respondents believe that the thesis will come true in the future.

The next issue in the Delphi study was to identify the factors that support the implementation of a particular thesis. For the study, the following five factors were identified from the literature review: opportunity for purchase funding, trust in technology, assurance of

security, regulation, environmental safety associated with the construction of the robot. In order to determine the strength in the operation of the thesis, the favorability index was calculated using the following formula (Ejdys, 2013):

$$W_F = \frac{n_{GE} * 100 + n_{LE} * 75 + n_M * 50 + n_L * 25 + n_{VL} * 0}{n - (n_{NO} + n_{NC})} \quad (2)$$

where:

n_{GE} – number of "to a very great extent" responses,

n_{LE} – number of "to a large extent" responses,

n_M – number of "to a medium degree" responses,

n_L – number of "low degree" responses,

n_{VL} – number of "to a very low degree" responses,

n_{NO} – number of "no opinion" responses,

n_{NC} – number of "the factor has no connection with the thesis" responses,

n – number of all responses.

The indicator is specified in the range from 0 to 100. The closer the numerical value is to 100, the higher the degree of favorability. The degree of favorability of the factors in the realization of these e-commerce area is presented in the table 3. The factors were identified based on a literature review.

Table 3.

The degree of favorability of factors in the implementation of these e-commerce area

Thesis	Factor				
	Opportunity for purchase funding	Trust in technology	Assurance of security	Regulation	Environmental safety associated with the construction of the robot
Thesis 1	61,0	75,0	81,0	58,0	55,2
Thesis 2	60,0	75,0	72,0	61,5	54,3
Thesis 3	59,0	69,0	68,0	65,6	45,6

Source: own study.

According to the opinion of respondents (Table 3), the factors that were the most conducive in the realization of the three theses are ensuring security and trust in technology. Nowadays, man is dependent on technology, but the risks associated with its use, can cause anxiety and fear among users. The basis for building trust in human-machine relationship is functionality, reliability and support system. The factor concerning regulation has a relatively high power of influence on all theses. The other factors concerning the possibility of subsidizing the purchase of an autonomous robot and the environmental safety associated with the construction of the robot have a low strength of favorability.

The experts, while carrying out the research, were also asked to answer to what extent the factors hinder the implementation of the formulated theses. The following five factors – barriers – were identified for the research: ability to subsidize the purchase, trust in technology, security,

legal regulations, environmental safety associated with the construction of the robot. Respondents answered using the same scale as for the factors. The degree of barrier to implementation of the e-commerce area theses is presented in Table 4.

Table 4.

The degree of barrier to implementation of e-commerce area theses

Thesis	Factor				
	Opportunity for purchase funding	Trust in technology	Assurance of security	Regulation	Environmental safety associated with the construction of the robot
Thesis 1	80,0	60,0	62,5	55,2	47,8
Thesis 2	78,0	71,0	65,0	52,0	45,8
Thesis 3	74,0	61,0	68,0	66,0	46,7

Source: own study.

According to the opinion of respondents (Table 4), the barrier that was the most impedes the realization of all theses is: the possibility of subsidizing the purchase. Taking into account all barriers, it can be concluded that the least difficult to realize all these are legal regulations and ecological safety related to the construction of the robot.

5. Discussion

The conducted literature review, as well as the present research, confirmed that the use of autonomous robots in the courier industry is dependent mostly on factors like: the ability to subsidise the purchase, trust in technology and assurance of safety. The survey results confirm that people are aware of the changes taking place in the world. As the most important factor for the realization of the three theses, experts perceive the assurance of safety and trust in technology. The implementation process of autonomous robots involves building a trust relationship between the user and the technology. The research conducted by Tammvee and Anbarjafari confirmed that safety for humans must be ensured when implementing autonomous robots (Tammvee and Anbarjafari, 2020). The research conducted by Ejdys and Halicka confirmed that trust in technology is one of the key aspects when implementing new technology (Ejdys and Halicka, 2018). The most important barriers to the use of autonomous robots in the opinion of the experts are: the possibility of subsidising the purchase and ensuring safety. The research by Dąbrowski confirmed that a factor determining the implementation of a new solution is most related with the subsidies for companies (Dąbrowski, 2016). In Poland, The Ministry of Development and the Ministry of Finance have introduced a robotisation relief, which allows companies to deduct costs associated with the purchase and use of robots (GOV, 2022.05.12). This is a milestone to enable more companies to implement innovative solutions.

The experts highly confirmed the relevance of the first thesis, which points to a correlation between the dynamics of online shopping and the increase in the use of autonomous robots in courier services.

6. Conclusion

The obtained results confirmed that the use of autonomous robots for delivery of packages takes an important role in e-commerce. When evaluating the various statements, the experts paid attention to building a trust-based relationship between the user and the technology. The survey concluded that:

- autonomous robots will be used in the courier sector within a few years,
- safety and trust in technology has the strongest influence on robots implementations,
- if companies receive funding, more companies will buy and use autonomous robots.

The research findings suggest several directions for future efforts. Since there are two parties in the sales process, i.e., companies and customers, it is desirable to research customer acceptance of new solutions and the factors determining the effectiveness of autonomous robots in delivery. As technology develops, there is a growing awareness among customers who value security when receiving parcels. The use of autonomous robots can be one of the solutions that will increase safety and at the same time companies can streamline the delivery process.

The limitations of the conducted research are related to the fact that it was carried out during the Covid-19 pandemic. The conducted research and achieved results will be the starting point for the author to further analysis.

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INVESTMENTS IN GOLD OR CRYPTOCURRENCIES? SAFE HAVEN DURING THE COVID-19 PANDEMIC

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Purpose: The aim of the article is a comparative analysis of selected cryptocurrencies and gold in the context of the SARS-CoV-2 coronavirus pandemic.

Design/methodology/approach: The study covered the stock exchange of Gold and the four largest cryptocurrencies in terms of market capitalization: Bitcoin, Ethereum, Binance Coin, and Cardano. The data for the analysis for the period 2020-2021 was taken from the internet platform www.coinmarketcap.com, where all cryptocurrencies are published in daily intervals, and from the Investing website www.investing.com for Gold. The analysis of data in the form of time series was carried out, based on the assumption that successive values in the data set represent successive measurements made at equal time intervals.

Findings: Our findings prove that the studied cryptocurrencies proved to be resistant to economic fluctuations related to the pandemic crisis.

Originality/value: We present original scientific research that provides useful information in a practical dimension for investors interested in the cryptocurrency market and safe assets, and anyone interested in the specificity of the problem at hand.

Keywords: investments, cryptocurrency, gold, safe haven, pandemic COVID-19.

Category of the paper: Research paper.

1. Introduction

There is no doubt that the SARS-CoV-2 coronavirus pandemic (short: COVID-19) had a very significant impact on the global economy as well as on the behavior of investors in capital and cryptocurrency markets. In the initial phase of the pandemic, there was a sharp movement of investors related to increasing uncertainty, which was reflected in all financial instruments of stock exchange securities. After initial sharp drops in stock prices, the stock market was gradually recovering from losses. The perception of risk in a pandemic crisis influences the decisions of investors who seek a “safe haven” to protect their capital. Lockdowns between

2020 to 2021 and the slowdown in the world economy contributed to the fact that people were looking for profitable investments, alternatives to traditional investments, such as stocks or bonds.

Until now, the most popular investment security asset was undoubtedly gold. However, currently, the cryptocurrency market is becoming a more and more popular way of profitable investing. In addition, the appearance of the work by Satoshi Nakamoto (2008) on decentralized the electronic payment system based on cryptographic evidence in the network sparked a broadly understood interest in this form of concluding transactions. Due to the numerous advantages, bitcoin is treated as “digital gold”. An important implication of this status is that he is considered a potentially independent – from economic and political turbulence – investment instrument as if it were a substitute for real gold. Over years were established thousands of cryptocurrencies. And their fans and users suggest that bitcoin can be considered as a safe haven like gold.

The aim of this paper is to research how developed the prices of gold and of the largest cryptocurrencies in terms of market capitalization during the pandemic COVID-19 i.e., in the years 2020-2021. Moreover, whether the most popular cryptocurrencies can be considered a safe haven similar to gold.

2. Literature Review

The growing interest in cryptocurrencies and their practical use causes the need for leading continuous research on this phenomenon. Since the appearance of Bitcoin and other cryptocurrencies have been written many theoretical and empirical articles. Cryptocurrencies have become the subject of trade. Interest in the cryptocurrency market is not only limited to technology enthusiasts or investors who value anonymity. Despite lingering skepticism in government circles and financial institutions, investment banks and asset managers conducted their own research into cryptocurrencies in terms of their competitiveness against centralized fiat money. Much of this research was experimental and did not make its way into scientific journals. On the other hand, scientific research focused mainly on the multi-faceted analysis of Bitcoin and its essence from a legal, social and economic point of view. Initially, they focused on the advantages and disadvantages trying to answer the question: Does Bitcoin have a chance to become a transactional unit? Many papers were related to the attitude of governments against to Bitcoin and other cryptocurrencies in different countries (Przyłuska-Schmitt, 2021; Sandner, Blassl, 2020; Brito, Castillo, 2016). They mainly covered the issues of taxation, counteracting money laundering, financing terrorism, consumer protection and fraud (Pieters, Vivanco, 2017; Arnfield, 2015). Others concerned the evaluation of the economic and social functions of bitcoin as money (Heller, 2017).

Meanwhile, more and more researchers (Selgin 2015; Baeck and Elbeck 2015; Yermacka 2016) admitted that a cryptocurrency resembles a more speculative commodity than money. The issues of cryptocurrency value were dealt with by Peterson (2017) and Van Vliet (2018), who studied Metcalfe's Law on the valuation of Bitcoin based on the size of the users' network. Grinberg (2012) described the influence of macroeconomic factors on the Bitcoin price, and Moore and Christin (2013) explored the phenomenon of the growing interest in Bitcoin in the context of the loss of confidence in money issued by central banks.

Urquhart (2016) was the first to test the performance of Bitcoin as the cryptocurrency with the largest market capitalization in the context of the effectiveness of the cryptocurrency market. It used five different tests to do this and found that Bitcoin returns were indeed inefficient in the market. One step further went Wang Chun Wei (2018), who investigated the liquidity of different cryptocurrencies. He calculated that the unpredictability of return increases in the case of cryptocurrencies with high market liquidity. His results showed a strong relationship between the Hurst exponent and liquidity the cryptocurrencies across the board. He concluded that liquidity plays a significant role in market performance and the return predictability of new cryptocurrencies. In turn, Kristoufek (2020) studied the quantile correlations of Bitcoin and two benchmarks – S&P 500 and VIX - in order to compare them with gold as a traditional safe resource. Whereas Al-Yahyaee (et al. 2020) and Zhang (et al., 2018) studied the efficiency of the cryptocurrency markets and proved that liquidity and volatility affect inefficiency, depending on the market situation.

Various authors undertook research issues in the area of investments in cryptocurrencies and gold. Their research addressed the still pending question whether Bitcoin is a safe haven for investments in extreme market conditions and whether this feature is similar to gold investments and the general commodity index (Shahzad et al., 2019; Mokni et al., 2022). The global crisis related to the COVID-19 pandemic should undoubtedly be considered extreme conditions (Al-Awadhi et al., 2020; Bakry et al., 2021). Uncertainty connected with COVID-19 is priced in in the market for stock options (Bannigidadmath et al., 2021) which tend to be more expensive when governments impose stricter restrictions (Li et al., 2022).

Studies of the new investment areas based on the trade of cryptocurrencies are the subject of numerous research works. The latest literature extensively examines the impact of the COVID-19 outbreak on the performance and stability of global stock markets (e.g., Al-Awadhi et al., 2020, Ali et al., 2020, Ashraf, 2020, Baek et al., 2020, Baig et al., 2021, Haroon and Rizvi, 2020, Liu et al., 2020, Zhang et al., 2020). Recent studies prove that cryptocurrencies can be strong security or a safe haven during the COVID-19 pandemic (Wüstenfeld & Geldner, 2022). However, the above research focuses on short-term analysis.

Our research focuses on the analysis of the full two-year (2020-2021) period of the pandemic crisis, in which we formulate the following research problems:

- How did the prices of gold and the largest cryptocurrencies develop during the COVID-19 pandemic?

- Are there correlations between investing in gold and cryptocurrencies or between the studied cryptocurrencies?
- Can the most popular cryptocurrencies be considered a safe haven similar to gold?

3. Research Hypotheses, Methods, and Data

The prices of investment instruments are the result of investors' behavior in response to changing market conditions. We predict that the cryptocurrencies we study with the highest market capitalization cannot be a safe haven for investments in the conditions of a pandemic crisis. However, they can bring above-average profits.

In connection with above mentioned we present the following research hypotheses:

H1: Prices of gold and cryptocurrencies increase significantly during the crisis because investors seek a safe haven to protect their financial means.

H2: Investments in cryptocurrencies and gold are correlated with each other and continue their upward trend during the pandemic crisis.

H3: Cryptocurrencies with the highest market capitalization due to their volatility cannot be considered a safe haven similar to gold.

The method used in this study is the time series of daily quotes for the four the highest ranked cryptocurrencies in terms of market capitalization: Bitcoin, Ethereum, Binance Coin, and Cardano, listed on CoinMarketCap <https://coinmarketcap.com/> and for the gold prices listed on Investing <https://www.investing.com/>.

The output data set consists of standardized and harmonized time series covering two full years of daily quotations i.e., the period from 01/01/2020 to 31/12/2021. The time series have been normalized to 100% of the final value. In turn, the harmonization was conditioned by a different number of observations in individual time series. Gold prices do not include public holidays. These observations have been removed from the time series of cryptocurrency prices. Ultimately, three data sets were included in the analysis i.e., the whole time series and two separate subsets, which cover the first half of 2020 and other data dating back to the end of 2021, respectively. The first subset includes the time immediately after the outbreak of the pandemic COVID-19. The second subset includes the longer term, in which the restrictions due to the coronavirus in the dimension and scale of threat were similar.

The empirical analysis is based on the tools of descriptive statistics and on the correlation between the analyzed financial instruments to which three tests were applied. The choice of this simple analytical instrumentation was preceded by careful observation of research data sets and numerous calculations in the SPSS program. The high level of price volatility of individual cryptocurrencies combined with the lack of their periodic repeatability testifies to a high level of predictive unpredictability of these financial instruments.

4. Results and Discussion

The very high level of price differentiation of the analyzed cryptocurrencies in 2020-2021 is due to the multiple increases in their price value. In the case of the Cardano cryptocurrency, the price has increased more than 41 times. At the same time, the price of gold increased by over 19%, wherein the difference in extreme quotations reached 43%.

The coefficient of variation (CV) for gold equal to 6.02% indicates a low level of volatility of its price, unlike the analyzed cryptocurrencies. High and very high volatility in the case of cryptocurrency prices is related to the dynamic development of these financial instruments (Table 1).

Table 1.

Descriptive Statistics (N = 530; 01/01/2020-31/112/2021)

	Bitcoin	Ethereum	Binance Coin	Cardano	Gold
Mean *	29,124.66	1,539.35	198.62	0.79	1,802.47
Std.Dev.	19,628.48	1,437.16	214.73	0.83	108.51
CV	67.39%	93.36%	108.11%	105.03%	6.02%
Max*	67,549.74	4,810.07	676.32	2.96	2,121.70
Min*	5,002.58	110.41	9.37	0.02	1,485.00
Max/Min	13.50	43.57	72.18	123.59	1.43
$X_{(530)} / X_{(1)}$	6.56	28.65	37.81	41.43	1.19

Note: CV=Std.DEV./Mean – Coefficient of Variation. * In USD.

Source: own study.

The graphical presentation (Figure 1) of the normalized time series illustrates the volatility of cryptocurrency prices and their small share in the gold quotations.

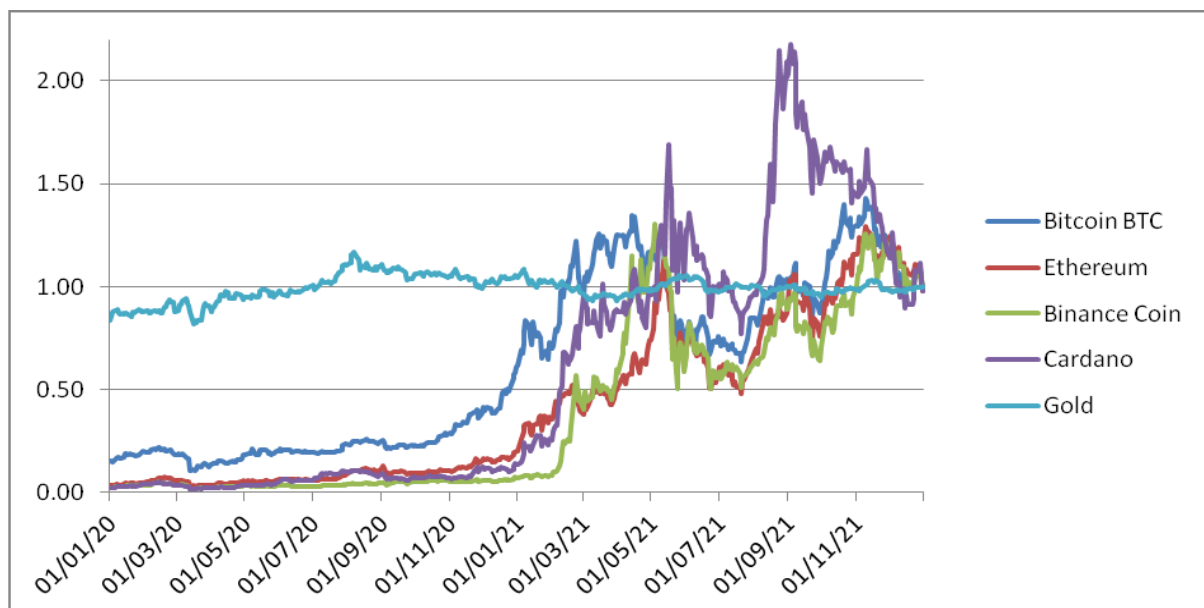


Figure 1. Cryptocurrency and gold prices in the period 01/01/2020 - 31/12/21 (31/12/2021 = 100%). Source: authors' work.

The correlation analysis shows a high level of positive price dependencies of individual cryptocurrencies in the analyzed period. With regard to gold, the obtained values of correlation coefficients do not give an unambiguous answer to the existence of dependences. However, taking into account the low values of these coefficients, the level of dependence should be considered negligible (Table 2).

Table 2.

Estimated correlation coefficients among variables (N=530; 01/01/2020-31/12/21)

Variables	CC	Bitcoin	Ethereum	Binance Coin	Cardano
Ethereum	a.	.905**(.000)			
	b.	.820**(.000)			
	c.	.936**(.000)			
Binance Coin	a.	.892**(.000)	.961**(.000)		
	b.	.802**(.000)	.873**(.000)		
	c.	.940**(.000)	.975**(.000)		
Cardano	a.	.863**(.000)	.926**(.000)	.904**(.000)	
	b.	.746**(.000)	.850**(.000)	.780**(.000)	
	c.	.901**(.000)	.963**(.000)	.928**(.000)	
Gold	a.	.049 (.255)	.061 (.157)	.002 (.957)	.022 (.610)
	b.	.045 (.123)	.127**(.000)	.078**(.007)	.123**(.000)
	c.	.163**(.000)	.242**(.000)	.188**(.000)	.241**(.000)

Note: CC - Correlation Coefficient, a. Pearson Correlation, b. Kendall's tau_b, c. Spearman's rho
 **. Correlation is significant at the 0.01 level (2-tailed).

Source: own study.

4.1. The Outbreak of the COVID-19 Pandemic and the Prices of Cryptocurrencies and Gold

The beginning of 2020 in the context of the COVID-19 pandemic and drastic limitations in social and economic life had a significant impact on investors' reactions and stock market quotations. Ultimately, however, the first half of 2020 in the overall settlement was not characterized by high volatility, both in the case of gold and the analyzed cryptocurrencies.

However, the statistical analysis based on descriptive measures ignores the fact that the relative homogeneity of individual data sets was due to large declines in quotations recorded in March 2020 after previous, systematic increases, and then after systematic increases again and again.

The first half of 2020 in the case of gold brought an increase in prices at a level similar to the previously analyzed two-year period 2020-2021 i.e., up to 19%. In the case of cryptocurrencies, there were also no declines in the end, while in the case of Binance Coin the increase was only 13%, which was less than in the case of gold.

Table 3.*Descriptive Statistics (N = 133; 01/01/2020-30/06/20)*

	Bitcoin	Ethereum	Binance Coin	Cardano	Gold
Mean*	8,472.91	194.25	16.77	0.05	1,675.19
Std.Dev.	1,297.85	42.36	3.26	0.02	84.79
CV	15.32%	21.81%	19.42%	33.78%	5.06%
Max*	10,323.96	282.04	26.46	0.09	1,816.90
Min*	5,002.58	110.41	9.37	0.02	1,485.00
Max/Min	2.06	2.55	2.82	3.72	1.22
X₍₁₃₃₎/ X₍₁₎	1.28	1.76	1.13	2.55	1.19

Note: CV=Std.DEV./Mean - Coefficient of Variation. * In USD.

Source: own study.

The graphical presentation (Figure 2) of normalized time series reflects the changes in quotations based on clear returns on investment. The large drops in quotations recorded in mid-February 2020 turned into increases only after a month, and the pace of these changes was not as fast as in the case of the drops.

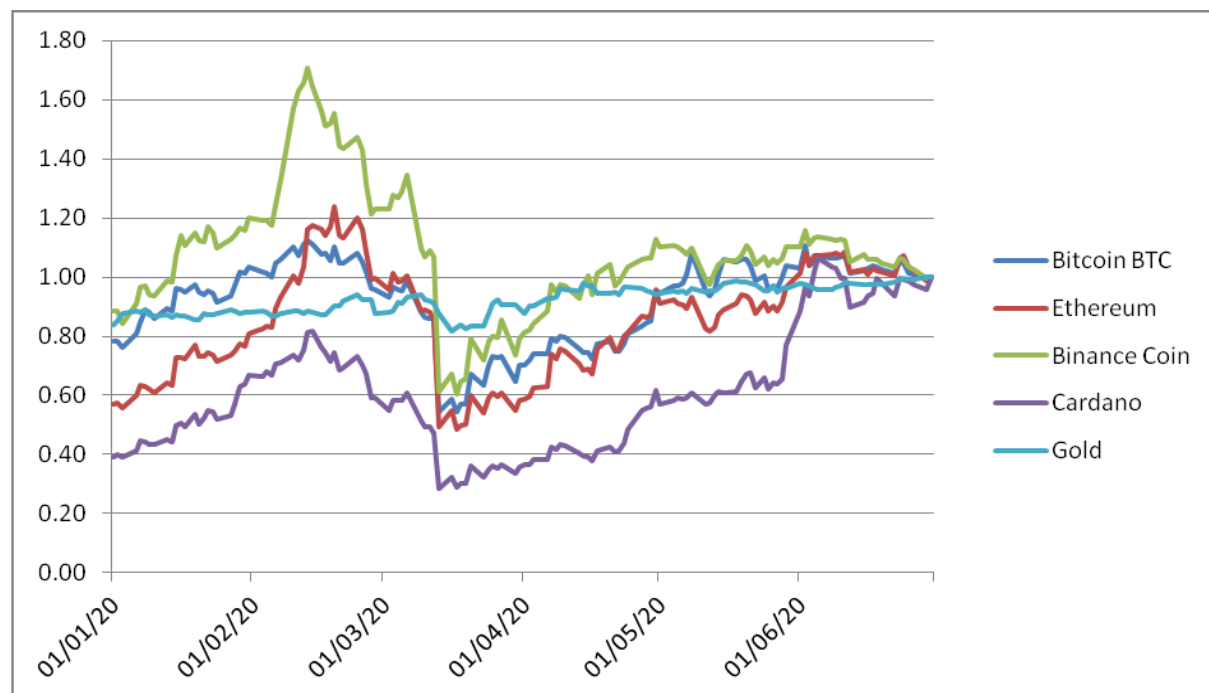


Figure 2. Cryptocurrency and gold prices in the period 01/01/2020 - 30/06/2020 (30/06/2020 = 100%). Source: author's work.

The correlation analysis shows a strong and very strong positive price dependence of the analyzed cryptocurrencies in the first half of 2020. With regard to Gold, there was a positive relationship in the case of three cryptocurrencies: Bitcoin, Ethereum, and Cardano. But the strength of this relationship was moderate. In addition, there was no correlation between Binance Coin and Gold. The corresponding calculations are presented in Table 4.

Table 4.*Estimated correlation coefficients among variables (N = 133; 01/01/2020-30/06/2020)*

Variables	CC	Bitcoin	Ethereum	Binance Coin	Cardano
Ethereum	a.	.854**(.000)			
	b.	.693**(.000)			
	c.	.868**(.000)			
Binance Coin	a.	.790**(.000)	.787**(.000)		
	b.	.607**(.000)	.586**(.000)		
	c.	.773**(.000)	.736**(.000)		
Cardano	a.	.809**(.000)	.831**(.000)	.508**(.000)	
	b.	.745**(.000)	.745**(.000)	.508**(.000)	
	c.	.889**(.000)	.892**(.000)	.648**(.000)	
Gold	a.	.360**(.000)	.495**(.000)	.030 (.732)	.517**(.000)
	b.	.231**(.000)	.352**(.000)	-.021 (.725)	.361**(.000)
	c.	.332**(.000)	.495**(.000)	-.033 (.710)	.484**(.000)

Note: CC - Correlation Coefficient, a. Pearson Correlation, b. Kendall's tau_b, c. Spearman's rho
 **. Correlation is significant at the 0.01 level (2-tailed).

Source: own study.

4.2. Cryptocurrency and gold prices in the COVID-19 pandemic

The period from July 2020 to December 2021 was characterized by large fluctuations in the prices of individual cryptocurrencies. However, as result led to multiple increases in their prices. The smallest increase exceeding 400% was related to Bitcoin, and the largest reaching 3.300% was recorded by Binance Coin. In the analyzed period of time, gold was characterized by very low volatility (CV = 4.22%) with the difference of extremely classified prices reaching 25%, and in the end reducing its initial quotations up to 1% compared to the quotations in December 31, 2021. The relevant calculations are presented in Table 5.

Table 5.*Descriptive Statistics (N = 397; 01/07/2020-31/12/2021)*

	Bitcoin	Ethereum	Binance Coin	Cardano	Gold
Mean *	36,043.26	1,989.98	259.54	1.04	1,845.11
Std.Dev.	17,968.99	1,395.45	16.25	0.82	77.90
CV	49.85%	70.12%	83.32%	79.16%	4.22%
Max*	67,549.74	4,810.07	676.32	2.96	2,121.70
Min*	9,072.85	226.13	15.41	0.08	1,691.20
Max/Min	7.45	21.27	43.89	38.56	1.25
X ₍₃₉₇₎ / X ₍₁₎	5.16	16.42	33.69	16.36	0.99

Note: CV=Std.DEV./Mean - Coefficient of Variation. * In USD.

Source: own study.

The graphical presentation (Figure 3) of the normalized time series illustrates the marked volatility of researched cryptocurrency prices and the lack of such volatility in the case of Gold.

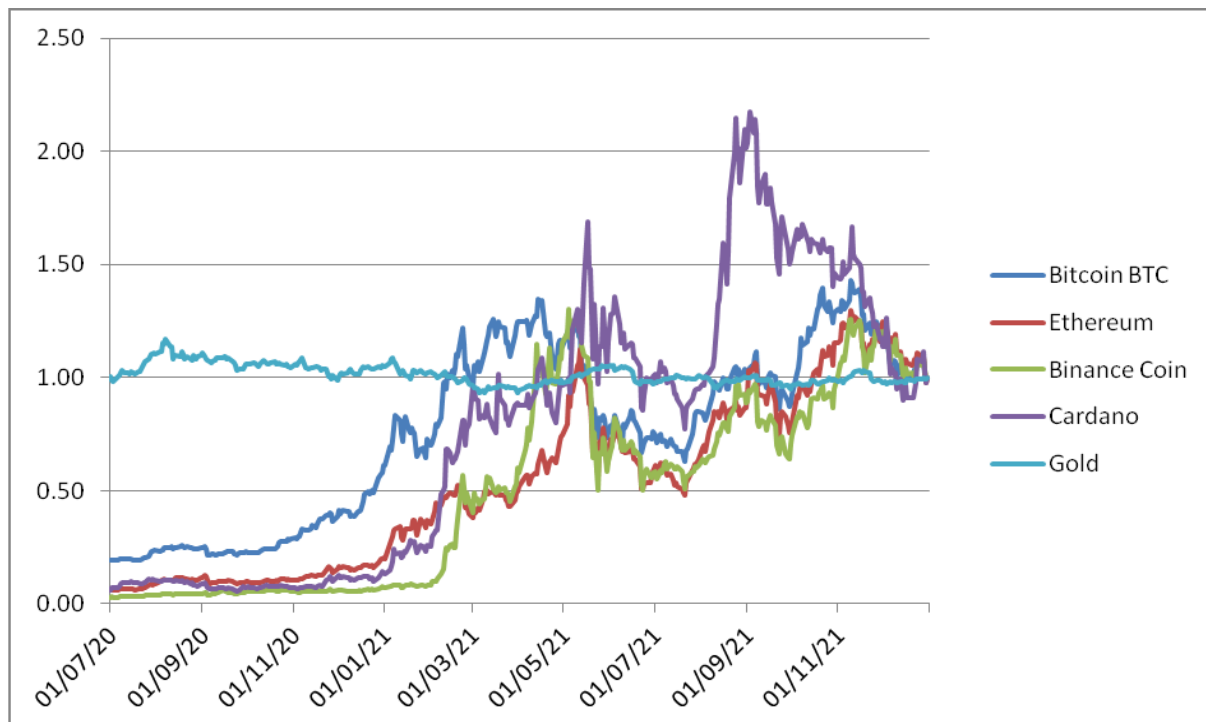


Figure 3. Notowania cen kryptowalut i złota w okresie 01/07/2020-31/12/2021 (31/12/2021=100%). Source: author's work.

The correlation analysis indicates a strong and very strong positive price dependence of all researched cryptocurrencies in the period from the second half of 2020 to the end of 2021. Comparing the cryptocurrencies with gold the dependence turned out to be negative and the strength of the relationship, in this case, was moderate, bordering on strong (Table 6).

Table 6.

Estimated correlation coefficients among variables (N = 397; 01/07/2020-31/12/2021)

Variables	CC	Bitcoin	Ethereum	Binance Coin	Cardano
Ethereum	a.	.863**(.000)			
	b.	.726**(.000)			
	c.	.857**(.000)			
Binance Coin	a.	.858**(.000)	.949**(.000)		
	b.	.719**(.000)	.848**(.000)		
	c.	.876**(.000)	.960**(.000)		
Cardano	a.	.808**(.000)	.898**(.000)	.871**(.000)	
	b.	.598**(.000)	.770**(.000)	.694**(.000)	
	c.	.783**(.000)	.921**(.000)	.869**(.000)	
Gold	a.	-.751**(.000)	-.594**(.000)	-.612**(.000)	-.621**(.000)
	b.	-.520**(.000)	-.399**(.000)	-.421**(.000)	-.417**(.000)
	c.	-.729**(.000)	-.604**(.000)	-.621**(.000)	-.614**(.000)

Note: CC - Correlation Coefficient, a. Pearson Correlation, b. Kendall's tau_b, c. Spearman's rho
 **. Correlation is significant at the 0.01 level (2-tailed).

Source: own study.

5. Conclusion

Significant increases in cryptocurrency prices in the past two years have become a fact proved by multiply changes in price quotations. The turmoil on the traditional stock exchanges in the first half of 2020 was of a temporary nature. Both in the case of gold and the analyzed cryptocurrencies, the balance of changes turned out to be positive. However, while the changes in the price of gold and cryptocurrencies in the first half of 2020 can be described as statistically convergent, the subsequent quotations reaching the end of 2021 were not of such a nature. Correlation analysis showed a clear negative dependence. Cryptocurrency prices have been steadily rising, ignoring systematic fluctuations in exchange rates, and the price of gold has changed slightly over time, eventually decreasing up to less than 1%.

The high level of volatility of prices included in the analysis of cryptocurrencies, combined with the lack of their periodic repeatability, proves a high level of unpredictability of this type of financial instrument, which requires leading further, systematic empirical research based on traditional statistical tools and enriched with new theoretical models.

The COVID-19 pandemic was the first global economic and financial phenomenon that has taken place during the existence of Bitcoin and other cryptocurrencies and their actual usage. During the pandemic, people gained more knowledge about cryptocurrencies by looking for alternative sources of investment. Nevertheless, whereas investments in gold continued their horizontal trend during the whole pandemic time, the cryptocurrencies with lower prices made it possible to achieve significantly higher profits.

To conclude, cryptocurrencies with the highest market capitalization have become undoubtedly high-yield investments, but due to their high volatility, they cannot be considered as a safe investment haven similar to gold.

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SOCIALLY RESPONSIBLE INNOVATIONS AND SUSTAINABLE DEVELOPMENT OF RETAIL CHAINS IN POLAND

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Purpose: The main aim of this paper is to identify the specificity of socially responsible innovations in retail against the background of sustainable development, and to identify examples of socially responsible innovations implemented by selected retail chains in Poland. In the Author's opinion, they are crucial for the development of a responsible society, but also for a sustainable economy.

Design/methodology/approach: The methodology applied in the article refers to the methodological canon of management sciences, including, among others, conceptual-theoretical and empirical research methodology. On their basis a critical analysis of foreign and Polish literature in the field of management science, theory of development and functioning of the retail trade has been carried out. The analyzed cases of retail chains were considered representative due to their strong market position and large contribution to the development of the FMCG market (the so-called "best business practices") – for this purpose, the qualitative research methodology was applied, including a case study.

Findings: The analysis conducted in this paper indicates that large retail chains are creating socially responsible innovations, thus having a significant impact on the spread of socially responsible practices. These activities are mainly based on shaping the environmental awareness of employees and customers, increasing the safety and quality of products, reducing carbon dioxide emissions, effective waste management, rational use of natural resources, reducing staff turnover and improving their working conditions.

Originality/value: The article presents how the literature on management science describes and explains the essence, specificity, and types of socially responsible innovations against the background of the sustainable development concept. On this solid factual basis, socially responsible innovations implemented by selected retail chains in Poland were identified. This allowed to verify theoretical assumptions related to the development of socially responsible innovations with the actual state of affairs, reflected in the analyzed practices of retail chains.

Keywords: socially responsible innovation, sustainable development, retail chains

Category of the paper: A literature review, and case study.

1. Introduction

The issues discussed in this paper indicate the important role of creating socially responsible innovations by retail chains that respond to the need to implement the assumptions of sustainable development in retail in Poland. In this situation, the ability to create socially responsible innovations by retail entities in Poland, mainly represented by retail chains, becomes crucial.

Introducing socially responsible innovations by retail chains in Poland contributes to building an aware, responsible society, which in terms of sustainable development needs, indicates an extremely important aspect of their market activities. Analyses and observations of the market FMCG (fast moving consumer goods) indicate increasing activity of retail chains in developing socially responsible innovations in retail (Reformat, 2019; Domański, 2020). These innovations concern important social issues related to environmental protection activities, support for local communities, improvement of relations with business environment entities (customers, suppliers, producers, employees) and improvement of the quality of life. (Sztangret, Reformat, 2017; Hadj, 2020).

These issues determine the problematic scope of the paper. whose aims are to: a) recognition the specificity of socially responsible innovations in retail against the background of sustainable development principles; b) identify examples of socially responsible innovations implemented by selected retail chains in Poland.

The article consists of several parts. A short Introduction is followed by a section providing theoretical background on socially responsible innovation and sustainability in retailing. In the next part, the author discusses socially responsible innovations in retail based on the practices of selected retail chains in Poland (leaders of innovative changes). The final part of the article consists of conclusions and references.

2. Theoretical Background

Based on the review of scientific literature, the analysis of important concepts for the research area was made. Their problematic scope includes socially responsible innovation and sustainable development, as important retail phenomena.

2.1. Socially responsible innovation

In recent years, we can see that the attention of researchers and economic practitioners is gradually shifting from technical and technological innovations, which have so far been the main driver of economic development, to social innovations (Morrar et al., 2017).

Edwards-Schachter and Wallace (2017), as well as many other authors state that social innovations they imply new solutions in terms of products, services, methods, and processes that respond to social needs and cause a lasting change in the behavior of social groups. According to Fitjar, Benneworth, and Asheim (2019), these innovations require reconciling scientific progress with societal interests, thereby driving economic growth and building a better society. Van der Have and Rubalcaba (2016) emphasize that these innovations serve to solve socially important problems.

Therefore, the term socially responsible innovation is closely related to the concept of corporate social responsibility (CSR), which broadly speaking, means the responsibility of entities for its impact on society (EC, 2012, pp. 2-3) and the sustainable development (SD), in which the environmental, social, and economic areas are intertwined (Anser et al., 2018).

Among innovation researchers, one finds that CSR concepts can be inspire the creation of innovations for the realization of sustainable development principles. The need to study the interrelationship between the concepts of sustainable development and corporate social responsibility (CSR) is emphasized by, among others, Camilleri (2017), Anser et al. (2018), Auer and Jarmai (2018), Meseguer-Sánchez et.al. (2021).

According to Porter and Kramer (2011, p. 6) social responsibility and sustainability can go hand in hand with economic development, creating "shared value", which is based on the premise that both economic and social progress must be considered using the principles of value.

In turn Stawicka (2016) states that social responsibility also occurs as a type of social innovation, as evidenced by the inclusion of business, ecological, and ethical as well as social aspects in the enterprise's activities. Moreover, it is based on cooperation and participation in decisions with employees and local communities, thus contributing to a significant improvement in their quality of life, which is the basis of socially responsible innovation (Lis, Sudolska, 2018). The mechanism for these activities in retail presents Figure 1.

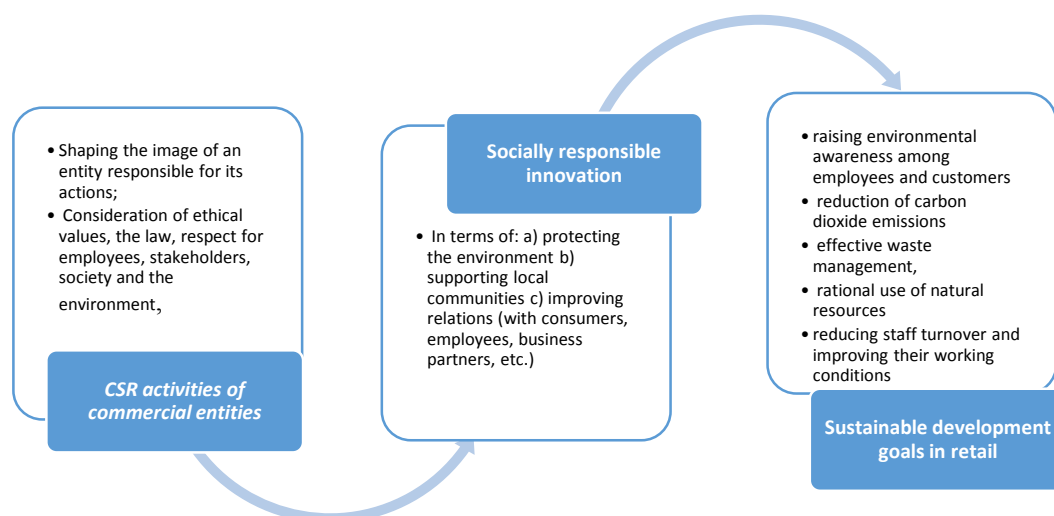


Figure 1. The concept of CSR, and socially responsible innovation and sustainability development goals in retail. Source: Prepared by the author based on previous studies.

The literature review conducted indicates that socially responsible innovation refers to new business solutions that consider ethical values, the law, respect for employees, society, and the environment, and make a specific contribution to sustainable development.

2.2. Sustainability development – retail context

Business activities for sustainability are one of the important elements of the strategy of many firms, including retail chains. Their development at the international level was initiated by the global strategy developed by the United Nations in 2015, as part of the 2030 *Agenda for Sustainable Development* initiative, titled: *Sustainable Development Goals* (Rezolucja..., 2015 [Resolution..., 2015]). The strategy formulates 17 goals of paramount strategic importance. Among the many important issues addressed in them were the fight against hunger and poverty, equalizing opportunities between different regions, combating the effects of climate change, protecting natural resources, or equality and education.

The implementation of sustainability goals is also a huge challenge for retail, which at the micro level, concerns the actions of individual retail chains, and food producers, and at the macro level, includes firms building retail facilities (Zrównoważony..., 2021 [Sustainability..., 2021]). The main goals of these entities are presented by Figure 2.

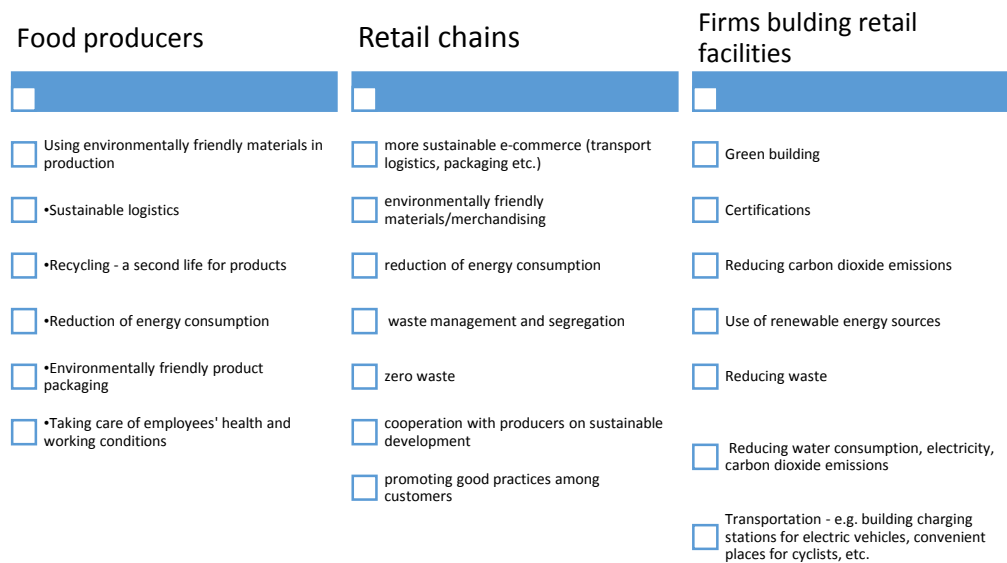


Figure 2. Key goals of the sustainability development in the retail sector. Source: created by the author based on (Zrównoważony..., 2021 [Sustainability..., 2021]).

We are currently seeing a re-evaluation of retailers' sustainability efforts in the retail space as a result of the COVID 19 (COronaVirus Disease 2019) pandemic (Roggeveen, Sethuraman, 2020; Borsellino et al., 2020; Nanda et al., 2021). Its course results, among others, in consumers' increased expectation of greater transparency and responsibility of companies in their business activities. The McKinsey Global Institute's consumer behavior survey results indicate that pandemic consumers have begun to place a much greater emphasis on such elements of life as health, ecology, cleanliness, equality, or environmental care – not only in their personal lives, but also in their relationships with the companies whose products and services they use (Mckinsey, 2020).

Due to increasing consumer expectations of pro-environmental actions the basis for sustainability in retail is now broadly defined as social and environmental education aimed at participants in the shopping process, i.e., consumers (Bywalec, 2017; Nieuwenhuis, 2021). One direction of such activities is to build greater awareness and trust among consumers for certified (BIO/ECO) products, which, as stated Bostan (2016, p. 34) are environmentally safe, contain no conservatives, flavor enhancers, artificial flavors, or colors, and are chemically unprocessed. These advantages have a very positive impact on the health of consumers, so social and environmental education in this area is important. It is an important challenge for retail chains, which through responsible marketing can contribute to changing consumer behavior, shaping in them the attitude of responsible market participants. This attitude as it states Sobocińska (2021, p. 4) in a broader context manifests itself not only in the purchase and consumption of organic products, but also in the economical, rational use of consumer goods and a shift away from ego – rationality to eco- rationality.

Another particularly important sustainability issue in retail is recycling and responsible waste management (Sztangret, Reformat, 2020). The reuse of waste, i.e., the processing of the secondary raw materials obtained from it, is a key element of waste prevention. Therefore, this area is an important part of the operation of retail chains, due to the huge amount of paper, cardboard, plastic (PET bottles), metal (aluminum cans), or glass packaging generated as part of their retail operations. Efficient recycling and waste management is helped by the universal ecological principle known as the "3 R's" (*Reduce, Reuse, Recycle*) – Figure 3.

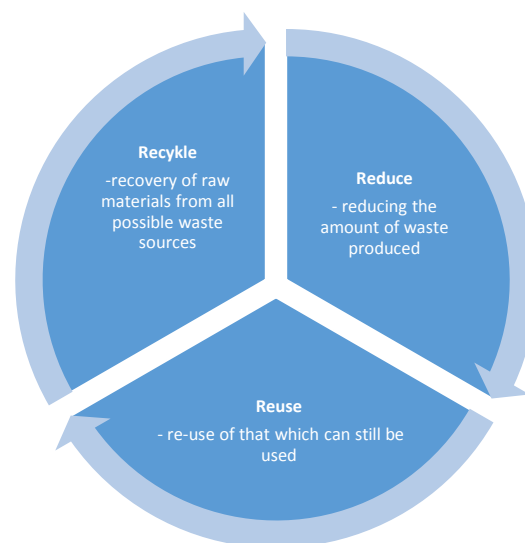


Figure 3. The elements of the 3 R's principle. Source: created by the author based on Ioannidis et al., 2021.

It should be emphasized that recycling and waste management in retail bring economic benefits for the environment as well as for the image of retailers.

The above-mentioned activities should be considered the most desirable from the point of view of sustainable development goals in retailing. In their area, various types of socially responsible innovations appear, created by large retail chains that are leaders of innovative

changes in commerce (Newman, et.al., 2018). Their examples are included in the next section of the study.

3. Examples of socially responsible innovations introduced by selected retail chains in Poland (leaders of innovative changes) – discussion

In the practice of retail chains in Poland, one may notice increasing activity in the field of creating socially responsible innovations. They combine a business approach with a pro-ecological one, which makes them a difficult strategic challenge for these market entities. Due to their scale of operations, financial potential and transaction power, these entities have a significant impact on shaping social awareness. Thanks to that they exert significant influence on the promotion of socially responsible practices throughout the whole supply chain of retail chains (Nieuwenhuis, 2021).

At the core of these innovations are raising environmental awareness among employees and customers, increasing product safety and quality, reducing carbon emissions, effective waste management, rational use of natural resources, reducing staff turnover and improving their working conditions (Furmańska-Maruszak, Sudolska, 2016; Sokołowska-Durkalec, 2019). Selected practices of retail chains' efforts to create socially responsible innovation presents Table 1.

Table 1.

Selected examples of socially responsible innovations introduced by retail chains in Poland

Area of innovative activities	Name of a retail chain and an example of a socially responsible innovations	Objectives of the innovations introduced
Environment protection	Kaufland retail chain: - conscious energy management to recover heat from the chillers reducing carbon dioxide emissions and energy consumption. The waste heat from the central refrigeration plant is used by underfloor heating. At high temperatures, the system is used to cool stores - development of electric vehicle charging stations available at Kaufland stores	- waste heat recovery - control of energy installations according to the store's needs thanks to quality sensors - the ability to charge an electric vehicle for free while making in-store purchases
	Lidl retail chain: - replacement in the composition of textile products of the raw material viscose, a more ecological variety of this material LENZING™ ECOVERO™.	- manufacturing eco-friendly, environmentally friendly textile products signed with the chain's own brand, to eliminate socially harmful viscose as a raw material - at the core of production is the purchase of sustainably sourced wood and the responsible use of chemicals.

Cont. table 1.

	<p>Auchan retail chain: - innovation: climate exhibition, which is a stage of an educational project of the Auchan chain dedicated to promoting a model of responsible consumption, showing how to counteract global warming</p>	- sensitize local communities, especially children, to environmental challenges related to ecology (e.g., climate change, access to clean water, renewable and affordable energy, biodiversity, and agriculture)
	<p>Biedronka retail chain: - internal procedure of waste segregation collected by specialized companies, thanks to which 99% of them is recycled, processed, or recovered.</p>	- recycling, processing, or reclaiming a product (e.g., fruits and vegetables are made into biogas for energy and heat production, and bread goes to a distillery as a raw material for alcohol production);
Supporting local Communities	<p>Carrefour retail chain: - annual "Neighbor's Day" action - „Senior citizen" card</p>	- the aim of the activities is to make the customers' everyday shopping more pleasant and to enable them to spend their time in an attractive way, close to their place of residence - supporting those in need over 60 with shopping discounts
	<p>Biedronka retail chain: - introducing books as a permanent element of its store offer</p>	- combating the reading deficit. - promoting reading among children. - promoting culture and art;
Improving relationships with business environment stakeholders (customers, suppliers, manufacturers, employees)	<p>Żabka retail chain: - innovation in the form of: a) the "Product Creators" program within which, teams of students develop ideas for innovative products under the auspices of Żabka; b) open workshops for students conducted by Żabka managers at the University of Economics; c) dual degree program at the School of Logistics in Poznan, whose idea is to combine theoretical knowledge with practical skills gained during a paid internship at the Żabka Polska Logistics Center;</p>	- cooperation with higher education institutions, including, among others, the University of Economics, and the Poznań School of Logistics, to support them. As part of the Partner Club, the network undertakes a few activities that directly engage and influence the development of students;
	<p>Kaufland retail chain: - cross-sector collaboration on the use of plastics and creating a closed circle economy - cooperation with local and regional producers and suppliers, for whom the chain created a special portal "Regional Kaufland".</p>	- reducing plastics 20% of plastic by 2025 and to introduce recyclable packaging across all own brands - support to domestic food producers and suppliers and promotion of local and regional products
Responsible consumption	<p>Kaufland retail chain: - "Conscious Nutrition Zones": , where special products dedicated to specific nutritional needs are available - „Eco since childhood" campaign</p>	- possibility to purchase healthy food products easily and quickly, such as vegan, vegetarian, with less sugar, gluten-free or for people leading an active lifestyle - environmental education to build customer awareness from an early age
	<p>Aldi retail chain: - product innovation as the chain's response to the changing environment and pro-health customer expectations: (a) launching Fairtrade-labelled private label products; (b) developing new BIO categories and vegan products;</p>	- sustainable assortment development based on environmental and social criteria, in the interest of healthy eating habits of its customers;

Cont. table 1.

	Netto, Lidl, Aldi, Biedronka, Kauchland, Carrefour, as well as other major chains: - donating unsold food products to needy organizations (Caritas, Food Banks, charitable institutions, etc.)	- reducing food waste
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Source: Prepared by the author based on previous studies.

The presented examples of socially responsible innovations show that large retail chains consciously take up the challenge of creating socially responsible innovations, resulting from the need of sustainable development. Within them, some general regularities may be noticed, explaining the goal and application of a given innovation (e.g., depending on the area of innovation activities).

The analyzed innovations are located in four areas, which are the main pillars of sustainable development, and which are implemented at the interface of three important spheres: social, economic and environmental. Their key element is undoubtedly the environmental protection. Socially responsible innovations related to environmental protection activities indicate that the presented retail chains implement the 3R concept (reduce, reuse, recycle) that consists in minimizing the negative environmental impact and sustainable waste management. Moreover, they try to rationalize their own waste production by increasing the percentage of recycled materials sent for recycling. At the same time, it is worth noting that each year there is a growing public awareness of the need to reduce the consumption of electricity, water, gas, and fuel.

In other areas of innovative activities (i.e., supporting local communities, improving relations with business environment entities, and responsible consumption) – we can see the willingness of large retail chains to engage in activities aimed at improving the quality of life of local communities, creating new models of relations, creating new platforms for cooperation, and responsibility for food waste.

Introducing socially responsible innovations by retail chains in Poland contributes to building an aware, responsible society, which in terms of sustainable development needs, indicates an extremely important aspect of their long-term market activities. The analyses and market observations show that the surveyed entities are increasingly active in developing socially responsible innovations in retail.

4. Conclusions

The purpose of this article was to recognition the specificity of socially responsible innovations in retail against the background of sustainable development, and to identify examples of socially responsible innovations implemented by selected retail chains in Poland. It was determined that socially responsible innovations are characteristic, first of all, for the activities of large retail chains. Their specificity is created by thematic areas that

accompany the CSR concept, and the concept of sustainable development, while their structure is filled by various types of innovations. These include:

- a) socially responsible innovations responding to social needs of various groups and organizations/institutions of public use (clients of the network, local communities, suppliers, employees, charities, etc.),
- b) socially responsible innovations focused on sustainable development (social, economic, and environmental dimension),
- c) socially responsible innovations focused on organizational changes in relations between different institutions and their stakeholder groups.

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THE CONCEPT A LOGISTIC NETWORK ORGANIZATION LVIV-RZESZOW

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Purpose: This publication focuses on issues related to logistics management. The aim of this publication is to show the possibility of creating a logistics center within logistic networks.

Design/methodology/approach: This publication uses a conceptual method based on observations, sales forecasts and distance analysis of logistics centers.

Findings: The analysis of the collected and presented data as part of the concept of creating a logistics center Lviv-Rzeszów shows that such an action is justified, in particular in economic terms. The study shows that the optimization of processes as part of the implementation of the concept would allow for many benefits for the economy and regional development, as well as for the transport and logistics industry itself.

Research Limitation/implication: During the study, there were limitations related to obtaining empirical data. The most important implication of the study is the statement that the planned investment will bring significant benefits to entrepreneurs and other market stakeholders.

Originality/Value of paper: The publication showed the possibilities of using the new logistics center Lviv-Rzeszów and its impact regional and business development.

Category of the paper: Research paper.

Keywords: supply chain, process optimization, logistics, industry 4.0.

1. Indroduce

Dynamic development of economies, IT, growing competitiveness, e-commers, Industry 4.0. etc. causes the intensification of unfavorable phenomena in land transport. The development of infrastructure, in particular logistic centers, based on the use of intelligent systems, allows to increase the possibilities of operation of all market stakeholders. Logistics activities aimed at optimization of processes and directly incurred costs allow, within the

framework of logistics networks, among other things, to improve the provision of services and increase the level of quality and customer satisfaction.

The aim of the article is to show the possibility of creating a logistics center Lviv-Rzeszów, which, from the point of view of logistics management, will increase the possibilities of product transfer and increase the benefits to market stakeholders.

2. Literature review

A major focus of corporate logistics management is the distribution network for goods, which forms the core of the process, offering a high level of service at the lowest cost possible (Rodrigues et al., 2021, p. 525). The decision of where to locate the various supply chain elements is very important, especially in the case of a distribution center (DC), because it is responsible for consolidating and distributing the goods, for regulating the number of vehicles to be used, and for redirecting the goods received from different locations. They also help optimize transportation logistics operations because they redistribute large volumes of cargo based on certain variables, such as distance, load size, and product type, among others (Castañeda Sivincha, 2018). The logistics center performs a connecting function, ensuring the delivery of goods from the sender to the recipient, as well as providing high-quality information support for the goods (Mandra, 2016). The modern logistics center is characterized by the provision of additional transport services: cargo handling, storage in comfortable conditions, forwarding, agency, customs clearance, etc. (Zagorodnia, 2017). The main task of the multifunctional transport and logistics center is to ensure the provision of transport and logistics services for minimum costs for logistics services and logistics infrastructure through cooperation of transport and logistics companies that provide a specialized range of logistics services (Mashkantseva, 2019). Development and implementation of a modern project of a multimodal transport and logistics complex requires a professional approach and use of the principles of project management, theories of systems analysis, business planning and management decisions (Solidor, 2021).

In most of the studies in the hub location mainly focus on two aspects: one is the location and optimization of hub nodes (Alumur, Kara, & Karasan, 2012; Gelareh & Nickel, 2011); the other is the design and optimization of logistics networks (Bowen, 2012; MingJun & Yan-Ling, 2012), it mainly includes a multimodal transport logistics network (Meng & Wang, 2011), postal logistics network (Lee & Moon, 2014), and port logistics network (Dai, Yang, & Li, 2018; Nguyen & Zhang, 2017). However, there is very little research on mixed central logistics networks. Most research on the focal logistics network is qualitative research and very few studies use mathematical models to study the selection of central nodes. A complex logistics network is considered resilient when it can maintain a near-peak performance while facing

disruptions. The network complexity stems from the size of the logistics arm and the intensity in which it coordinates with its partners while disruptions caused by the demand side is dependent on the performance of the e-commerce player. Supply chain management covers numerous processes and operations that transform raw materials into products and distribute them through retail sales. Consequently, the supply chain involves numerous parties, including suppliers, manufacturers, distributors, retailers, and customers, to improve coordination and collaboration between the parts of the chain (Christopher, 2016). In the transportation sector, there is a robust location-routing approach that considers simultaneous decisions on vehicle routes and the location of loading stations to design strategic networks of logistics fleets. To this effect, (Schiffer, and Walter, 2018, pp. 31-42) assess the problem with different levels of uncertainty by creating an algorithm; based on the results, they analyze the benefits of a robust planning approach regarding operational feasibility and overall costs savings for the planning problem. Organizational networks make it possible to join forces in joint initiatives and innovation activities, to use various unique skills as well as the creation of specialized configurations of competencies spread across multiple organizations participating in the network. They are supported by information technologies, especially the Internet, changing the relationship between organizations and their partners. These phenomena lead to new business models based on networks between organizations, including alliances and partnerships, among others. It has become common knowledge that the arising digital technologies could improve the efficiency of the operations of supply chains (SCs) worldwide (Govindan et al., 2018; Dubey et al., 2019). Both academia and practitioners have widely reported the potential benefits of the integration of digital technologies and SC management (Kamble et al., 2020). Implementing these novel technologies can help SCs to perform more efficiently (Chiappetta Jabbour et al., 2020). The operations and SC management could be restructured through Industry 4.0 (I4.0), named after the 4th industrial revolution. The name refers to the prevailing trend of exchange of data and automation in manufacturing technologies, like the Internet of Things (IoT), cyber-physical systems, and cloud computing, which could lead to forming smart factories (Govindan et al., 2018; Koot et al., 2021). There are the following problems in creating logistics networks (Table 1).

Table 1.
Selected problems of creating a logistic supply network

No.	Information on challenges	
	category	description
1.	Financial constraints (Theorin et al., 2017; Ghadge et al., 2020)	Financial restraints are considered a significant challenge among organizations that intend to develop their abilities regarding advanced machines and equipment, and sustainable process innovations in I4.0
2.	Meagre digital operations vision and strategy (Erol et al., 2016; Saatçioğlu et al., 2019)	The digital transformation of organizations is a significant part of I4.0 adoption, which is achieved with the help of a clear digital operations vision and mission. The vision and strategy for adopting I4.0 should be specified before the start of the transportation process. Developing an SSC requires an efficient transformation of the visionary ideas of I4.0 to a missionary level, which is struggling for organizations

Cont. table 1.

3.	Lack of competency to adopt/implement new business models (Khan et al., 2017; Saucedo-Martínez et al., 2018)	Flexibility and customised systems are the requirements of competing in the global environment for contemporary industrial systems. Industries and organizations require the adoption of new business models to reach these goals. The analytics of big data from industries boosted the productivity of manufacturers. A solid base for planning new projects was presented due to predictions of new events based on big data. All the novel insights will not be functional, and just some cases are interesting out of millions. Hence exploring them would be challenging for data scientists to develop proper algorithms addressing novel business models
4.	Problem in integration of technology platforms (Zhou et al., 2016; Gajšek and Sternad, 2020)	The integration of technology platforms is a critical step toward efficient productivity and communication. Industries face challenges in outlining a flexible interface for integrating independent elements. I4.0 systems have many distinct parts that should be connected and supported for efficient analysis and data transfer. Hence, it is essential to develop and devise a platform for integrating technologies and efficient I4.0 driven SSC.
5.	Legal matters (Müller et al., 2017; Karabegović et al., 2020)	I4.0 works with real-time exchange of data between a networks of robots, computers, sensors, and humans interlinked to each other within the internet. The operation of this network might cause some intricate legal matters. Adoption of I4.0 in a sustainable environment should be secured regarding legal issues in the operations of organizations
6.	Lack of governmental policies and support (Raut et al., 2019)	Governmental policies and regulations are critical for developing an SSC through I4.0. There is a lack of clear governmental guidelines and regulations on I4.0 in most developing countries. Moreover, governments are uncertain of the probable outcomes of I4.0. As a result, government parties and policy analysts have not unveiled the roadmap to reach smarter and more sustainable business functions.
7.	Problem of coordination and collaboration (Pfohl et al., 2017; Luthra et al., 2020)	Collaboration and transparency between members of an SC are essential for understanding the organizational policies of adopting I4.0 and enhancing sustainability. Facilities should have efficient coordination and collaboration with each other for more reliable interaction. Their communications should have high adaptability issues of software and hardware, standardized interfaces, and synchronized data for practical synchronization
8.	Security concerns (Wang et al., 2016; da Silva and Barriga, 2020)	One of the I4.0 traits is creating a connection across manufacturing environments and making SCs more productive and, conversely, making the SC vulnerable to intruders. One of these vulnerable places is the supplier, which can be attacked by phishing intrusions and stealing privileged credentials, causing a vast data leak. The primary vulnerability of an SC is at its top, causing an exposure in other processes through their interactive elements. Security is the principal requisite for transforming a company or SC into a smarter one.

Due to COVID-19 and war in Ukraine related restrictions, there have been many more disruptions, such as the break of network connectivity with lockdowns and entry restriction policy. Creating international hubs and logistics networks will allow for better movement of goods.

3. Methodology

International logistics networks possess complex structure due to the size of stakeholders, infrastructures and the intermediary processes. A number of stakeholders and their transporting/warehousing departments are involved with the support of the transportation infrastructures and freight terminal, such as the railway, highway, warehouse and distribution centre. All the transiting facilities and terminal can be treated as nodes in the international logistics network, and the material flow between the nodes can be treated as edges. The design of regular hierarchical logistics networks with regard to the organization of The design of regular hierarchical logistics networks for the organization of logistics centers The design of regular hierarchical logistics networks for the organization of logistics centers is determined by the way in which the logistics service demand of the individual customers in the area is met. This means that it is necessary to identify not only the sources and outlets of demand for logistics services in a given network, but also the intermediate nodes of this network, which are the logistics centers where the cargo streams and related information streams are transformed.

Thus, the entire distribution process may involve multiple intermediaries, depending on the nature and complexity of the services provided. To define a multi-level system in order to define a multi-level distribution system, it is necessary to determine the sources of In order to define a multi-level distribution system, it is necessary to determine the intermediate recipients and suppliers and final recipients of services.

4. Case study: Lviv-Rzeszow

Designing logistic networks of enterprises is a complex decision-making problem. It results from the need to take into account both the specificity of enterprises' operations and the functional and spatial shape of storage facilities that are the elements of the designed network. The designed structure of logistic network influences the reduction of costs of material supplies delivery to enterprises or distribution of finished goods to customers. Main determinants and directions of development of the supply network of European enterprises (Figure 1).

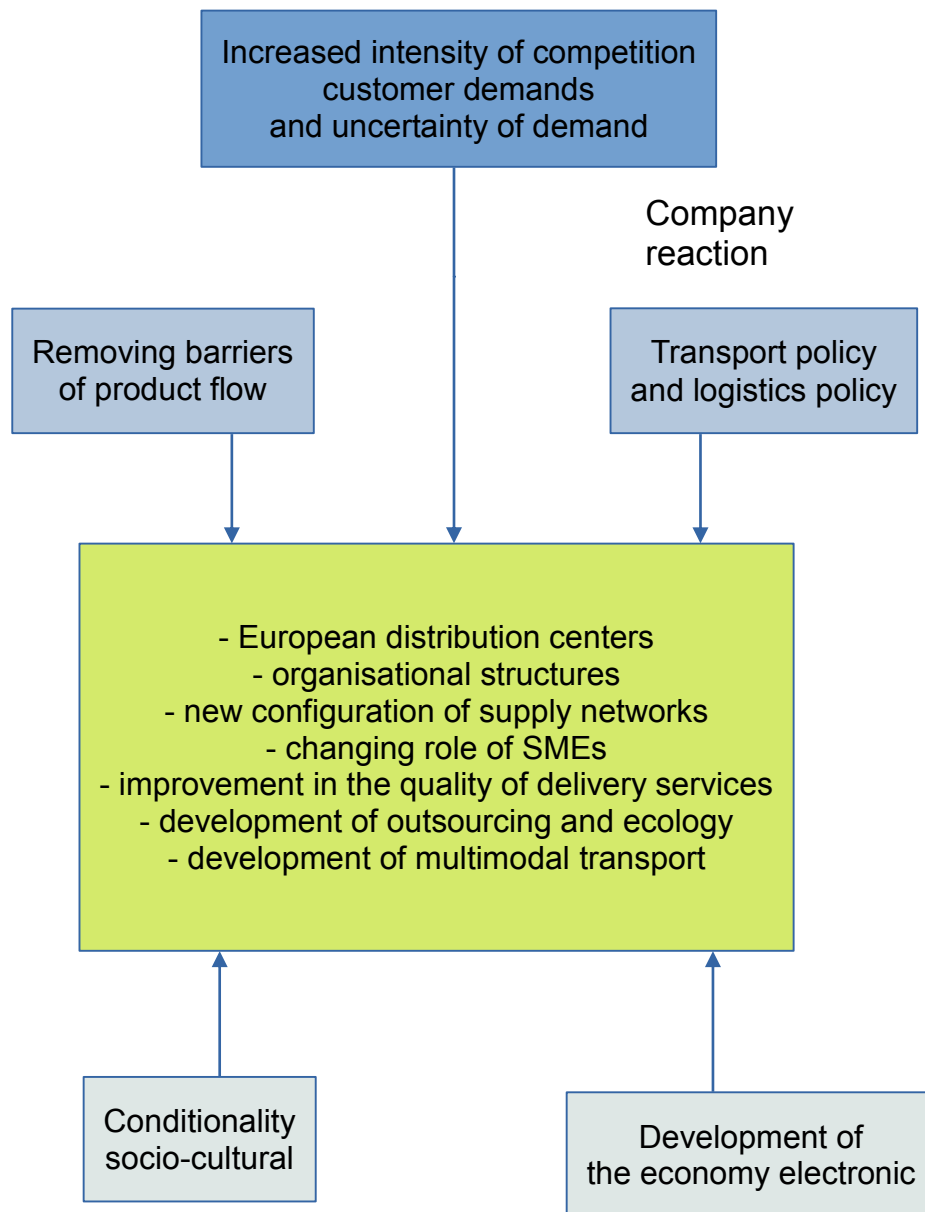


Figure 1. Main determinants and directions of development of the supply network of European enterprises. Source: Authors' own materials.

The government has the task of separating the units responsible for logistics and management in the supply network in the organizational structures of the given network of enterprises and the origin of national and international structures managing processes between contractors to European structures.

There are two models: centralized and decentralized. For the needs of the distribution network Lviv-Rzeszow a decentralized model is proposed, where standard products are mass produced and then distributed using warehouses / distribution centers and intermediaries – maintaining stocks: to the final customers.

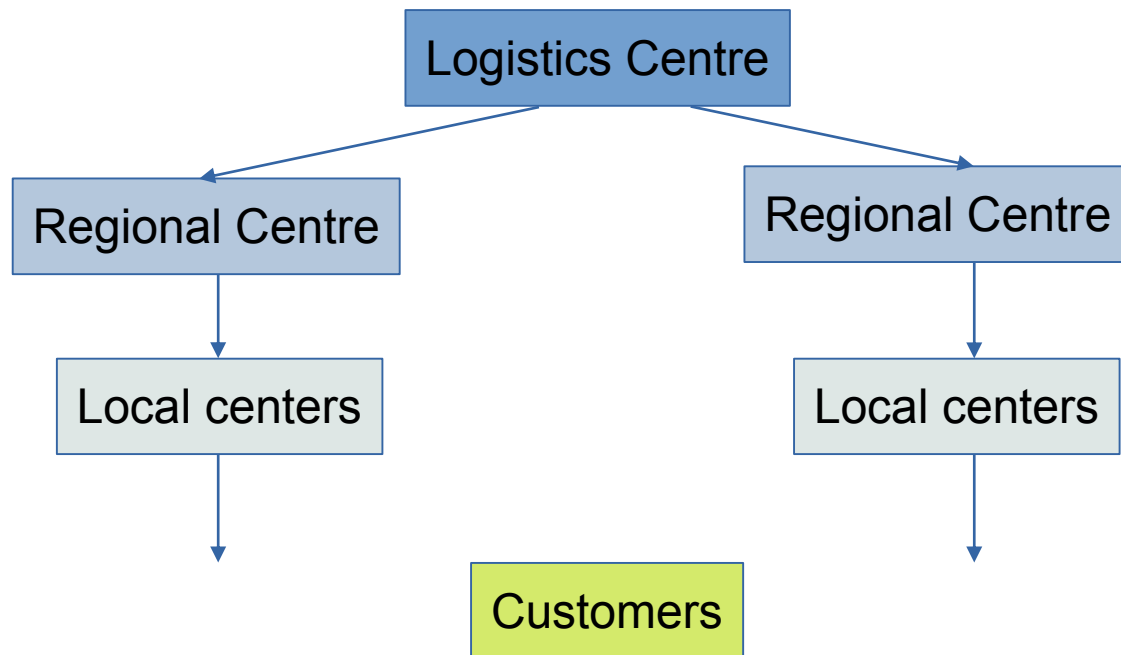


Figure 2. A model of a decentralized logistics network. Source: Authors' own materials.

The logistics center (CL) is identified in Medyka, as a location on the border. In this case the location of the railroad crossing is important. Regional centers (RC) are located in Rzeszow and Lviv. Table 2 identifies the distances from regional centers (RL) to local centers (LC).

Table 2.

The distances from regional centers (RC) to local centers (LC)

No.	Distances from RC (km)	
	RC-Rzeszow	RC-Lviv
1.	Krosno – 60 km	Drohobycz – 78 km
2.	Przemysl – 92 km	Czervonohrad – 72 km
3.	Tarnow – 87 km	Stryi – 72 km
4.	Tarnobrzeg – 75 km	Boryslav – 90 km
5.	Nowy Sacz – 148 km	Ivano-Frankivsk – 133 km

The selected local centers (LC) are evenly distributed in terms of distance, except for the intentionally selected ones in Nowy Sacz and Ivano-Frankivsk, which act as an integrator with other regional centers (RC). Table 3 presents the potentials of selected local centers (LCs).

Table 3.

Industry of which manufacturing: the potential of local centers (LC) in 2018

No.	Manufacturing company of the area LC	
	RC-Rzeszow – 5530	RC-Lviv – 10998
1.	Krosno – 3849	Drohobycz – 539
2.	Przemysl – 2196	Czervonohrad – 365
3.	Tarnow – 3654	Stryi – 339
4.	Tarnobrzeg – 5124	Boryslav – 195
5.	Nowy Sacz – 4057	Ivano-Frankivsk – 3893

Source: Authors' own materials based on statistical data (GUS, 2019; UKRSTAT, 2019).

The total number of entities in the industry as of 2020 in Podkarpackie voivodship is 16 696-49 764,2 sold in mln PLN. Regional center (RC) in Rzeszow would serve 24 410 manufacturing enterprises. Regional center (RC) in Lviv would serve 16 329 enterprises.

The main logistics center should solve the problem of strategic management of cargo flows in the directions and transport corridors, promptly coordinating the activities of regional logistics centers in cooperation with the central governing bodies of various modes of transport and the international logistics system. Regional logistics centers are responsible for operational management within their region in cooperation with adjacent local logistics centers.

The creation of the proposed logistics center will provide the following results:

- a significant increase in direct investment in the real sector of the economy, which will ensure the dynamic economic development of the region,
- increase in production of competitive goods,
- creation of new jobs, which will significantly increase the standard of living and social protection of the region's residents and reduce social tensions in it,
- introduction of modern technologies in the field of road construction,
- meeting consumer demand through the provision of quality logistics services
- increase in tax and social revenues to the budgets of all levels.

The potential analysis presented in the study suggests the possibility of a logistics center (LC) on the Polish-Ukrainian border in Medyka at the railroad crossing as the main mode of transport. Due to the high potential on the Ukrainian side the regional center (RC) in Rzeszow will at the same time be an intermediate logistic hub for the whole Poland. Regional Center (RC) in Lviv will act as logistic node for Medyka (LC) - Rzeszow(RC) and Poland as well as for western part of Ukraine.

5. Summary

The presented article is the basis for considering the necessity to modify and develop network logistics infrastructure. They confirm the necessity to use modern ICT solutions that allow to increase the attractiveness of both logistics and production companies. Optimizing logistics processes, among others thanks to the creation of a conceptual logistics center Lviv-Rzeszow, would bring significant benefits for entrepreneurs and other market stakeholders. This will be especially visible in production companies that have to build operating strategies based on processes, in particular logistics processes that must be repeatable.

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MOTIVATION OF RETIRED OFFICERS OF THE POLISH ARMY TO TAKE UP WORK AFTER THE SERVICE

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Purpose: The aim of the work was to successfully define motivation and the act of motivating, but also to characterize many different kinds of the former. Based on a survey carried out among retired officers a set of data was presented, explaining the reasons for their desire to find employment after withdrawing from the army, as well as making known retirees' opinions on their persisting willingness to keep working post-retirement. The profile of an officer of the Polish Army was also discussed.

Design/methodology/approach: The research was conducted in a group of retired officers of the Polish Army in 2019-2021 using the snowball method. The study also used the method of analysis and criticism of the literature and the heuristic method, as well as the quantitative method - a questionnaire was used. The research problem was expressed in the form of a question: What factors influence the motivation of retired officers of the Polish Armed Forces to take up work after leaving the service?

Findings: The termination of military service after several years of work in the Polish army may be a difficult moment for some officers, because most of their lives they worked in one organization, where there are clear and defined rules and high discipline. During their service, the officers of the Polish Armed Forces acquired valuable competences – knowledge and skills supported by experience, therefore it is important that they can still use their competence potential. It is essential that officers who will retire plan their future careers. Motivation, i.e. a set of forces and factors that are aimed at supporting an individual in certain behaviors, also plays a large role. Thanks to them, you can work towards achieving specific goals. According to the survey, retired officers take up work after leaving the service due to the desire to further use their knowledge and experience. Working in a group, contact with other people also influences the continuation of work in retirement. For some respondents, too low a retirement benefit is a factor that motivates them to look for a job.

Originality/value: Results of this research should be of interest to institutions and people, who help retired officers of the Polish Armed Forces. Secondly they are also directed to officers themselves, as a support in planning their future professional career.

Keywords: motivation, motivating, officer of the Polish Army, service, retirement.

Category of the paper: research paper.

1. Introduction

What motivates people to take up a further career in retirement depends on the distinct character of a given individual – each of us is motivated by various factors. It can be a financial aspect, i.e. the desire to maintain the standard of living from before retirement or the desire to be still active – contact with other people, the need to feel needed. However, the same applies to the group of retired officers of the Polish Army. Those are people with unique competences, including high qualifications. They are characterized by, among others: the ability to forecast changes and, consequently, to plan activities that take place in the organization's environment, set goals and implement them properly, as well as the ability to properly delegate powers. They are also characterized by the ability to act efficiently or work effectively in a group. It is important for officers to consider whether they want to work after leaving the service, and therefore they should think about additional courses and trainings that would help supplement their valuable potential with competences needed on the civil market. Employment of Polish Army officers after termination of service would be a great advantage for many organizations, especially civilian ones, because a former officer of the Polish Army can be called a complete employee. Therefore, it is important to verify and learn about the factors that motivate retired officers to work in retirement.

2. Motivation and motivating

Motivation is, according to some authors, a complex process, often regarded as "the most complex function of human resource management" (Tokarska-Ołownia, 2019, p. 161). Motivating is also "influencing employees with the use of specific incentives (motivators) that are to cause them to behave in accordance with the company's goals" (Tokarska-Ołownia, 2019, p. 161). Motivating is known as the process of "consciously and deliberately influencing the motive of people's behavior by creating means and possibilities of implementing their systems of values and expectations (goals of action) to achieve the motivating goal" (Zakrzewska-Bielawska, 2020, p. 325). The motivational process can be inferred by analyzing the continuity of the behavior of a given individual, which depends on e.g. the environment, heredity, and it is also observed how this process affects the personality or knowledge and skills (Kanfer, 1990, p. 78). In the case of motivation, one can also speak of a set of forces that make people behave in a certain way (Zakrzewska-Bielawska, 2020). It is important, however, to recognize the needs of your subordinates and activate them in such a way that they act in accordance with the guidelines enabling the achievement of the goals of a given organization with the possibility of satisfying their own needs. The area of motivating in the organization concerns the

characteristics of managing employees, their remuneration (tangible and intangible), as well as evaluating their subordinates.

On the other hand, motivation is related to the willingness to "do something, conditioned by the possibility of satisfying a need of an individual by this action" (Olszewska, 2007, p. 229). It is also "a set of forces and factors that support a person in behavior aimed at achieving specific goals and stimulating him to them" (Zakrzewska-Bielawska, 2020, p. 325). Motivation comes from the combination of conscious and unconscious factors. It may be, for example, the intensity of an individual's desire or expectations (Ganta, 2014, p. 221) According to J.A.F. Stonner and CH. Wankel's motivation is a management process that involves "influencing people's behavior, taking into account the knowledge of what causes such and not other human behavior" (Kacprzak-Biernacka et al., 2014, p. 3). Motivation is the "source of energy" that is responsible for why man will decide to make an effort, how long it takes his willingness to stay active and how hard he is trying to fulfil it (Rost, 2006, p. 1).

Motivation can be divided into internal and external motivation. Internal motivation "results from personal desires and aims at self-realization" (Olszewska, 2007, p. 327). It also stimulates "to action, induces to achieve values in themselves, its manifestation is interest or love for something" (Kacprzak-Biernacka et al., 2014, p. 4). It can be said that "this is the most important, the most desirable and the strongest type of motivation" (Kacprzak-Biernacka et al., 2014, p. 4). External motivation "is related to influencing the needs and the intended change of employees' behavior" (Olszewska, 2007, p. 327). This motivation is related to: rewards, including salary increases, promotions, praise, but also penalties, such as "disciplinary actions, lower wages, or criticism" (Kacprzak-Biernacka et al., 2014, p. 4). Another division is negative and positive motivation. The first one is based on anxiety, fear. Its purpose is to stimulate to work by creating conditions and an atmosphere of danger. On the other hand, positive motivation is related to the fact that the superiors organize for their employees the possibility of "better and better realization of their goals as well as meeting the employer's expectations" (Zakrzewska-Bielawska, 2020, p. 327).

People who are internally motivated will become more involved in doing the activity. This is due to an interesting aspect related to the specific job and also due to satisfaction. Employees operate without awards, because it gives them great satisfaction and gives them the opportunity to develop their competency potential (Żurawska, p. 3).

3. Polish Army officer

The soldier profession entails many challenges. One of them may be a particularly demanding qualification process and recruitment rules. You can also mention availability, physical fitness (at different stages of life it may turn out to be a challenge or a barrier).

From the officers of the Polish Army, "continuous self-development and education are required" (Struś, 2012, p. 498). In the military hierarchy, officers are the most important available group. When performing the function of a commander, teacher and educator of subordinate soldiers, it is necessary to demonstrate appropriate knowledge and social, leadership, training and tactical-specialist competences. It should be emphasized that the changing environment requires the officer to constantly train independently, i.e. self-education (Struś, 2012).

"In every organization there is a group of employees whose special value results from their professional, often unique knowledge and skills supported by experience" (Strzelczyk-Łucka, Dewalska-Opitek, 2019, p. 117). However, it is not easy to replace these people, so it is worth taking care of "shaping their competences within the framework of development programs" (Strzelczyk-Łucka, Dewalska-Opitek, 2019, p. 117). It should be noted that the dynamics of changes taking place in the world around us exerts on organizations, regardless of their type, the search for new solutions that will help in managing their potential (Maśloch, Jałowiec, Grala, 2019).

Officers who already did or will retire begin to consider their further professional career in the civilian environment, and therefore have to think about possible preparations for it. Often the age at which officers leave service is a factor that influences job search, but sometimes also it is the matter of finances. One of the documents relating to retired officers of the Polish Army is the Act on retirement provision for professional soldiers and their families. The military pension is due to a soldier dismissed from professional military service, who on the day of his release from this service has 15 years of military service in the Polish Army (Ustawa z dnia 10 grudnia 1993 r. o zaopatrzeniu...)¹.

The fact is that often "highly qualified and skilled soldiers leave the army with experience acquired during foreign missions" (Zarządzanie-zasobami-osobowymi..., 2019)². Therefore, there should be an interest in the qualifications of former officers in the civilian labor market. There is a need to prepare more soldiers, who will take the place of those leaving the service, by sending them to additional courses that complement their already acquired skills

¹ Ustawa z dnia 10 grudnia 1993 r. o zaopatrzeniu emerytalnym żołnierzy zawodowych oraz ich rodzin, Chapter 1, Art. 12, Source: <https://sip.lex.pl/akty-prawne/dzu-dziennik-ustaw/zaopatrzenie-emerytalne-zolnierzy-zawodowych-oraz-ich-rodzin-16795740/dz-2-roz-1>, 02.01.2020; This applies to soldiers who entered military service before 2013, Rzepecka, A. (2019). Wykorzystanie potencjału kompetencyjnego emerytowanych funkcjonariuszy służb mundurowych na przykładzie żołnierzy Wojska Polskiego. *Zeszyty Naukowe ZPSB FIRMA i RYNEK*, 2(56), p. 113.

² *Zarządzanie-zasobami-osobowymi-a-gotowość-bojowa-Sił-Zbrojnych-RP* (2019). pp. 9-12, Source: <https://www.stratpoints.euwp-content/uploads/2019/08/Zarz%C4%85dzanie-zasobami-osobowymi-a-gotowo%C5%9B%C4%87-bojowa-Si%C5%82-Zbrojnych-RP.pdf>, 07.05.2020.

(Zarządzanie-zasobami-osobowymi..., 2019). As a result, their ability to find themselves in the labor market outside the army will increase.

The information gathered shows that the following number of soldiers left the army in individual years, i.e. (Bera, 20019, p. 20; R.CH., 2020):

- 2016 year – 4830 soldiers,
- 2017 year – 4131 soldiers,
- 2018 year – 3976 soldiers,
- 2019 year – 4400 soldiers.

It has been illustrated in the figure below.

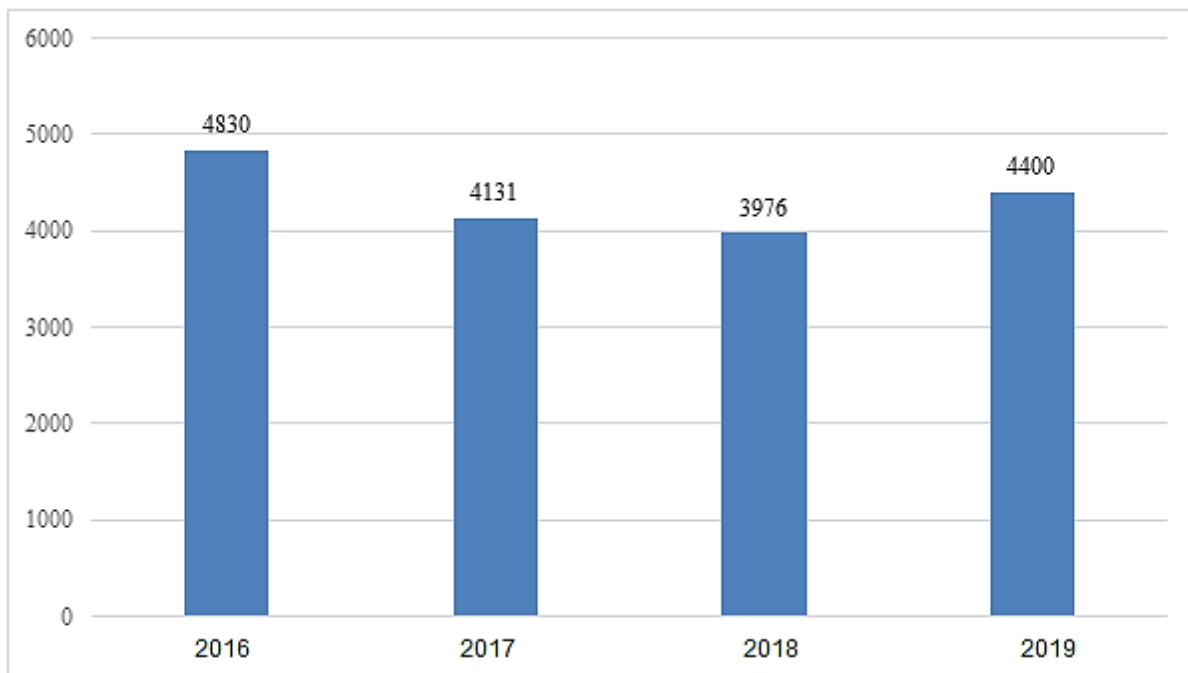


Figure 1. The number of dismissals of soldiers of the Polish Army in the period 2016-2019. Source: opracowanie własne na podstawie: Bera, R. (2019). *Tranzycja byłych wojskowych na rynek pracy a ich zasoby osobiste*. Lublin: Wyd. Uniwersytetu Marii Curie-Skłodowskiej, s. 20; R.CH., *Więcej zwolnień, ale struktura kadry WP pozostaje bez zmian*, 04.02.2020, Available online: <https://m.portal-mundurowy.pl/index.php/start/item/11160-wiecej-zwolnien-ale-struktura-kadry-wp-pozostaje-bez-zmian>, 12.05.2020.

3. Research methodology

179 questionnaires were used to compile the collected statistical material – they were obtained in direct and indirect interviews conducted in 2019-2021. These were the responses of retired officers of the Polish Army serving in the Army. Some of the questionnaires were completed by telephone and e-mail, and some were completed in face-to-face meetings. Establishing contacts largely relied on recommendations from the recruited respondents to the next respondents, as it was already mentioned during the discussion of the snowball method.

However, it should be emphasized that the retired officers did not show "enthusiasm for confiding", as it happened that they occupied less honorary positions compared to their positions in the military. In the interviews conducted, many respondents stated that the qualifications of former officers are not fully used in the civilian labor market, especially when they are not employed in a uniformed organization. However, you can find examples of people who managed in private enterprises, such as the founder of DRUTEX.

The figure below shows the age of the respondents participating in the study. The largest group are respondents aged 56-60, the next – 51-55. The respondents aged 40-45 and 71 and more were a minority in the group.

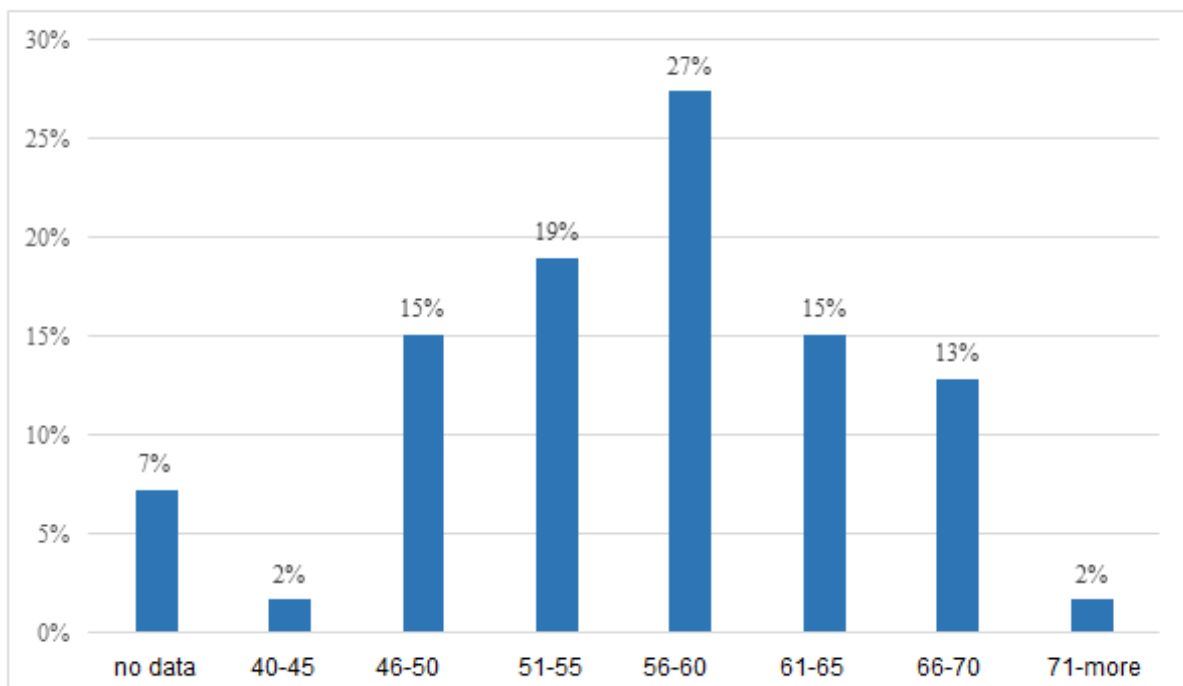


Figure 2. Age of retired officers participating in the study. Source: *own study* based on own research.

4. Research results

The respondents were asked about their motivation to start working in retirement. The respondents could indicate more than one answer. The greatest number of retired officers indicated the willingness to further use the knowledge and experience acquired during the service (almost 60%). Working in a group, contact with other people may be another factor influencing the continuation of work in retirement by a former officer. This allows you to maintain the achievements you have obtained while at the peak of your career. In the next place, the respondents indicated too low retirement benefit (38%).

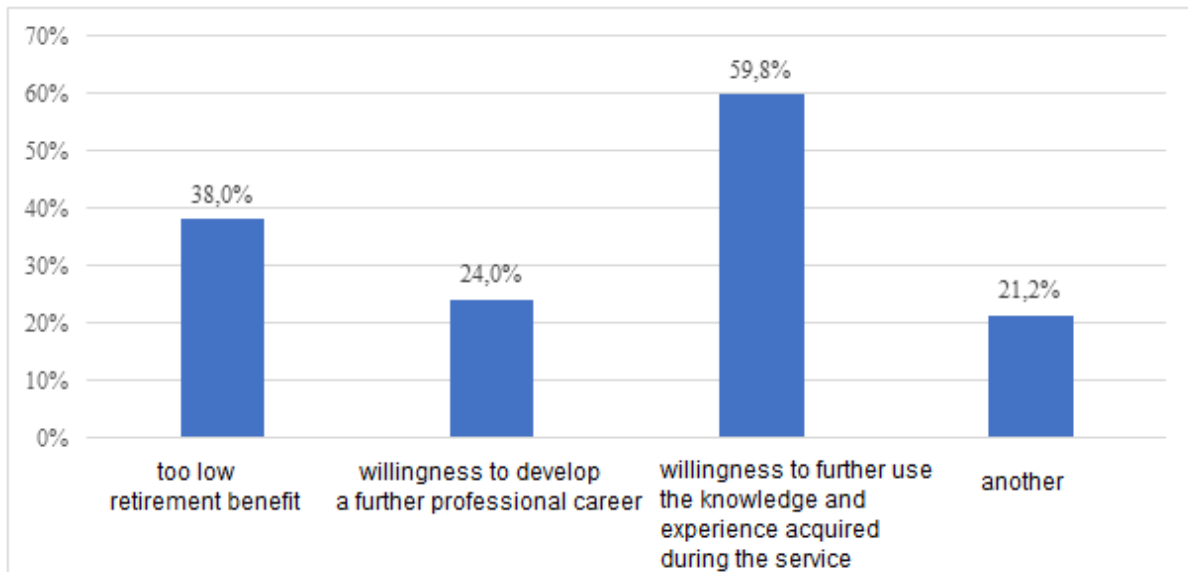


Figure 3. Motivation of retired officers to work in retirement. Source: *own study* based on own research.

The next figure shows that the insufficient retirement benefit was indicated by the largest number of respondents with the shortest retirement age (15-25 years). This is due to the fact that former officers with less military service receive a small part of the salary of a professional soldier.

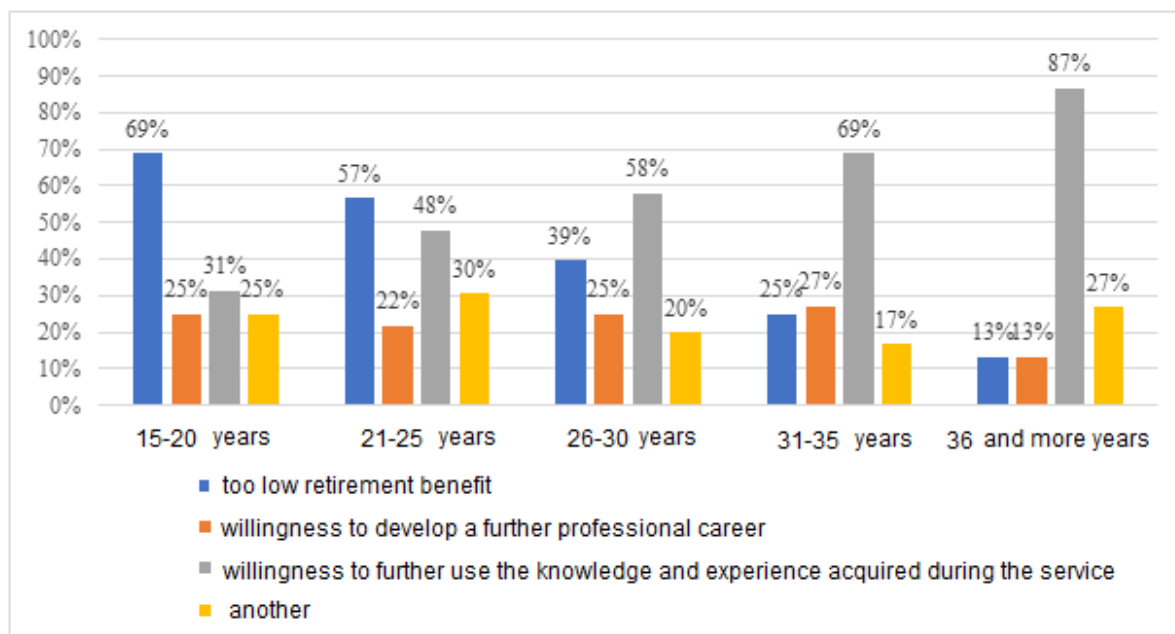


Figure 4. Motivation of retired officers to take up employment in retirement - according to years of service. Source: *own study* based on own research.

In the group of respondents serving 15-20 years in the army, the greatest number of people indicated that the old-age pension was too low (69%). On the other hand, among the retired officers who are in the army for 21-25 years, two answers can be noted: too low retirement benefit (57%) and the willingness to further use the knowledge and experience acquired during the service (48%). The majority of retired officers serving 26-30 years (58%) and 31-35 years (69%) indicated a willingness to further use the knowledge and experience acquired during the service. It can be concluded that the longer the service period, the greater the desire for further self-realization. Unfortunately, when it comes to retired officers with a shorter length of service, they need to improve their financial resources. Other responses from retired officers were: the need to be professionally active, the financial issue – increasing income, the desire to acquire new knowledge, and the desire to bring value to other people's lives. Apart from those mentioned above, the following were also mentioned: self-realization, willingness to test oneself on a different professional level, willingness to do something positive for society and the country, the need for contacts, the need to be active.

According to the chairman of the convent of deans of the professional officers corps in the rank of commander "most of the military try to earn full service for years, in order to receive the highest possible pension" (Rzemek, 2021). He adds that "when they leave the service at the age of 50–60 years old, they are fully active and try to look for a job on the civil market" (Rzemek, 2021).

The next figure shows the opinions of retired officers about their willingness to continue working in retirement. Over 30% of the respondents would like to work as long as possible, while 24% of the respondents would still work for 4-7 years. It shows, that most of the retired officers do not see themselves out of work in the future, thanks to which they will be able to develop further, especially if they find a job in which they would find themselves, for example through acquired competences. Also, they won't have to worry about financial issues, but most importantly they will be among co-workers, similarly like they surrounded themselves and collaborated with many other people during their service in the army.

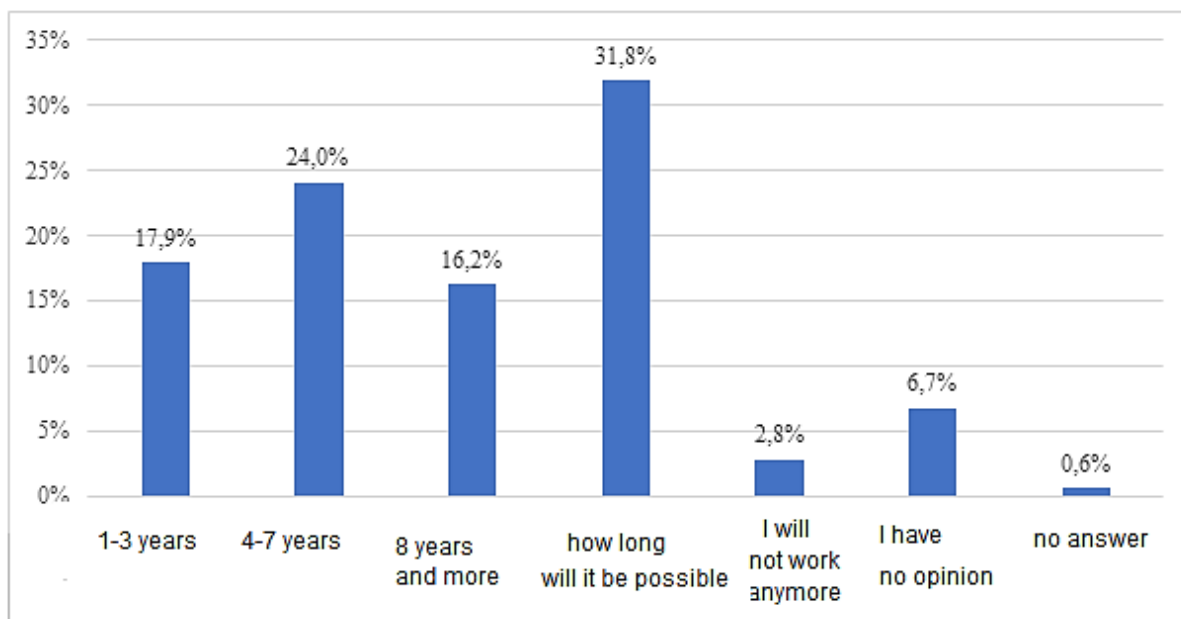


Figure 5. Opinions of retired officers about their continued willingness to work in retirement. Source: *own study* based on own research.

In analyzing this question, the years of service of retired officers were taken into account. In the group of respondents serving in the army, the shortest time was the advantage of such answers as: 8 years and more (37.5%) and how long will it be possible (31.3%). Such answers are related to the length of service, as retired officers may not have acquired a full retirement pension or they want to develop further and use their experience.

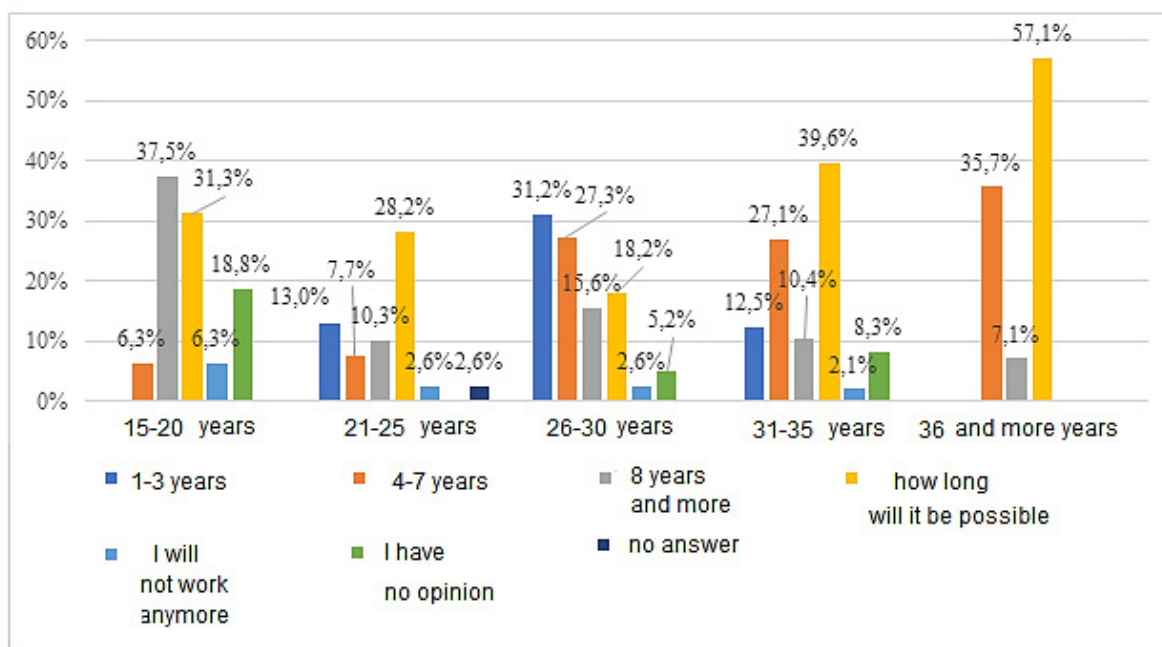


Figure 6. Opinions of retired officers on their continued willingness to work in retirement – by years of service. Source: *own study* based on own research.

This question was also analyzed for an independent variable such as retirement years. 36% of former officers with the shortest retirement would like to work 4-7 years, while almost 25% of respondents – as long as it will be possible for them to work.

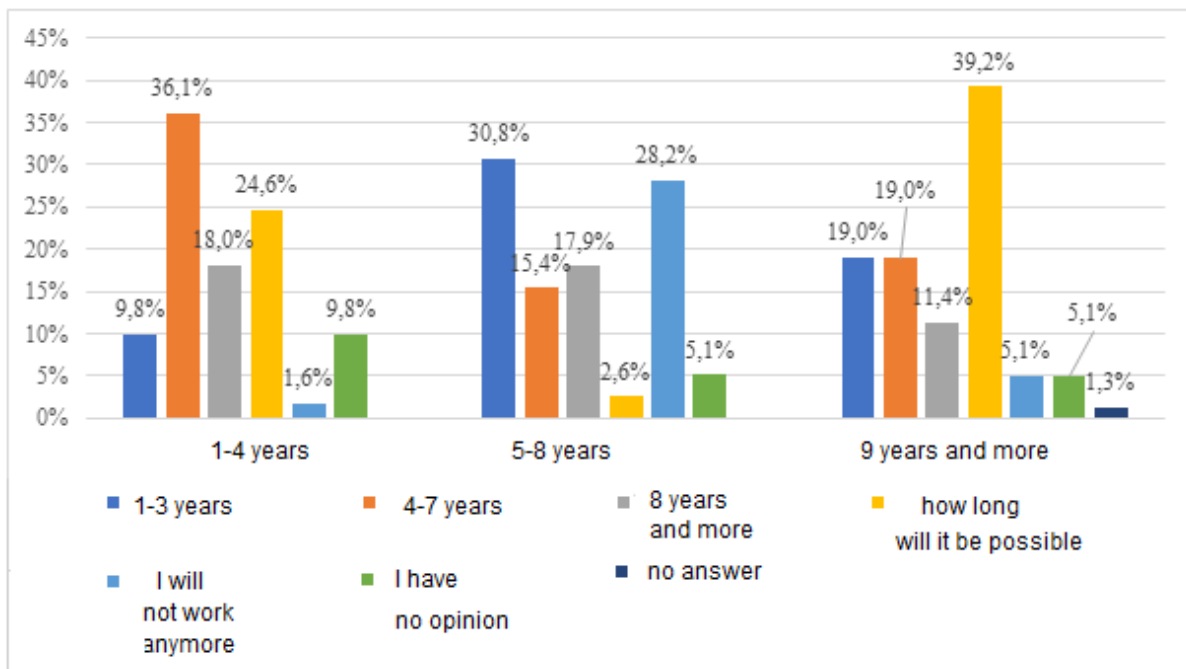


Figure 7. Opinions of retired officers on their continued willingness to work in retirement – b y retirement years. Source: *own study* based on own research.

This is due to the fact that former officers have just left their service and have a need and willingness to continue working. They are still quite young for retired people, therefore their activity is still high. By contrast, officers who are retired for 5-8 years indicated two answers: 30% of them intend to work for 1-3 years, while 28% of the respondents will no longer work. In the group of those who stayed the longest in retirement, 39% of respondents would like to work the longest.

5. Conclusion

The motivation in life for each person is and will be different. It is related to the desire to do something, to pursue the goal by meeting the needs of a given person. Retired officers of the Polish Army come from a specific environment which allowed them to acquire unique competences, including specialist knowledge, ability to work in a group, discipline, determination in achieving the goal, duty, punctuality, execution of entrusted tasks.

The motivation of retired officers to take up employment in retirement results from the willingness to further use the service, knowledge and experience acquired by them over many years. Also, the possibility of working in a group, maintaining contacts with other people are

other factors that influence the decisions of former officers to continue working in retirement. It also helps them maintain the qualifications obtained at the peak of their careers. The financial issue is also very important for some respondents - it is a factor motivating the respondents to take up further work.

The research also shows that a large number of retired officers would like to work as long as possible, another group of respondents would work for 4-7 years. It follows that most of the retired officers think about continuing their careers, thanks to which they will be able to develop further, especially if they find employment in an organization where they could use their already acquired competences.

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DEVELOPMENT OF KNOWLEDGE AND SKILLS OF ENGINEERS AND MANAGERS IN THE ERA OF INDUSTRY 5.0 IN THE LIGHT OF EXPERT RESEARCH

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Purpose: The article aims to identify areas of knowledge, key skills, and competencies of engineers and managers necessary in the Industry 5.0 environment.

Design/methodology/approach: The achievements and results presented in the article were obtained based on literature research and expert research conducted among 25 professionals with experience in management, innovation, and technology of Industry 4.0. The research technique was a standardized interview.

Findings: Based on the research results obtained, the essential knowledge areas and competencies of engineers and managers of industrial enterprises oriented to the implementation of the Industry 5.0 concept were identified.

Research limitations/implications: The analysis of experts' opinions is only a signaling of the problem of the need for changes in the development of knowledge and competencies of industry employees functioning in the Industry 5.0 environment. The research should be extended to other areas of the economy, e.g., services, education, quality of life, and Society 5.0.

Originality/value: Original achievements obtained during the research include getting valuable research results in the areas of knowledge, required key skills, and competencies required of future industry employees. The research results were obtained directly from experts who, through their daily experience, meet the knowledge and competence deficits of modern companies. In addition, experts have the necessary knowledge of new technologies and requirements posed by the Industry 5.0 environment.

Keywords: Industry 5.0, Industry 4.0, skills and competencies of engineers.

Category of the paper: Research paper.

1. Introduction

Industry 4.0 builds cyber-physical production systems to integrate information technology and operational technology in enterprises and supply chains (Lee et al., 2015; Liu et al., 2017). The evolution of industrialization from Industry 4.0 to Industry 5.0 is primarily dictated by the need to expose the role of humans in cyber-physical systems. The technologies used to build Industry 4.0 cannot impose their choices on humans but offer them. The first mentions of the role of operators in Industry 4.0 appeared in the publications of Romero et al. (2016). It was emphasized that symbiosis is needed between humans and new technologies. The authors proposed to introduce the human factor into cyber-physical systems. The new system design is called the Human Cyber-Physical System (H CPS). The humanization of the built-tech environment for Industry 4.0 was one of the first factors in the evolution of Industry 4.0 towards Industry 5.0. In addition to the human factor, Industry 4.0 has noted research gaps in sustainability, accountability, safety, and others. Saniuk et al. (2020) attempted to systematize the barriers of Industry 4.0 in the following categories: social and market, concerning particular stakeholder groups.

Other authors (academics and researchers) have also participated in discussing the social and environmental problems (shortcomings) of Industry 4.0. Ranghino (2019) made a discussion on environmental risks. Bonilla et al. (2018) wrote about the impact of Industry 4.0 technology on the environment and sustainability, creating optimistic and pessimistic scenarios. The sustainability aspect of Industry 4.0 was also a topic of publication. Gajdzik et al. (2020), Luthra et al. (2018), Pagoropoulos et al. (2017) and others.

Industry 5.0 is an industry that focuses primarily on the consideration of the critical role of humans and greater involvement of their knowledge and competencies in a cyber-physical production system. The interaction of human and artificial intelligence is paramount in Industry 5.0. Man and machine work together to improve the quality and efficiency of production (Broo et al., 2021; Haleem, 2019). The upcoming fifth industrial revolution is also expected to be more environmentally friendly as companies develop renewable energy systems and eliminate waste (Nahavandi, 2019).

Participants considered the main ideas of the Industry 5.0 concept at a meeting of research and technology organizations organized by the European Commission (EC) from 2-9 July 2020. At that time, the basic principles of the Industry 5.0 concept were developed, and key changes in directions were proposed to make the industry more sustainable and human-centered (Breque et al., 2021; Council, 2015a, 2018b).

According to EC, the strength of Industry 5.0 is the social goals beyond jobs and economic growth to become a resilient provider of well-being by making production respect the limits of the planet and putting the well-being of the industrial worker at the center of the production process. A favorable factor in the development of the Industry 5.0 concept is society's growing

awareness. This means interest in green products, the sharing economy, and interest in developing a closed-loop economy (Elfar et al., 2021; Aslam et al., 2020; Di Nardo, Yu, 2021).

Industry 5.0 emphasizes the importance of technology for industrial development. Still, at the same time, it promotes social goals in the workplace, e.g. it emphasizes workplace safety with next-generation technologies or human-machine relationships and external purposes, i.e., social and environmental responsibility (Gorodetsky et al., 2019). Industry 5.0 does not deny the necessity of digitising societies, economies, and industries but rather extends it with social and environmental aspects (Doyle-Kent, Kopacek, 2019).

Digitalization in Industry 5.0 is a broad philosophy that organizes enterprise and supply chains processes. Within this philosophy, digitalization and elements of artificial intelligence penetrate into people's everyday life. Hence, there is an opinion among scientists that Industry 5.0 is actually creating the idea of "Society 5.0" (Elim, Zhai, 2020). Society 5.0 is a society in which advanced technologies are actively used in people's lives, industry, health care, and other spheres not for the sake of progress, but for the benefit and quality of life (John et al., 2020). Society 5.0 is not only limited to industry but solves social problems by integrating physical and virtual space.

The premise of Industry 5.0 is to create interaction in the human-machine system. The interaction involves connecting humans with smart devices and the cyber-physical system through smart mobile devices (Demir et al., 2019; Vollmer, 2018). Nowadays, robots seem to be replacing humans due to advances in artificial intelligence development and the possibility of brain-machine interface development (Longo, 2020). This means, in the future, a potent combination of robots with the human brain and using them as a collaborator and executor of commands, rather than a competitor (Nahavandi, 2019). Therefore, the idea of Industry 5.0 will focus on developing more advanced human-machine interfaces using artificial intelligence algorithms. This represents an opportunity to utilize the capabilities of human brains to increase the efficiency of automated and robotization systems (Aslam et al., 2020). This means breaking with the view of losing control of the cyber-physical world dominated by thinking robots which was feared in the era of Industry 4.0 (Haleem, Javaid, 2019). The transformation of the Industry 4.0 concept to Industry 5.0 combines the advantages of the cyber-physical system of intelligent machines and common sense thinking, which can mean a focus on productivity and sustainability. (Özdemir, Hekim, 2018).

In human-machine integration, it is also essential to develop competence and knowledge in new technologies and the trend of talent management. The future is based on investments in employee retraining and the lifelong learning process. According to Forbes, about 34% of HR leaders invest in developing strategies to prepare for new technologies (Esbah, 2022). This implies the need to focus on talent development and talent management of employees to improve the systems' productivity and better orient to the needs of the economy and society (Humayun, 2021).

Industry 5.0 is expected to create many new jobs in human-machine interaction (HMI) and human computational factors (HCF). Some of the most important areas where jobs will be created include intelligent systems, artificial intelligence and robotics, machine programming, machine learning, maintenance, training, etc. (Martynov et al., 2019) or (Madsen, Berg, 2021). The goal of Industry 5.0 is to achieve a higher standard of living and creativity through high-quality custom-made products that lead to sustainable production and consumption. Along with the focus (of scientists and researchers) on people, Industry 5.0 places a premium on human resource development. New occupations, skills, and functions of production workers are emerging. Hence, there is a need for research on changes in the skills and competencies needed by workers in modern industry. This article aims to identify areas of knowledge, key skills, and competencies of engineers and managers necessary in the Industry 5.0 environment.

2. Materials and Methods

The research carried out consisted of two parts. The first part of the research consisted of a literature analysis. A systematic review of the literature and a critical analysis of the content of selected publications allowed the identification of the research gap. In the second part, research questions were formulated, and interviews with experts were conducted. The interview was standardized; its basis was a survey questionnaire containing 15 questions. The questionnaire was validated, and a pilot study was carried out among eight Polish experts with knowledge of Industry 5.0. Interviews with 25 experts were conducted between 15 January and 15 April 2022.

The experts who participated in the survey were selected by three competent judges (academics with knowledge of Industry 4.0 and Industry 5.0). The experts were business professionals and managers from manufacturing companies implementing Industry 4.0 technologies.

3. Results

According to experts, the most sought-after specialists in the analyzed companies are production engineering managers (100%), data analysts (80%), cyber security experts (64%), logisticians (60%), project managers (56%), and ICT specialists (56%). Experts show no demand for machine operators (automation engineer, mechatronics) (12% of respondents) and low-skilled manual workers (12% of respondents). The exact demand for all occupations declared by experts is shown in Figure 1.

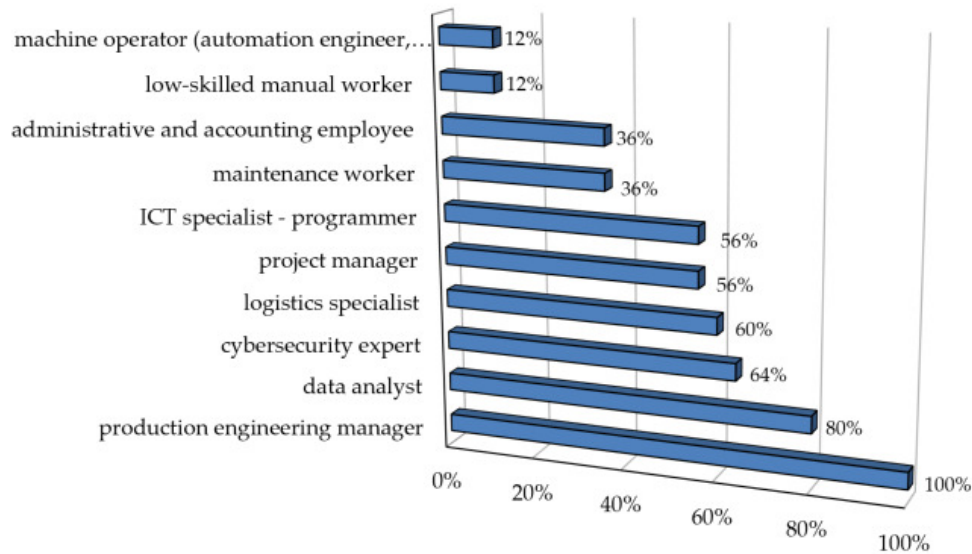


Figure 1. Demand for employees in industrial enterprises implementing the Industry 4.0 technologies.

The demand for employees in manufacturing companies is closely related to the skills of engineers responsible for implementing Industry 4.0 technologies. In this area, experts declared 100% of the required engineering skills. A high level of expectations concerns the ability to solve problems (92% of respondents), openness to sustainable development (88%), openness to digitalization (80%), and analytical thinking (80% of respondents). Essential are: the ability to learn long-life (72%) and to use computer-aided systems (72%). Experts also pay attention to openness to new technologies (automation and robotization) and teamwork (68% of declarations). Figure 2 shows a graph with the answers of respondents.

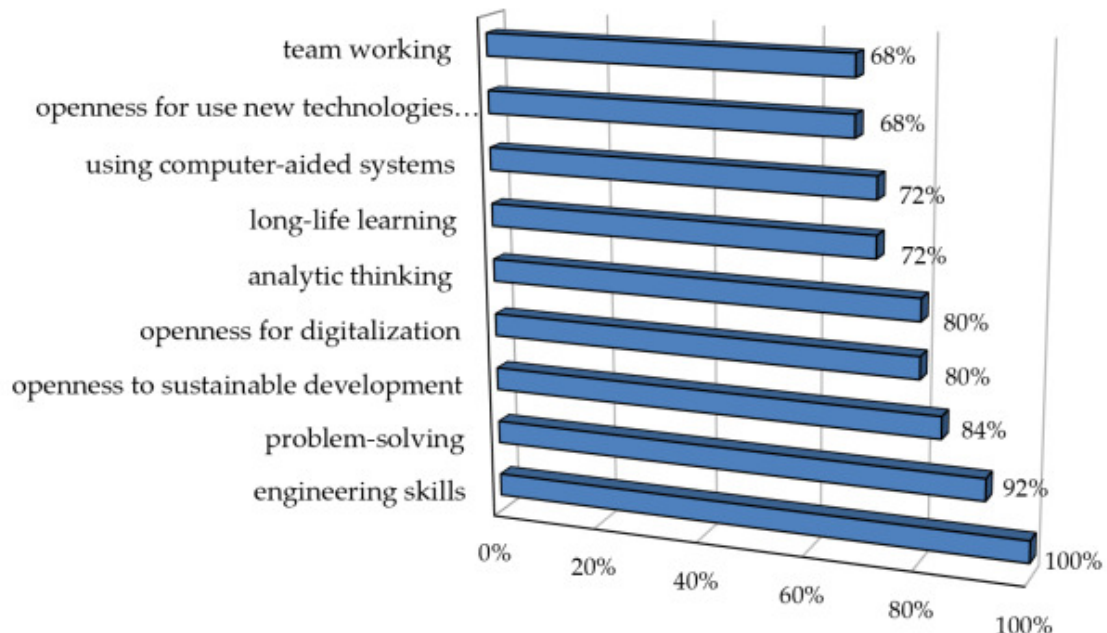


Figure 2. Required skills for engineers in the era of Industry 5.0.

Experts also highlighted managerial skills as essential for the technologies of the fourth industrial revolution (Figure 3). High expectations include the ability to strive for continuous improvement, openness to sustainability and teamwork (92% of respondents), problem-solving, conflict resolution and creative thinking (84%), technical and management skills for connections, and openness to the use of new technologies (80% of respondents). Resilience to stress and openness to digitalization is significant (72%). Experts also pay attention to self-discipline (68% of declarations).

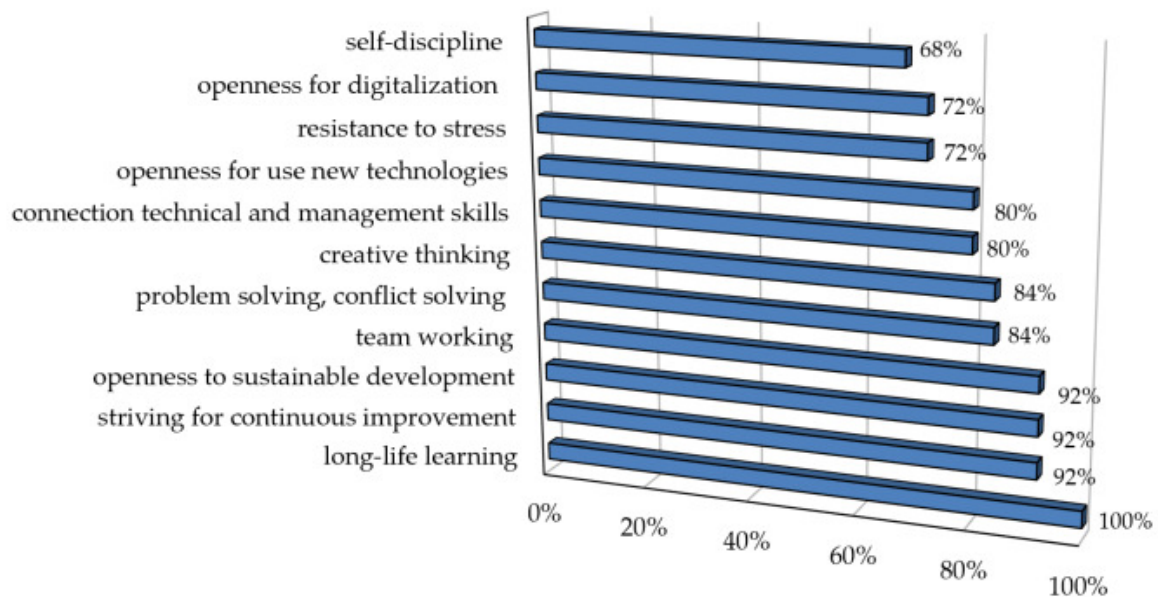


Figure 3. Required managerial skills in the Industry 5.0 era.

Experts, answering the question: Which groups of competencies, in your opinion, should be more developed during the education of engineers? They assessed four groups of competencies on a 5-point Likert scale (Figure 4). Technical skills (Technical skills, Understanding IT security, Process understanding, Media skills) for an engineer are very important (60%) and important (40%). Methodological competencies (Creativity, Entrepreneurial thinking, Problem and Conflict solving, Analytical skills, Decision making, Research skills) were most often assessed as important (72%) and very important (20%). 8% of experts considered this group of competencies moderately important. Another group of competencies, Social competencies (Communication skills, Networking and integration skills, Ability to work in a team, Intercultural skills, Ability to be compromising and cooperative, Leadership skills), is important (56%) and medium (36%). Only 8% of the experts considered social competencies to be very important. The last group assessed were personal competencies (Commitment to lifelong learning, Flexibility, Motivation to learn, Ability to work under pressure, and Social responsibility). Most experts (64%) consider personal competencies moderately important, 28% as important, and only 8% as very important.

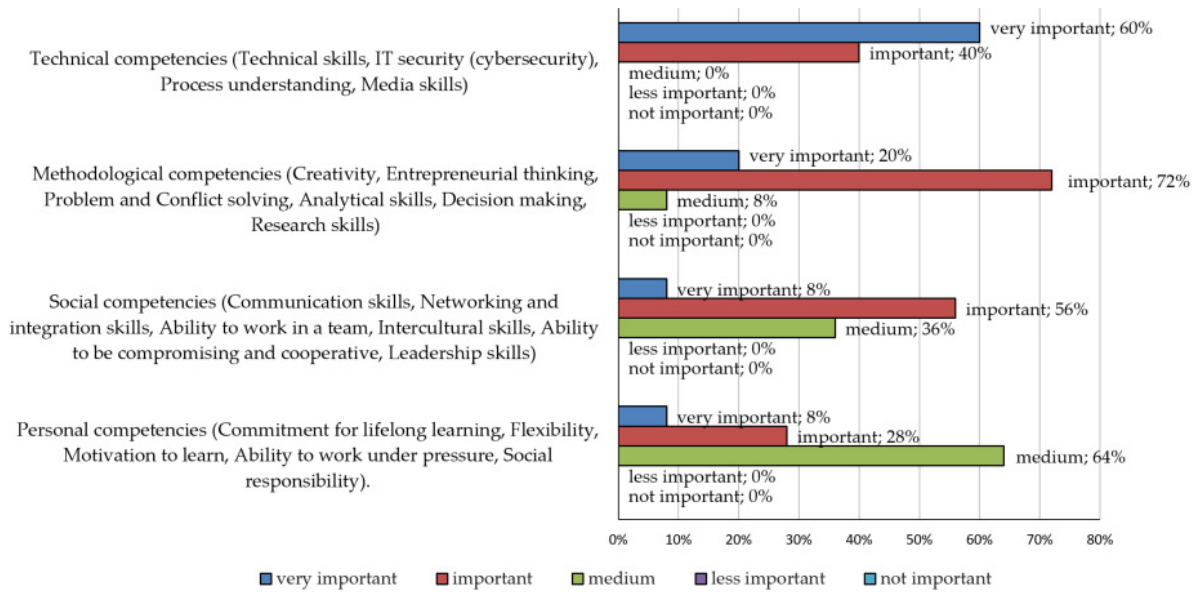


Figure 4. Groups of competencies to be developed during engineering education.

In the following question, the experts evaluated the level of competence represented by the engineers (Figure 5). The assessment was carried out using a 5-point Likert scale. Competences were divided into four groups:

1. Social competencies – according to experts, these competencies are at a low level (15) and a medium level (10).
2. Methodological competencies – rated as medium level (14) and high level (11).
3. Technical competencies – 14 experts rated these competencies in engineers as high level and 11 as very high level.
4. Personal competencies – according to experts, they are at a low level (14) and medium level (11).

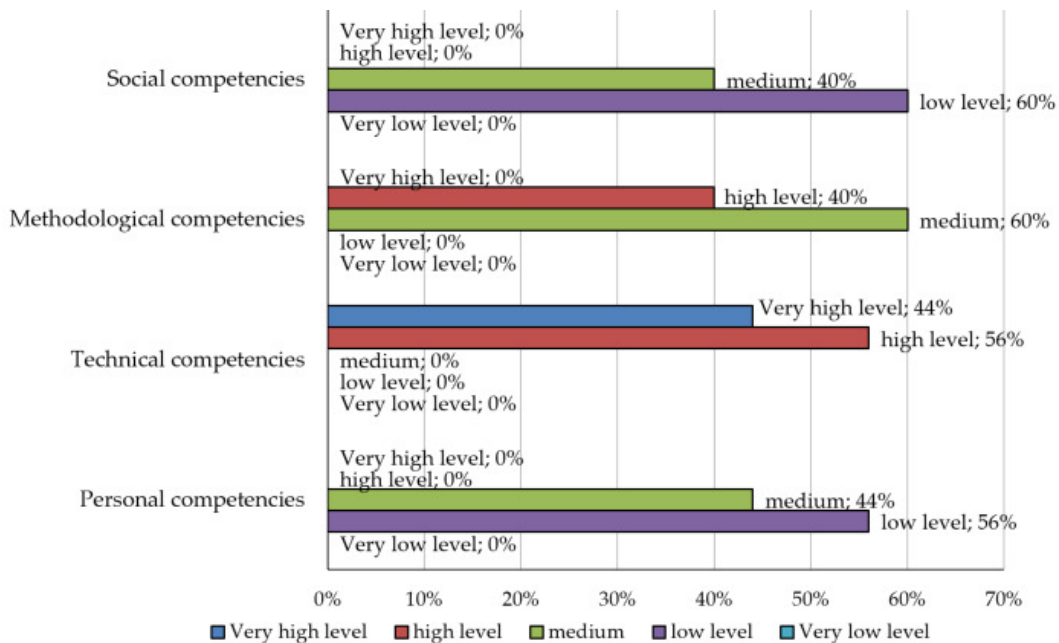


Figure 4. Assessment of the level of education of engineers based on expert experience in the following groups of competencies.

4. Discussion and Conclusions

The fourth industrial revolution brought enormous benefits to society regarding personalization of production, high flexibility, and increased productivity of production processes. Supporters of digitalization of processes see in the implementation of new digital technologies an increase in the quality of life, environmental pollution reduction, and energy consumption. This is possible through digital technologies in smart cities, smart factories, and smart homes focused on low carbon and reducing energy demand. Society 5.0 is a community that uses digital technologies in all areas of social life, including communication, work, entertainment, shopping, and health care. Today, people are becoming part of the digital world, which leads to the need to develop competence and knowledge of applied technologies. This applies to both ordinary users and employees of companies implementing these technologies.

The development of digitization of processes, intelligent interfaces, and augmented reality is changing the way people interact with different types of systems. Today's workers must understand and manage intelligent machines and robotic systems. Unfortunately, this means a change in the workforce structure that comes with increased employee demands. Widespread digitization also raises a lot of concerns related to cyber-attacks, etc. Based on research and literature analysis, it can be concluded that today's workforce needs a complement of knowledge and skills resulting from widespread digitization, which leads to increased productivity and flexibility of production systems. There is a need to recruit highly skilled employees with openness to change, the ability to transfer knowledge, and the ability to work in a team.

Experts emphasize the need to combine different groups of competencies (technical, methodological, social, and personal) in the education system, stressing the importance of the development of interdisciplinarity in the education of engineers and the need to develop the idea of lifelong learning, which affects the growth of creativity of employees and talent development.

Modern manufacturing companies must promote a climate of innovation and learning and change the culture of knowledge, which means changing values and expectations (Mohelska and Sokolova, 2018). This means changes in education, which should be directed towards the development of professions such as production engineering manager, data analyst, cybersecurity specialist, logistician, project manager, and ICT specialist, among others. The current education system is exposed to the ageing of competencies. It lacks mechanisms to introduce continuous updating and development of knowledge and skills required by the current and future labor market (Ghislieri et al., 2018). Gonzalez and Calderon emphasize the need for learning for both students and teachers, especially for knowledge and skills covering areas such as advanced automation, surveillance, robotics, and communication in industrial networks,

including integration of systems, sensors, actuators, etc. (Gonzalez and Calderon, 2018). There should be the development of support programs for academics to organise practical internships in modern enterprises, intensifying the participation of researchers in solving specific enterprises' specific problems. Currently, the focus on the development of basic research in a dynamically changing environment is becoming useless and overdue. Unfortunately, this negatively reflects the education process of students who lack up-to-date and practical knowledge.

Engineers' knowledge must also be complemented with environmental aspects, the need to reduce environmental pollution, and reduce energy consumption. This awareness is essential to understand the need for smart solutions that contribute to growth in productivity and reduction of waste. It is also important to develop soft skills necessary for collaboration, communication, and interpersonal relationship building skills.

Future research should address the social effects of widespread digitization, changes in the employment structure, and the required humanization of industry. Research should also cover other areas of the economy's functioning and human living conditions after implementing the Industry 4.0 and Industry 5.0 concepts. This requires strengthening cooperation between industrial enterprises and academia in applied research and developing new study programs.

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INNOVATION OF SMALL AND MEDIUM ENTERPRISES IN TIMES OF COVID-19

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Purpose: The study explores how the disruption caused by Covid-19 has influenced the innovativeness of small and medium enterprises (SMEs) in Poland. It aims to show the examples of innovative ideas introduced by SMEs in times of pandemic to overcome the obstacles that appeared due to fluctuations in the demand and supply because of Covid-19.

Design/methodology/approach: The study draws on a qualitative research design and uses case studies. We chose three small and two medium-sized Polish firms specializing in different business areas for analysis.

Findings: The analysed organizations due to Covid-19 introduced innovations mainly focused on IT solutions. All of the firms have begun to offer remote work. Moreover, they implemented a new work organization system and a new customer service system. In all cases, the new solutions will be maintained and developed after the end of the pandemic.

Research limitations/implications: The study uses five case studies.

Practical implications: The outcomes of the study can motivate entrepreneurs to implement innovations as the case studies may inspire them. Moreover, the successes of presented SMEs may convince entrepreneurs that introducing innovations is not difficult and that the effects of innovative changes are measurable and visible in a short time. Thus, they may be encouraged to take action to overcome obstacles in their surroundings.

Originality/value: The study develops the knowledge concerning the innovation process in companies in an uncertain, unstable and unpredictable environment.

Keywords: product innovation, process innovation, small and medium enterprises, SMEs, Covid-19.

Category of the paper: Research paper.

1. Introduction

Covid-19 has impacted businesses worldwide, causing some companies to be closed and others to grow (Foss, 2021). The changes in demand and supply and the new needs of customers and business partners that emerged in the pandemic left many companies on the edge of bankruptcy. The challenging market situation and threat to business goal achievement required firms to make quick decisions and manage efficiently (Gopalakrishnan and Kovoov-Misra, 2021). Thus, entrepreneurs were highly motivated to look for new opportunities for survival and growth. Many firms responded to the changes brought about by Covid-19 by using creativity in problem-solving to achieve market viability (Thukral, 2021). As a result, some innovated (Adam and Alarifi, 2021; Caballero-Morales, 2021) and developed business risk-taking behaviours (Cepel et al., 2020).

Studies are revealing that due to the pandemic, some companies have introduced new products or services (Liguori and Pittz, 2020; Sarkar and Clegg, 2021). Likewise, research shows that Covid-19 caused some firms to modify their market offer or change how they operated during the pandemic (Bloom et al., 2021). However, knowledge of firms' innovations implemented because of Covid-19 is limited, and still, there are many cognitive gaps in that field. This study enriches that knowledge by exploring how the disruption caused by Covid-19 has influenced the innovativeness of SMEs. It aims to show the examples of innovative ideas introduced by SMEs in times of pandemic to overcome the obstacles that appeared due to fluctuations in the demand and supply because of Covid-19. Moreover, it identifies the main drivers of SMEs' innovation in times of Covid-19, the principal challenges of managing these innovations, and their results. In particular, the study seeks to answer the following related research questions:

- Q1: How the disruption caused by Covid 19 has influenced the innovativeness of SMEs?
- Q2: What changes caused by Covid-19 were the main drivers of SMEs' innovation?
- Q2: What kind of innovation was introduced by the company to face challenges caused by Covid-19?
- Q3: What were the principal challenges of managing innovation in times of Covid-19?
- Q4: What were the main effects of innovations introduced in SMEs because of Covid-19?

Qualitative research was used to reach the goals adopted for the study and to answer the research questions. The data were gathered in Poland.

2. SMEs and their innovation behaviors in times of pandemic

The pandemic caused by Covid-19 has had an unprecedented impact on many industrial sectors (Wojnicka-Sycz et al., 2022). Due to numerous employee and customer illnesses and pandemic restrictions, many companies were forced to make significant organizational changes. Some even had to change key elements of their business models entirely (Guckenbiehl and Corral de Zubielqui, 2022). However, there were also such firms that have made only minor adjustments to the market conditions. Nevertheless, even these companies had to adapt to an entirely new perspective.

Covid-19 has caused all businesses could not familiarize themselves slightly with a new market situation; instead, they had to think about the solutions under extreme time pressure. Thus, due to the 'liquid' nature of the environment (Zamani et al., 2022), companies, regardless of their size and location, had no time to analyse the appearing challenges carefully.

Innovation is imperative for organizational survival and success (Steinerowska-Streb and Głód, 2020), particularly in turbulent market surroundings (Lee and Trimi, 2021). Thus, in the Covid-19 environment, many companies decided to introduce innovations to adjust to customers' new needs and the low regulations that have been changed because of the pandemic (Adam and Alarifi, 2021; Liguori and Pittz, 2020; Sarkar and Clegg, 2021). Small and medium-sized enterprises (SMEs) were among these companies (Adam and Alarifi, 2021; Alraja et al., 2022; Clauss et al., 2022). Some of them implemented innovations, despite their specific characteristics compared to large firms: capital shortages, lack of human resources, limited managerial capacity (procedures, techniques, and tools), limited capital resources, and no knowledge management (Klein and Todesco, 2021).

Some research demonstrates that Covid-19 encouraged SMEs to implement product and process innovations (Liguori and Pittz, 2020; Sarkar and Clegg, 2021). Moreover, little evidence shows that the pandemic has primarily become the driving force behind introducing IT solutions to SMEs, such as: creating a website and social media channels for marketing and sales or implementing communication solutions in the home office (Szarucki et al., 2021). These digital innovations have helped SMEs adapt to market changes in times of Covid-19 and overcome the difficulties of a pandemic. Importantly, in many cases, the digital solutions implemented because of Covid-19 began to function naturally in the daily business practice of SMEs even after the pandemic had subsided (Almeida et al., 2021).

Previous scant research on SMEs' innovation practices in response to the COVID-19 pandemic also found that revisiting their existing business model for some SMEs became necessary to minimize the negative consequences of the pandemic (Guckenbiehl and Corral de Zubielqui, 2022). Additionally, these studies reveal that the activities of SMEs in the new modes allowed them not only to survive but sometimes also to benefit (Brzeziński et al., 2021). However, the knowledge about SMEs' innovations remains incomplete and inconsistent,

and therefore there is a need to conduct research concerning innovations introduced in SMEs due to the pandemic.

3. Methodology

The study examines how the disruption caused by Covid 19 has influenced the innovation of small and medium enterprises (SMEs) in Poland. Hence, empirically, it explores a new yet not fully recognized field. It draws on a qualitative research design and uses case studies considering its exploratory nature. We selected this research method because case studies answer to the 'how' question and are considered the best for explaining processes in companies (De Massis et al., 2014).

The selection of enterprises for the sample was purposeful. Only those companies were chosen for the study that implemented at least one innovation in products/services and/or production/service processes during 2019-2021. Importantly, this innovation had to be made in response to changes in the market caused by Covid-19. Moreover, two criteria were used to select the company for the case study: 1) the size of the company (small or medium), and 2) the type of activity that the company conducts (trade – the retail or wholesale trade sector, manufacturing, service). The size of the enterprise was distinguished based on the employment criterion. The thresholds used to determine the enterprise size have been taken from the European Union recommendations for defining micro, small and medium-sized enterprises (European Commission, 2003).

Five companies functioning in the Polish market participated in the study. The number of case studies thus ranged from four to ten, which is recommended in this type of research for methodological and pragmatic reasons (Czakoń, 2006). Three SMEs participating in the study were small-sized firms, and two were medium-sized firms. Among the small companies, there was one trading company, one service company, and one involved in trading, manufacturing, and services simultaneously. Among the medium-sized firms, one specialized in trade, manufacturing, and services; the other was a service provider.

The information about chosen companies was gathered from two sources. First, the data about each company were taken from their websites. Then, the interviews with the top managers representing chosen companies were conducted. The interviews were made in 2021 and at the beginning of 2022 and lasted between 45 and 60 minutes. The interview recordings were transcribed and then analyzed using QDA Miner 5.0 software.

4. Results

4.1. Case 1: Small service company X

X is a family company operating market for ten years. It is a small firm with 40 employees and deals with freight forwarding and transport between European Union countries, especially Poland, Spain, England, Germany, Italy, and France. However, it also cooperates with Bulgarian, Ukrainian, and Romanian partners.

The company regularly innovates. One of the company's leading innovations in recent years has been the introduction of geolocation. Its manager says: "Without innovation, we would not exist because the industry is growing very fast, and there is much competition."

Covid-19 contributed to the replacement of stationary work with remote work and the reorganization of the whole company: "We figured it [remote working] might make sense, well we tried it, it worked for us in some ways. Then, when more and more people saw that it was effective, they wanted it, and we started to use it [...]. We did it very gradually [...]."

The biggest problem that after introducing the remote work appeared was employee control. The company solved this problem by introducing innovative software to monitor the work of employed people: "[...] we bought such a program Axence, [...] which controls employees – we can see what and when the employee is doing, we can control employees and peep, appropriate printouts, etc., from which sites... We can also block sites because, for example, they were tempted by some other sites there [...]."

The introduction of remote working has increased efficiency: "it [remote working] is very effective. Employees work at different times of the day [...]. Sales are round-the-clock, even on Saturday, and not just from 8 a.m. to 4 p.m. as before (which was very inconvenient to at least check). Customers send in their transport needs, and employees find the carrier and sell orders on Saturday. I even saw that on Sunday, an employee also sold such an order".

Additionally, remote working has reduced in the company's costs: "[...] we also reduced many costs because we recently moved into a new office. The office we occupied was huge, and with this innovation of remote working, we just reduced that space and costs. Much cash stayed in the company".

Although the pandemic significantly impacted the company's profits, over time, the company has stopped feeling the effects and intends to maintain the solutions introduced during Covid-19.

4.2. Case 2: Small trade company Y

Company Y has been trading the articles from the wood industry for 15 years. Mainly these are articles for further processing, such as wooden beams. However, the company also offers floor panels, moldings, various door frames, and doorframes. In addition, the company

intermediates in selling wooden products. On customer request, it creates some elements for furniture.

The pandemic has increased the company's running costs and has affected restrictions on turnover and the movement of goods. According to the company's co-owner, the stationary shop's turnover is still less than before the pandemic. However, the company owners are proud that no one has been fired because of the drop in turnover. Due to the pandemic, the company's website has been improved, and customer service and warehouse operations have been modified. Many activities in this area started to be handled online thanks to implementing new customized software for the company. One of the most important effects of the new IT system is the ability for customers to place and process orders electronically: "A customer service system was developed according to our order [...]. Previously, we had only used ready-made solutions, which did not quite fit the specifics of our company. It [The new system] was made so that transmission is coded. We have VPNs, and company representatives can connect, e.g., from a car or a client's company. Moreover, the transmission is safe, but also visible".

Another innovation caused by the pandemic was the introduction of remote office work, which was implemented in those areas where possible. The responsibilities of employees in certain positions were also changed, and some organizational changes were made. Consequently, personal contact between the employees was reduced: "Now we have one system where you can record what an employee has to do during the day. It also registers the contacts with the customer. Moreover, it shows all the logistical chains concerning the goods coming to us and going out from us. We also have stock levels in the system automatically filled in. It led us to adapt to the changes caused by the pandemic because it gives access to this from home". "Thanks to all these changes, we could work all the time. Now agents can stay away from the company for weeks and react flexibly to orders and demand".

Thanks to the new solutions, productivity has increased considerably, and order processing time has been shortened. Furthermore, the introduced changes have contributed to greater coordination of the activities of individual units of the company and improved control of employees. They also positively influenced the satisfaction of employees and customers. Although the changes were time-consuming, the company manager says that the introduction of innovations was effective, and the company intends to develop further in this area.

4.3. Case 3: small service, trade, and manufacturing company Z

Company Z has been in business for 28 years. Initially, it specialized in organizing concerts. Today, the company's offer has expanded to include other types of events, such as cabarets or conferences. Before the pandemic, these were exclusively stationary events, and since March 2019, the company has started organizing online events. When all the events and concerts were cancelled, the company created its webinar system within a week. It started using it to organize events: "We were already able to sell conferences after just one week. [...] within maybe ten days, we were up and running for that".

The most significant advantage of the system created by company Z is that there is no need to install the software on computers to attend an event. When it was recognized by various market players such as universities, the sales of this system began.

Thanks to introducing an innovative software system, the company expanded its scope of activity, doubled its workforce, gained popularity, and built an image of a modern company: "Suddenly we could not keep up with answering the phone – all the conferences, training sessions".

Observing the present company's activities, one can notice that the firm responds quickly to all customer needs and suggestions: "if a customer has above-standard expectations, we can quickly introduce them into the offer so that he has them." Considering that it can be expected that the innovations made by the company because of Covid-19 will be further improved.

The business owner is fully aware that the company has managed to turn a market threat into an opportunity. He states: "If it were not for Covid, we probably would not have introduced any such innovation because we would not need it".

4.4. Case 4: medium-sized trade, manufacturing and service company U

U is an international company functioning for over 15 years in the environmental protection sector. It provides environmental consulting services, collects and processes industrial waste, and sells semi-finished products derived from processed waste. It currently operates in Poland, France, Hungary, and Saudi Arabia. The company regularly introduces innovations. At the beginning of 2019, such an innovation was a modern technological line that made it possible to obtain an intermediate product from plastics, which the company sells. Another innovation was a system for utilizing rainwater.

The pandemic initially affected the company's turnover and profits. It also caused the company to postpone the opening of further divisions. To increase turnover and profits, the company decided to change the way of providing services to customers. Before Covid-19, customers were served by company representatives, which took place at the customer's office. After an initial meeting, an offer was prepared for them. After the pandemic began, a new IT system was introduced to reduce direct contact between the transaction parties. Thanks to that new solution, the customer can locate all the information needed by the company on the website. This system also enables the company to continue working with the customer on an ongoing basis and make new offers based on the customer's data. The director describes this innovation as follows: "in connection with this pandemic, we had to change this IT system to one more pro-client [...]. We wanted to tighten contact with clients differently than face to face. So we created a kind of subsystem connected to our green route, which we call it. In larger companies, the customer has a connection to our system – they enter, for example, the collection dates that suit them, data on how full the containers are".

The effects of this solution have proved to be beneficial for both the company and the customers. It has improved the flow of information between the parties of the transaction, making the whole cooperation easier and speeding up waste collection: "We have an overview of this, and it is easier for us to work with the customer. The customer is also delighted because he has to pay less attention to it".

The change in cooperation with customers has also forced the company to take a different view of the market and further development. Therefore, the company has created new jobs to analyze market changes. In addition, the number of sales staff has been reduced. The main problem experienced by the company in connection with the change in customer communication concerned the difficulty of integrating the IT systems used.

4.5. Case 5: medium-sized service provider W

W is a medium-sized company operating for ten years in the telecommunications industry specializing in organizing out surfing, offering its services, and trying to win customers. Its services focus on setting up call center services and its comprehensive maintenance. Currently, the company operates in the Polish market.

During the pandemic, the company's turnover decreased. In addition, the company began to experience problems with customer acquisition. Innovations introduced by the company due to the pandemic concerned two areas. One was the introduction of new evaluation forms for customers, which were created according to customer guidelines. IT specialists merged this form with the company's software, and reports are based on it. The second new solution introduced by the company during the pandemic was the implementation of remote working. Employees began running the company's programs from home. In contrast, previously, everyone performed their duties exclusively at the company's headquarters: "We all worked Monday to Friday normally in the office, from 8 am to 4 pm".

The company's problems with introducing remote working were mainly related to employee control, which was solved by introducing the new software. However, remote working caused a reduction in costs: "costs could be reduced because the company did not need to have an office space, or at least not the same size as before. Renting a nice office is a huge cost, especially in the center".

Although the company had grown and had no plans to downsize its office, the solutions introduced in the pandemic encouraged it to give up much of its office space and maintain remote working.

5. Findings and discussion

The results of the study show that SMEs participating in the study modified their market offer or changed their way of operating in response to the market changes caused by the pandemic (Table 1).

Table 1.
The main findings from case studies

Characteristics of the company	The impact of the pandemic on the company's business operations	Type of innovation introduced as a result of Covid-19	Effects of innovation in the short term
Small service company	Drop-in turnover The need to limit direct contact between employees The need to limit direct contact with customers	Remote work New IT system of work employees' monitoring based on a software Change of remuneration systems to a commission system	Increase in the effectiveness Increase in sales Cost reduction
Small trade company	The pandemic has increased the company's running costs and affected restrictions on trade and the flow of goods.	Creation of a website Implementation of new software with 3D technology New remote customer service system Remote work system	Increase in work efficiency Shorten the lead time of orders Increase in customer satisfaction Maintaining market share
Small trade and service company	Loss of orders Inability to provide services in the current formula	Creating of webinar system	Change in business model Extension of the offer to sales Development of a product for other organizations (e.g. universities) Quicker response to the customer needs
Medium trade, production and service company	The need to limit direct contact with customers	A new IT system for customer service and calculation of offers. Creation of jobs (worksites) aiming at the analysis of market trends.	Increase in customer satisfaction Improvement of the flow of information Cost reduction
Medium service company	Activity in an innovative market; the need to acquire new customers A decrease in turnover	Introduction of a customer assessment form Integration of IT systems Remote work	Cost reduction Maintaining market share

Source: Own elaboration.

The analysis of the results reveals that innovations introduced by SMEs in times of Covid-19 were primarily focused on digitalization. Companies have mainly implemented the new software to reduce direct contact between employees or between employees and customers. Generally, the implementation of IT solutions has led to a reorganization of production

processes, modifications in companies' logistic systems, and the introduction of remote work. These changes have often resulted in reduced office space and company operating costs. Moreover, some SMEs changed incentive systems, and new methods of controlling employees were introduced.

Digital innovations were also implemented in SMEs to improve the communication between companies and customers and enable clients to place orders online. The improvements made for that aim to companies' websites have usually contributed to higher turnover for businesses and increased customer satisfaction.

However, it is important to note that SMEs participating in the study also implemented organizational and management changes. One of the five SMEs made even significant changes to its business model. With this transition, the company has expanded its business profile and increased its size considerably. Nevertheless, without the business model's modification, the company's further existence would not have been possible.

The main innovation management challenge during Covid-19 was for SMEs the need to quickly implement new solutions and take prompt corrective management actions. This approach enabled SMEs to adapt smoothly to the new reality and maintain business continuity.

Summing up the study's findings, it can be concluded that Covid-19 affected SMEs' innovation. Such results of the study are in line with previous studies on innovation practices of SMEs during the pandemic (Adam and Alarifi, 2021; Guckenbiehl and Corral de Zubielqui, 2022; Liguori and Pittz, 2020; Sarkar and Clegg, 2021).

6. Conclusions/Implications/Limitations

The analysis of the case studies reveals that the disruption caused by Covid 19 influenced the implementation of innovative solutions in SMEs. Limited face-to-face contact opportunities between employees and customers became a major driver for SMEs to introduce product modifications and process innovations. These include remote working, remote employee control, new or modernized IT logistic systems, and creating websites that fully allow customers to explore the firms' offerings and place orders online. Thanks to these innovations, SMEs could present their company's offer alternatively or contact customers differently than in the past. They also enabled SMEs to organize the safe work of employees. Consequently, process innovations have allowed SMEs to keep their processes running smoothly and reduce operating costs. Additionally, in many cases, the implemented changes led to an increase in the satisfaction of both customers and employees. Importantly, all the mentioned effects were visible even in a short time.

By showing examples of innovation introduced by SMEs in times of pandemic, the study develops the knowledge concerning the innovation process in companies in an uncertain, unstable, and unpredictable environment and contributes to the literature on entrepreneurship. An essential added value of the study is that its outcomes can motivate entrepreneurs to implement innovations as the case studies may inspire them. Furthermore, the successes of presented SMEs may convince entrepreneurs that introducing innovations is not difficult and that the effects of innovative changes are measurable and visible in a short time. Thus, they may be encouraged to take action to overcome obstacles in their surroundings.

The results of this study should be interpreted keeping in mind that it has some limitations. Firstly, the study presented in the article is limited to the presentation of a few selected case studies. Therefore, the results of the study cannot be generalized. Secondly, all case studies concern small and medium-sized enterprises and do not include micro-enterprises. Finally, the study was conducted only in Poland. In other economies that were restricted by other constraints during the pandemic, SMEs may have innovated differently during Covid-19.

Future research should develop the knowledge about the innovation of micro-enterprises in times of Covid-19. These studies should not be limited to qualitative research but should also be quantitative. In the future, the long-term results of the innovations introduced by SMEs during the pandemic could also be determined. Additionally, separate analyses can be conducted to implement product and process innovations.

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EVALUATION OF THE INNOVATION ACTIVITIES OF COMPANIES IN THE COMPETITIVE EU MARKET – EXTERNAL FACTORS

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Purpose: The purpose of this paper is to assess the innovation activities of companies in the EU countries, taking into consideration the external factors.

Design/methodology/approach: This article focuses on the analysis of the most frequently used factors determining the external conditions of the companies innovation activities with the use of taxonomic analysis. The research was conducted on the annual data for years 2017-2019 for the selected European countries. The data from the databases of OECD and Eurostat were used in the analysis.

Findings: The results of the conducted analysis allow to conclude that the state and organisation of innovation activities in the economy and thus, in the companies is strongly dependent on external factors. The averages and quartiles were calculated to show the dynamics of the factors. Moreover, Ward dendrogram was presented to show the similarities and differences in shaping the innovation activities. The synthetic indicator was used to determine the development path and the map of objects was drawn. There is a strict connection between the amount of expenditures on R&D and the employees' education concerning the implementation of the innovation activities in all analysed countries. In particular, it is visible in the Scandinavian countries and in Luxembourg. In Poland the innovation activities of companies is similar to the ones in the countries of Central and Eastern Europe. The low level of GERD causes that many companies have financial problems and despite high dynamics of industrial production, the innovativeness is still at a low level.

Research limitations/implications: The comparison of Poland with other countries would surely give a wider picture whether the innovation processes are performed in an efficient way. The accessibility of data, for each country, used in the research not only limited the period of analysis but also determined the selection of variables. The analysis was based on the data from the mentioned databases to make it more reliable.

Practical implications: The information obtained during the conducted analysis may facilitate the process of proper decision making referring to the management of innovations. The implementation of innovations guarantees not only the company development but also greater transparency in the information and knowledge flow among the workers.

Originality/value: The analysis of external factors of the innovation activities is really important as the investments in innovation activities are the more and more important GDP part and the numerical taxonomy methods enable to indicate, indirectly, these countries which should be models for Poland so that it could organise and manage the innovation processes. The analysis of innovation activities makes it possible to indicate desired directions of changes

in the management of Polish companies. Thus, it is a basis to take decisions in the competitive markets.

Keywords: innovativeness of enterprises, innovation policy, map of the objects, Ward's dendrogram.

Category of the paper: Research paper.

1. Introduction

The changes in particular countries caused that a big attention is paid to the introduction of new solutions in the company activity (Baruk, 2018). The implementation of these solutions guarantees that work is managed in a better way, the production costs are lowered and the competitive advantage is gained, which allows to satisfy the demand for manufactured goods and to meet the expectations of the consumers who buy the goods and services which are of appropriate kind and of high quality (Brodowska-Szewczuk, 2019; Koziół et al., 2015).

The experiences of many countries show that the high level of economy may be achieved, among others, by using modern management tools and implementation innovations to all areas of company functioning. Innovation potential of companies is defined as the set of social and economic resources (in particular funds to run research and development activity, flow of information and knowledge and social capital), being the basis of the innovation activities of a company, gives the possibility to create and implement innovations (Thompson, 2018; Guckenbiehl et al., 2021). However, it should be remembered that innovations do not mean the company innovation activities even though the researchers often use these terms interchangeably (Hee-Jae, and Pucik, 2005). Whereas the innovations are connected with the product, the innovation activities are regarded as the company ability to introduce something new or as the changes in the company functioning (Hilami et al., 2010). This ability is strongly stimulated by the country policy of innovativeness (Alam, Arshad, and Rajput, 2013), creating general conditions of the company functioning in the fast changing environment (Yachmeneva, and Vol's'ka, 2014).

However, the competition in the global market is undoubtedly the crucial element driving the innovation activities of companies (Osieczko, and Stec, 2019; Agarwal 2018). Nevertheless, it is often also possible to see the statement that the implementation of new solutions in companies comes from the existence of competition in the market (Gryczka, 2016; Grossman, and Helpman, 1990; Dodgson, and Rothwell, 1994; Fagerberg, et al. 2006). Though according to the EU, the innovation activities are and will be the significant factor of the international competitiveness of economies in the future (Dyjach, 2011; Skrzypek, 2009), and in a consequence, will be the factor of providing the desired level of economic growth of the member states of the European Union. Such an approach caused the creation of the report Green

Paper on Innovation and acceptance of The First Action Plan for Innovation in Europe by the European Commission in 1996. The result of this article was that in 2000 the European Commission created the Lisbon Strategy in which innovations and innovation activities of companies were regarded as key factors of economic growth in the member states of the European Union (European Parliament, 2010). The innovation strategy described in the Lisbon strategy was aimed to make Europe the most dynamic and competitive region from 2010. However, due to the overestimation of Europe economic potential, the assumed result failed to be achieved. It caused that the assumptions were corrected and the new strategy Europe 2020 was created. This new document assumes the stimulation of innovation activities with the use of ICT and balanced use of resources.

However, it should be stressed that the framework programmes constitute the basic documents of innovation policy in the European Union (Defazio, Lockett, and Wright, 2009). Two programmes were performed in years 1998-2006: Fifth and Sixth Framework Programme and in years 2007-2013 Seventh Framework Programme.

Fifth Framework Programme was to increase the competitiveness of companies in the countries of the European Union and the associated states and improve the life conditions thanks to the development of work markets and the increase in the employment and strengthening of connections between science and industry (European Commission, 1999). The increase in the technological innovations was significant in this programme. 6th Framework Programme of the European Commission focused on the creation of the European Research Area, so called ERA (European Commission, 2002). Whereas 7th Framework Programme was the biggest programme to finance scientific research and technological development in Europe (European Communities, 2007).

The next programme was “Horizon 2020” (2014-2020) – this programme became the tool to implement Union Innovations in the scope of scientific research and innovations (Bartosiewicz, 2012). It is followed by the Union investment programme for years 2021-2027 in the scope of scientific research innovations “Horizon Europe” (“Horyzont Europa...”, 2021). Within it, it is possible to achieve access to the newest solutions and research results in the work e.g. by the cooperation with international academic units. In order to increase the flexibility and synergy effect, the actions were divided into five clusters which contribute to meeting the sustainable growth objectives. Within “Global Challenges and European Industrial Competitiveness” it is possible to distinguish e.g. cluster “Digital, Industry and Space” which covers, among the intervention areas, among others: manufacturing technologies, circular industries, low carbon and clean industries. In pillar III “Innovative Europe” it focuses on:

- Promoting breakthrough innovation with scale-up potential at the global level (European Innovation Council).
- Creating more connected and efficient innovation ecosystems to support the scaling of companies, encourage innovation and stimulate cooperation among national, regional and local innovation actors (European Innovation Ecosystems).

- fostering the development of entrepreneurial and innovation skills in a lifelong learning perspective and support the entrepreneurial transformation of EU universities (European Institute of Innovation and Technology).

As it can be noticed the research on measuring the innovation activities is carried out at each level: the international (OECD, UN, EU) and national (Decyk, and Juchniewicz, 2013) and is based on the recommendations arising from the series of Frascati Family documents published by OECD in 1963, in particular Oslo Manual referring to the innovation policy. The determinants of the economy innovation activities are assessed by the European Commission every year and the results of the assessments are presented in the publication European Innovation Scoreboard. On this basis the European Commission draws up the European Innovation Index and the research of the innovation level in particular countries of the European Union has been carried out within the programme Trend Chart on Innovation in Europe since 2000.

Taking the above into consideration, the assumption was made that indirect factors (economic, social and technical ones) determining the company innovation activities affect the creation of new solutions in companies. Moreover, external factors refer, in particular, to the surrounding of economic subject the functioning of which depends on market mechanisms and creation of pro-innovation policy. Thus, the question arises which group of countries should Poland try to follow to improve its position concerning the development of innovation activities in the companies.

As a result, the following hypotheses were formed:

- The analysis of external factors affecting the company innovation activities enables to monitor the engagement of countries in the improvement of implementing new solutions.
- The results of the international comparisons provide information being the reference point to create innovation policy in every country.

Taking the above into consideration the purpose of this article is to evaluate the innovation activities of companies in the selected countries belonging to the EU and OECD in terms of their external factors. The method of cluster analysis and object map were the research tools that made it possible to perform this objective.

Thus, the presented paper is an attempt to meet this aim and constitutes a proposal thanks to which it will be possible to cluster and order the countries according to the accepted set of factors affecting the innovation activities of companies.

2. Method

The comparison of Polish companies to the companies in the EU seemed to be an important research subject in the previous analysis of innovation activities in this country. On this example it is possible to indicate which countries should be followed to improve the innovation activities of the companies in Poland.

Thus, the analysis of countries may also be useful when it comes to answering the questions in which the innovation activities of companies seem to be unsatisfactory in comparison to others in which the significant organisational changes should be performed and also to determine which region may be a model for others when it comes to the functioning of companies.

However, due to the complexity of this issue, the research was conducted in four parts. The first part focused on shaping the external factors of innovation activities in companies. The second one was aimed to order the countries, the third – drawing up the object map and development path and the fourth one – showing the clusters of countries in which the factor works in a similar way.

The values of the selected external factors affecting the innovation activities of companies were calculated in the first part. The changes of their values show the changes in forming these factors in years.

In the second, third and fourth part of the conducted research the analysed objects were characterised taking into consideration twelve features. They constitute the basis in the description of the analysed issue and come from the commonly available data included in the statistical reporting kept by Eurostat. Thus, the analysed features included:

1. Human resources for innovations:

- Participation of people at the age 25-64 in lifelong learning – X_1 ,
- Graduates of scientific and technical universities per 1,000 people at the age of 20-29 – X_2 ,
- People with higher education at the age 25-64 as a percentage of the total number of people at this age – X_3 ,
- Level of young people's education as a percentage of the population at the age of 20-24 with at least secondary education – X_4 .

2. Level and dynamics of social and economic growth:

- GDP per capita according to PPP in USD – X_5 ,
- Inflation rate in % – X_6 ,
- Unemployment rate – X_7 ,
- Dynamics of industry production expressed with the use of individual chain indexes of dynamics – X_8 .

3. Research and development activity:

- National gross expenditure in R&D activity as % of GDP – X_9 ,
- The total number of scientific and research workers per 1,000 professionally active people in the equivalent of the full work time – X_{10} ,
- Number of registered EPO patents per 10,000 people – X_{11} ,
- Number of registered UPSTO patents per 10,000 people – X_{12} .

The article focuses on the above variables in order to consider the issue of innovation activities in a company, especially that such a selection is confirmed by the national and foreign researchers in this field (Barro, 1991; Cohen, and Soto 2007; Weresa, 2003; Jasiński, 2003; Grossman, and Helpman, 1991; Lin et al., 2020; Simao, and Franco, 2018; Audretsch, and Belitski, 2020; Sokołowski, 2018; Wołodkiewicz-Donimirski, 2011). Thus, these features represent the features of social, economic and technical nature.

In order to test the phenomenon, the classification was based on the cross-sectional data for years 2017-2019 and the suggested research methods focused around the numerical taxonomy methods. Thus, the research was aimed to determine the relations between the UE states, ordering them concerning the innovation activities of companies and dividing them into similarly functioning regions. In the analysis the object map was built on the basis of the value of a synthetic feature and the hierarchical agglomerative clustering method (Ward method) was used. This method enabled to present the creation of clusters of higher and higher ranks with a specific distances of bonds. The constructed dendrite made it possible to indicate similarities and differences between the tested objects concerning the analysed features.

Ordering the innovation activities in companies in the selected countries was started with the standardization of features with the use of quotient transformation (Malina, 2004). The standardization is usually used due to the possible scale differences between variables (Eszergár-Kiss, and Caesar, 2017), and thus standardization procedures make it possible to compare the features. In this case, due to the wide discrepancy of every feature, the standardization was performed by dividing particular values of variables by the constant value which consisted the respective average (Zeliaś, 2004). The features were given weights with the use of the ranking method based on the orthogonal projection in order to determine the level of their significance (Kolenda, 2006). The quartiles were used to determine the weights: the value of the third quartile for a given feature was the pattern and the value of the first quartile for a given feature was the anti-pattern. Having performed the calculations, the synthetic features were determined for each object, indicating in this way the country with the greatest potential of innovation activities. Using this feature, the development path was presented (with 12 selected features) in order to show, considering these twelve selected features, in which country the “innovation activities of companies work the best”. The map of objects was presented in a form of a polar graph in which semicircles show the distance of the selected object from the others and radiuses – the positions of objects in the ranking. The objects with the highest rank are at the right side of the discussed graph and the worst ones – on the left side.

Thus, in order to determine the development path for a selected object, the pattern objects are indicated for it, which is significant when the analysed object goes to higher ranks. Then, the similarities of the level of innovation activities in countries were tested with the use of the cluster method according to which the countries were divided into groups and similar countries were included in each cluster and the different ones were included in other clusters.

Therefore, the distance matrix between countries was determined. The method of Euclidean distance was used to calculate it (Panek, 2009). The countries were clustered on the basis of the distance method featuring with "...the highest efficiency of recognising the structure in the matrix of data describing the analysed objects..." (Malina, 2004, p. 63), starting from the one-element cluster through the ones that connect the most similar countries and finishing on the one connecting all tested objects.

The states belonging both to the UE and OECD were included in the test group and the information was taken from the websites of Eurostat and OECD. The accessibility and completeness of data for all analysed countries determined the selection of the test period. In 2019 the number of recorded EPO and UPSTO patents was calculated as the average from the last two years. The values were given as the intensity indicators and each variable was given on the ratio scale and was the aggregate value within each country. The tests were performed in the programmes: Numeric Taxonomy and Statistica 13.3.

3. Results

The average, median, first and third quartiles were determined to indicate the change in shaping the external factors. It will enable to notice whether the change of the external factor of the innovation activities occurred. On the basis of the literature review (Wiśniewska, 2005; Janasz, and Kozioł, 2007; Haberla, and Kuźmińska-Haberla, 2013; Romanowska, 2016; Mardania et al., 2018; Audretsch, and Belitski, 2020; Di Vaio et al., 2021) the variables having the main influence on the innovation activities in companies and which represent various factors of the organisation surrounding were selected to the analysis (Table 1).

Table 1.

The changes of external factors in the selected EU group in years 2017-2019

Types of factors	Variable	2018/2017	2019/2018	2019/2017
Average				
Social factors	X ₁	102.11	102.13	104.29
	X ₂	101.72	102.55	104.32
Economic factors	X ₅	105.04	104.28	109.54
	X ₈	98.42	99.19	97.62
Technical factors	X ₉	102.86	102.76	105.71
	X ₁₀	103.90	103.32	107.36

Cont. table 1.

First quartile				
Social factors	X ₁	89.33	110.45	98.67
	X ₂	96.55	101.43	97.93
Economic factors	X ₅	105.71	105.55	111.58
	X ₈	98.15	98.61	96.78
Technical factors	X ₉	99.88	103.51	103.39
	X ₁₀	112.91	101.55	114.66
Median				
Social factors	X ₁	107.14	100.95	108.16
	X ₂	105.29	99.50	104.76
Economic factors	X ₅	103.71	104.01	107.86
	X ₈	98.36	99.02	97.40
Technical factors	X ₉	110.03	108.35	119.21
	X ₁₀	103.59	104.07	107.80
Third quartile				
Social factors	X ₁	108.14	104.84	113.37
	X ₂	101.79	103.95	105.80
Economic factors	X ₅	103.78	101.70	105.55
	X ₈	99.15	99.04	98.20
Technical factors	X ₉	103.40	101.53	104.99
	X ₁₀	103.52	100.63	104.17

Source: Own study based on Eurostat and OECD.

On the basis of the information presented in table 1, the fall of the industrial production may be noticed, which is not advantageous. However, it should be noticed that the values of other external factors improve and the biggest change was noticed in the case of technical factors. In years 2018-2019 the threshold of shaping the four external factors of the innovation activities in companies increased for half of the countries. It refers mainly to the value of expenditures on R&D measured as the percentage of GDP (growth by 8.35%) and the total number of scientific and research workers counter per 1,000 professionally active people, in the equivalent of the full work time (growth by 4.07%). This situation is strictly connected with the economic growth of the country calculated with the use of GDP per capita. In this case, there is also a growth but this value decreases with the higher quartile and fluctuates from 1.70 to 5.55%. The most probably it is connected with the problems which face the countries with the lowest level of income. In 2019 in comparison to 2018, the number of people at the age 25-64 participating in the lifelong learning as well as the number of graduates of scientific and technical universities calculated per 1,000 people at the age 20-29 increased for 75% of the countries. The first one increased by 4.84% and the other one was only 0.89 percentage point lower. In general, slight growths were noticed on average among described external factors, apart from the dynamics of industry – independently of compared years.

Taking into consideration the position of Poland among 23 EU countries (considering every variable), the following information was received:

- Poland took third place from the end before Greece and Slovakia and it was much less than the average for the EU states (variable X₁).

- Poland was over the average for the EU but there were fewer and fewer graduates per one thousand people in our country; it took 9th place in 2019 behind Portugal and before Slovenia (variable X₂).
- GDP per capita in Poland was at the level of PLN34,151.8 in 2019. Our country took the 5th place from the end with this result (variable X₅).
- Poland is in the group of countries with the highest dynamics of the industrial production; this dynamics increased by 4.2% in 2019 in comparison to the previous year (variable X₈).
- Poland's rank increased from 20 to in 2017 to 16 in 2019 obtaining the level of 1.32% of GDP in 2019; however, still its result was under the average for tested countries (variable X₉).
- the number of research and development workers in Poland is not big; 9.64 equivalents of the full work time per 1,000 professionally active people which ranked us before Estonia, Lithuania, Slovakia and Latvia (variable X₁₀).

Then the synthetic values were indicated as in this way, it is possible to order the European Union countries concerning the level of innovation activities in companies and concerning the accepted set of diagnostic features (Table 2).

Table 2.

The values of synthetic feature for the EU countries in years 2017-2019

Country	Symbol	2017	2018	2019
Belgium	BE	2,58	2,59	2,58
Czechia	CZ	1,25	1,27	1,21
Denmark	DK	4,26	4,09	4,16
Germany	DE	3,78	4,09	3,89
Estonia	EE	1,50	1,50	1,58
Ireland	IE	3,19	4,21	3,54
Greece	GR	1,33	1,35	1,28
Spain	ES	1,56	1,61	1,55
France	FR	2,77	2,74	2,78
Italy	IT	1,67	1,71	1,70
Latvia	LV	0,89	0,95	0,91
Lithuania	LT	1,02	1,07	1,08
Luxembourg	LU	7,27	5,92	6,69
Hungary	HU	0,93	0,97	0,95
Netherlands	NL	3,86	3,94	3,87
Austria	AT	3,37	3,47	3,37
Poland	PL	0,95	1,01	0,96
Portugal	PT	1,27	1,24	1,25
Slovenia	SI	1,78	1,66	1,72
Slovakia	SK	0,87	0,83	0,81
Finland	FI	4,75	5,06	4,89
Sweden	SE	5,45	5,01	5,35
United Kingdom	GB	2,10	2,17	2,14

Source: Own study based on Eurostat and OECD.

In each tested year, Luxembourg turned out to be the leading country with the synthetic indicator amounting to on average 6.63. Thus, it is possible to state that the innovation activities in companies are at the highest level in the smallest country of the EU. Also Sweden, Finland and Denmark characterised with the high average value of the synthetic feature. However, in 2018 Denmark took the fourth rank, just after Ireland. In these countries more and more people participated in the lifelong learning, the number of graduates of scientific and technical universities or the percentage of expenditures on R&D in the percentage of GDP were growing. Slovakia, Latvia and Hungary took the lowest ranks among the countries in 2017-2019. Poland may also be included in this group – concerning its innovation activities it takes the rank just before Hungary and it is 20th place. Portugal and Greece characterised with the smallest innovation activities among the countries of so called “old Union”. Slovenia and Estonia took the first place in the countries of the “new Union”. In the last year of the research in comparison to the previous one, their position increased and they took 12th and 14th place among the 23 analysed countries, respectively.

On the basis of the performed research, it is possible to notice that Sweden, Denmark, Germany, the Netherlands, Slovenia, Estonia and Portugal belonged to the countries of the growing rank in the last period. The position of Poland did not change and it shows that the actions should be intensified in our country to improve the innovation activities of companies or the whole economy.

Drawing up the so called “object map” was the next stage of the research. It is used to analyse the position of the selected object in the ranking and enables to find units that are better than that and the most similar to it. At the same time, it makes it possible to determine the pattern that is the basis for specifying the strategy of its development or create its development path.

The development path can be created for all objects. Only the object map for Poland was presented in the article as it is the most interesting for the author (Figures 1-3).

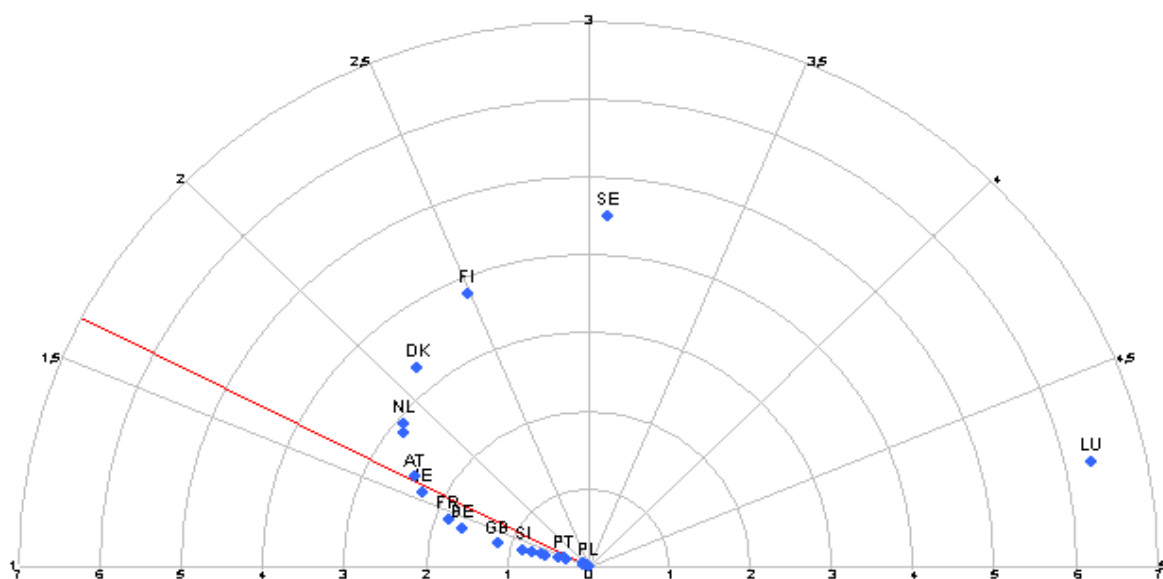


Figure 1. The map of objects for Poland in 2017. Source: Own study.

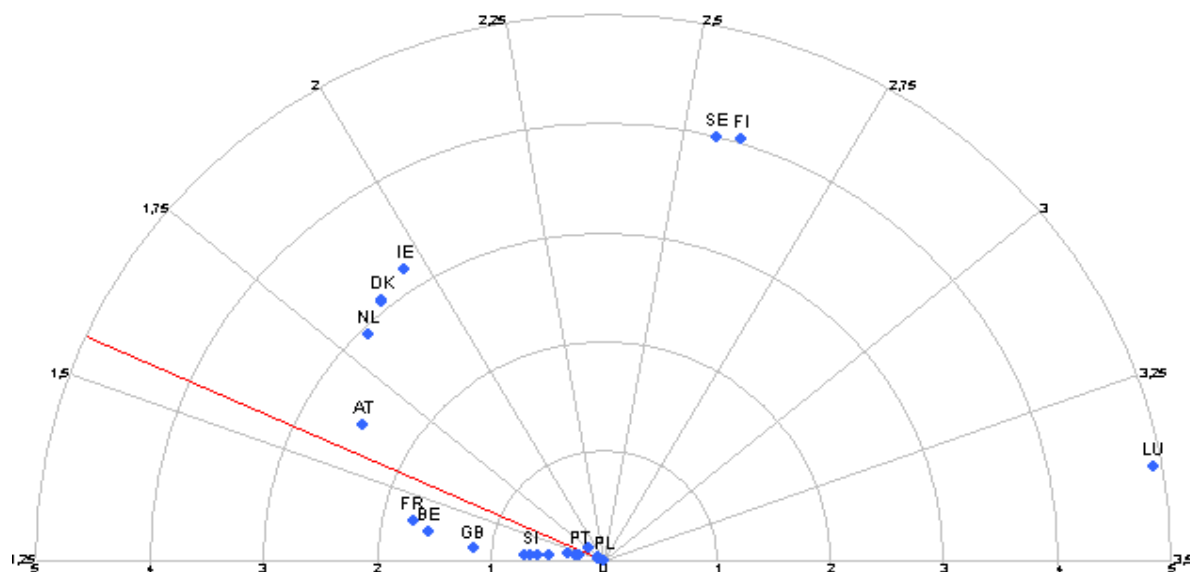


Figure 2. The map of objects for Poland in 2018. Source: Own study.

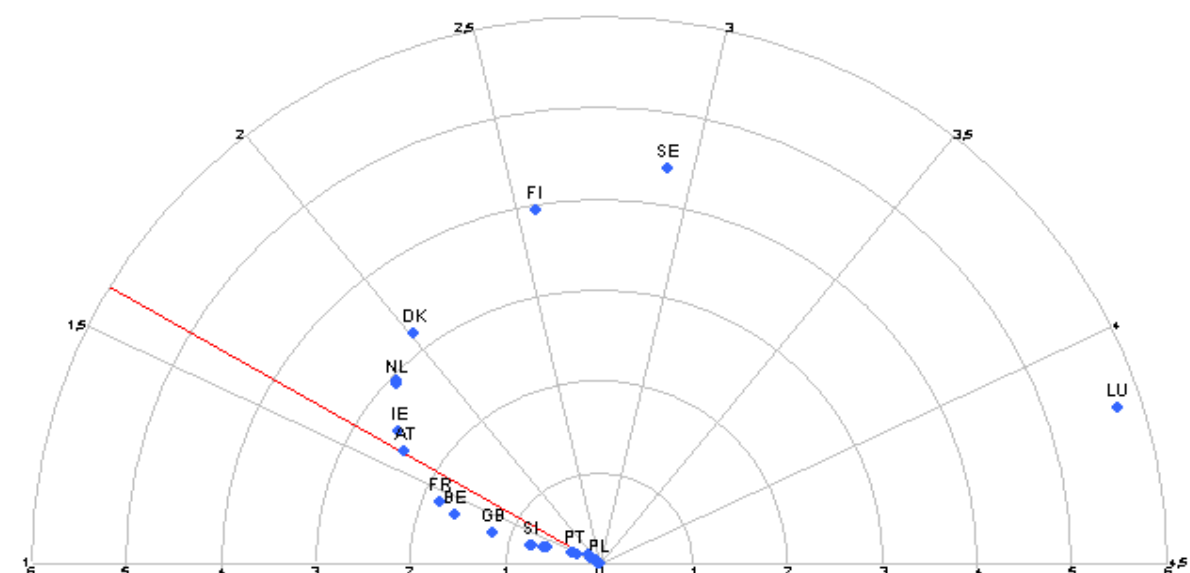


Figure 3. The map of objects for Poland in 2019. Source: Own study.

The conducted research shows that at first Luxembourg, Sweden and Denmark should be patterns for Poland in 2017. Their ranks were higher than the one indicated for Poland and the distances between them were relatively small. In 2019 Finland took the place of Sweden and in 2018 the Netherlands replaced Denmark. Austria, which may also be a model when it comes to the innovation activities in companies, is the “nearest” country for Poland each year. The distance of Poland to it decreased and the difference was bigger in 2018 than in 2017. The difference in the Euclidean distance was 0.05 (2018) and 0.02 (2017). It seems interesting that creating the development path, we should not try to catch up with Ireland, the Netherlands, Germany or Sweden in 2019. Probably it is not a good idea to get similar to these countries yet – the high factors specifying the determinants of the innovation activities differ too much from the ones specified for our country. The position of France, Belgium or the United Kingdom is surprising. Taking into consideration the set of features showing external factors, it turned out

that the situation of Poland and these countries is not clear. As the results show, although France, Belgium and the United Kingdom take higher positions in the ranking of the innovation activities in companies, we should not try to follow them creating our development path. Hungary is the country which takes the position nearest to Poland. It takes a lower position in the ranking of the innovation activities in companies and was not marked in pictures as showing it would make it difficult to read the picture (it is similar with other “undisclosed” countries).

Due to the fact that the significant reduction of indifferences through the increase in the technological abilities of the industry, strengthening the scientific research and increasing the expenditures on the research and development is one of the purposes of the sustainable growth (OECD, 2017), the author decided to complete the performed analysis. For that, the attempt was taken to assess which countries are similar to each other and which differ when it comes to the innovation activities in companies. The set of analysed features was considered. The Ward agglomeration method was used in this research because the results of clustering are the most often shown in a graphic form with the use of so called tree of connections called dendrogram (Figures 4-6).

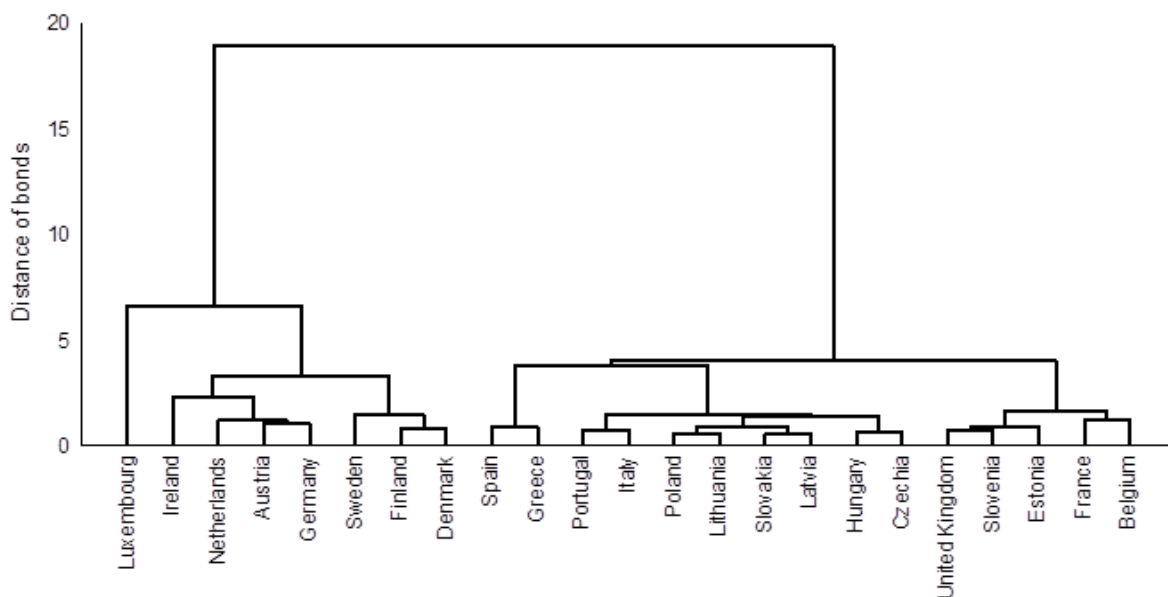


Figure 4. Ward dendrogram of the analysed European countries in 2017. Source: Own study based on Eurostat and OECD.

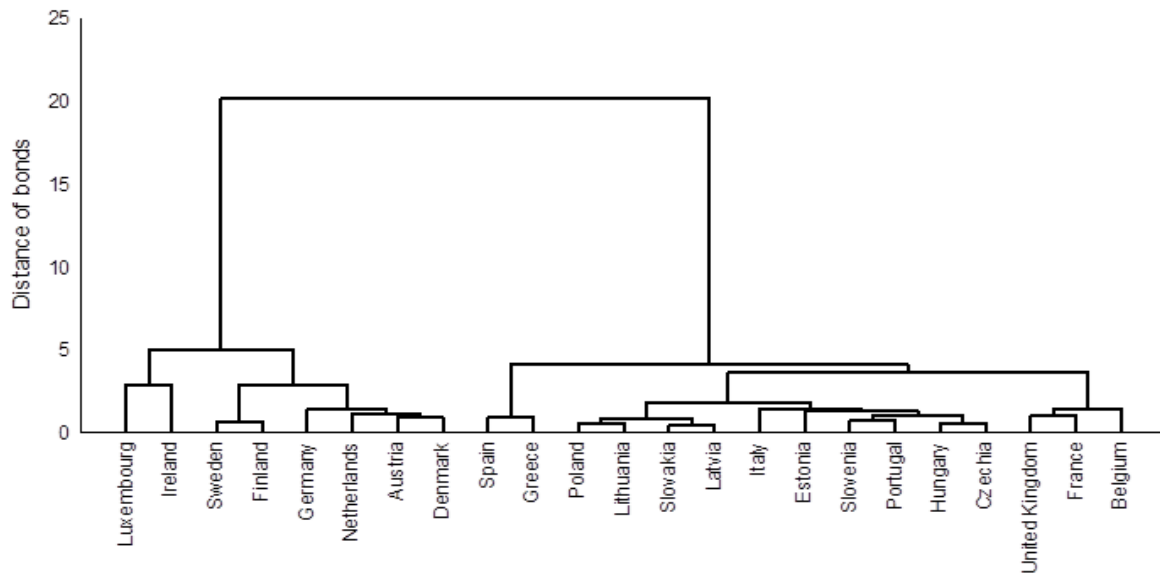


Figure 5. Ward dendrogram of the analysed European countries in 2018. Source: Own study based on Eurostat and OECD.

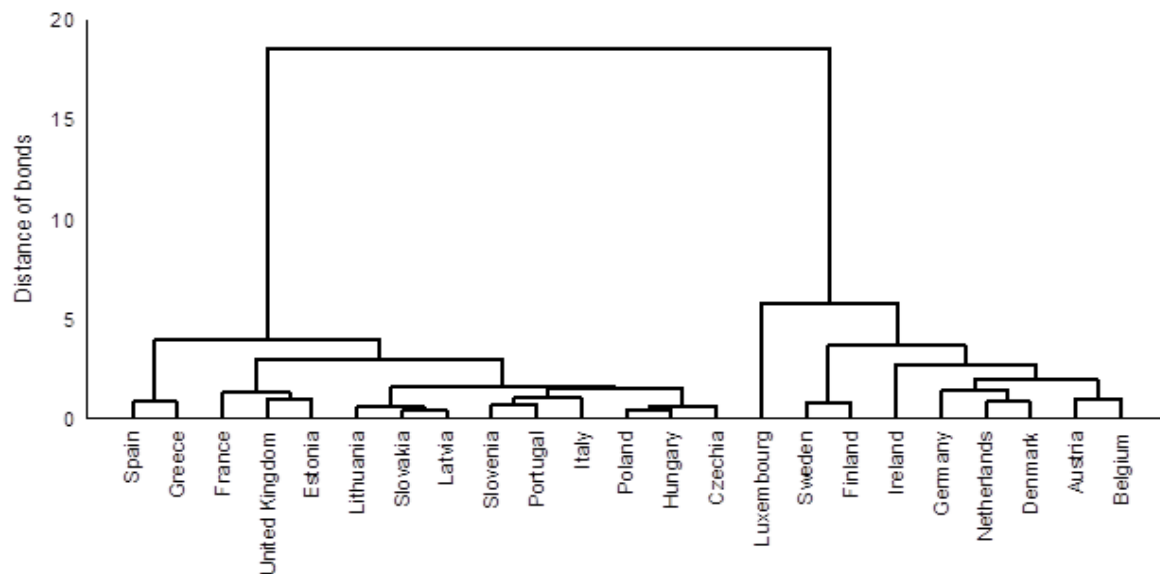


Figure 6. Ward dendrogram of the analysed European countries in 2019. Source: Own study based on Eurostat and OECD.

Analysing the above pictures it is possible to say that the countries of Central and Eastern Europe (Lithuania, Latvia, Hungary, Slovakia, the Czech Republic) showed the biggest similarity to Poland in 2018, taking into consideration the analysed features, and this group was smaller a year later – without Hungary and the Czech Republic. These two countries got more similar to Portugal or Slovenia considering the external factors of the innovation activities in companies. In 2019 Poland “connected” with Hungary and the Czech Republic again and the other countries (Lithuania, Latvia and Slovakia) created a separate group. As it can be observed, these countries of CEE created one cluster again but at the higher level of bonding. In years 2017-2019 Slovakia and Latvia were the most similar. The distances between these countries were the smallest concerning the analysed structure. In the case of clusters created by Poland

with other regions, it can be noticed that the similarity rate was smaller and smaller with years. Our country is still in the group of countries belonging to the EU since 2004 but the level of bonding is different. It shows that it is necessary to equalise the differences in the analysed external factors of the innovation activities, in particular when it comes to such countries as: Luxembourg, Sweden, Finland, Denmark, Austria, Germany, the Netherlands and Ireland. All these countries took higher position in the ranking than Poland, which created a cluster with them at the last level of bonding. Slovenia and the United Kingdom (2017), Finland and Sweden (2018) and Portugal and Slovenia (2019) showed the biggest similarity due to the analysed features from the countries that joined the EU before 2004. The country that took the first place in the ranking created a cluster with “old” EU member states, i.e. Denmark, Austria, the Netherlands, Germany, Finland, Sweden, Ireland in years 2017-2018 and Belgium joined this group in 2019. However, Ireland was the country that showed the greatest similarity (considering the analysed features) to Luxembourg. These two countries created a bond at the level 2.84.

The analysis of the external factors of innovation activities presented in pictures 4-6 shows that it is possible the same number of groups of countries having the similar structure of the innovation activities in companies with the bond distance from 0.97 to 1.02 but the elements of cluster differ from each other. However, the countries feature with the big similarity within analysed clusters concerning the analysed structure (Table 3).

Table 3.
Clusters of countries in years 2017-2019

Cluster number	2017	2018	2019
1	Latvia, Slovakia	Latvia, Slovakia	Latvia, Slovakia
2	Lithuania, Poland	Czechia, Hungary	Czechia, Poland
3	Czechia, Hungary	Lithuania, Poland	Czechia, Hungary, Poland
4	Slovenia, United Kingdom	Finland, Sweden	Latvia, Slovakia, Lithuania
5	Italy, Portugal	Portugal, Slovenia	Portugal, Slovenia
6	Denmark, Finland	Latvia, Slovakia, Lithuania, Poland	Finland, Sweden
7	Latvia, Slovakia, Lithuania, Poland	Greece, Spain	Greece, Spain
8	Greece, Spain	Denmark, Austria	Denmark, Netherlands
9	Estonia, Slovenia, United Kingdom	Czechia, Hungary, Portugal, Slovenia	Estonia, United Kingdom
10	Germany, Austria	France, United Kingdom	Belgium, Austria

Source: Own study.

The research shows that Polish sector changed the country to which it was the most similar last year – in years 2017-2018 it was Lithuania and in 2019 the Czech Republic. Taking into consideration the fact that the Czech Republic takes a higher position in the ranking (according to the synthetic feature), it is a beneficial situation.

4. Discussion

The development of companies is one of the key challenges of the sustainable growth because there is a strict dependence between the innovation policy of countries and implementation of new solutions in the company (Kamińska, 2017; Jędrzejczak-Gas, Barska, and Wyrwa, 2021). Thus, it is very important to improve the innovation activities in the context of sustainable growth of particular UE regions (Hermundsdottir, and Aspelund, 2021). The innovation activities depend on numerous issues, so they are connected with the environment, legal factors, economy or innovation policy of economies (Yachmeneva, and Vol's'ka 2014; Maradana et al., 2019). Therefore, it seems necessary to implement modern solutions as they contribute to creating a goodwill. Its development contributes to monitoring external factors of the company innovation activities e.g. by appropriate management of human resources.

Due to the fact that innovations are created by people, it is possible to state that the level of education affects the assessment and the flow of information about new solution (Bogdanienko, 2004; Grabowski, and Staszewska-Bystrova, 2020), and qualifications, knowledge, application of the appropriate management methods are the basic source of the competitive advantage or facilitate creating and implementation of achievements in the modern organisation (Pomykalski, 2001; Mardani et al., 2018). The company success depends not only on the cooperation of various departments in the organisation (Di Vaio et al., 2021) but on the quality of knowledge possessed and used by workers and employers in a greater and greater extent. Thus, trainings organised by organisations contribute to the increase in competences, abilities and motivation of workers (Janowska, 2002; Schweisfurth, and Raasch, 2018; Sharma et al., 2021) and it, from the company's point of view, affects the organisation activity to increase the competitiveness or organisation development in the dynamically changing surrounding (Butkiewicz-Schodowska, 2015; Mamuli, 2002; Müller, 2021). So, it is possible to state that the more educated workers, the higher is his relative tendency to adapt and implement new technological solutions more easily (Mardania et al., 2018). However, the high level of management staff's education is a very important issue because the people with higher education most frequently implemented the innovation activities in the companies managed by them (Mazgajska, 2002). It should be stressed that the development of information technologies and the implementation of new solutions in knowledge based organisations contribute to the production growth, improvement of the product quality, sale growth or reduction of production costs and thanks to it have influence on the way how consumers perceive the company and the products offered by it. Human factor not only affects the company but also the economic growth of the given country (Chlebisz, Gruszowski, and Igielski, 2019; Mamuli, 2002), as the company is a being that operates and exists in a given surrounding. Thus, it is possible to risk a statement that the level of society's education (Baro, 1991; Cohen, and Soto, 2001) and the quality of

education (Hanushek, and Komko, 2000) affect the development of the organisation and the micro, meso and macro level (Efendi, 2020).

However, due to the changes occurring in the company, not only human resources should be included but also economic conditions as the ones which may be included to the very important factors affecting the organisation surrounding. Undoubtedly, the amount of funds allocated by government or unit institutions insignificant among the determinant of the innovation activities in companies. It is mainly connected with the fact that the economy which characterises with low economic growth does not foster the growth in the scope of innovations (Guloglu, and Tekin, 2012). In the case of low economic prosperity, it is difficult to invest in new solutions and due to this fact, the possibilities to finance innovation activities are limited. Thus, the fact that companies possess sufficient funds may interest them in innovation activities, creating the research and development background and starting cooperation with other companies, universities or research institutes (Romanowska, 2016).

Although GDP is the most frequently used synthetic indicator of economic growth and development, its value does not show the level of development. Thus, it is necessary to include the population of the given country, i.e. include GDP per capita. In general, this indicator is used to assess the societies' wealth and possibilities to perform social and economic policies and finally to analyse the innovation activities in companies in international comparisons (Jasiński, 2003; Al-Qudah, Al-Okaily, and Alqudah, 2022). Apart from the GDP, the inflation and unemployment rates are frequently used (Lydeka, and Karaliute, 2021). The first one affects indirectly the height of the interest rate for investment credits as it affects the value of interest rates. The other one shows the economic state and may cause problems in the labour market (Dosi et al., 2018; Berzinskiene, and Juozaitiene, 2011). Moreover, the dynamics of industrial production is important as it specifies the rate of aggregate growth and physical level of economic production. High dynamics of production shows that the economy is in a good condition and the low one informs about unfavourable economic situation.

The factors representing the scientific and research potential (Audretsch, and Belitski, 2020) and technical equipment (Bogdanienko, 2004) cannot be omitted in the assessment of the innovation activities in companies. Any investment in research and development has influence on the increase in the work productivity e.g. by facilitating the knowledge exchange between the organisations (Audretsch, and Belitski, 2020). In practice, the structure of R&D expenditures is mainly assessed by the level of R&D expenditures and the number of scientific and research workers and the patents given by USPTO and EPO are the effect of R&D activity (Baruk, 2018). Moreover, the level of R&D expenditures strongly conditions the innovation activities in companies and is determined by the general level of the given country wealth (Dyjach, 2011). It is confirmed in the research referring to the influence of the public support of R&D on the effects of innovation activities in companies (Grabowski, and Staszewska-Bystrova, 2020; Czarnitzki, and Hussinger, 2018; Szczygielski et al., 2017; Doh, and Kim, 2014).

The level of R&D expenditures or cooperation between companies, companies and universities is really significant when it comes to the perception of innovation abilities in companies. Thus, the growth of this ability or strengthening the company orientation on sustainable development comes from the volume of expenditures to finance R&D activities (Sudolska, and Łapińska, 2020), the worker's approach to create or implement the innovation activities in companies or the stability of social and economic situation.

However, the lack of financing or unfinanced support of commercialising the innovative products concerning their market testing (Portugal) or permanent economic or financial crises (Greece) do not contribute to the implementation of innovation activities (Koperek, and Koperek, 2018; Sporek, 2013). In general, the relatively low innovation activities in Polish companies are caused by the lack of funds on research and development or the lack of appropriate competences of management staff and at the same time high costs to prepare and implement innovation activities (Sopińska, and Wachowiak, 2016; Róžański, 2020). It has a negative influence on taking innovation activities by companies and the low level of management infrastructure modernisation causes that Poland is still not regarded as innovative economy.

However, the fact should be considered that the external factors are not the only ones that affect the innovation activities in companies. Still they are crucial as human resources, level of expenditures on research and development activities and economic growth of the country are having bigger and bigger meaning in the innovation policy (Protasiewicz, 2020; AlQershi, Mokhtar, and Abas, 2021). These elements have influence on the factors of innovation activities in companies in which the use of information and communication technologies plays a big role (Miśkiewicz, 2021; Cvetanovic, Nedic, and Eric, 2014). Thus, there is a strict connection between the innovation activities of the economy and companies (Stefaniuk, 2019). Therefore, the innovation policy cannot be omitted while assessing the innovation activities because it is a significant factor stimulating the ability to implement innovation activities in a company (Kasperkiewicz, 2004). It causes that various strategies are introduced at the national and union level, which is to contribute to pro-innovation policy with the consideration of each country peculiarity (Głodek, 2011; Fedirko O., and Fedirko N., 2021). It is important as the activities of governmental entities do not focus on raising the expenditures on R&D per se but on the increase in the investment level (Hasana, and Tucci, 2010). It seems that it is the aim of the majority of economies, in particular due to the fact that the intensification of investments has influence on the development of innovation activities of companies, regions and in a consequence economies.

The comparison of Poland with other EU member states may contribute to the achievement of the sustainable growth objectives, e.g. by the introduction of new solutions in companies. The use of quantitative methods facilitating the decision making process may be one of the proposal to set up the directions of the innovation activities development. The strategy of the European Union for research on innovation activities may regulate the activities of international

and national institutions, especially in the matters of expenditures on research and development. According to the author, the analysis of determinants (workers' education, activities of subjects focused on creating innovations and economic factors) having influence on the innovation activities is very important nowadays when the progress is tested in this scope. It has a key meaning as the issues of financing and implementing the innovation activities are significant in the EU strategy. The presented comparisons may be used to assess the subjects introducing new solutions in the field of innovation activities in companies at local, national and international level.

5. Summary

In the period of the increasing competitiveness in the competitive European markets, conducting the thorough analyses of external factors of the innovation activities in companies guarantees the proper innovation policy is created. Thus, it seems to be necessary to use the quantitative methods to assess the situation in this sector, especially that the management of the innovation activities is connected with the decision making process and the decisions are usually taken in the conditions of uncertainty.

The higher the economic growth and development of the given country, measured in GDP per capita, is, the bigger are the expenditures on research and development, in general. However, their percentage in GDP is not high (it is on average 1.19% for Poland) and a big differentiation of expenditure volume contributes to the lack of financial stability. This situation is not favourable to run a business activity and it is particularly important to perform various investment (development) undertakings which enable the use of modern solutions. Moreover, the growing number of people with higher education also has influence on the innovation activities in companies by e.g. bigger percentage of more educated workers in creating and implementing innovation activities or registering bigger number of patents. However, analysing the stimulation of the innovation activities in companies, it is possible to state that financial situation plays the most important role here. The research showed that it is particularly visible in the case of Luxembourg and Finland or the countries of Central Europe. Furthermore, economic or political crises are important. On the example of Greece, it is difficult to pay attention on implementation of innovation activities in such periods. Thus, the financial support from the state is significant in this case.

The results obtained in the research are consistent with the ones published in European Innovation Scoreboard. In 2020 the Scandinavian countries, the Netherlands and Luxembourg were the leaders in innovations. Although the leaders did not change in EIS ranking in 2021, Poland was included in the group of emerging innovators (it is before Latvia and after Slovakia – years 2020 – 2021). In the previous ranking it closed the group “moderate innovators and

took the third place from the end behind Latvia. It means that the factor increased for our country, which is good information.

The presented analysis referring to the innovation activities in companies in the EU member states showed that Poland does not take a high position concerning every external factor of innovativeness. It results in a low position in the presented ranking among the analysed European Union states which confirms the common view that innovation activities are at a low level in companies in our country. It is not a favourable situation, especially when it comes to the country development.

The situation is different when it comes to the country with the highest value of the synthetic feature. This position proves that social, economic and technical factors had the biggest influence on the innovation activities and the funds were used in the best way. However, it should be stressed that the research results did not make it possible to state that the analysed expenditures were used in an optimal and effective way in Luxembourg.

On the basis of the presented test results it is possible to state that we should follow, at first, Austria and Denmark in our activities. In this case we should mainly pay attention to the dynamics of the industrial production and the value of R&D expenditures measured as the percentage of GDP.

Moreover, it is possible to say that the number of graduates of scientific and technical universities and permanent workers' training have a big influence on the innovation activities. Whereas we have a big number of people finishing technical universities, our workers are not always interested in trainings. The workers' financial situation does not contribute to it, as they usually have to cover the costs of training. Although the number of people with higher and secondary education increased in Poland, we are far behind Luxembourg (the difference amounts to about 0.33 percentage point for the disadvantage of Poland). In 2017 two countries were between Poland and in 2019 there were thirteen. Should such a tendency remain, the situation would not be optimistic. However, the situation is different when it comes to Austria. The difference in the percentage share in the population of people at the age 25-64 participating in lifelong learning amounted to approximately 0.04 percentage point (for the benefit of Austria).

On the basis of the information coming from the dendrogram, it is possible to state that when all countries are analysed together, the differentiation between countries is smaller and the distance between them is getting smaller. It is indicated by the fact that all countries create a final cluster at the lower and lower level with years (the last bond was at the level of about 18.89 in 2017 and two years later it was at the level of about 18.57). The level of the last bond was also lower in the two last years, the difference amounted to 1.52. Moreover, the conclusion may be taken that the clusters created and shown in dendrograms group countries with the similar level of expenditures on R&D or the number of people raising their qualifications and knowledge. Thus, the statement can be made that the innovation activities in companies require to verify the innovation policy according to the rules of sustainable development. It will be

a long lasting process and its results will surely depend on the level of economic growth. Especially that the company functioning depends on the state of economy and the policy of the government.

Summing up, the general conclusion which arises from the analysis of the presented indicators is that the situation is not satisfactory (low share of expenditures on R&D in the percentage of GDP, low number of patents). Moreover, the research showed a big differentiation between “new” and “old” EU member states. The countries of Central and Eastern Europe did not manage to catch up with the other European countries. Only Slovakia is the exception here. It may be a pattern for the countries belonging the EU since 2004. Thus, the verification of the innovation policy as well as the intensification of activities aimed to achieve the sustainable development seems to be necessary.

Nevertheless, the author wants to indicate that the presented analyses may be the starting material to further research on the innovation activities in companies, especially in the surrounding changing dynamically. The present research was limited due to the availability of data as the information was taken from one, possibly two sources. According to the author it is necessary to carry out more detailed analyses and including more variables in them so that it was possible to assess the real progress in equalising the differences in the innovation policy. The further research should also cover the assessment whether the objectives of the innovation activities are met when it comes to knowledge management, sustainable growth, cooperation of companies with the academic institutions, technological progress and sizes of companies operating in the market.

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INFLUENCE OF SELECTED PARAMETERS ON THE QUALITY OF TECHNICAL TESTS BRAKING SYSTEM

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Purpose: The aim of the study is to find out whether and to extent the change of selected parameters of the system, such as the type of tires, tire pressure and axle load, changes the result of the technical test of the analysed vehicle in the field of measuring braking forces.

Design/methodology/approach: Diagnostic tests, tire pressure measurements, axle load measurements, braking force measurements on a roller device were carried out.

Findings: The relationships between the pressure in the tires and the braking force measured on the wheel as well as between the braking force and the load acting on the vehicle axle have been demonstrated.

Research limitations/implications: Mathematical relationships between tire pressure and vehicle braking force can be derived in the future.

Practical implications: In the course of the tests, it was found that the technical tests made it possible to determine the braking forces only while maintaining the nominal $\pm 1 \times 10^5$ Pa tire pressure. Changes to this parameter may influence the measurement results. Moreover, the influence of tire pressure on the change of the measured braking force values was found, which translates into the safety of the vehicle in road traffic.

Originality/value: approach to brake system.

Keywords: safety and quality of transport, braking system, tire pressure.

Category of the paper: Technical paper.

1. Introduction

The continuous development of transport, the growing number of vehicles moving on the roads means that the requirements for the construction and reliability of vehicles are increasing. More and more demands are placed on their quality and safety. One of the main requirements is an efficient braking system, i.e. one that ensures a gradual reduction of the driving speed until the vehicle comes to a halt and with a pressure of 50 daN on the foot brake pedal, it will allow to achieve 60% of braking efficiency (Journal of Laws of 2015, item 776). Additionally, in accordance with the Road Traffic Law, the difference in braking forces between the wheels of one axle cannot be more than 30% in relation to the wheel with greater braking force. Literature data indicate cause-effect relationships between the braking distance of vehicles and the condition of the road surface on which they maneuver (Borkowski, 1973; Graczyk, 2010), type of tires (winter, summer), condition of the tire tread (Krzyżewska, 2019; Varghese, 2013; Reiter, Wagner, 2010) as well as tire pressure (Pawar et al., 2020; Szczucka-Lasota et al., 2021). The authors of the studies (Kasprzak et al., 2006; Li et al., 2011) also indicate the influence of the mass of the transported goods and the pressure exerted on the axles of the vehicle, both on the condition of the tires and the braking distance of the vehicle. In the light of the published test results and the described cause-and-effect relationships, it should be considered whether the described above factors may have a negative impact on the result of the technical examination of the vehicle.

The aim of the study is therefore an attempt to answer whether and to what extent the change of selected parameters of the system, such as the type of tires, tire pressure and axle load, results in a change in the result of the technical test of the analyzed vehicle in the field of braking force measurement. Are the registered changes significant enough to change the overall result of the quality test and the final decision made on the admittance of the vehicle to traffic.

2. Materials and research methods

To achieve the aim of the work, diagnostic tests were used, which were carried out at an operating vehicle inspection station. A roller device for measuring braking forces was used in the research (Figure 1a-1d) and three randomly selected passenger cars: Volkswagen Lupo, Audi A4, Renault Espace (Figure 2a).

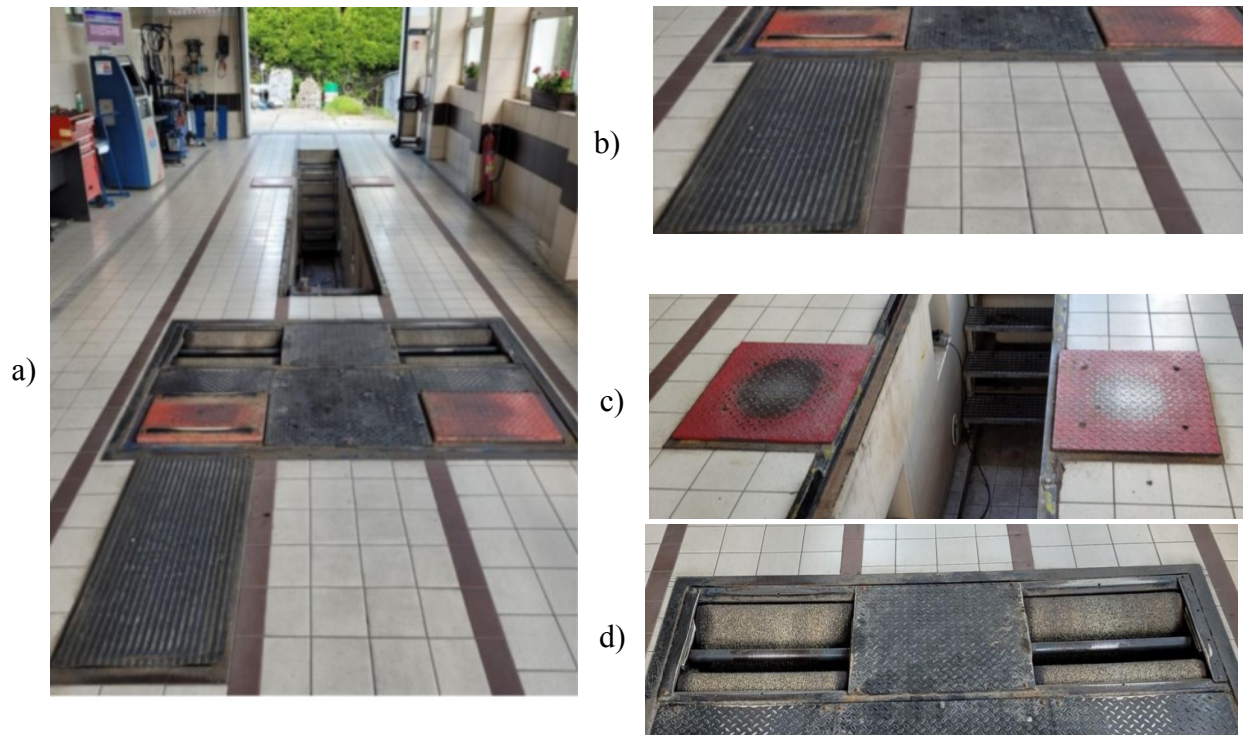


Figure 1. Diagnostic path a) general view b) roller device for measuring braking forces, b) plates for initial measurement of wheel alignment and shock absorber tester, c) sack and diagnostic channel.

It was found that the test with the use of various vehicles will provide higher reliability of the obtained results than the test of one type of vehicle. During the research, the MAHA diagnostic line was used, consisting of the following devices: the MINC1 toe-in tester, FWT1 shock absorber control device, IW2 roller brake control device, brake pedal pressure sensor, remote control of devices (Figure1-2).

At the time of the tests, all devices were operational, correctly set, in accordance with the principles of measuring the braking forces, and had valid tests, inspections and certifications necessary to conduct tests at a vehicle inspection station. Before starting the tests, the diagnostic path remote control was paired with a computer and a pad for measuring the pressure on the brake pedal. Before entering the diagnostic path, the pressure in the tires was adjusted (Figure 2b). The pressure was set in accordance with the recommendations of the vehicle manufacturer to the nominal values (table 1) or it was lowered from this value by $\pm 1 \times 10^5$ Pa, so that the difference between the nominal and the set pressure was the maximum allowed in the technical test of the passenger car, specified in (RMiR of 18 December 2013).

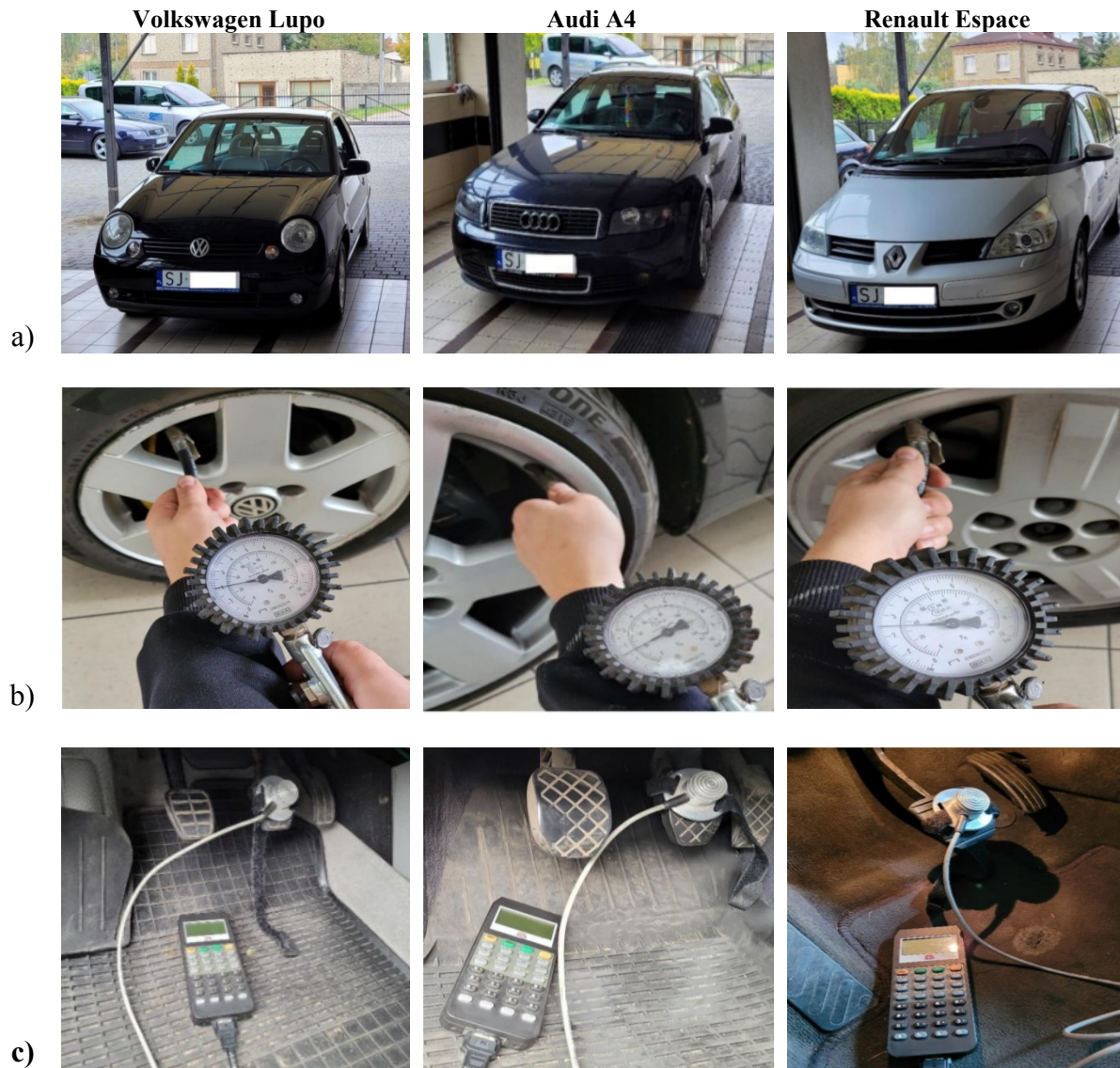


Figure 2. Preparation for technical testing of braking forces measurement, a) test vehicles, b) adjustment and measurement of tire pressure, c) installation of a cover on the brake pedals of the tested vehicles.

Pressure regulation was carried out using a certified Wika pressure gauge. Each of the tested vehicles with nominal tire pressure was subjected to three measurements on summer tires and three measurements on winter tires on the dynamometer (Figure 3). Similarly, tests on the dynamometer were performed with the use of reduced pressure on the tires. Only the front axle of the vehicle was tested. Each time, after adjusting the pressure in the tires, the installation of a cover with a sensor measuring the force pressure on the brake pedal during braking was started (Figure 2c).

Table 1.

Nominal tire pressures for the front wheels of the tested vehicles

Vehicle – brand	Nominal pressure read from the vehicle nameplate
Volkswagen Lupo	$\pm 2 \times 10^5$ Pa
Audi A4	$\pm 2.5 \times 10^5$ Pa
Renault Espace	$\pm 2.5 \times 10^5$ Pa

The next step was to drive through the plate for measuring the initial toe-in of the wheels and the shock absorber tester. At the time of testing the braking system on the roller device, the measured axle load of the vehicle expressed in daN was displayed on the monitor (Figure 3a-3c). Then the vehicle drove the front axle onto the roller device. The rollers were started. The driver of the vehicle held a pilot in his hand. When pressing the brake pedal on the remote control, the value of the force applied to the pedal was displayed.



Figure 3. The course of the technical test of measuring the braking forces, a) setting the pressure of 50N on the brake pedal, b) measurements on a roller device, c) example measurement results.

For the purpose of the tests, the same force is applied to the brake pedal for each vehicle. The adopted force for the conducted research is 50 N (Figure 3a). When 50 N of the force exerted on the brake pedal is reached, the results of the braking forces for the left and right wheels and the difference between them are displayed on the monitor (Figure 3c). The values mentioned are expressed in kN.

3. Results and analysis

The tests were carried out on a diagnostic stand and in accordance with the methodology described in the previous chapter. The first vehicle to be tested was the Volkswagen Lupo, the next one was the Audi A4, and the last was the Renault Espace. All the obtained results of measuring the braking forces were compiled in a tabulated form. The recorded braking force measurements for vehicles equipped with summer tires and the calculated differences between the measurement results for the front wheels are presented in Table 2-3.

Table 2.

Recorded measurements of braking forces for front wheels of vehicles fitted with summer tires

Vehicle – brand	Braking force – average of three measurements [N] for vehicles with summer tires			
	Left wheel, tires with nominal pressure	Right wheel, tires with nominal pressure	Left wheel, tires with lowered pressure	Right wheel, tires with lowered pressure
Volkswagen Lupo	1130	1260	1090	1110
	1150	1230	1100	1100
	1120	1240	1050	1020
Audi A4	2080	2370	1820	1990
	2110	2250	1850	1980
	2090	2230	1830	1990
Renault Espace	3120	3100	3100	3060
	3100	3080	3070	3060
	3140	3100	3100	3080

The analysis of the results presented in tables 2 and 3 makes it possible to state unequivocally that the tested vehicles met the technical requirements for the annual braking system test, because the differences in braking forces on one axle, between the right and left wheel, did not exceed 30%.

Table 3.

Differences between braking force measurements for front wheels with summer tires

Vehicle – brand (measured axle load)	Braking force - average of three measurements [N] for vehicles with summer tires				Braking force difference between right and left wheel	
	A	B	C	D	A-B	C-D
	Left wheel, tires with nominal pressure	Right wheel, tires with nominal pressure	Left wheel, tires with lowered pressure	Right wheel, tires with lowered pressure		
Volkswagen Lupo (6350 N)	1133	1243	1080	1076	110 N (8.85%)	4 N (0.38%)
Audi A4 (9080 N)	2093	2283	1830	1990	190 N (8.33%)	153 N (7.71%)
Renault Espace (12070 N)	3120	3093	3096	3060	27 N (0.87%)	36 N (1.17%)

The pressure in the tires influenced the obtained test results. For example, the difference between the measured values of the braking force in the case of an Audi A4 vehicle for the left front wheel with summer tires with nominal pressure and with lowered pressure was 263 N, and for the right wheel as much as 293 N. was lowered by a value of $\pm 1 \times 10^5$ Pa. Similar tests were carried out for vehicles equipped with winter tires.

The recorded braking force measurements for and the calculated differences between the measurement results for the front wheels are presented in Table 4-5.

Table 4.

Recorded measurements of braking forces for front wheels of vehicles fitted with winter tires

Vehicle – brand	Braking force [kN] for vehicles with summer tires			
	Left wheel, tires with nominal pressure	Right wheel, tires with nominal pressure	Left wheel, tires with lowered pressure	Right wheel, tires with lowered pressure
Volkswagen Lupo	1140	1250	1100	1120
	1130	1240	1100	1110
	1110	1260	1040	1030
Audi A4	2070	2300	1850	1990
	2090	2200	1840	2000
	2120	2370	1850	1980
Renault Espace	3100	3080	3100	3060
	3120	3100	3070	3060
	3150	3080	3100	3090

Table 5.

Differences between braking force measurements for front wheels with winter tires

Vehicle – brand (measured axle load)	Braking force - average of three measurements [N] for vehicles with summer tires				The difference in the braking force between the right and left wheel expressed in N and (%)	
	A	B	C	D	A-B	C-D
	Left wheel tires with nominal pressure	Right wheel, tires with nominal pressure	Left wheel, tires with lowered pressure	Right wheel, tires with lowered pressure		
Volkswagen Lupo (6350 N)	1126	1250	1080	1086	124 N (9.92%)	6 N (0.56%)
Audi A4 (9080 N)	2093	2290	1846	1990	197 N (8.61%)	144 N (7.24%)
Renault Espace (12070 N)	3123	3086	3090	3070	37 N (1,19%)	20 N (0,65 %)

Based on the results of measuring the braking forces (tables 4 and 5) of vehicles with winter tires, it can be concluded that the tested vehicles met the technical requirements for the annual braking system test. As in the case of summer tires, also in this case the differences in braking forces on one axle between the right and left wheels did not exceed 30%. There were also no significant differences between the test results presented in Tables 3 and 5 for the same wheels.

This means that the result of the technical test is not significantly influenced by the type of tires (winter, summer). On the basis of the obtained test results, it can be concluded that the pressure in the tires affects the measurement results. The differences between the value of the braking force for the wheels with the nominal tire pressure and the value of the braking force for the wheels with the reduced pressure are recorded.

Nevertheless, a reduction in pressure by the value of $\pm 1 \times 10^5$ Pa (the maximum permissible value by which the pressure in the tires may be lowered during technical tests of vehicles), indicates that this change does not affect the final test result. The measurement results are within the prescribed standard. It can be concluded that the correct pressure in the tires will affect the level of road safety of the vehicle, and its significant changes from the nominal value may cause an extended braking time of the vehicle.

The recorded braking force measurements presented in the graph (Figure 4) show that with the increased axle load, the recorded braking forces of the vehicle increase, regardless of whether the vehicle has nominal or lowered tire pressure.

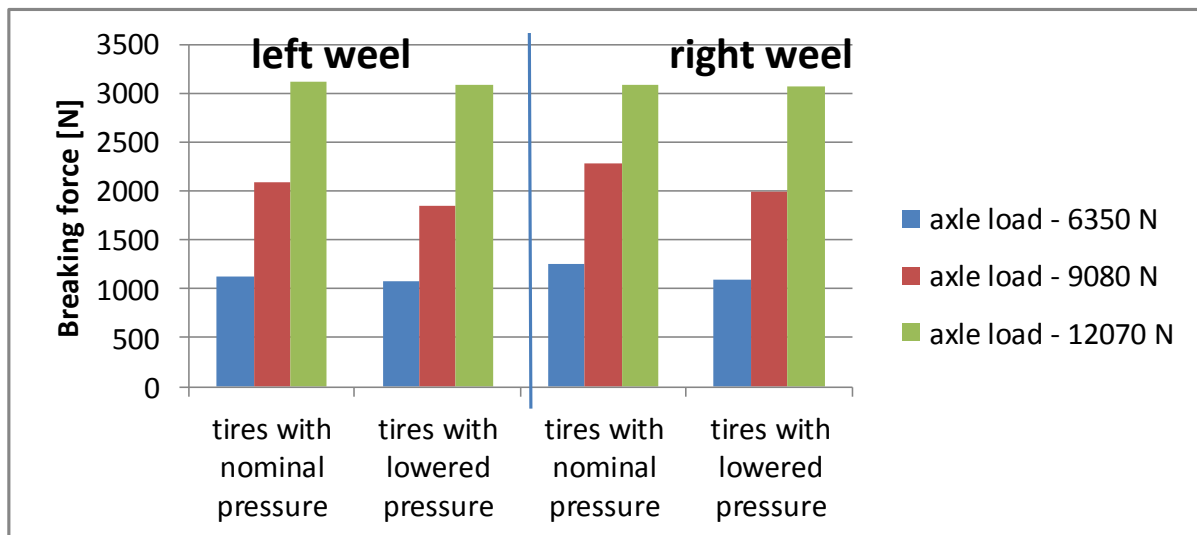


Figure 4. Braking force for front wheels with winter tires.

The axle load resulting from the vehicle structure does not affect the final result of the technical test of the vehicle, because the final evaluation takes into account the percentage values of the braking forces for the front and rear axles and the difference expressed as a percentage between the values obtained for the wheels of the same axle (cannot be more than 30%). The research results are consistent with the views presented by (Filipczyk, 2001). The observed relationship may be important for the vehicles carrying the load, especially in its improper distribution.

4. Summary

Summing up, it should be stated that there is a relationship between the pressure in the tires and the measured braking force of the vehicle. This relationship may affect the extension of the braking distance of the vehicle used on the road, when the correct nominal pressure in the tires is not maintained. In order to maintain appropriate safety measures, drivers should check and inflate their tires. The tire pressure permitted by law under the test conditions – technical inspection of the braking system - does not adversely affect the measurement results.

In the range of tire pressure changes by $\pm 1 \times 10^5$ from the nominal pressure, no significant differences in the results of the braking force measurement shall be recorded. The obtained results allow to conclude that the type of tires (summer, winter) does not significantly affect the recorded braking forces, the test results obtained for wheels with winter and summer tires are comparable. As the axle load increased, an increase in the braking force was recorded. However, the results were not translated into the final result of the technical braking test of the tested vehicles. All vehicles passed the tests positively.

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ELIMINATION OF INCONSISTENCIES IN THE PROCESS OF EXPANDING THE FLEET OF ELECTRIC BUSES

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Purpose: The aim of the work is to present selected research results of the first stage of work, the so-called pre-design research related to the implementation of electric vehicles into the company's fleet.

Design/methodology/approach: the article presents inconsistencies and problems related to the use of electric buses as well as problems related to point infrastructure. The results of the research were obtained from the observations of the analyzed transport processes, the process of fleet management, from interviews with employees, as well as from the analysis of documentation and comparison of records with the actual state.

Findings: The results confirm that the effective elimination of nonconformities leads to the improvement of the process quality and the reduction of costs related to vehicle breakdowns.

Research limitations/implications: The research indicates the need for continuous improvement of the process of using electric vehicles. Validation studies have confirmed that it is impossible to eliminate all problems, therefore the process should be constantly improved.

Originality/value. The article indicates the need to amend the subsequent projects and the current methodology of the procedure.

Keywords: transport quality, public transport, electric buses, electric vehicles, vehicle fleet.

Category of the paper: Case study.

1. Introduction

Due to the high cost of purchasing an electric car, public transport is taking a significant share of the drive towards electromobility (Sarmow, Figaszewski, 2018; Borghetti, Longo, 2022). Subsidies from the European Union and various programmes, i.e. "Green Public Transport" give Polish transport companies the opportunity to purchase expensive but

environmentally friendly vehicles (Alwesabi, Liu, 2021; Piłkuła, Piotrowski, 2018). The Green Public Transport programme at the start of 2021 has allowed applications from 33 cities seeking 176 charging stations, 322 electric buses, two hydrogen refuelling stations and 102 hydrogen buses and 7 trolleybuses (Połom, 2021; Maciocha, 2018).

In November 2012, measures were launched to implement electromobility in the city of Jaworzno. Between 2013 and 2014, the first electric buses were tested (Jamróz, 2012). In 2015, a Solaris Urbino 12 electric vehicle was purchased for the passenger line. At that time, a so-called fast-charging charger was installed on the Osiedle Stałe loop.

After the positive experience of operating the first electric vehicle implemented on passenger lines, the carrier purchased a fleet of another 22 electric vehicles. The EU program covered the purchase of intelligent fleet management system, central station for charging and replacement of bus batteries at the depot and the construction of five fast battery charging stations in the city of Jaworzno. Development of electric vehicle fleet required appropriate planning of development and implementation works covering three main stages (Jamróz, 2012; Rusak, 2018).

Pre-design study stage. Due to various problems connected with using and maintaining the existing fleet of electric vehicles and the required point infrastructure, before undertaking implementation activities it was necessary to identify these problems and then to develop corrective or correction actions. Obtained solutions were taken into account in next stages of the project. During the **design studies**, the location of chargers, lines to be electrified and modifications to existing timetables were determined. The moments of charging were planned and the schedule of energy replenishment on pantograph chargers was created for all electric vehicles. The project was implemented in this way. The **final stage** included the verification and validation of the implemented design solution.

The aim of this paper is to present selected research results of the first stage of work, the so-called pre-design research. The study is a case study in this respect. The proposed, presented solutions were implemented by the company.

2. Research methods

In order to identify incompatibilities, the solutions implemented so far in the enterprise were analyzed, routes of electric vehicles admitted to passenger traffic implemented by 2020 were traced, including departure and arrival times and their compliance with the adopted schedule in summer and winter months, and route intersections, lines which are the most and least loaded were determined.

Additionally, the location of charging stations, possibilities of using a given station during route realisation, frequency of charging for given brigades, level of battery charge in electric vehicles were analysed.

At each stage process observation, interview with employees (drivers, service technicians) and analysis of available documentation was done. On this basis nonconformities and problems of so-called "bottlenecks" were identified. After identifying the occurring problems, corrective actions were planned (chapter 3).

3. Results and analysis of studies on the possibility of using the existing point-of-use infrastructure – vehicle charging

The results of the analyses conducted on the operation of existing charging stations (point infrastructure) allow a number of problems to be identified, some of which are presented below:

- the planned locations of chargers in the city make it impossible to make flexible changes to the transport network, e.g. the first charger erected in the city has lost its importance within a few years. In 2017 it served 3 transport lines and now only one;
- the charger located on a hill makes it impossible to use it regularly in winter, due to the difficulty of moving the bus from under the charger after it has finished charging;
- the charger located on uneven paving makes it very difficult to connect the pantograph correctly. Numerous connection attempts take place, which significantly reduces the charging time;
- charges are carried out without formatting the batteries, often short and incomplete charges are made.

The analysis carried out allows the following conclusions to be drawn:

1. After the initial planning of the location of newly purchased chargers in the city, and before their installation, a visual assessment of the terrain should be made (absence of hills, unevenness, other protruding infrastructure elements) which could affect the process of charging the vehicle.
2. Wherever possible, locate charging stations at intersections of transport lines so that changes to transport networks can be made if necessary

4. Results and analysis of studies on the operation and maintenance of electric vehicles

The operation of electric buses involves a number of activities that need to be synchronized in order to ensure the fluidity of the city runs. In order to identify the problems connected with the operation of electric buses, an environmental interview was carried out with the plant employees connected with the operation of the vehicles and transport lines under study, and the documents made available were analysed. The research results and conclusions are presented in Table 1.

Table 1.

Wyniki badań dotyczących eksploatacji autobusów elektrycznych

Fleet management problems							Problem with appropriate reaction to low battery alert The dispatcher has multiple tasks and the implemented system requires the dispatcher to constantly monitor the energy level of the electric vehicles. Conclusion: One person will not be able to perform all tasks with an increased fleet of vehicles.
> 344	Szczakowa Dworzec PKP » (234) Martyniaków (248)	12:45:00 13:48:00	12:45:24 13:48:31	-00:00:24 -00:00:31	73% 57%	351 Solaris Urbino 12 electric	
> 344	Elektrownia Zespół Szkół » (390) Szczakowa Dworzec PKP (234)	14:12:00 15:10:00	14:12:04 15:14:21	-00:00:04 -00:04:21	56% 39%	351 Solaris Urbino 12 electric	
> 314	Szczakowa Dworzec PKP » (234) Podłęże Osiedle (1701)	15:30:00 16:14:00	15:30:48 16:13:33	-00:00:48 00:00:27	38% 28%	351 Solaris Urbino 12 electric	
> 314	Podłęże Osiedle (1701) » Szczakowa Dworzec PKP (234)	16:25:00 17:05:00	16:25:40 17:06:44	-00:00:40 -00:01:44	38% 29%	351 Solaris Urbino 12 electric	
> 314	Szczakowa Dworzec PKP » (234) Podłęże Osiedle (1701)	17:10:00 17:54:00	17:10:55 17:54:24	-00:00:55 -00:00:24	28% 19%	351 Solaris Urbino 12 electric	

Figure 1. Result from the system showing different levels of battery charge


Fleet maintenance/service problems	
 <p>Vehicle servicing and maintenance problem The company lacks employees who can work at height and regularly service structural components on the roof of vehicles. Not enough equipment to reach the roof of the vehicle Conclusion: Service employees should be referred immediately to the appropriate courses and obtain additional authorisations to work at height, it is imperative to comply with health and safety regulations</p>	

Figure 2. Service hall with a platform to work on the roof of an electric bus with many components

Cont. table 2.

	<p>Excessive downtime due to repair of traction motors</p> <ul style="list-style-type: none"> - Failure of components (e.g. traction motors and drive bridges), - Lack of suitable parts in stock. - PKM employees did not have the appropriate skills to repair and replace these components. <p>Conclusion: Maintenance staff should be referred to appropriate courses and gain additional qualifications related to the repair of electric vehicles.</p> <p>Failures of traction battery modules</p> <p>Batteries were recharged too often and at the same time unformatted</p> <p>Conclusion: Charge the batteries less frequently. Charge with low voltage, always to 100%.</p>
Problems during on-road operation	
 <p>a)</p>	<p>Incorrectly designed timetables</p> <p>Electric vehicles were unable to perform the task in its entirety.</p> <p>Conclusion: Creating one timetable for a diesel bus and an electric vehicle is wrong. When creating timetables for electric vehicles it is necessary to take into account the different behaviour of the vehicle during operation under varying climate conditions.</p>
 <p>b)</p>	<p>Problems with driving in winter</p> <p>Electric buses have a higher weight and at the same time the rear of the vehicle at the drive axle is not under load (as is the case with diesel buses, for example).</p> <p>Conclusion: Electric buses cannot start in winter on a slight hill and generate large disturbances and delays in service, so extra time for "starting" must be taken into account when planning the timetable.</p>
<p>Figure 4. Electrobus in operation a) in summer b) in winter</p>	

The results of the research (Table 1) were taken into account during the subsequent stages of the implementation project.

5. Corrective and preventive action

The analysis of the existing and potential non-compliances made it possible to develop corrective and preventive actions, which were implemented at the stage of the EU programme

implementation. The estimated cost of implementing the selected solutions for the company (as of 1.01.2021) is presented in Table 2.

Table 2.

Proposed preventive measures related to the operation of electric buses in the plant under analysis (own elaboration)

	Activities introduced to the company
Problem with appropriate response to alerts – low battery	For the project related to the deployment of a fleet of 20 vehicles to the plant, the employment of at least one person to supervise the vehicles and an additional person to operate the vehicle fleet was included. Estimated cost of implementing the solution: - full-time employee of the dispatching centre - 4000 PLN gross per month, <ul style="list-style-type: none"> • training - 4200 PLN.
Problems with vehicle servicing and maintenance	For the project related to the implementation of a fleet of 20 vehicles, additional equipment was purchased, i.e. platforms, ladders and even overhead cranes. Estimated cost of implementing the solution: - platform - PLN 17,000, - ladder - 5000 PLN, - crane - 30000 PLN. As the existing employees of the service had acquired the necessary qualifications by the time the work at this stage of the project commenced, all new service employees should be directed to appropriate courses and acquire additional qualifications for work at height.
Excessive downtime due to repair of traction motors	For the project related to the implementation of the 20-vehicle fleet, an agreement was drawn up and signed with the vehicle supplier, according to which the supplier is responsible for carrying out training in the use of electric buses and covers the costs of spare parts under warranty. Estimated cost of introducing the solution: employee negotiation time
Failures of traction battery modules	The timetable was changed, the electrobus services by limiting the number of charges and a schedule was created. In addition, battery formatting was introduced. The study was carried out as part of an engineering project and made available to the company. No additional costs for the company.
Incorrectly designed timetables	The timetable was carefully analysed, summer and winter times were measured, vehicle circulation was analysed and appropriate adjustments were made to the timetable. Estimated cost of the solution to the company: The study was carried out as part of the engineering project and made available to the company. No additional costs for the company.
Problems with driving in winter	Change your attitude to the type of tyres you use. Purchase winter tyres (instead of multi-season). Estimated cost of solution: <ul style="list-style-type: none"> • cost of one winter tyre around 1,300 PLN, for a vehicle of standard length (12 metres) 6 such winter tyres are needed, i.e. a cost of around 7,800 PLN.

As a result of the research work carried out, design assumptions were drawn up for the charging of the new 20 vehicles and a charging schedule was created for all 44 electrobuses owned by the company. The application of the proposed solutions made it possible to reduce the number of charges for 7 transport tasks from the current 65 to 33 charges (Table 3).

Table 3.*Number of battery charges of electric buses on routes*

Nr of bus-course	Number of charges before modification	Number of charges after modification
303/01	9	5
303/02	9	4
303/03	7	5
303/04	8	5
372/01	10	4
372/02	11	5
372/03	11	5

It was found that bus vehicle batteries are currently in much better condition. For example, analysis of the technical documentation of 4 Solaris Urbino 8.9le electric vehicles, running on services 372/01, 372/02 and 372/03, on which charging was reduced twice, allows us to state that the number of registered defective energy stores has significantly decreased.

After a few days of operation of the implemented project, another problem arose. One of the chargers was installed at the very end of the parking bay, where the driver has proper access and possibility to connect the vehicle for charging (no hills, bumps, etc.). Unfortunately, the bus shelter under which passengers are waiting is behind the charging infrastructure. Consequently, the charger obscures part of the vehicle, including the open door. Cases of passengers being left under the shelter have been reported. As a result, an additional rule has been introduced to withdraw the vehicle under the bus shelter when charging is complete and to ensure that all willing passengers have boarded the bus.

6. Summary

Implementation of the program contributed to increase of the fleet of electric vehicles serving bus lines in Jaworzno. In addition, the introduction of the new schedule reduced the number of charges on the so-called pantograph fast chargers installed on the loops and contributed to a reduction in the number of damaged battery modules. In 2019, 6 faulty batteries were found, in 2020 3 faulty batteries were found and in 2021 only 1 faulty battery. The introduction of corrective actions, including the employment of an additional person, enabled the supervision of all electric vehicles.

As shown, the elimination of non-conformities and quality improvement is a continuous activity. During the operation of the new fleet of vehicles, a new, hitherto unheard of problem was identified, related to passengers not being picked up from a bus stop, due to the awkwardly placed spot infrastructure. In future implementations this problem should be taken into account during the analysis related to the deployment of the infrastructure.

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CONSTRUCTS OF QUALITY RELATIONS IN COOPERATION OF INNOVATIVE ENTERPRISES WITH SCIENTIFIC AND RESEARCH AND DEVELOPMENT INSTITUTIONS

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Purpose: The aim of the article is to learn about the attitudes of innovative enterprises representatives towards the strength and importance of relations in regard to scientific/research and development institutions.

Design/methodology/approach: The presented analyzes constitute a part of a broader study on the determinants of the quality of relations between enterprises in the quadruple helix. The article focuses on the enterprise – scientific institutions plane. The research was carried out with the use of CATI method on a sample of 200 innovative enterprises

Findings: The results show that in the case of the relationships strength, communication is an important construct in relation to scientific and R&D institutions, while in the case of the relationships importance it is commitment. The significance of trust and satisfaction with regard to the strength and importance of the relationship between an innovative enterprise and scientific and research and development institutions was not indicated. Moreover a high positive correlation was indicated between the individual relationship quality constructs.

Research limitations/implications: The research sample is a limitation. The research was conducted on a sample of 200 innovative enterprises, but only 22.5% declared maintaining relations with scientific and research and development institutions.

Practical implications: The article indicates which quality constructs should be paid attention to by representatives of scientific and research institutions in managing relations with enterprises.

Originality/value: The article indicates that in some aspects of relationship management, commitment and communication are more important components than trust and satisfaction.

Keywords: relations, relations quality, relations quality constructs, enterprise, business environment institutions.

Category of the paper: research paper.

1. Introduction

Enterprises that wish to create and maintain a competitive advantage on the market are doomed to constantly introduce new solutions. This, in turn, forces them to carry out scientific as well as research and development activities – conducted independently or with the use of external entities. They can also implement a policy of joint research and development works with other organizations (Lavoie, Daim, 2019).

On the other hand, more and more attention is paid to the quality of relationships as a source of competitive advantage (Samiee, Walters, 2003, Leonidou et al., 2014; Inków, 2017) and to its importance for organizational performance in a turbulent environment. This corresponds to the fact that for many years enterprises have noticed the need for skilful relationship management and have implemented it in practice (Vieira et al., 2008). Therefore, it becomes important to examine the business relations between enterprises and scientific and research and development institutions. The more so because in contemporary value creation mechanisms the importance of relations cannot be overestimated at all levels of shaping relationships (Tu et al., 2014; Belderbos et al., 2004; Moczyłowska et al., 2017).

The aim of the article was to indicate which of the constructs of relationship quality is the most important from the point of view of the strength and importance of the relationship between innovative enterprises and scientific and research and development institutions.

2. Literature review

2.1. The essence and subjects of the research and development sphere

The research and development sphere includes organizations conducting research and development activities, the results of which are often product innovations, new services and technologies, as well as new organizational and management solutions, regardless of their organizational affiliation (Czerniachowicz, Świadek, 2014). Research and development (R&D) is a systematic creative work undertaken in a methodical manner in order to increase the amount of knowledge and find new applications for it. The features of R&D should be novelty, creativity, unpredictability, methodology and transferability (OECD).

According to the most commonly adopted classification, R&D includes three types of research – basic, industrial and developmental. Basic research is undertaken primarily in order to gain new knowledge about the foundations of phenomena and observable facts, without focusing on practical application or use. Industrial research aims to acquire new knowledge and skills with the aim of developing new products, processes and services or introducing significant improvements to existing products, processes or services. They include the creation

of complex systems components. Development works include the acquisition, combination, shaping and use of the currently available knowledge and skills in the field of science, technology and business as well as other knowledge and skills for production planning and the creation and design of new, changed or improved products. They do not include routine and periodic changes, even if they are improvements in nature (stat.gov.pl).

The entities conducting R&D activity include (stat.gov.pl):

- scientific and research and development entities, the basic type of which is research and development,
- science service units – scientific libraries, scientific archives, scientific associations,
- development units – economic entities, mainly enterprises with their own R&D facilities, conducting research and development activities in addition to their basic activities,
- higher education schools,
- other entities.

On the other hand, when considering entities conducting scientific and research and development activities in an institutionalized manner, the following elements can be listed (Szopik-Depczyńska, 2009):

- enterprise sector – economic entities, organizations and institutions involved in the production of goods and services as well as non-profit institutions serving them,
- government sector, including local government – ministries, offices and other bodies providing public services to citizens, usually free of charge,
- private non-profit sector, composed of non-market entities operating for the benefit of households, including individuals, associations and trade unions,
- higher education sector, which includes higher than secondary education institutions and research institutes, experimental stations and clinics under the direct control, administration or affiliation of higher education unit,
- foreign sector consisting of institutions and individuals located outside the country (except for means of transport and satellites) and international institutions and organizations (excluding enterprises).

The basic assumption regarding cooperation between the spheres of science and business is to support the implementation of research and development projects carried out jointly by entrepreneurs and the science and research sector, as well as the implementation of their results on the market. The activities undertaken as part of this cooperation are mainly focused on strengthening the links between business and science, increasing the degree of commercialization of R&D results and on supporting and developing innovativeness of companies (Tomaszuk, Wasiluk, 2021).

2.2. The quality of relationship and its dimensions

An unambiguous definition of a relationship has not been adopted in the literature (Kolemba, 2009; Wasiluk, Tomaszuk, 2020). A similar situation exists with regard to the quality of the relationship (Skarmeas, Robson, 2008; Kumar et al., 1995; Ahamed, Skallerud, 2013; Lages et al., 1995; Lages et al., 2005). A popular approach among researchers when defining the quality of a relationship, which at the same time provides the basis for creating tools for its measurement (Danik, 2017), is to define it as a metaconstruct consisting of a number of components (Holmlund, 2008); while the sets of the relationship quality components differ depending on the adopted research approach (Barry, Doney, 2011). The most common among the analyzed and considered key constructs are trust, satisfaction and commitment (Hennig-Thurau et al., 2002; Ulaga, Eggert, 2006; Barry, Doney, 2011; Tung, Carlson, 2013; Leszczyński, 2014; Walter, 2003; Ahamed, Skallerud, 2013; Hajli, 2014; Vieira et al., 2008; De Wulf et al., 2001; Skarmeas, Robson 2008; Liang et al. 2011; Chu, Wang, 2012). Some researchers also consider communication as an additional dimension of the relationships quality (Jiang et al., 2016; Heroux, Hammoutene, 2012; Whipple et al., 2010, Athanasopoulou, 2009; Fynes et al., 2005; Mohaghar, Ghasemi, 2011; De Burca et al., 2011), although it is worth mentioning that by others it is sometimes considered one of the determinants of satisfaction (Mohr, Sohi, 1995). Conflict (or the lack of it) may be considered a construct of relationship quality by some researchers (Leonidou et al., 2006; Skarmeas, Robson, 2008; Ghzaiel, Akrouf, 2012; Heroux, Hammoutene, 2012; Hoopner et al., 2015; Athanasopoulou, 2009; Roberts et al., 2003). Apart from the above-mentioned five, the analyzed constructs are sometimes also cooperation, distance, understanding, dependence, and adaptation (Leonidou et al., 2006), atmosphere (Woo, Enew, 2004) or reputation (Kühne et al., 2013).

Undoubtedly, the most frequent dimension of relationship quality is trust (Inków, 2017). From the point of view of inter-organizational trust, it can be assumed that it is the belief of one company that actions undertaken by its partners will have positive effects, as well as the belief that partners will not undertake actions that could have unexpected negative effects (Anderson, Narus, 1990; Fynes et al., 2004).

From the point of view of the relationship quality commitment can be understood as deepening and broadening the existing exchange relationships (Anderson et al., 1994), as the exchange partner's belief that the ongoing relationship is important enough to justify making maximum efforts to maintain it, thus contributing to the belief of the involved party that the relationship is worth ensuring its longest possible duration (Morgan, Hunt, 1994, p. 23). It is also worth noting that commitment often has a growing tendency – showing commitment by partners causes its further increase (Gundlach et al., 1995). Moreover, commitment that occurs together with trust promotes efficiency, productivity and effectiveness of jointly undertaken activities (Morgan, Hunt, 1994) and protects against opportunism (Sap, Anderson, 2003; Czakon, 2005).

Another dimension of relationship quality, satisfaction, helps to build and secure future revenues, creates barriers for competitors' activities and reduces future transaction costs (Lewin, 2009). When analyzing satisfaction in the institutional market, according to Tikkanena and Alajoutsijärvi (2002) attention should be paid to the internal context of the relationship, the context of interconnected network and the external context. The internal context of the relationship consists of a structural characteristic, expressed in continuity, complexity, symmetry and unofficial character, as well as a process characteristic expressed in adaptation, level of cooperation, social interaction and routine. The context of the interconnected network is made up of a network of relationships to which both (all) partners belong – the satisfaction of a given entity depends in this case on business relationships with other entities from its network. The external context is an extension of the interconnected network context and it is made up of all entities relevant in any way to a given relationship. Contexts overlap, thus creating a background for the emergence of satisfaction (Danik, 2017).

As mentioned while distinguishing relationship constructs, communication is sometimes analyzed as one of the separate components, however, it is also related to both trust and commitment and satisfaction. When analyzing communication as a separate component of relationship quality, it should be remembered that the prerequisites for good communication are long-term orientation, network coordination and the use of information techniques and technologies facilitating communication (Paulraj et al., 2008). Long-term orientation makes the partners willing to invest in creating stronger ties due to the expected future profits – this contributes to creating an atmosphere of mutual understanding and promotes cooperation. Network coordination is based on informal social norms and systems based on solidarity, reciprocity, flexibility and information exchange, which contributes to supporting the development and exchange of knowledge and thus also to higher competitiveness of the partners in the relationship (Paulraj et al., 2008). There is no doubt that the third premise – the use of technologies facilitating communication (and media used in relationships) – is in the present world a factor that is obligatory to be used in the communication process and it is conducive to the flow of information.

3. Methodology

For the purposes of classifying market participants, the concept of a quadruple helix was used, covering the system of connections of representatives of four sectors – private (the so-called "business" sector), science (including research and development), public (the so-called administration sector) and civil society (represented primarily by business environment institutions – BEI) (Carayannis et al., 2012; Carayannis., Campbell, 2011; Bojar, Machnik-Słomka, 2014). The analyzes presented in the article are fragmentary – they concern the quality of relations between representatives of innovative companies in relation to scientific institutions and research and development organizations.

Relationship quality measurement was based on a multidimensional scale, consisting of four subscales: trust, satisfaction, commitment and communication. Regardless the subject of the study (the addressee of the relationship), the list of symptoms proving the quality of the relationship was formulated universally for all helixes. A set of statements reflecting the observable features of the analyzed constructs was adopted as the measuring instrument (Sankowska, 2017). Due to the complicated nature of the tested constructs (Blunsdon, Reed, 2003; Sankowska, 2011; Lewicka et al., 2016), the number of statements used to examine them was optimized and ranged from 3 (for satisfaction) to 5 (for the remaining constructs – trust, commitment and communication). Ultimately, the following statements were distinguished (Lages et al., 2005; Walter, Ritter, 2003; Ryciuk, 2013; Stach, 2013; Woo, Ennew, 2004; Roberst et al., 2003):

- for trust:
 - (Z1) We are convinced that the scientific/research and development institutions we work with are fair.
 - (Z2) We believe that the scientific/research and development institutions we work with know what they do.
 - (Z3) We trust the scientific/research and development institutions we work with because they have trusted us.
 - (Z4) We believe that cooperation with scientific/research and development institutions will be beneficial for us.
 - (Z5) Scientific/research and development institutions usually keep their promises to our company.
- for commitment (devotion):
 - (O1) We believe that scientific/research and development institutions treat cooperation with us as an element of long-term relationships.
 - (O2) We believe that scientific/research and development institutions prefer long-term cooperation with us over short-term profits.
 - (O3) We believe that the scientific/research and development institutions we work with would not do business with others at our expense.
 - (O4) We believe that the scientific/research and development institutions we work with are ready to invest time and resources in developing relationships with us.
 - (O5) From time to time we are ready to make sacrifices to help scientific/research and development institutions.
- for satisfaction:
 - (S1) Taking into account all aspects of cooperation, our experience with scientific/research and development institutions is very satisfactory.

(S2) Our relations with scientific/research and development institutions have positively surprised us.

(S3) We are very pleased with the cooperation with scientific/research and development institutions.

- for communication:

(K1) The contents of messages from scientific/research and development institutions are clear to us.

(K2) Scientific/research and development institutions communicate with us in an open manner.

(K3) Our contacts with scientific/research and development institutions are very frequent.

(K4) Our contacts with scientific/research and development institutions are very often direct.

(K5) Scientific/research and development institutions make efforts to better understand us and our needs.

The reliability of the created scale was checked with the use of the Cronbach's alpha coefficient. The calculated statistics (Cronbach's alpha test for trust was 0.88, for commitment 0.89, for satisfaction 0.92, for communication 0.80) indicates high consistency of items included in the created scale. For each of the statements contained in the questionnaire, the respondent was asked to indicate his position by marking the category on a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree).

The survey was conducted with the use of CATI method on a sample of 200 innovative enterprises in the last quarter of 2021. The method used made it possible to achieve a high level of standardization and minimize the influence of the interviewer on the respondent's opinion and also made it possible to reach respondents with high positions in the surveyed companies and gave a sense of complete anonymity (Malhotra, 2010). The enterprises characteristics are presented in Table 1.

Table 1.

Research sample characteristics

Industry		Enterprise size	
Production	26%	10-49	57%
Construction	16,5%	50-249	34,5%
Trade	29,%	>249	8,5%
Transport	9%		
Service	19,5%		
Active in the market		Operations range	
Up to 1 year	0%	Local	21%
1-3 years	0,5%	Regional	18%
4-9 years	5,5%	Domestic	31,5%
More than 9 years	94%	International	29,5%

Cont. table 1.

Established relationships	
With other enterprises – 98%	
With administration units – 38%	
With research and development units – 22.5%	
With business environment units – 33%	

Source: own study.

The analyzes presented in the article constitute a part of a broader research and concern the determinants of relationships quality in the enterprise – scientific/research institutions perspective. The characteristics of enterprises (N = 45) which established relationships with scientific/research and development institutions are presented in Table 2.

Table 2.

Characteristics of enterprises which established relationships with scientific/research and development institutions

Industry		Enterprise size	
Production	40%	10-49	53,3%
Construction	13,3%	50-249	33,3%
Trade	28,8%	>249	13,3%
Transport	2,2%		
Service	15,6%		
Active in the market		Operations range	
Up to 1 year	0%	Local	8,9%
1-3 years	0%	Regional	13,3%
4-9 years	0%	Domestic	35,6%
More than 9 years	100%	International	42,2%
Established relationships			
With other enterprises – 100%			
With administration units – 33,3 %			
With business environment institutions – 42,2%			

Source: own study.

The analyzes were aimed to learn about the attitudes of innovative enterprises representatives towards the quality of relationships with scientific/research and development institutions. The following research questions were posed:

- P1 – Which of the relationship quality constructs affect the strength of the relationship in the area of enterprise – scientific/research and development institutions?
- P2 – Which of the relationship quality constructs affect the importance of the relationship in the area of enterprise – scientific/research and development institutions?
- P3 – Is it possible to determine dependencies between particular constructs of relationship quality in the enterprise – scientific/research and development institutions area?

4. Analysis of research results

When analyzing the respondents' answers regarding compliance with individual statements, it can be noticed (Table 3) that the highest compliance occurs with regard to statements reflecting trust (4.24-4.44 according to the arithmetic mean). With regard to the remaining constructs, the compliance is much lower and ranges from 3.20 (statements reflecting communication behavior – K3 and K5) to 4.04 (for satisfaction – S1). Therefore, it can be presumed that in relation to scientific/research institutions, trust is the most important among the analyzed constructs of relationship quality. The levels of the median index remain similar (mostly 4); also the most common dominant answer is 4 – I rather agree. The standard deviation ranges from 0.66 (for Z3) to 1.1 (for K5), and can be considered low.

Table 3.

Assessment of respondents' compliance with the statements reflecting individual relationship quality constructs

Construct	Statement	\bar{x}	M_e	D	n_D	Min.	Max	Standard deviation
Trust	Z1	4,33	4	5	22	2	5	0,80
	Z2	4,33	4	5	21	2	5	0,74
	Z3	4,24	4	4	20	2	5	0,80
	Z4	4,44	5	5	24	3	5	0,66
	Z5	4,13	4	4	24	2	5	0,81
Commitment (devotion)	O1	3,84	4	4; 5	14	2	5	0,98
	O2	3,62	4	3	17	1	5	0,96
	O3	3,42	4	4	19	1	5	1,03
	O4	3,44	3	3	16	1	5	1,10
	O5	3,84	4	4	24	1	5	0,95
Satisfaction	S1	4,04	4	4	24	2	5	0,82
	S2	3,60	4	4	17	1	5	1,07
	S3	3,93	4	4	22	1	5	1,01
Communication	K1	3,93	4	4	18	1	5	0,96
	K2	3,97	4	4	19	1	5	0,99
	K3	3,20	3	3	17	1	5	1,04
	K4	3,57	4	4	23	1	5	0,92
	K5	3,20	3	3	17	1	5	1,10

Source: Own study.

The values reflecting the relationship strength and importance in the area of enterprise – scientific/research institutions are presented in Table 4. Comparing them with the other analyzed areas (enterprise – other enterprises, enterprise – administrative institutions and enterprise – business environment institutions), it can be noticed that both indicators have the lowest importance in terms of strength as well as importance of the relationship (the highest are for the relationship between enterprise and enterprise, 4.12 and 4.43, respectively).

Table 4.

The importance of relationships with scientific/research institutions in the respondents' perception

	\bar{x}	M_e	D	n_D	Min.	Max	Standard deviation
strength	3,38	3	3	17	1	5	0,98
importance	3,71	4	4	19	1	5	1,04

Source: own study.

Multiple regression analysis was used in order to determine which of the constructs primarily determine the strength and importance of the relationship. When analyzing the influence of constructs on the relationship strength, strength was considered a dependent variable, while trust, commitment, satisfaction and communication were assumed as independent variables. A similar analysis was performed for the validity of the relationship. The results of the multiple regression analysis are presented in Table 5.

Table 5.

Multiple regression analysis for the strength and importance of enterprises relationships with scientific/research and development institutions

Relationship strength				
N = 45	b*	SE with b*	t	p
constant			0,95	0,35
communication	0,60	0,12	4,91	0,01
Models parameters: $R^2 = 0,36$ $F(1,43) = 24,064$ $p < 0,00001$ Standard error of estimation: 0,79				
Relationship importance				
N = 45	b*	bl. std. z b*	t	p
constant			2,63	0,12
Communication	0,48	0,13	3,62	0,01
Models parameters: $R^2 = 0,23$ $F(1,43) = 13,087$ $p < 0,00078$ Standard error of estimation: 0,90				

Source: own study.

For both analyzed variables, only one construct turned out to be an influencing construct. With regard to scientific and research institutions, communication turned out to be a construct influencing the strength of a relationship, while commitment was the construct influencing the importance of a relationship. Interestingly, no impact of trust or satisfaction was observed in the case of this group of entities, although both constructs are important from the point of view of shaping the relationship quality. The mutual correlations between the constructs were also analyzed (Table 6).

Table 6.

Pearson's r-correlation coefficient of quality dimensions

The relationships quality dimension		1	2	3	4
1	trust	1			
2	commitment	0,64	1		
3	satisfaction	0,78	0,76	1	
4	communication	0,60	0,74	0,59	1
The market correlation coefficients are significant with $p < ,05000$, $N = 45$					

Source: own study.

All analyzed correlations turned out to be positive and statistically significant. The most important ones were observed for satisfaction and trust as well as for satisfaction and commitment, the lowest - between communication and satisfaction. This confirms the thesis that individual relationship quality constructs cannot be fully analyzed separately (Leonidou et al., 2006; Danik, 2017) – also in the context of the relationship between the enterprise and scientific/research institutions.

5. Conclusion

The quality of relationship is not fully recognized in terms of its nature, conditions and effects (Inków, 2017). The discrepancies concern not only the very definition of the concept, but also the dimensions affecting it. The formulated assumptions of the study were based on the belief that it is possible to formulate a list of universal constructs of relationship quality that are adequate for all spheres of the quadruple helix, including the scientific one, and the following were adopted: trust, satisfaction, commitment and communication. The results obtained by means of the conducted research show that the construct of relationship quality that influences the strength of a relationship is communication, while in the case of relationship importance it is commitment. Interestingly, no relationship is shown for trust, which is considered the most important dimension of relationship quality. This may be due to the specificity of these relations (most studies indicating the importance of trust concern the quality of consumer or B2B relations) and/or the specificity of the research sample, which is also a significant limitation of the research. Only 22.5% of the analyzed enterprises indicated the established relations with the scientific sphere, which is covered by the research of other authors – the low percentage of cooperation of Polish enterprises with the R&D sphere is conditioned, inter alia, by poor cooperation with the scientific and research and development sector (Tomaszuk, Wasiluk, 2021). The conducted research also shows that with regard to the significance of individual relationship quality constructs, the area in which they are implemented may be important.

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MANAGING PERSONAL FINANCE BY ROBO-ADVICE USERS DURING THE COVID-19 PANDEMIC AND IN THE POST-PADEMIC PERIOD. A COMPARATIVE ANALYSIS OF POLAND AND SLOVAKIA

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Design/methodology/approach: This article aims to compare the behaviour of Polish and Slovak robo-advice users in the area of personal finance management during the COVID-19 pandemic, as well as their expected saving, expenditure and investment action after the end of the pandemic. An important aspect of the analysis is a comparison of how the respondents use the PFM application for personal finance management. The article was based on a literature analysis, statistical data, as well as our own pioneering empirical study conducted in September 2021 among clients of the Slovak brokerage house Finax in Poland and Slovakia, which was the first entity in Poland to offer a robo-advice service. A number of statistical methods were used to analyze the collected statistical material: Mann-Whitney U Test, Pearson's Chi-square test, Linear Regression Analysis, Kendall's tau correlation analysis.

Findings: The COVID-19 pandemic did not adversely affect the personal finance of Polish and Slovak robo-advice users and they differed in terms of investment methods during the pandemic as well as their investment plans after the pandemic. Polish and Slovak robo-advice users used spreadsheets plus special banking and non-banking applications to manage their personal finance. Sociodemographic variables did not largely explain how Poles and Slovaks used the application to configure personal finance. During the pandemic, saving was associated with the use of an application to configure personal finance and the awareness of the existence of such an application among both Poles and Slovaks.

Research limitations/implications: The conclusions of the study can be used by financial institutions, FinTechs, robo-advisors and PFM application providers for managing the home budget.

Originality/value: The novelty of the article is the first comparative study of robo-advice users in Poland and Slovakia on personal finance management during the COVID-19 pandemic and financial plans in the post-pandemic period.

Keywords: COVID-19 pandemic, robo-advice, personal finance management, PFM applications.

Category of the paper: research paper.

1. Introduction

The World was gripped by a pandemic over the first half of 2020, of which the second wave emerged in the fall. It was identified as a new coronavirus (severe acute respiratory syndrome coronavirus 2, or SARS-CoV-2), and later renamed as Coronavirus Disease-19 or COVID-19 (Brodeur et al., 2021). The COVID-19 pandemic as the so-called the black swan, i.e. an unexpected and sudden phenomenon, has affected all spheres of socio-economic life, including the finance of economic entities – enterprises and households. For countries, the COVID-19 pandemic meant increased public spending, preceded by crisis shields and aid to households (Li et al., 2021). The financial resilience and vulnerability of households (Bruce et al., 2022) depended on their financial resources and the ability to deal with crisis situations. Policies and programs that enhance financial resilience can help low and moderate-income households withstand economic shocks and be able to better address unexpected income needs (Clark, Mitchell, 2022). The results indicate that vulnerability is experienced and reflected through a multitude of fears and concerns and is influenced by personality traits (agreeableness, neuroticism, conscientiousness, need for material resources, and need for body resources) and can result in increased spending on products/services that are not normally perceived as necessities (Yazdanparast, Alhenawi, 2022). The outbreak of pandemic is having major effects on the economy both for households and nations (Barrafrem et al., 2020). The interruption of education is a key channel through which the pandemic risks having a long-term adverse impact on inequality and household welfare, with children in rural households and with less-educated parents being less likely to continue learning during school closures (Bundervoet, 2022). According to EU households' data the COVID-19 pandemic is likely to affect significantly households' disposable income in the EU, with lower income households being more severely hit (Almeida et al., 2021). In China households' liquidity constraints become serious after the outbreak of COVID-19. Households' likelihood of liquidity constraints increases with the severity of the pandemic, mainly due to the COVID-19 pandemic shock to employment and household income (Li et al., 2020).

Lockdowns, social isolation and quarantine, work and remote learning, the closure of restaurants and the entertainment industry made us home more often than before the pandemic. There was also more time to think about personal finance – the structure of income and expenses, change habits in payments (Kubota et al., 2021). Spending declined due to fears of tomorrow, uncertainty, and refraining from purchasing, which may have increased savings and the demand for automatic financial advice. Therefore, an empirical look at the financial behavior of households on the example of Poland and Slovakia is justified, and the target group, due to the availability of data, will be robo-advice users.

The following research hypotheses were proposed:

1. The COVID-19 pandemic did not adversely affect the personal finance of Polish and Slovak robo-advice users.
2. Polish and Slovak robo-advice users differed in terms of investment methods during the pandemic as well as their investment plans after the pandemic.
3. Polish and Slovak robo-advice users used spreadsheets plus special banking and non-banking applications to manage their personal finance.
4. Sociodemographic variables did not largely explain how Poles and Slovaks used the application to configure personal finance.
5. During the pandemic, saving was associated with the use of an application to configure personal finance and the awareness of the existence of such an application among both Poles and Slovaks.

2. The impact of the COVID-19 pandemic on personal finance – a literature overview

COVID-19 has caused profound socio-economic changes worldwide (Khetan et al., 2022). The outbreak of the COVID-19 pandemic, reduction in income and total loss of jobs have affected the financial behaviour of consumers worldwide. People's lives are mainly affected in two ways: First, a notable fraction of the population is concerned that they or their family members and friends may get infected with the coronavirus. Second, many people suffer from socio-economic consequences of the crisis, including a discontinuation of employment, a decrease in household income, and worries about financial troubles (Immel et al., 2022). Managing the budget in times of turbulence and crisis has posed a challenge for households (Waliszewski, Warchlewska, 2021a). According to research in European countries consumers who had been making cashless payments prior to the outbreak of the pandemic have often been doing so more frequently since, while those who had preferred to pay in cash have for the most part continued to do so. This may indicate financial inclusion issues—e.g. people without cashless instruments could have difficulties adapting to the new situation within the confines of the imposed restrictions. During the COVID-19 pandemic payment behaviour shifted toward cashless payments. The scale of change in payment patterns varied between the European countries. Heavy cash users were generally less likely to adopt cashless solutions. The divide between cash and cashless users seems to have widened during the pandemic (Kotkowski, Polasik, 2021). The pandemic caused falling living standards of low and middle-income households (Egger et al., 2021). As results shows inhabitants were interested in compromising their spending and other forms of savings to have more emergency savings (Gopal et al., 2022).

Research has shown the devastating effects of COVID-19, and the impact on families' financial stress and well-being is one of them (Rodrigues et al., 2021).

The COVID-19 pandemic has changed the daily lives of people in many countries. It has affected the level and forms of the employability of an individual, freedom of movement and how income is spent. In such economically and socially difficult situations, the importance of financial literacy is being increased because these adverse circumstances which do not depend on a citizen significantly affect people who make financial decisions and change their behaviour (Ciemleja, Kozlovskis, 2021). The pandemic situation has changed the way we work, learn and shop. Digital finance has helped individuals and companies to meet challenges. The pandemic has pushed forward digital solutions for payments and banking services. People have been dragged from their comfort zone when it comes to managing personal finance. The discrepancies between those who have access to digital devices and knowledge and those left out between poor and rich became more obvious during this pandemic (Bostan, 2021). According to research conducted in China, households who know someone infected with COVID-19 lose confidence in the economy. They are more likely to change their attitude to risk and become more risk-averse. Furthermore, COVID-19 increases the probability that a household will change its investment portfolio. In the context of the impact of the COVID-19 pandemic on personal finance, the term household financial resilience is used. Financial resilience is the declared, probable ability of households to withstand financial shocks, the possibility of obtaining funds for unforeseen expenses. This is the ability to cope financially when faced with a sudden fall in income or unavoidable rise in expenditure. These financial shocks can arise in many ways including a drop in income due to sickness, job loss or reduced working hours, a relationship breakdown or bereavement, or a jump in housing costs including essential repairs to the home, or taking on new responsibilities such as caring. Some households are less resilient to financial shocks than others. This may be because they have low levels of savings, have limited access to affordable credit, already hold high levels of debt or lack the skills required to manage household budgets. Financial resilience is difficult to estimate because it is a dynamic concept – the ability to recover quickly from an income or expenditure shock. This means that we have different indicators of resilience (Knight, Rucci, 2020). Personal financial counseling is of great importance in maintaining financial resilience to external shocks with the lack of knowledge and financial education of the society. Financial advisors have long held the responsibility to assist their clients when they encounter financial shocks. Financial planners typically recommend 3 to 6 months of income or expenses in an emergency fund. To manage unexpected shocks, the emergency savings accounts could be one potential solution to short-term financial fragility. Financial advisors could demonstrate to households the importance of building an emergency fund as part of a financial plan, such as having an emergency savings account that is separated from long-term assets. Low-income households and single-parent families are more vulnerable to financial shocks and thus should prioritise building emergency funds, and the size of the emergency fund could be larger than the standard

benchmark of 3 to 6 months' worth of income or expenses (Sun, Small, Huang, Ger, 2022). Additionally financial and digital literacy are key factors to building financial resilience. Traditional financial literacy needs to be redefined to include digital literacy. A dual literacy approach is necessary to improve financial inclusion and resilience (Kass-Hanna, Lyons, Liu, 2021).

During the pandemic, there was an increase in use mobile financial services (MFS). The gap between the registered users and active users of MFS and found some interesting factors leading to this phenomenon. These are dependency, lack of basic digital literacy, lack of perceived usefulness, lack of perceived ease of use, security concerns and transaction costs (Afroze, Rista, 2022). The use of remote and automatic financial solutions due to social isolation during the pandemic was becoming more and more popular. Figure 1 illustrates the benefits of robo-advice during a pandemic.

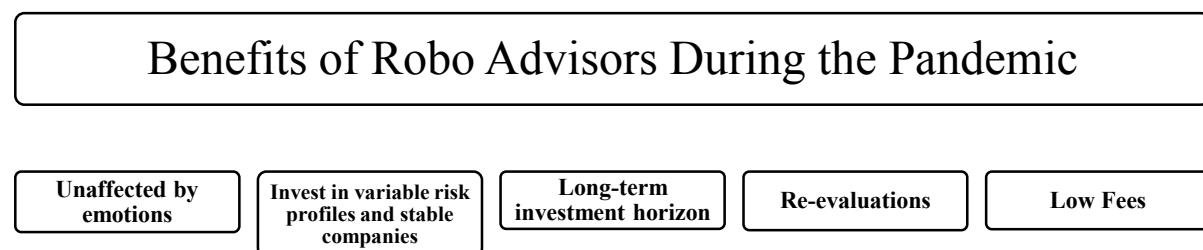


Figure 1. Benefits of Robo Advisors during the Pandemic. Source: own study based on The Rise in Robo Advisory Services during Covid-19, <https://www.corporatevision-news.com/the-rise-in-robo-advisory-services-during-covid-19/> (access 4.05.2022).

At the global level, respondents shared that the practice of financial planning has accelerated its adoption of communication technology (Fox, Bartholomae, 2020). The digital acceleration will likely have important longer-term implications for involved consumers and providers. On the demand side, while the large-scale shifts in fintech adoption and particularly the use of alternative lending sources may have helped many households and small firms mitigate the expected short-term fall in productivity and economic growth stemming from COVID, they may also have implications for overindebtedness and consumer protection. It remains to be seen whether these newer fintech lending sources acted as complements or substitutes and whether the adopting borrowers suffer disproportionately from loan performance issues and other adverse outcomes over time. On the supply side, the trends have policy relevance for regulators and supervisors who have been closely watching the trajectory of fintech and interplay between traditional incumbents, “BigTech” and other fintech players, such as neobanks (Fu, Mishra, 2022).

3. Methodology of research

The current state of affairs and future prospects regarding the development of the market for robo-advice services in Poland and Slovakia—a comparative analysis.

Robo-advisors have emerged from the entwinement of two strands of history represented by investment theory and AI-technology during the latter part of the 20th century. The leading robo-advisory models **founded** in today's AI-driven technological environment are mostly based on Modern Portfolio theory (MPT), based on an optimal portfolio for a given investor's risk preference (Waliszewski, Warchlewska, 2020). In previous research the diagnosed differences in the development of automated financial advisory services in Eastern and Central European countries are grounded in economic, regulatory, technological and socio-cultural factors (Waliszewski, Warchlewska, 2021b).

To compare the scale and potential of the Polish and Slovak markets, it is worth recalling the demography. The population of Slovakia at the end of 2021 was 5.43 million, while the population of Poland stood at 37.7 million.

The Polish robo-advice market

Assets under management in the robo-advice segment are projected to reach US\$3.00bn in 2022. Assets under management are expected to show an annual growth rate (CAGR 2022-2026) of 17.20% resulting in a projected total amount of US\$5.67bn by 2026. In the robo-advice segment, the number of users is expected to amount to 1.184m users by 2026. The average assets under management per user in the robo-advice segment is expected to equal US\$3.60k in 2022. From a global comparison perspective it is shown that the most assets under management are in the United States (US\$1,230.00bn in 2022). (Robo-Advisors – Poland, Slovakia). Assets under management in the robo-advice segment are projected to reach US\$469.30m in 2022.

The Slovak robo-advice market

Assets under management are expected to show an annual growth rate (CAGR 2022-2026) of 24.15% resulting in a projected total amount of US\$1,115.00m by 2026 (figure 2). The average assets under management per user in the robo-advice segment is expected to equal US\$3.66k in 2022 (figure 3). In the robo-advice segment, the number of users is expected to be 0.175m users by 2026 (figure 4). The penetration rate is expected to grow in Poland and Slovakia to the level above 3% by 2026 (figure 5).

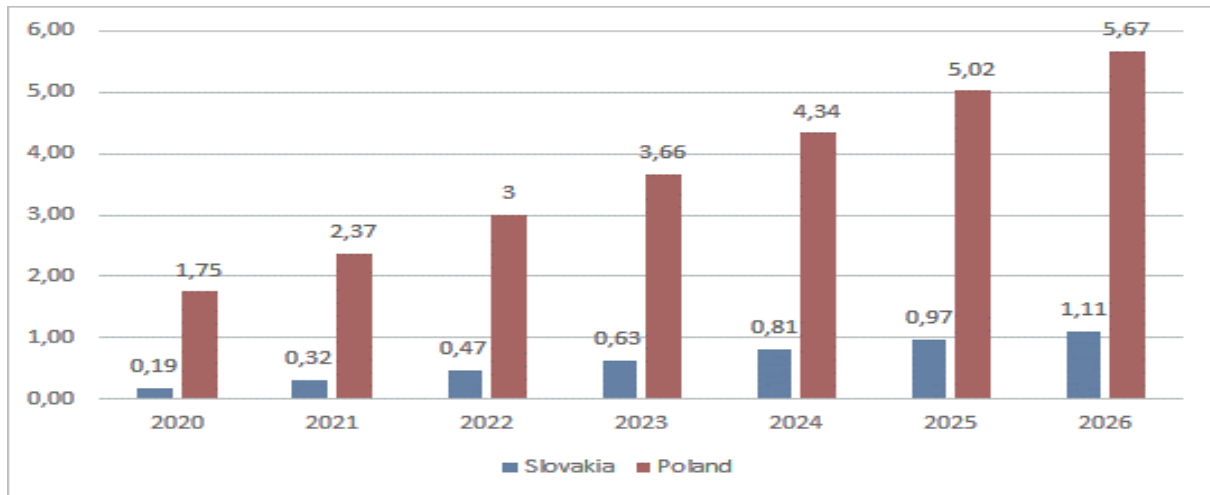


Figure 2. Assets under Management by Robo-Advisors in billion USD. Source: Statista.

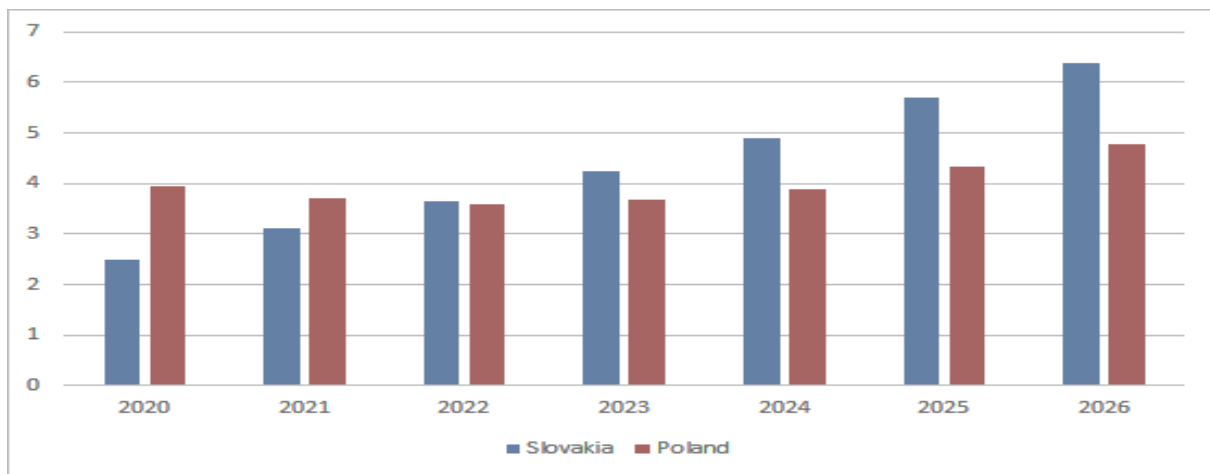


Figure 3. Average Assets under Management by Robo-Advisors per User in thousand USD. Source: Statista.

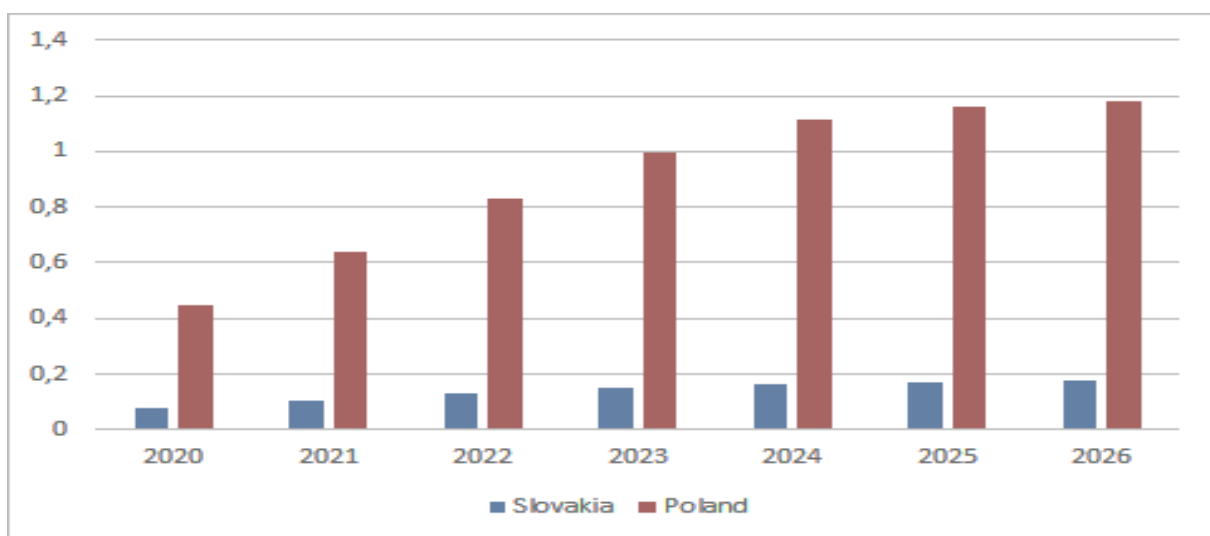
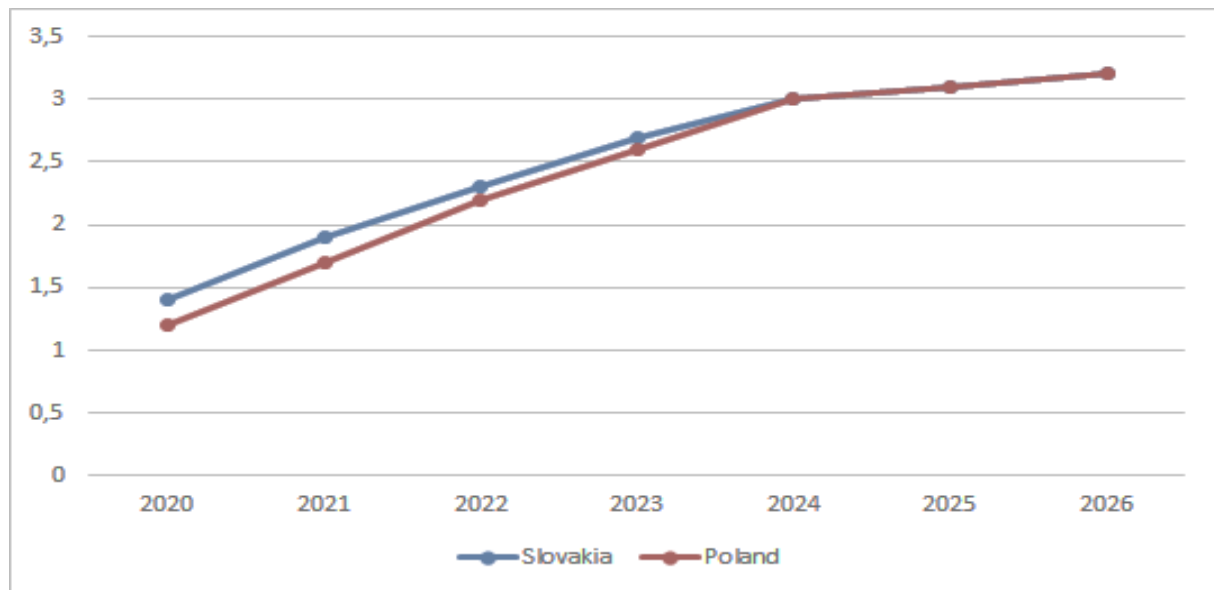


Figure 4. Users of Robo-Advice in million users. Source: Statista.



* The Penetration Rate shows the share of active paying customers (or accounts) from the total population of the selected market (market segment, region) for each year.

Figure 5. Penetration rate* as a percentage. Source: Statista.

Own empirical research

A survey in the form of an online questionnaire distributed among Finax customers was conducted in September 2021 on a group of $N = 438$ Poles and $N = 1059$ Slovaks. The Polish citizens were aged between 20 and 77 with an average age of $M = 36.29$ years with a deviation of ± 9.49 years, and the median in this group was 35 years. The Slovak citizens were aged between 19 and 74 with an average age of $M = 36.60$ years with a deviation of ± 9.25 years, and the median in this group was also 35 years. The Mann-Whitney U test analysis revealed no differences between the groups in terms of age distribution $Z = 0.84$; $p = .402$; $r = .02$.

Table 1.

Comparative age analysis with Mann-Whitney U tests between groups

		<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>Me</i>	<i>Z</i>	<i>p</i>	<i>r</i>
Age	Poland	20	77	36.29	9.49	35	0.84	.402	.02
	Slovakia	19	75	36.60	9.25	35			

Symbols: Min – minimum, Max – maximum, M – mean, SD – standard deviation, Me – median, Z – Mann-Whitney U statistic, p – level of statistical significance, r – strength of the relationship.

The majority of the study group were men—84.5% of the Polish and 83.8% of the Slovak group. Most of the respondents had higher education (82.2% of Poles and 74.5% of Slovaks), followed by people with secondary education with a high school diploma (14.8% of Poles and 23.9% of Slovaks), and more rarely with a secondary education without a high school diploma (3% of Poles and 1.6% of Slovaks). In terms of education, there were slight differences between the groups, $p < .001$. The Slovak group contained more economically active people (93.8%) than the Poles (90.2%), and this difference was statistically significant $p < .001$, but minor $V = .09$. There were also statistically significant differences between Poles and Slovaks in terms

of their place of residence $p < .001$; $V = .23$. The Poles featured a greater percentage of inhabitants of large cities (66.9%) than the group of Slovaks (42.3%). On the other hand, the Slovaks had a greater percentage of inhabitants of small towns and villages. The study groups did not differ in terms of household size—most of the respondents lived in households of two, three or four people. The mean average net income per person in the household was also compared between the groups, and this difference was statistically significant $p < .001$ and moderate $V = .20$. The Poles had a higher average household income per capita than the Slovaks.

Table 2.

Characteristics of the group of respondents with the results of Pearson's χ^2

		Poland		Slovakia		<i>p</i>	<i>V</i>
		<i>N</i>	%	<i>N</i>	%		
Sex	Women	68	15.5%	172	16.2%	.731	.01
	Men	370	84.5%	887	83.8%		
Education	Secondary without high school diploma	13	3.0%	17	1.6%	***	.11
	Secondary with high school diploma	65	14.8%	253	23.9%		
	Higher	360	82.2%	789	74.5%		
Professional situation	Unemployed	15	3.4%	10	0.9%	.005**	.09
	Student	17	3.9%	38	3.6%		
	Professionally active	395	90.2%	993	93.8%		
	Retired	11	2.5%	18	1.7%		
Place of residence	Village	42	9.6%	224	21.2%	***	.23
	Town up to 50,000 inhabitants	53	12.1%	248	23.4%		
	Town with 50-150,000 inhabitants	50	11.4%	139	13.1%		
	City with more than 150,000 inhabitants	293	66.9%	448	42.3%		
Number of people in bousehold	One	67	15.3%	134	12.7%	.131	.07
	Two	149	34.0%	320	30.2%		
	Three	95	21.7%	230	21.7%		
	Four	102	23.3%	293	27.7%		
	Five and more	25	5.7%	82	7.7%		
Average monthly income (net) per person in the household in Euro	Up to 250	11	2.5%	2	0.2%	***	.20
	251-500	25	5.7%	50	4.7%		
	501-750	51	11.6%	141	13.3%		
	751-1000	50	11.4%	193	18.2%		
	1001-1500	94	21.5%	332	31.4%		
	1501 and more	207	47.3%	341	32.2%		

Symbols: *p* – level of statistical significance, *V* – strength of Cramer's *V* relationship.

A number of statistical methods were used to analyse the statistical material collected from an initial study of Poles and Slovaks. Mann-Whitney U Test to:

- comparison of average age,
- comparison of satisfaction with the application, the likelihood of recommending the application and using it.

Pearson's Chi-square test to:

- comparison of gender, education, place of residence, number of people in the household, income,
- comparison of the financial impact of the pandemic between countries,
- comparison of app usage rates between countries,
- relationship between awareness of the existence of the application and use of the application to configure personal finance with being a Finax client.

Linear Regression Analysis to analyse:

- impact of sociodemographic variables on the use of the application,
- impact of sociodemographic variables on the awareness of the application,
- influence of sociodemographic variables on being a Finax client.

Kendall's tau correlation was used to analyse relationship between the evaluation of the application for configuring personal finance and sociodemographic variables.

The following research hypotheses were proposed:

1. The COVID-19 pandemic did not adversely affect the personal finance of Polish and Slovak robo-advice users
2. Polish and Slovak robo-advice users differed in terms of investment methods during the pandemic as well as their investment plans after the pandemic.
3. Polish and Slovak robo-advice users used spreadsheets plus special banking and non-banking applications to manage their personal finance.
4. Sociodemographic variables did not largely explain how Poles and Slovaks used the application to configure personal finance.
5. During the pandemic, saving was associated with the use of an application to configure personal finance and the awareness of the existence of such an application among both Poles and Slovaks.

4. Results and discussion

Assessment of the impact of the pandemic on the financial situation

Table 3 presents the results of Pearson's χ^2 test the analyses to compare groups with regard to the financial impact of the pandemic. The pandemic did not adversely affect the finance of

50.5% of Poles and 60.8% of Slovaks (statistically significant difference $\chi^2(1) = 13.62$; $p < .001$; $V = .10$), and an increase in income despite the pandemic occurred in 37.4% of Poles and 30.5% of Slovaks (statistically significant difference $\chi^2(1) = 6.80$; $p < .01$; $V = .07$). A decrease in income during the pandemic was observed by 15.1% of Poles and 12.5% of Slovaks. Therefore, most of the people surveyed did not feel the impact of the pandemic on their finance or their financial situation improved compared to the pre-pandemic period.

Table 3.

The results of analyses using Pearson's χ^2 tests to compare groups in terms of the financial impact of the pandemic

How did the COVID-19 pandemic influence your finance?	Poland	Slovakia	χ^2	p	V
I received less income	15.1%	12.5%	1.83	.176	.03
I lost my job	4.6%	2.7%	3.27	.071	.05
I had difficulty keeping up with loan repayments	0.5%	0.1%	2.03	.154	.04
The pandemic hit my company	7.1%	4.9%	2.78	.095	.04
The pandemic did not negatively affect my finance	50.5%	60.8%	13.62	***	.10
My income rose in spite of the pandemic	37.4%	30.5%	6.80	.009**	.07

Symbols: χ^2 – Chi-square statistic, p – level of statistical significance, V – strength of Cramer's V relationship.

The study groups were also compared in terms of how the pandemic affected financial behaviour, and these results turned out to be statistically significant at $p < .0001$ (Table 4). During the pandemic, most of the respondents had lower expenditure (67.4% of Poles and 70.5% of Slovaks), but more than half of the respondents did not plan to change their level of expenditure going forward (53.0% of Poles and 59.1% of Slovaks). During the pandemic, most of the respondents increased their savings (63.9% of Poles and 61.7% of Slovaks).

Table 4.

The results of Pearson's χ^2 test analyses to compare groups in terms of how the pandemic impacted financial behaviour

		Fewer expenses/ less saving	No change	More expenses/ saving	χ^2	p	V
How did the COVID-19 affect your expenses?	Poland	67.4%	32.6%	0.0%	28.29	***	.14
	Slovakia	70.5%	24.8%	4.7%			
What are your spending plans for the future compared to what you were spending before the pandemic?	Poland	28.5%	53.0%	18.5%	35.31	***	.15
	Slovakia	33.0%	59.1%	7.9%			
How did the pandemic affect your savince?	Poland	12.1%	24.0%	63.9%	24.24	***	.13
	Slovakia	5.8%	32.7%	61.7%			

Symbols: χ^2 – Chi-square statistic, p – level of statistical significance, V – strength of Cramer's V relationship.

Comparisons were also made between Polish and Slovak groups on how the pandemic impacted their investments. The study groups differed in a statistically significant way in terms of shifts in investment habits during the pandemic $\chi^2(3) = 21.26$; $p < .001$; $V = .12$ as well as investment plans post pandemic $\chi^2(3) = 9.71$; $p < .05$; $V = .08$. Poles tended to state that they invested more during the pandemic (70.1% vs. 65.9%), while Slovaks were more likely than Poles to have invested the same amount during the pandemic (27.7% vs. 18.9%). On the other hand, the surveyed Slovaks declared that after the pandemic they intend to invest more than Poles (57% vs 49.8%).

Table 5.

Pearson's χ^2 test results analysis to compare groups in terms of how the pandemic impacted investments

		Poland	Slovakia	χ^2	p	V
How did your investment habits change during the pandemic?	I didn't invest at all	7.1%	3.2%	21.26	***	.12
	I invested less	3.9%	3.2%			
	I invested the same	18.9%	27.7%			
	I invested more	70.1%	65.9%			
What are your investment plans post-pandemic?	I am not going to invest	2.3%	0.9%	9.71	0.021*	.08
	I will invest less	3.2%	2.6%			
	I will invest the same	44.7%	39.5%			
	I will invest more	49.8%	57.0%			

Symbols: χ^2 – Chi-square statistic, p – level of statistical significance, V – strength of Cramer's V relationship.

Use and evaluation of applications for configuring personal finance

The study also aimed to determine how often Poles and Slovaks used financial management applications and how they assessed the efficacy and usefulness of such tools. These respondents indicated that applications for tracking expenses at the bank were used more often by Slovaks (17.1% vs. 6.6%), while Poles tended to plan their finance with the help of Excel (37% vs. 26%) and a special application (15.1% vs. 11.7%), and this difference was moderately strong $\chi^2(5) = 41.41$; $p < .001$; $V = .17$. In the study group, Finax clients were more likely to be Slovaks than Poles $\chi^2(1) = 35.76$; $p < .001$; $V = .16$.

Poles using applications to track expenses at their bank usually used ING bank and Millenium apps, while the Slovaks used George, Tatra and VUB bank apps. On the other hand, when it comes to special applications for tracking expenses in Poland, the most popular ones were Money, My finance and YNAB, while in Slovakia, Spendee, E0xpense and Wallet tended to be used.

Table 6.

Pearson's χ^2 test results analysis to compare groups in terms of approach to supervising finance

		Poland		Slovakia		χ^2	p	V
		N	%	N	%			
Do you have an overview of your expenses?	No	69	15.8%	179	16.9%	41.41	***	.17
	Yes, I check bank statements	79	18.0%	201	19.0%			
	Yes, I use an app to track my bank expenses	29	6.6%	181	17.1%			
	Yes, I use my own spreadsheets	162	37.0%	275	26.0%			
	Yes, I use paper and pen	33	7.5%	99	9.3%			
	Yes, I use a special app to track expenditure	66	15.1%	124	11.7%			
Are you a Finax client?	No	82	18.7%	85	8.0%	35.76	***	.16
	Yes	356	81.3%	974	92.0%			

Symbols: χ^2 – Chi-square statistic, p – level of statistical significance, V – strength of Cramer's V relationship

In the case of people who used an application to configure personal finance, the majority did so via a mobile app and website (45.3% of Poles and 59.3% of Slovaks) or via mobile app alone (40% of Poles and 35.4% of Slovaks), and the difference between the groups was statistically significant $\chi^2(2) = 11.68$; $p < .01$; $V = .17$. Bugs in the applications were noticed by 13.7% of Poles and 15.7% of Slovaks (no statistically significant differences between the groups $p > .05$).

Table 7.

Pearson's χ^2 test results analysis to compare groups in terms of using applications to configure personal finance

		Poland		Slovakia		χ^2	p	V
		N	%	N	%			
How can you use your app?	Only on my mobile phone	38	40.0%	108	35.4%	11.68	.003**	.17
	Only on the Internet	14	14.7%	16	5.3%			
	Mobile phone and Internet	43	45.3%	181	59.3%			
Does the app have any bugs?	No	31	32.6%	71	23.3%	3.34	.189	.09
	I don't know/I haven't noticed	51	53.7%	186	61.0%			
	Yes	13	13.7%	48	15.7%			

Symbols: χ^2 – Chi-square statistic, p – level of statistical significance, V – strength of Cramer's V relationship

The respondents were of the opinion that the application meets most of their requirements regarding control over daily expenses (74.7% of Poles and 73.8% of Slovaks) as well as an overview of expenditure structure by category (91.6% of Poles and 85.9% of Slovaks). Poles were demonstrably more appreciative of the application in terms of being able to plan a monthly budget $\chi^2(1) = 12.61$; $p < .001$; $V = .18$, future expenses $\chi^2(1) = 13.79$; $p < .001$; $V = .19$ and monitor savings $\chi^2(1) = 10.17$; $p < .01$; $V = .16$. On the other hand, a small percentage stated that the application they use to configure personal finance meets their requirements in terms of maintaining a positive balance on their account.

Table 8.

Pearson's χ^2 test results analysis to compare groups in terms of evaluating how the application meets the requirements for configuring personal finance

What needs does the application meet?	Poland	Slovakia	χ^2	<i>p</i>	<i>V</i>
I have control over my daily expenses	74.7%	73.8%	0.04	.851	.01
Overview of the expenditure structure by category	91.6%	85.9%	2.10	.147	.07
Automatic categorisation of expenses	49.5%	57.0%	1.68	.195	.06
Monthly budget planning	52.6%	32.5%	12.61	***	.18
Planning future / regular expenses	58.9%	37.4%	13.79	***	.19
It helps me to maintain a positive balance on my account	30.5%	23.0%	2.23	.135	.07
It helps me to take control of my savings budget	50.5%	32.5%	10.17	.001**	.16

Symbols: χ^2 – Chi-square statistic, *p* – level of statistical significance, *V* – strength of Cramer's V relationship.

Comparing the assessment of the benefits offered by an application for configuring personal finance, Poles were demonstrably more inclined to mention the benefit of developing the habit of saving $\chi^2(1) = 13.77$; $p < .001$; $V = .19$ and financial security through constant monitoring of the account balance $\chi^2(1) = 12.50$; $p < .001$; $V = .18$, but they mentioned the benefit of building a credit history less frequently than the Slovaks $\chi^2(1) = 5.85$; $p < .05$; $V = .12$. The main benefit offered by the application used was control of expenses, followed by the habit of saving and financial security. The least frequently mentioned benefit of an application for configuring personal finance was personalised product recommendations.

Table 9.

Pearson's χ^2 test results analysis to compare groups in terms of the benefits of using an app to configure personal finance

Name the benefits of using an application:	Poland	Slovakia	χ^2	<i>p</i>	<i>V</i>
Control over banking products in one place	40.0%	46.6%	1.26	.262	.06
Control of expenses	95.8%	93.4%	0.71	.400	.04
Support for financial decisions	33.7%	27.5%	1.33	.249	.06
Developing the habit of saving	67.4%	45.6%	13.77	***	.19
I am building a positive credit history, clearing payments on time	9.5%	20.3%	5.85	.016*	.12
Financial security through constant monitoring of the account balance	57.9%	37.4%	12.50	***	.18
Personalised product recommendations	2.1%	4.3%	0.93	.334	.05

Symbols: χ^2 – Chi-square statistic, *p* – level of statistical significance, *V* – strength of Cramer's V relationship.

Through analyses of Pearson's χ^2 tests, the study groups were compared in terms of shortcomings in the application for configuring personal finance (Table 10). Most of the results of the analyses turned out to be statistically insignificant $p > .05$, which means that Poles and Slovaks in the study groups did not differ in terms of how they evaluate deficiencies in applications. The respondents most often found intelligent financial advice in the application to be lacking, as well as the possibility to compare their own financial behaviour with the average customer and to synchronise with the bank. Poles were more likely than Slovaks to express the opinion that the application lacked offers of more advantageous products, which they currently use $\chi^2(1) = 6.50$; $p < .05$; $V = .13$.

Table 10.

Pearson's χ^2 test results analysis to compare groups in terms of shortcomings in applications for configuring personal finance

What's lacking in the application you use:	Poland	Slovakia	χ^2	<i>p</i>	<i>V</i>
The application has everything I need, nothing is lacking	26.3%	30.8%	0.70	.402	.04
I'd like to set a monthly budgets and see how much more I can spend in that category this month	23.2%	22.6%	0.01	.914	.01
I would like the app to sync with my bank/multiple banks	43.2%	32.5%	3.65	.056	.10
I also miss being able to link my partner's account to see expenses for the entire household	18.9%	26.9%	2.43	.119	.08
I'd like the app to advise me on what I can improve based on my expenses	53.7%	47.2%	1.21	.271	.06
I would like to be able to compare my spending structure with the average of people with a similar lifestyle	47.4%	46.9%	0.01	.934	.00
I would like to communicate with the app via smart chat to answer my questions	8.4%	7.5%	0.08	.779	.01
Suggestions of more advantageous products that I am currently using	23.2%	12.5%	6.50	.011*	.13

Symbols: χ^2 – Chi-square statistic, *p* – level of statistical significance, *V* – strength of Cramer's V relationship.

People who use an app to configure their personal finance were also asked to evaluate it. Comparisons between groups were made by means of analyses with Mann-Whitey U tests (Table 11). It was not demonstrated that the groups were statistically significantly different in terms of satisfaction with the application and the probability of recommending it $p > .05$. The average rating of satisfaction with the application was $M = 7.89$ points with a deviation of $SD = 1.54$ points in the Polish group of Poles and $M = 8.01$ points with a deviation of $SD = 1.59$ points in the Slovak group. The likelihood of recommending the application to a friend was, on average, $M = 7.84$ points with a deviation of $SD = 1.97$ points in the Polish group and $M = 7.71$ points with a deviation of $SD = 2.23$ points in the Slovak group. Slovaks claimed they would be more likely to use an application that would help manage the family finance was ($M = 6.79$) than the Poles ($M = 2.72$ points).

Table 11.

U Mann-Whitney test results to compare groups in terms of evaluation of applications to configure personal finance

		<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>Me</i>	<i>Z</i>	<i>p</i>	<i>r</i>
How satisfied are you with the application?	Poland	3	10	7.89	1.54	8	1.04	.299	.05
	Slovakia	1	10	8.01	1.59	8			
How likely are you to recommend this application to a friend?	Poland	1	10	7.84	1.97	8	0.05	.963	.00
	Slovakia	1	10	7.71	2.23	8			
What is the likelihood that you would consider using an app to help to manage your family finance?	Poland	1	10	6.43	2.76	7	2.18	.030*	.07
	Slovakia	1	10	6.79	2.72	8			

Symbols: *Min* – minimum, *Max* – maximum, *M* – mean, *SD* – standard deviation, *Me* – median, *Z* – Mann-Whitney U statistic, *p* – level of statistical significance, *r* – strength of the relationship.

Awareness of applications for configuring personal finance and evaluation of their functionality

Among those who did not use applications that can connect to bank accounts and help configure personal finance, 67.9% of Poles and 64.5% of Slovaks were aware of the possibility of using such applications (no statistically significant differences between the groups in this respect $\chi^2(1) = 1.26$; $p = .262$; $V = .03$).

Table 12.

Results of Pearson's χ^2 test analysis to compare groups in terms of awareness of applications for configuring personal finance

Do you know that there are modern applications today that, with your consent, can connect to your bank accounts and help you configure your personal finance?	Poland		Slovakia		χ^2	p	V
	<i>N</i>	%	<i>N</i>	%			
No	110	32.1%	268	35.5%	1.26	.262	.03
Yes	233	67.9%	486	64.5%			

Symbols: χ^2 – Chi-square statistic, p – level of statistical significance, V – strength of Cramer's V relationship.

From a handy app that configures personal finance, the respondents most often expected an overview of their spending structure by category, automatic categorisation of expenses, and tips for improvement. There were statistically significant differences between the groups in terms of whether they expected the app to be able to connect their account with a partner's account $\chi^2(1) = 3.99$; $p < .05$; $V = .06$, tips on improvement $\chi^2(1) = 4.20$; $p < .05$; $V = .06$ or offers of more advantageous products $\chi^2(1) = 6.64$; $p < .05$; $V = .08$. The Slovaks would tend to expect these features more than the Poles. The latter group had more expectations that the app would be able to plan budgets for individual categories $\chi^2(1) = 6.16$; $p < .05$; $V = .07$.

Table 13.

Pearson's χ^2 test results analysis to compare groups in terms of evaluation of an application's functionality for configuring personal finance

What features would you expect from the handy app?	Poland	Slovakia	χ^2	p	V
The ability to connect my account with my partner in one application to obtain a competent overview of household expenses	45.5%	52.0%	3.99	.046*	.06
Overview of expenditure structure by category	70.0%	67.9%	0.47	.494	.02
Automatic categorisation of expenditure	66.2%	65.9%	0.01	.931	.00
Planning monthly budgets for individual categories of expenses	51.0%	43.0%	6.16	.013*	.07
Tips on where I have room for improvement	55.4%	61.9%	4.20	.040*	.06
Oferta korzystniejszych produktów	36.2%	44.4%	6.64	.010*	.08

Symbols: χ^2 – Chi-square statistic, p – level of statistical significance, V – strength of Cramer's V relationship.

Relationship between sociodemographic variables and the use of an application to configure personal finance, knowledge of the existence of such an application and its evaluation

The sociodemographic factors influencing the use of an application to configure personal finance, knowledge about the existence of such an application and its evaluation were also studied. In order to check the impact of metric variables on the use of an application, a logistic regression analysis was performed on the Polish and Slovak groups separately. It was demonstrated that the probability distribution in the model did not differ in a statistically significant manner from the distribution in the sample, both in the case of the model for Poland $\chi^2(2) = 31.26$; $p = .506$ and Slovakia $\chi^2(8) = 9.30$; $p = .318$. R2 Nagelkerke's coefficient of determination was $R^2 = .03$ for Poland and $R^2 = .04$ for Slovakia. This means that the metric variables did not go far to explain the use of an application to configure personal finance. In the case of Poland, applications for configuring personal finance were demonstrably used by people living in larger urban agglomerations $W(1) = 7.76$; $p < .01$; $OR = 1.47$. However, the model for Slovakia indicated that the application was used by younger people $W(1) = 10.86$; $p < .01$; $OR = 0.97$, with higher education $W(1) = 6.65$; $p < .05$; $OR = 1.53$ and living in larger agglomerations $W(1) = 5.83$; $p < .05$; $OR = 1.16$. The remaining metric variables were not shown to have an impact on the use of applications to configure personal finance in the study groups.

Table 14.

Results of logistic regression analyses for the impact of sociodemographic variables on the use of an application to configure personal finance

Use of an application		<i>B</i>	<i>SE</i>	<i>W</i>	<i>p</i>	<i>OR</i>
Poland	Permanent	-2.62	.51	26.60	.000	.07
	Place of residents	.38	.14	7.76	.005**	1.47
Slovakia	Permanent	-1.55	.54	8.14	.004	.21
	Age	-.03	.01	10.86	.001**	.97
	Education	.43	.17	6.65	.010*	1.53
	Place of residence	.15	.06	5.83	.016*	1.16

Symbols: *B* – non-standardised coefficient, *SE* – standard error, *W* – Wald coefficient, *p* – level of statistical significance, *OR* – odds ratio.

Similarly, logistic regression analyses were used to examine the influence of sociodemographic variables on the awareness of the existence of an application for configuring personal finance among those who had not used such an application yet. It was indicated that the probability distribution in the model did not differ significantly from the distribution in the sample, both in the case of Poland $\chi^2(3) = 0.15$; $p = .985$ and Slovakia $\chi^2(8) = 4.68$; $p = .791$. Nagelkerke's R^2 coefficient of determination was $R^2 = .02$ for Poland and $R^2 = .03$ for Slovakia. This means that the metric variables did not explain much of the knowledge about the existence of an application for configuring personal finance. Among the Poles, awareness of the existence of an application for configuring personal finance was influenced solely by higher income $W(1) = 5.03$; $p < .05$; $OR = 1.20$ while in the Slovak group, male gender

W (1) = 10.10; $p < .01$; OR = 0.52, higher education W (1) = 3.04; $p = .081$; OR = 1.30 (the result on the border of the statistical tendency) and a larger household W (1) = 4.42; $p < .05$; OR = 1.15 were relevant.

Table 15.

Results of logistic regression analyses for the influence of sociodemographic variables on the awareness of the existence of an application for configuring personal finance

Knowledge of the existence of an application		<i>B</i>	<i>SE</i>	<i>W</i>	<i>p</i>	<i>OR</i>
Poland	Permanent	-.14	.41	.12	.731	.87
	Net income	.19	.08	5.03	.025*	1.20
Slovakia	Permanent	-.41	.46	.80	.372	.67
	Sex	-.64	.20	10.10	.001**	.52
	Education	.26	.15	3.04	.081	1.30
	Household size	.14	.07	4.42	.036*	1.15

Symbols: *B* – non-standardised coefficient, *SE* – standard error, *W* – Wald coefficient, *p* – level of statistical significance, *OR* – odds ratio.

The possible relationship between how applications for configuring personal finance are evaluated and sociodemographic variables was checked. Most of the results of Kendall's tau correlation analyses turned out to be statistically insignificant $p > .05$ (Table 16). The only indication was that Poles from larger households tended to rate the probability of using an application for family finance management higher $\tau = .09$; $p < .05$, as well as those with a lower income per person in the household $\tau = -.10$; $p < .05$. Among the Slovaks, it was shown that younger people rated the probability of using a family finance management application higher $\tau = -.13$; $p < .01$.

Table 16.

The results of Kendall's tau correlation analyses on the relationship between the evaluation of personal finance configuration applications and sociodemographic variables

	Satisfaction with the application		Likelihood of recommending the application		Likelihood of using the application for managing the family's finance	
	Poland	Slovakia	Poland	Slovakia	Poland	Slovakia
Sex	.16	.00	.14	.06	-.01	.00
Age	.07	-.04	.06	-.07	-.06	-.13**
Education	.12	-.02	.01	-.02	-.05	-.01
Professional activity	.01	-.04	.02	-.05	-.06	-.02
Place of residence	.08	-.07	.11	-.04	.05	-.01
Household size	-.11	.04	-.11	.09	.09*	.05
Income	.12	-.01	.11	-.01	-.10*	.02

Symbols: * $p < .05$; ** $p < .01$.

Relationship between financial behaviour during the pandemic with the use of an application to configure personal finance, knowledge of the existence of such an application and its evaluation

The aim of the study was also to investigate the relationship between using an application to configure personal finance and expenditure during the pandemic. Pearson's χ^2 test results analysis showed that in the Slovak group, albeit on the border of statistical tendency, people who spent more money during the pandemic than prior to it used an application for configuring personal finance more often. No such relationship was found in the Polish group.

Table 17.

Pearson's χ^2 test results analysis for the relationship between using an application to configure personal finance and expenditure during the pandemic

		Less expenditure		The same expenditure		More expenditure		χ^2	<i>p</i>	<i>V</i>
		<i>N</i>	%	<i>N</i>	%	<i>N</i>	%			
Poland	I don't use an app	227	76.9%	116	81.1%			0.99	.321	.05
	I use an app	68	23.1%	27	18.9%					
Slovakia	I don't use an app	538	72.0%	188	71.8%	28	56.0%	5.92	.052	.08
	I use an app	209	28.0%	74	28.2%	22	44.0%			
Poland	Unaware	68	30.0%	42	36.2%			1.38	.241	.06
	Aware of the existence of an application	159	70.0%	74	63.8%					
Slovakia	Unaware	193	35.9%	64	34.0%	11	39.3%	0.38	.826	.02
	Aware of the existence of an application	345	64.1%	124	66.0%	17	60.7%			

Symbols: χ^2 – Chi-square statistic, *p* – level of statistical significance, *V* – strength of Cramer's V relationship.

Analysis of Pearson's χ^2 tests also helped investigate the relationship between using an application to configure personal finance and saving during a pandemic. However, no connection was demonstrated between saving during a pandemic and the use of an application to configure personal finance and the awareness of the existence of such an application among both Poles and Slovaks (Table 18).

Table 18.

Pearson's χ^2 test results analysis for the relationship between using an application to configure personal finance and saving during the pandemic

		Less saving		The same level of saving		More saving		χ^2	<i>p</i>	<i>V</i>
		<i>N</i>	%	<i>N</i>	%	<i>N</i>	%			
Poland	I don't use an app	42	79.2%	84	80.0%	217	77.5%	0.31	.856	.03
	I use an app	11	20.8%	21	20.0%	63	22.5%			
Slovakia	I don't use an app	49	80.3%	249	72.2%	456	69.8%	3.23	.198	.06
	I use an app	12	19.7%	96	27.8%	197	30.2%			

Cont. table 18.

Poland	Unaware	15	35.7%	24	28.6%	71	32.7%	0.77	.680	.05
	Aware of the existence of an application	27	64.3%	60	71.4%	146	67.3%			
Slovakia	Unaware	24	49.0%	93	37.3%	151	33.1%	5.39	.068	.09
	Aware of the existence of an application	25	51.0%	156	62.7%	305	66.9%			

Symbols: χ^2 – Chi-square statistics, p – level of statistical significance, V – strength of the V-Cramer relationship.

The possible relationship between evaluation of an application for configuring personal finance and financial behaviour during the pandemic was also verified. These links were investigated using Spearman's rho correlation analyses (Table 19). The only statistically significant results were found among the Slovaks, who incurred higher expenses during the pandemic, assessed their satisfaction with the application as lower $\tau = -.10$; $p < .05$ as well as the probability of using the application to manage family finance $\tau = -.09$; $p < .05$. In the case of the Slovaks, who saved more during the pandemic, their satisfaction with the application was higher $\tau = .14$; $p < .01$, as was their likelihood of recommending the application to a friend $\tau = .11$; $p < .05$ and using the application to manage family finance $\tau = .06$; $p < .05$.

Table 19.

The results of Kendall's tau correlation analyses on the relationship between evaluation of an application for configuring personal finance and financial behaviour during the pandemic

	Impact of the pandemic on expenses		Impact of the pandemic on savings	
	Poland	Slovakia	Poland	Slovakia
Satisfaction with the application	.02	-.10*	-.02	.14**
Likelihood of recommending the application	.07	-.05	-.05	.11*
Likelihood of using the application to manage the family finance	.00	-.09*	.02	.06*

Symbols: * $p < .05$; ** $p < .01$.

5. Conclusions

The COVID-19 pandemic had an impact on personal finance as an external shock, but this was not a one-way street—for some households, rationalisation and reduced consumption at certain levels of income led to increased savings. On the other hand, for some households working in industries closed by lockdown, or affected by SARS-cov 2 virus itself or other comorbidities, income fell and they dipped into savings where possible. Otherwise, the household sought external funds from family, friends or financial institutions—banks and non-banking lending institutions. Previous research has shown that using applications to manage personal finance during a pandemic enabled better control of these finance. The pandemic gave us more time to look at our spending and to adopt spending and savings and investment plans after the pandemic period.

The comparative empirical study of Poles and Slovaks regarding personal finance management by users of robo-advice services positively verified the following research hypotheses:

1. The COVID-19 pandemic did not adversely affect the personal finance of Polish and Slovak robo-advice users.
2. Polish and Slovak robo-advice users differed in terms of investment methods during the pandemic and their investment plans post pandemic.
3. Polish and Slovak robo-advice users used spreadsheets as well as special banking and non-banking applications to manage their personal finance.
4. Sociodemographic variables did not largely explain how Poles and Slovaks used personal finance management applications.
5. Saving during the pandemic was linked with the use of an application to configure personal finance as well as the awareness of the existence of such an application among both Poles and Slovaks.

The author is aware that the conducted empirical study has certain limitations in terms of the Internet survey method or the sample size. However, taking into account the pioneering nature of this type of comparative research, the author accepts these limitations. The results of the study may be an inspiration for further in-depth research on the presented issues.

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ON THE WAY TO TURQUOISE ORGANIZATIONS AND TURQUOISE LEADERSHIP

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Purpose: The aim of the text is to present the concepts of turquoise organizations and turquoise leadership against the background of the evolution of societies, organizations and leadership.

Design/methodology/approach: The study was based on literature studies.

Findings: The text summarizes and characterizes the various stages of the development of societies. The different types of organization were characterized in the model of organization by F. Laloux, paying particular attention to the turquoise organization. All the "colored" leaders are characterized in detail – from purple to turquoise.

Practical implications: The basic recommendation for management practitioners who would like to create a turquoise atmosphere in their organizations is reflection on the actual and declared key values and the mission of the organization. They also have to answer the question of how much they are able to share power with their colleagues, how much are they able to trust them. It is also becoming extremely important to build emotional openness between employees and their loyalty to each other.

Originality/value: The text may be of interest to both researchers on the topic of turquoise organizations and practitioners who would like to transform their organizations into modern workplaces.

Keywords: turquoise organization, teal organizations, leader.

Category of the paper: research paper.

1. Introduction

Permanent competitive advantage results less and less from the product or business model and more and more from the organizational culture that allows us to create innovative products in series or rapidly change business models. In the 21st century, significant changes were observed in the approach to organization management, such as a systematic departure from hierarchical structures, increased flexibility of operations, delegation of authority, development of employees' initiative, importance attached to values (Lee and Edmondson, 2017; Ziębicki,

2017, p. 79; Iliadou and Schödl, 2018). The changes taking place in this area indicate the transformation of modern organizations towards a new model of operation (Czekaj et al., 2020). This contributes to increasing the flexibility of the organization, development of individual employee competences, empowerment, increased commitment and motivation, greater sense of community among employees, creativity, speed of decision-making, information openness, process approach and results orientation (Ziębicki, 2020, p. 3). In this context, the emergence of the 'Teal Organizations' model represents an important milestone in re-identifying the basic principles of the organization (Romero et al., 2020, p. 2). Teal organizations provide a unique model of management with flat organization's structure, autonomy, employee participation, self-organization, employee influence on working environment and extreme transparency (Kryczka, 2019, p. 37).

The aim of the text is to present the concepts of turquoise organizations and turquoise leadership against the background of the evolution of societies, organizations and leadership. The study was based on literature studies.

2. Towards turquoise awareness

The idea of turquoise organizations is not new. Its many elements appeared already in the second half of the 20th century (Rosiński, 2018, p. 244), especially in the works of E. Deming and P.F. Drucker. However, only the description of their common philosophy by F. Laloux (2015) and the presentation of management styles against the background of the evolution of management styles and giving them a catchy name resulted in a marked increase in interest in this theory (Blikle, 2017, p. 51).

The reference to the turquoise organization was based, among others, on the theory of the spiral of social development, the foundations of which are based on the theory of levels of development of human consciousness formulated by C.W. Graves in the 1970s (Graves, 1970). This theory was developed and disseminated only thanks to the publication of D.E. Beck and Ch.C. Cowan (1996), who coined the term "Spiral Dynamics" and introduced the color marking system (Table 1).

Table 1.*Value systems in the theory of the spiral of social development*

Development stage	Description
Beige color (around 100,000 BC) - instinctive	<i>Parent Value:</i> survival. <i>Behaviors:</i> everything you need to survive.
Purple color (c. 50,000 B.C.E.) - magical	<i>Overriding value:</i> safety and security. <i>Motto:</i> "The individual is not important, what matters is the team, that is the organization to which I belong." <i>Behaviors:</i> through rituals, they have a mystical sense of cause and effect; people are strongly associated with the group, nepotism is normal; employees owe their lives to family organizations.
Red color (c. 7,000 B.C.E.) - impulsive, egocentric	<i>Superior value:</i> power and action. <i>Motto:</i> "Life is a jungle and the most adapted will survive!" <i>Behavior:</i> People must be subject to a strong leader who rewards them; the weaker must serve; employees can cope with many things if their basic needs are systematically met.
Blue color (c. 3000 B.C.) - deliberate, authoritarian	<i>Overriding value:</i> stability and purposeful life. <i>Motto:</i> "I introduce order in chaos and structures instead of anarchy." <i>Behavior:</i> People work best if you tell them how to do it; it gives meaning to life by fulfilling one's duties and being punished if it is not done.
Orange color (c. 1000 AD) - strategic, achievement-oriented	<i>Overarching Value:</i> Success and Autonomy. <i>Motto:</i> "I will measure, weigh, compare and be the best!" <i>Behavior:</i> people are motivated by material reward; competitiveness improves productivity and promotes personal development.
Green color (c. 1850 AD) - egalitarian, community oriented	<i>Overriding value:</i> harmony of community and equality. <i>Motto:</i> "I have my interests and you have your interests. I accept your interests and expect you to accept mine. We are all equal". <i>Behavior:</i> people want to cooperate with each other; sharing something or taking part in something together is better than competing with each other; human rights and community development; working to minimize divisions and secure life.
Yellow color (c. 1950 AD) - integrative	<i>Overriding Value:</i> Quality of Life and Responsibility. <i>Behavior:</i> People like to do what they know; employees need free access to information and materials; the world is seen as an integrated system; flexibility is emphasized; change is the norm.
Turquoise color (c. 1970 AD) - holistic	<i>Overarching Value:</i> Global Governance and Renewal. <i>Behavior:</i> spiritual connections between man and organization; work must be at the service of a comprehensive and healthy life in full existence; the world is in an equilibrium which, in man's hands, is under threat; flexibility is emphasized; change is the norm.
Coral color (approx. ??? AD) - undefined	<i>Overarching Value:</i> ??? <i>Behavior:</i> ??? So far, the level is unattainable for humans

Adapted from: "Spiral Dynamics. Leadership, Werte und Wandel" by D.E Beck, Ch.C Cowan. 2008 by Inspire!, Bielefeld; "Spiral Dynamics in Action. Humanity's Master Code" by D.E Beck, T.H. Larsen, S. Solonin, R. Viljoen, T.Q. Johns. 2018 by John Wiley&Sons, Chichester; "9 Levels of Value Systems. Ein Entwicklungsmodell für die Persönlichkeitsentfaltung und die Evolution von Organisationen und Kulturen" by R. Krumm. 2017 by WerdeWelt, Mittenaar-Bicken.

What makes this theory different from other theories of human development is that it does not claim that people are going to one ultimate destination. Depending on the changing psychological, environmental, social and biological factors, they flow through the spiral stages of consciousness development (Dobbelstein, Krumm, 2016). To adapt to change, people create increasingly complex conceptual systems that enable them to cope better, survive and develop further (Butters, 2015, pp. 67-68). Each stage includes and exceeds all previous stages,

thus opening up new possibilities. Each level of consciousness is organized around a system of core values that express collective intelligence at a given stage, and the same core values apply to entire cultures as well as to individuals. As noted by Beck and Cowan (2008), the theory is not complete, but open to the limit of the development of the homo sapiens brain.

3. Towards a turquoise organization

F. Laloux (2015) combined the theory of psychology with management. He put together new and older management techniques depending on their impact on people and organizational culture. He identified and described five organizational models (giving each of them a symbolic color) ranging from the most authoritarian to the most democratic (Table 2). He noticed that the better the management techniques, the higher the degree of organizational culture. In the development chain he outlined, he considered turquoise organizations to be the most developed and effective form of human cooperation at present (Jeznach, 2017, p. 18). It should be emphasized that F. Laloux views turquoise differently than in the theory of the development spiral. "*At Laloux turquoise (...) is a mixture of green and yellow levels*" (Kirov, Kirova, 2017, p. 22).

Table 2.

Organization models according to F. Laloux (from red to green organization)

Organization models	Characteristic
<p style="text-align: center;">Red organizations <i>The guiding metaphor: a pack of wolves</i></p>	<p>What binds them together is the constant use of force in interpersonal relationships. The most important value is absolute obedience.</p> <p>The leader uses ruthless violence and subordinates others to his own will, because this is the only way he can maintain his status. When his power is called into question, someone else will immediately try to overthrow him by the method of force. The leader surrounds himself with family members, who are usually more loyal, and buys their loyalty. In turn, the people closest to the leader are kept in check by their members of the organization. It is bloody leadership based on fear: one leader and one punishment. The leader must regularly resort to public displays of cruelty and punishment, because only fear and submission keep the organization from disintegrating.</p> <p>The weaknesses of these organizations are poor planning and strategy-building skills, and the strength of the ability to react quickly to threats and seize opportunities with cruel ruthlessness. Thus, they adapt well to chaotic environments, but are ill-suited to achieving complex results in stable environments where strategic planning is possible.</p> <p><i>Examples:</i> mafia, street gangs, paramilitary groups, but also some companies, institutions, organizations and political parties.</p>

Cont. table 2.

<p style="text-align: center;">Amber organizations <i>The guiding metaphor: the army</i></p>	<p>The leading value of these organizations is their subordination to a certain unquestionable code of honor (army) or ethics (church).</p> <p>These organizations are able to undertake long-term projects. Knowledge is embedded in the organization and can be passed down from generation to generation. It doesn't depend on one particular person. Each person can be replaced by another who takes the same role in the process.</p> <p>Members of such an organization strive for order and predictability. Changes are viewed with suspicion. These organizations are exceptionally well suited to stable contexts where the future can be planned in relation to past experience. What worked in the past will work in the future. These organizations have problems with accepting the need for change, they feel bad in the situation of competition, therefore they strive for monopoly and domination.</p> <p>These organizations bring stability to power along with formal titles, established hierarchies and organizational patterns. The overall structure is based on a rigid pyramid where formal reporting is from bottom to top. A catalog of applicable rules as well as disciplinary measures and penalties is established. It is assumed that the members of the organization are lazy and dishonest, so management must rely on issuing commands and control to achieve the desired results. Innovation, critical thinking and self-expression are downright undesirable. Individual talents are not recognized, rewarded or developed.</p> <p><i>Examples:</i> Religious Institutions, Military, Most Government Agencies, Public School System.</p>
<p style="text-align: center;">Orange organizations <i>The guiding metaphor: the machine</i></p>	<p>These organizations are able to question the status quo and formulate ways to change it for the better. Leaders reiterate that change and innovation are not a threat but an opportunity. The organizational structure includes divisions that did not exist before: research and development, marketing and product management. These organizations maintain a hierarchical organizational structure, but pierce rigid, functional and hierarchical constraints by introducing project groups, virtual teams, multidisciplinary initiatives, expert positions, and in-house consultants to accelerate communication and foster innovation.</p> <p>There is a profound change in the style of leadership and management. Senior management formulates the overall direction and then distributes the goals to the next levels of the organization to achieve the desired result. To some extent, management does not care how the goals will be achieved as long as they are met. People are driven by material success, which is why a whole range of incentives have been invented in the motivational processes. Members of the organization are given space to use their creativity and talent and the freedom to work out ways by which they want to achieve their goals.</p> <p>Unfortunately, organizations do not always follow these rules. It happens that in practice the fear of losing control triumphs over their ability to trust and still decisions that would be better left at the lowest levels of the organizational hierarchy are made at the highest levels. In addition, the constant pursuit of innovation and profit leads to the artificial creation of needs, fueling consumerism, greed for organization and unethical behavior.</p> <p><i>Examples:</i> multinational companies, community schools.</p>
<p style="text-align: center;">Green organizations <i>The guiding metaphor: family</i></p>	<p>While organizations maintain a hierarchical organizational structure, they relegate most decisions down to the bottom ranks where they can be made without the approval of superiors. A strong, shared culture is the glue that keeps organizations from disintegrating. The culture of the workplace is of great importance.</p> <p>Leaders are expected not to simply and dispassionately solve problems, but to be leaders in the service of others, listening, empowering, motivating and developing them. They often express themselves in the form of "employees are part of the same family and together they are ready to help each other and be one for the other."</p> <p>The main commitment of managers is to maximize investor returns, as it benefits all stakeholders in the long term. The role of leaders is to choose the right compromises so that all stakeholders can thrive. Organizations consider their social responsibility an integral part of running a business. It is often the core of their mission.</p> <p><i>Examples:</i> Organizations driven by corporate culture.</p>

Adapted from: "Turquoise Organizations - The Perspective of Polish Organizations" by A. Wasiluk, A. Daniluk. In: K. Soliman (Ed.), Innovation Management and information Technology impact on Global Economy in the Era of Pandemic: Proceedings of the 37th International Business Information Management Association Conference (IBIMA) (pp. 6561-6568). 2021 by International Business Information Management Association.

Turquoise organizations are based on the theory of human-oriented development, openness and transparency in company management (Miśkiewicz et. al., 2021). It is a new, coherent organizational model that corresponds to a new stage in the development of human consciousness, a new paradigm of teamwork and a new way of managing an organization (Laloux, 2015). Its creation requires a reorientation of the existing rules of operation of the organization and requires employees to completely stop identifying with their own ego, which allows them to move from external to internal assessments of decisions made. Thanks to this, it becomes possible to reverse the order prevailing in the current organizational models. Success or wealth are no longer needed for the good living out of life by every person, employee of the organization. The most important thing is to ensure a good life, and only its effect can be recognition, success, wealth and love (Pluta, 2017, p. 307).

The concept of turquoise organizations is based on three pillars: self-management, wholeness, evolutionary purpose (Table 3).

Table 3.
Pillars of turquoise organizations

Pillar	Description
self-management	The ability of team members to self-manage, take responsibility and flexibly adapt to current challenges. Efficiency depends on interpersonal relationships, honesty and trust between employees.
wholeness	The feeling that you can be yourself at work without pretending and separating your professional and private life. The team realizes that everyone is deeply connected to each other as part of a larger whole. Employees are appreciated in various aspects and dimensions and have freedom and space for development (training is not imposed on employees to eliminate their weaknesses, but is voluntarily chosen by them and is intended to serve general development).
evolutionary purpose	Organizations are seen as a living organism with a life goal, while team members help to achieve it. The purpose of existence is constantly adapted to the present and is a response to the current individual and collective needs. The goal determines the meaning of the organization's existence. Profit is a by-product of a job well done, not an end in itself.

Adapted from: "Pracować inaczej" by F. Laloux. 2015 by Studio Emka: Warszawa, pp. 276-278; „Trust makes this organisation unique. Looking at the future of work through two human-centric organisations” by S. Kurki, and M. Wilenius. 2016 by *European Journal of Futures Research*, 23, 4. Retrieved from https://gupea.ub.gu.se/bitstream/2077/56998/1/gupea_2077_56998_1.pdf, 30.05.2022.

Teal management is based on the fact that the organization is managed by everyone who works in it. All information is public, tasks are discussed collectively and on an ongoing basis. Decisions are made by those who know how to deal with the emerging challenge and are able to meet it. The solution is implemented after consulting the team (Wzorek, 2019, p. 14).

The turquoise organization is based on cooperation and mutual trust. Employees together form the company and fulfill its mission. Everyone knows what goal they pursue, what values they follow and what responsibility they bear, therefore they realize that they set tasks for themselves, based on their skills. Employee involvement, their personality and enthusiasm in which they approach the performance of duties are the essence of the organization (Tabaszewska-Zajbert, 2019; Juchnowicz, 2017, p. 12).

Structural solutions of turquoise organizations are not devoid of hierarchical relationships, although they are not strong (Hopej-Tomaszycka and Hopej, 2018, p. 241). An important distinguishing feature of these organizational structures is the considerable standardization and formalization of activities, which proves that they are somewhat bureaucratic. This was noted by E. Bernstein, J. Banch, N. Canner and M. Lee (Bernstein et. al., 2016, p. 93), who stated that in some respects, contrary to popular claims, they resembled bureaucracy, so as M. Weber saw it at the beginning of the 20th century. M. Wzorek (2019, pp. 83-84) has a different opinion, who states that in the world of turquoise the hierarchy is completely disappearing. To avoid chaos, clutter and anarchy, turquoise organizations develop specific practices and methods that allow them to communicate efficiently and make the best decisions. Establishing "specific rules of playing together", signing the constitution, transparent financial systems, records of decisions made and goals set - these are just some examples of the use of new working methods.

In turquoise organizations, the control of employees is kept to a minimum. It mainly boils down to the fact that employees support each other in the performance of their duties, but also control each other. The classic system of motivation is replaced by the internal motivation of employees. It is the transfer of power to employees that is the most important, but also the most controversial, assumption of the turquoise concept.

The concept of turquoise organizations developed by F. Laloux by many scientists and business practitioners was considered "groundbreaking", "brilliant", "extraordinary", "impressive" and "changing the world". Many also consider it "utopian" and "dreamy" (Iwko and Pisarska, 2020). Regardless of how this concept is viewed, it should be emphasized that organizations based on this idea function both in Poland and around the world (Table 4).

Table 4.
Turquoise organizations in Poland and in the world

The reach of the organization	Teal Organisations
Global	Sun Hydraulics – USA, UK, Germany, South Korea, China, India
USA	Morning Star – California Patagonia – California Resources for Human Development (RHD) – 14 US States New Era Windows & Doors Isthmus Engineering & Manufacturing Union Cab Cooperative – Madison, WI
Europe	Buurtzorg – Netherlands Evangelischen Schule Berlin – Germany Heiligenfeld – Germany Favi – France We-Q – United Kingdom The John Lewis Partnership – United Kingdom

Cont. table 4.

Poland	PKS Gdańsk-Oliwa SA - Gdańsk Grupa Szkoleniowa Halibut – Poznań Brewa s.c. – Kalisz HighSolutions – Poznań Kaizendo – Warszawa KAMSOFT PODLASIE Sp. z o.o. – Zambrów LeaNce sp. z o.o. – Kraków Not Just Shop Marco sp. z o.o. – Gliwice Mentax – Koszalin MTA Digital – Poznań OXALIS Polska – Radzionków WINS – Web Innovative Software – Wrocław SoftwareMill – Warszawa School Turkusowa wieża – Warszawa Kindergarten and nursery school Zielona wieża – Warszawa REC – Kraków Igus Polska – Warszawa Mediaflex – Kraków GEP Poland – Łódź LPP – Gdańsk
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Adapted from: <https://we-q.com/collaborative-intelligence/list-of-teal-organisations-examples/>, 30.05.2022; <https://turkusorg.pl/turkusowe-organizacje-w-polsce/>, 30.05.2022.

4. Towards turquoise leadership

The stage at which a given organization operates determines leadership. F. Laloux claims that what matters is the level from which leaders most often view the world. More or less consciously, it is they who establish such organizational structures, culture and practices that make sense for them and match their style of dealing with the world. This means that a given organization is not able to develop beyond the development stage of its leader (Laloux, 2015, pp. 56-57).

Conscious leaders are able to skillfully recognize the needs of a co-worker resulting from his level of development and adjust messages and other leadership behavior to a given level. This means that if a leader has a member in his team who is on the red level of relations, it means that he cannot talk to him and deal with him from the green level, where decisions are made jointly and democratically. Conscious leadership is the result of passing and "doing homework" resulting from each level of the development spiral (Kirov and Kirova, 2017, p. 23).

Table 5.
Leaders of various stages of development

Type of leader	Description
Purple leader	<p>The purple leadership manifests itself in a clan manner - the family is the most important. This level of human consciousness leads to the classic management style of caring only for the interests of "your people". In Western societies, the equivalent of this type of leadership thinking in a company is the phrase "my team", which is more important than other teams and divisions in the company. With regard to the market, the counterpart is "my company", which is more important than other companies in the market. On a social level, it is "my country", which of course is more important than any other country in the world. The leader of the purple color sees no value in human diversity. He believes that the added value generated by individual employees for the organization in the form of resources or money will be generated by itself. Such a leader believes that only willingness counts, and if someone does not do their job well, it is simply because they do not want to. He does not notice that the employee has no knowledge or competences, often even he himself cannot show him how to perform a given task. He is also unable to see or use employees' talents.</p>
Red leader	<p>At this level, the "ego" plays a huge role: "All that is good is because of me, and all that has failed is not my fault." For the red leader, respect and reputation mean more than life, so he believes that he must not be allowed to be embarrassed, humiliated or defeated. Hence, these leaders often exhibit emotional over-reaction, anger, and anger. Red thinking is not cause-effect. Red seeks immediate gratification and ignores the possible long-term consequences of his actions. In leadership, this can manifest itself in resolving conflicts impulsively and putting everything "on the edge of a knife". Red level leaders can be identified by their vocabulary as they often use phrases such as: fight, defeat opponents / competition, take over / conquer the market. For them, "the price decides about the order" and they most often sign reference contracts, for which the company most often pays extra money in the long term, because here and now it is the quantity that counts, not the quality. The red leader also does not understand that people are different, have different talents and predispositions. Unlike the purple leader, however, he believes that you should not slack off, you just have to try harder and the goal will be achieved. And an employee who does not achieve their goals simply does not pay attention.</p>
Blue leader	<p>A blue leader is limited by organizational or social rules and procedures, even though he theoretically has the power to change them. What matters at the blue level is what the system tells you to do. The blue leader feels more like an element of the system than a leader. Therefore, it will strive to formalize relations and build functional organizational structures, unchanging schedules and expect clear consequences. It will be leadership geared to defending the status quo. There is bureaucracy here, but also people who are always prepared and well organized, on whom you can count. They are focused on completing the task as intended. The blue leader, instead of potential and talents, will look for diplomas, qualifications, internships and titles in employees.</p>
Orange leader	<p>Leaders who are in the process of moving from blue to orange can become classic workaholics, and as managers they are dictators who insist on getting higher and faster results. The orange leader learns through trying and experiencing, he is a lover of research and analysis, all statistics and tables. He is a flexible individualist who quickly adapts to changes. The world of the orange leader is ruled by rationality, reason and science. He is motivated to act by the thought of independence, the will to achieve a goal (usually material) and the thrill of victory.</p> <p>For an orange leader who strives for better results, there are no sacred things that cannot be changed if he has a scientific basis and analysis to do so. He invests in employee training, counts the results and consciously builds the organization's strategy. Employee talent management in an orange organization is about finding the most productive, hit-and-miss and fastest learners, providing them with high-quality and expensive training programs, and preparing them for future key positions in the company. The rest of the team doesn't get these opportunities.</p>

Cont. table 5.

Green leader	For the green leader, everything is subjective, everyone has the right to express their opinion, the most important are acceptance, equality and community. He sees the source of all evil in discrimination, racism, dogmas and divisions. He is convinced that people are equal and equally important, that when making a decision, no one's interests should be overlooked. It emphasizes people. It will not tolerate expressions like "human resources" or "human capital". For him, everyone is equal and everyone must be treated equally. For this reason, the green leader may have difficulty enforcing financial performance or actions according to procedures, and sometimes with the division of tasks among employees on the team. Rather, he will expect us to "share tasks together." The green organization and its leader are very sensitive to minority rights and equality in the team. This usually results in the boss's reluctance to distinguish and name the talents of individual team members. This can lead to people feeling unnoticed and underestimated by such a supervisor.
Yellow leader	The yellow leader sees much more and more widely than his predecessors. He sees people from previous levels, accepts and can speak their language. He knows that people are different, have different visions of reality and are not equal to each other because of their predispositions and competences. The leader does not need to be in a group, he rarely uses the word "we" and does not need the acceptance of the community. Likes to be independent and dislikes working in hierarchical organizations. According to him, knowledge and skills should be valued higher than formal authority or social position. It has a strong, own ethical system based on many sources, but none of them come from formal law or dictates of authorities. These people are always ready to learn. They can draw conclusions for themselves from every situation. They are fully aware that what works today will not necessarily work tomorrow. The leader is aware of the diversity of people. For him, each team member has their own talents and seeks to identify them and enable them to be used to the maximum for the benefit of the entire organization. He understands that for a team to be effective, individual team members should enjoy their work, use their talents and develop them continuously. It will strive to create comfortable working conditions not to make employees happy, but to achieve greater efficiency of the company. In yellow organizations, talent management is about identifying the talents of each team member individually, investing in them and finding the best place where he can contribute to the growth of the organization's value and personal development.

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In hierarchical organizations, task forces have leaders. Commands flow from top to bottom, and task completion messages flow from bottom to top. The management structure is used to synchronize the work of the final contractors of the task. The concentration of power at the top, which divides workers into power and powerless, makes it perceived as a scarce commodity to fight for. This situation causes personal ambitions, political games, distrust, fear and greed to emerge. At the bottom of the organization, this situation causes resignation and reluctance. There is no domination or central control in turquoise organizations. There are no superiors in the traditional sense of the word. There are, however, people who jointly organize their work in a dynamically changing organization. Sometimes they are decision makers, other times they are making decisions, or they are wondering how to do both of these tasks. Decisions are made by those who are knowledgeable in the area, and the rest trust them. This is called partner democracy and is a central feature of the turquoise organizations. If a colleague takes the initiative to make an obvious decision, that is immediately taken. If this is not the case, the initiator consults the selection with a few other people deemed competent in the matter. If neither of these persons objects, the decision is made or announced in the public forum,

waiting for possible objections. In the event of an objection, a discussion begins, and if there is no objection, a decision is made. The client-supplier paradigm takes the place of the supervisor-subordinate paradigm. It is not the supervisor who dictates what needs to be done, but the client does it. Teams are not supported by their superiors, but their members support each other (Kałwa-Rojc, 2018).

M. Wzorek (2018, p. 82) claims that the leaders needed by turquoise organizations should be servant leaders, creating favorable conditions for their colleagues to develop. They should not overdo it with too much interference, micro-management or directive management. Such leaders should be highly ethical, have the ability to abandon their own ego and ambition to share their knowledge and experience, ensure that the entire organization is healthy, take care of prevention and develop individual members of the organization on the way to being a better person. They should do this as mentors, coaches, facilitators and good leaders setting a good example by their behavior. R. Jack (2018) has a slightly different opinion, who claims that servant leadership has more green features than turquoise ones. However, she emphasizes that servant leadership seems to lean more towards turquoise than orange.

In the world of turquoise, the role of authorities is changing a lot. On the one hand, people do not need authorities themselves, as was the case in previous periods, on the other hand, those who could be authorities, i.e. leaders, experienced entrepreneurs, spiritual leaders, encourage people to discover their own value, to find their own way, and not to follow the path taken by the leader. "Authority corrupts both the leader and the follower. Each type of authority blinds you, leads to thoughtlessness (...). Authority generates strength, and force always becomes centralized, and thus extremely corrupt. It corrupts not only the one who possesses power, but also those who follow him" (Krishnamurti, 2002, p. 47).

According to S. Denning, in the "turquoise revolution" the differences between leaders and managers are disappearing. Both groups need to be able to "get their hands dirty" (Denning, 2010, pp. 89-114). The tasks of the turquoise leader include in particular (Blikle, 2017, p. 63):

1. building a space for dialogue,
2. building partnership and trust,
3. building cooperation,
4. supporting the principles of the turquoise decalogue,
5. being a role model.

As A. Blikle argues (Blikle, 2017, p. 63), it is easier to build turquoise organizations from scratch than to change the existing management model to turquoise. It is the leader that must be ready to share power in the organization. It requires proper preparation and belief that such a management model is effective.

5. Summary

Although the concept of turquoise organizations is interesting and arouses interest among both researchers and management practitioners, its practical application can be considered in the case of a marginal number of organizations. The main barriers to adopting this model of organization are both psychological and social factors, perceived at various levels: from individual, through group, cultural, to aspects related to values, methods of communication or obligations at the level of national culture. It becomes important to reformulate beliefs about oneself, other people and the world, deeply rooted in the subconscious (Skrzypek, 2017, p. 3).

Many supporters of the concept assume that since F. Laloux in his book gives examples of the organization of the "turquoise paradigm", they must be based on all three identified pillars. This is far from the truth (Romero et. al., 2020, p. 2). F. Laloux himself cautions not to simplify anything, as no organization is ever 100% orange, green or turquoise. When aiming at turquoise, the copy-paste method cannot be used. Each organization has to work out the best way to get there on its own. Otherwise, the most inspiring aspects of these organizations will become another completely misunderstood fad of management (Minnaar and de Morree, 2019). So it becomes necessary to break both mental and emotional patterns, and this requires both courage and time.

The basic recommendation for management practitioners who would like to create a turquoise atmosphere in their organizations is reflection on the actual and declared key values and the mission of the organization. They also have to answer the question of how much they are able to share power with their colleagues, how much are they able to trust them. It is also becoming extremely important to build emotional openness between employees and their loyalty to each other.

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STUDENT INTERNSHIPS AS A TOOL FOR ASSESSMENT OF THE EMPLOYER BRAND

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Purpose: At present, one of the most important challenges faced by employers is to find, employ and retain talents. Attracting the best interns can be the way of creating the company's brand as an attractive employer for Generation Z. The management of an internship programme with good preparation can strengthen the employer's brand from the close supervision of engaged mentors and managers. The aim of the research is to identify the impact of the assessment of the internships carried out by students on their perception of the employer brand.

Design/methodology/approach: The survey has been conducted in Poland in the period 2019-2021 among 789 full-time students in different fields of study. The paper presents a quantitative analysis of the obtained data in the cross-section of the respondent's study level (bachelor's and master's). The theoretical part of the article explained the essence of employer branding in a contemporary organisation and the meaning of internships as an employer branding tool for Generation Z.

Findings: The answers of respondents reveal that the overall assessment of the internship affects their willingness to work at the given company and to recommend the company to others. The experiences gained during the internship, mentors involvement, and the way the internships are prepared and carried out by the company, have an impact on the assessment of the employer brand and influence the decision of Generation Z to participate in recruitment processes in this company as well as the selection of this employer as the future workplace.

Research limitations/implications: The size of the surveyed group does not allow for the formulation of general conclusions. However, the obtained results may be the basis for further in-depth studies on the problem. Similar research could be conducted to establish the opinion of employers and university representatives with a broader consideration of other variables.

Practical implications: The conclusions of the study will deliver the enterprises valuable information about the importance of internships for the acquisition and retention of future employees from Generation Z, and building the employer brand in the labour market.

Originality/value: The obtained results allowed to fill the research gap concerning the perception of the representatives of Generation Z regarding the student internships in the context of the assessment of employer brand.

Keywords: Employer branding, company brand, internships, students, Generation Z.

Category of the paper: Research paper.

1. Introduction

Building a brand of the employer is a strategy, which by an increasing number of organisations is perceived as an important area of development under conditions of strong competition (Wilden et al., 2010). Modern companies largely owe their position on the market to highly qualified employees. At present, one of the most important challenges faced by employers is to find, employ and retain talents, i.e. people with the highest competences and potential. Achieving this goal involves conscious employer branding on the labour market.

Undertaking such activities is particularly important for students starting their professional careers, i.e. those representing Generation Z. Most commonly, they gain their first experiences by doing an internship, the scope of which depends on the curricula and the conditions of cooperation between the university and the organisation (Slaidins et al., 2017). The main goal of such an internship is to increase the knowledge and develop practical skills in a real work environment, as workplace learning is considered to be one of the most effective forms of competence development among young people (Forssberg et al., 2021).

Assessment of the employer branding of a given enterprise may be directly connected to the level of the students' satisfaction with the completed internship. For this reason, each company should focus on the professional preparation of the internship program to ensure valuable candidates, for whom it will become the first choice employer (Rampl, 2014; Bellou et al., 2015).

2. Employer Branding in a Contemporary Organisation

The concept of employer branding (EB) was first defined by T. Ambler and S. Barrow (Ambler and Barrow, 1996). They viewed EB as “the functional, economic and psychological benefits that are provided by employment, and identified with the employing company”. Employer branding is currently understood as the sum of a company's efforts to communicate to existing and prospective staff that it is a desirable place to work (Tavassoli, 2008). It is also seen as the company's long-term strategy aimed to identify, recruit and retain the most talented and valuable employees (Dogl and Holtbrugge, 2014; Saini and Jawahar, 2019; Davies et al., 2018). Thus, the concept of employer branding encompasses all the efforts of the organization aimed at existing and potential employees, which purpose is to create an attractive image of the employer and support their strategic business goals (Bellou et al., 2015).

The employer's branding efforts are divided into activities directed internally and externally in the company, depending on the employee group they are targeted at (Sengupta et al., 2015):

- internal – covering efforts addressed at existing employees and aimed primarily at creating a friendly working environment, ensuring the possibility of employee development, and building organizational engagement,
- external – covering efforts undertaken outside of the company and addressed to potential employees, and seeking to build the employer image to be seen as attractive.

It is of great importance that these two directions of impact are mutually consistent. Employer branding is therefore aimed at creating the best job of the employer in the eyes of both current and potential employees. Thanks to it, it is possible not only to attract talents but also to retain them and increase their job satisfaction. Miles and Mangold (2004) drew attention to an important aspect of employer branding which assumed that working in a specific company is a special commodity that, just like everyone else, needs to be skillfully sold using external communication.

The brand of the company as an employer is understood as the company's image formed in the awareness of its current and future employees based on their personal experience or information that has reached the potential members of the organization, the source of which are both people who create the organization as well as all types of mass media. This definition emphasizes the importance of the opinions and experiences of different people who refer to many sources of data currently coming primarily from the Internet in the process of creating the organization's image (Grzesiuk and Wawer, 2018). Attracting the best candidates successfully can be achieved by creating the company's image as an attractive employer and combining the right personnel strategy and a strategy for the company's communication with its environment.

The brand of the employer is an important message that influences the acquisition of candidates who will later support the entrepreneurship culture and desirable values in their future work. It provides the company with visibility among potential employees and helps the company become the employer of choice among top talent candidates (Chunping and Xi, 2011). The name "employer of choice" is most often given to organizations where current and potential employees perceive the work environment as particularly attractive for the development of their careers.

Research confirms that companies that undertake efforts to establish their brand as a positive one are seen by candidates as a first-choice employer brand (Rampl, 2014). This term signifies that an enterprise has a strong and recognized brand and offers a possibility of first-rate employment (Ghadeer et al., 2016). The company becomes a trusted enterprise that employees can be proud of, and whose management team cares about the individual needs of its employees facilitating their professional and personal development, ensuring cooperation with the supervisor listening to the expectations of subordinates. Thus, employer branding can be considered an important factor not only in the implementation of the personnel strategy but also as a condition for the success of the entire organization and an important indicator of the company's value.

3. Generation Z Internships as an Employer Branding Tool

Generation Z is currently at the stage of education as students and beginning professional careers (Goh and Okumus, 2020), becoming of interest to the labour market. Based on the literature review, the author assumed that Generation Z includes individuals born after 1995 (Lut, 2020; Rodriguez et al., 2019). It is estimated that Generation Z already makes up 24% of the global workforce, and that proportion is only going to grow in the coming years (Fuscaldo, 2020).

Generation Z has been called many names, e.g. “Sharing Generation”, “All Technology All Time” Generation, and “Born Digital” (College, 2020). People from Generation Z are often referred to as “digital natives”, as they have had access to the Internet, mobile networks, and mobile systems 24/7 from their earliest years. In the specific context, the generation has become perfect at collecting and comparing information from various sources and integrating virtual and offline experiences.

Candidates from Generation Z are generally perceived as expecting a career with a fast progression to higher positions and impatiently awaiting promotions (Goh and Okumus, 2020). According to Goh and Lee (2018), Generation Z demonstrates a stronger tendency towards a positive approach (i.e., being people-engaged, interesting, fulfilling, and equipped with travel opportunities) than negative attitudes (e.g., having challenges in dealing with people, and language proficiency).

Surveys carried out by McKinsey show four main types of behaviour of Generation Z, all related to searching for truth. Therefore, it is possible to state that Generation Z is the “True Gen” (Francis and Hoefel, 2018). Young people from Generation Z appreciate individual expression and avoid stereotypical statements. They are convinced that dialogue is important for conflict solving and for making the world a better place. They make decisions and approach organisations in a highly analytical and pragmatic way. In consequence, from the perspective of candidates and employees from Generation Z, all activities of companies should be based on truth and be directly connected with the organisation's ethics, especially in the area of work ethics (Francis and Hoefel, 2018). Similar research results are presented in the Deloitte report, which emphasises that employees from Generation Z seek a transparent organisational culture and corresponding transparency from their leaders (O’Boyle et al., 2022). They also expect open conversations around business strategy and decisions. This approach is reflected in the expectations of Generation Z regarding taking up professional activity in organisations.

The global competitiveness of organisations depends on the ability to hire well-educated and experienced employees who can develop new innovative products and services. Unfortunately, for a university graduate, it takes time to become an experienced employee, because higher education is based on academic traditions providing mainly a theoretical background (Slaidins et al., 2017). This means that academic teaching must be closely linked

to the needs of the economy. Companies can offer internship opportunities for students and universities can introduce internships in their curricula. It is essential to establish information exchange between higher education organisation and businesses to find innovative solutions for efficient collaboration.

It is very important to investigate changing demands of the labour market regarding workforce knowledge and skills, match educational provision with these requirements, and take into account the diverse interests of students. It is, therefore, crucial to develop a model of education that closely links formal education with internship education, facilitating graduates entering the labour market, which in turn leads to a reduction of high unemployment among university graduates (Landrat et al., 2019). One of the forms of shaping students' practical skills is the introduction of student internships, during which the student will have the opportunity to learn in the workplace and use the knowledge gained during their studies.

The results of the literature research confirm that the students participating in the internships positively assessed the shaping of work readiness. They knew what it was expected by employers from them to do at work. They were able to effectively apply basic academic skills, high-order skills, and professional skills required by employers on the job (Kapareliotis et al., 2019). It should be emphasised that the measure of success of such activities is a high level of students' satisfaction with their internship. For this reason, organisations should pay great attention to appointing the right work supervisors who can assign appropriate tasks to interns, provide clear guidance, and facilitate social interaction between interns and other people (To and Lung, 2020).

The management of an internship programme with good preparation can strengthen the employer's brand from close supervision of engaged managers. Employment planning should also include a process for high-performing interns to convert to regular employment. An outstanding internship program will hire motivated and talented students who feel embraced by the organization and empowered by their managers to make a positive difference in their roles. And these successful interns will spread positive messages back to their peers and help to enhance the company's brand (Griffitts, 2016).

4. Methods

The conducted research aimed to identify the impact of the assessment of the internships carried out by students on their perception of the employer brand.

The main research question is as follows: can the way of preparing and carrying out student internships by an enterprise be a tool for assessment the employer brand? Four detailed research questions have been formulated in the study:

1. Do the students take into account the brand of the potential employer on the labour market when considering the selection of a given company as a place for their professional internship?
2. Do the professional competences and experience acquired by students during the internship have an impact on the assessment of the employer brand?
3. Does the way the internship is organised have an impact on the assessment of the employer brand?
4. Is the opinion on the carried out professional internship a basis for recommending a company to other students as a valuable employer and the willingness to work at it in the future?

The following two hypotheses have been defined:

H1: Ensuring professional development by the company during the student internships has an impact on the assessment of the employer brand.

H2: The organisational aspects of internships have an impact on the assessment of the employer brand.

To achieve the research goal, the author developed a questionnaire consisting of eleven closed-ended questions. Five of them concerned the first hypothesis, and the next six ones – the second hypothesis.

The first question verified whether the students considered the brand of the potential employer when choosing the place of their internship. The answers to the following three questions expressed the opinions of the respondents on acquiring knowledge, skills, and social competences during the internship. The question as to whether the professional experiences gained during the internship have an impact on the opinion about the employer brand was a summary of the considerations concerning the first research hypothesis. In the next four questions, the respondents answered whether the working conditions, the mentor attitude and engagement, the attitude and engagement of co-workers, and the duties performed during the internship affect the assessment of the company brand. The next question has been defined to diagnose whether the attitude of the company towards interns has an impact on their assessment of the employer brand. The purpose of the last question was to assess whether the general opinion on the completed internship was the basis for recommending the organisation to other people as a valuable employer and the willingness to work at it in the future.

The 5-point Likert scale has been applied in the questionnaire, used for measuring attitudes in social sciences. Answers have been given on scale: definitely yes, somewhat yes, neither yes nor no, somewhat no, definitely no. The section with detailed information about respondents contained questions about the level of study, the field of study, gender, and job seniority.

In the period 2019-2021, emails with a link to the online questionnaire have been sent to over 1960 students of universities located in Poland. The data were collected with the use of Computer-Assisted Web Interviewing (CAWI), a technique suitable for the respondent group characterised by very high computer literacy. A total of 818 responses to this study have been

received. To ensure the quality of data, all respondents' entries have been carefully scrutinized and verified to ensure that the study includes only fully completed questionnaires. These ones which did not contain answers to each question have been excluded. For further analysis, 789 questionnaires have been accepted.

The survey has been conducted among students of bachelor's (59%) and master's studies (41%) in different fields of study, i.e. natural sciences (26%), strict sciences (31%), and human sciences (43%). 58% of them were women and 42% were men, 19% of surveyed had the job seniority. All respondents were full-time students. The paper presents a quantitative analysis of the obtained data in the cross-section of the respondent's study level (bachelor's and master's) because this variable differentiated the responses of the investigated group of students to the greatest extent.

5. Results

The first question in the research questionnaire was as follows: When considering the choice of a given enterprise as the potential internship place, did you take its brand in the labour market into account? The detailed results have been presented in Table 1.

Table 1.

Consideration of employer brand when choosing the internship place (%)

Level of studies	Definitely yes	Somewhat yes	Neither yes nor no	Somewhat no	Definitely no
Bachelor	21	24	18	31	6
Master	38	27	16	15	4

Source: Own elaboration.

Analysis of the total results for all students revealed that more than half of them (55%) confirmed the consideration of the employer brand when looking for a place of internship, 17% had no opinion, while 28% of the respondents answered negatively. The cumulative values of the positive answers (definitely yes and somewhat yes) – according to the level of education – were determined at 45% for the bachelor's degree students and 65% for the master's students. The above results indicate that for approximately half of the students, the employer brand is important when looking for a potential internship place; however, it is most important for the respondents who are closer to completing their academic education and starting their job search. It is also noteworthy that the cumulative values of the negative responses (somewhat no and definitely no) are relatively high in both groups, amounting to 37% for the bachelor's degree students and 19% for the master's students. This means that many students looking for a place to take their internship do not pay attention to the brand of the company; however, this conclusion applies less to people studying at the master's level.

For a large part of the respondents, the analysis of the employer brand is important not only in the context of searching for an internship placement but also from the point of view of the duties assigned to students during the internship and achieved results. The answers to the following three questions expressed the opinions of the respondents on the impact of acquired knowledge, skills, and social competences during the internship on the assessment of the employer brand (Table 2).

Table 2.

The impact of acquired knowledge, skills, and social competences during the internship on the assessment of the employer brand (%)

Level of studies	Type of competences	Definitely yes	Somewhat yes	Neither yes nor no	Somewhat no	Definitely no
Bachelor	Knowledge	66	34	0	0	0
	Skills	52	40	8	0	0
	Social competences	49	40	11	0	0
Master	Knowledge	43	39	18	0	0
	Skills	78	22	0	0	0
	Social competences	62	21	17	0	0

Source: Own elaboration.

The comparison of the answers of the respondents shows some differences in their opinions. For students at the bachelor's level, the acquired knowledge is the factor that has the biggest impact on the assessment of the employer brand (66%), whereas for master's level students – skills (78%). This is probably because the master's students have already knowledge gained in the course of education or internships at the bachelor's level.

The last question in this part of the questionnaire summarised the considerations of the first research hypothesis and was as follows: do the professional experiences gained during the internship affect the assessment of the company brand? The answers of the respondents have been presented in Table 3.

Table 3.

The impact of professional experiences gained during the internship on the assessment of the company brand (%)

Level of studies	Definitely yes	Somewhat yes	Neither yes nor no	Somewhat no	Definitely no
Bachelor	64	25	11	0	0
Master	76	34	0	0	0

Source: Own elaboration.

The obtained survey data confirm that experiences gained during the internship have an impact on the assessment of the employer brand. This opinion has been expressed by both the bachelor's (64%) and master's students (76%).

All results presented in the above tables allow one to state that the first research hypothesis has been positively verified.

The following six questions were aimed at verifying the second research hypothesis. The first four ones concerned the organisational aspects of the internship, i.e. the impact of the way it was organised by the company on the assessment of the employer brand by the students. In this regard, the analysis of the questionnaire concerned the respondents' answers to the following questions:

- Do the working conditions, i.e. an appropriate work station, the necessary conditions for the internship, and a properly organised course of the internship, have an impact on the assessment of the company brand?
- Do the mentor's attitude and engagement affect the assessment of the company brand?
- Do the attitude and engagement of co-workers, with whom the student cooperated during the internship, affect the assessment of the company brand?
- Do the duties performed during the internship have an impact on the assessment of the company brand?

The detailed results have been presented in Table 4.

Table 4.

Impact of the method of organising the internship on the assessment of the employer brand (%)

Level of studies	Organisation of the internship	Definitely yes	Somewhat yes	Neither yes nor no	Somewhat no	Definitely no
Bachelor	working conditions	81	19	0	0	0
	mentor attitude and engagement	92	8	0	0	0
	co-workers' attitude and engagement	66	30	2	2	0
	appropriate duties	51	34	11	4	0
Master	working conditions	76	14	10	0	0
	mentor attitude and engagement	77	23	0	0	0
	co-workers' attitude and engagement	89	11	0	0	0
	appropriate duties	93	7	0	0	0

Source: Own elaboration.

The obtained results indicate that the bachelor's and master's level students differ in their opinion on the impact of organisational factors on the assessment of the employer brand. For the bachelor's students, the most important aspects are the mentor attitude and engagement (92%), and working conditions (81%). In contrast, these two areas are less important for the master's students (77% and 76%, respectively). For these students, the most important aspects are the appropriate duties (93%) and co-workers' attitude and engagement (89%). This confirms the big impact of the way an internship is organised by a company on the assessment of the employer brand.

The next question aimed at investigating the opinions of students on whether the attitude of the company towards interns affects its brand. The detailed results have been presented in Table 5.

Table 5.*The impact of the company's attitude towards interns on employer brand (%)*

Level of studies	Definitely yes	Somewhat yes	Neither yes nor no	Somewhat no	Definitely no
Bachelor	65	22	10	3	0
Master	67	30	3	0	0

Source: Own elaboration.

The results of the survey show that students from both groups confirm that the appropriate attitude of the company towards interns affects their assessment of the employer brand. The definitely yes answer has been given by 65% of the bachelor's level respondents and 67% of the master's level students. The bachelor's students gave more neutral and negative answers (13%) compared to the master's level respondents (3%).

The research results presented in Table 4 and Table 5 allow one to confirm the second hypothesis that the organisational aspects of student internships have an impact on the assessment of the employer brand.

Additionally, in the frame of undertaken research, the surveyed have been asked about whether their general opinion on the completed internship is the basis for recommending the company to other people as a valuable employer and affects the willingness to take up employment there in the future. The answers to this question will deliver the company valuable information about the importance of internships for the acquisition of future employees from Generation Z. The detailed results have been presented in Table 6.

Table 6.*Impact of the overall assessment of the internship on the recommendation of the company to others and the willingness to work there in the future (%)*

Level of studies	Results	Definitely yes	Somewhat yes	Neither yes nor no	Somewhat no	Definitely no
Bachelor	recommendation	53	38	9	0	0
	employment	59	38	3	0	0
Master	recommendation	73	26	1	0	0
	employment	79	20	1	0	0

Source: Own elaboration.

The answers of respondents reveal that the overall assessment of the internship affects their willingness to work at the given company in the future and to recommend the company to others.

This phenomenon is observed more evident among individuals with master-level studies. Both in the context of recommendations (73%) and employment (79%), the share of the definitely yes answers is 20% higher among the master's level respondents than among the bachelor's level students (53% and 59%, respectively). This is probably because master's level students are more focused on thinking about finding a job.

6. Discussion

The internship program is beneficial for both interns and host organizations (Ismail, 2018). Two main categories of advantages that result from organizing internships for students, namely: advantages related to efficiency, increasing the quality of future human resources training; advantages related to image, increasing the visibility of companies providing internships for students (Cojocariu et al., 2019). The results of the survey show that students confirm that the appropriate attitude of the company towards interns affects their assessment of the employer brand.

According to Cojocariu et al, employers are conscious importance of the proper organization of student internships (e.g. working conditions, appropriate duties). In their view, this attitude creates opportunities to build, and enhance the prestige, and image of the organization (Cojocariu et al., 2019). In this respect, the expectations of the students are in line with the employers' strategy.

The obtained results in this study especially underline the role of the mentors in the internship implementation process. According to the survey of students, the involvement of a mentor is very important for the assessment of employer image. This view is confirmed by studies conducted by Thessin et al. Interns and mentors should first establish the partnership, then cultivate the mentoring relationship, and finally engage in learning through the leadership experience. The establishment of trust is a key component of the development of the intern and mentor partnership in organisation (Thessin et al., 2018). This requires selecting internship mentors who have available time and competences to develop young talent. Without this involvement, needed feedback and coaching will not be provided. The lack of support, also from co-workers, risks that any work and academic goals of the internship will not be achieved by the student and organization (Maertz et al., 2014).

Analysing students' assessment of internships, it can be noticed that they perceive them as a vital starting point for their careers (Ciolan et al., 2020). The obtained results confirm that the possibility of acquiring knowledge, skills, and social competences by the students significantly influences their assessment of the employer's image on the job market.

The conducted research also indicates that master's students have greater expectations regarding the obtained benefits, in particular in terms of professional skills gained during the internships than bachelor's students. According to Fachelli & Toboso, older students have more success during their internships than younger students, Additionally, the young graduates with lower ICT skills have less success in internships than graduates with more advanced and expert skills, gained through longer academic education. According to these authors, there is also a relation between the field of study and having more or less success in the internships. Those university students who study in the fields of social science, economics, management, legal

science, engineering, architecture, and health science, have a greater probability of doing a successful internship than students from arts or humanities (Fachelli & Toboso, 2021).

According to Ciolan et al., (2020) motivation for studying is one of the key factors in increasing the extent to which students involve themselves in internship activities. An internship is also a valuable learning experience and earns its place in the curriculum (Bolli et al., 2021). It is desirable, that it was realised in the organization perceived as an employer with a positive image.

7. Summary

The conducted research aimed to identify the impact of the assessment of the internships carried out by students on their perception of the employer brand.

Based on obtained results it can be stated that the way the internships are prepared and carried out by the company is important for the assessment of the employer brand and influences the decision of Generation Z to participate in recruitment processes in this company as well as the selection of this employer as the future workplace.

The comparison of the answers of the bachelor's and master's level respondents revealed the existence of differences in perceiving the importance of particular factors related to the internship for the assessment of the employer brand. This is probably because the master's level students have higher expectations concerning the internship because they will enter the labour market earlier than their colleagues from the bachelor level.

Moreover, research results should become for the employer an indication of the direction of its actions towards the Generation Z representatives. Creating valuable internship programmes for students, undertaking cooperation with universities in this area, and proper organisation of the course of internships should become the subjects of concern for departments responsible for employer branding and attracting employees.

The author is aware that the cardinality of the surveyed group does not allow for the formulation of general conclusions. However, the obtained results may be the basis for further in-depth studies on the problem. In addition, similar research could be conducted to establish the opinion of employers and university representatives with a broader consideration of other variables, such as the field of study of the respondents, previous professional experience, duration of the internship as well as specificity, and type of organisation.

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IMPROVING THE UNIVERSITY RECRUITMENT PROCESS WITH WEB ANALYTICS

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Purpose: The main aim of the article is to know the information needs of candidates for university courses and indicate the importance of web analytics tools in the university recruitment process. The authors present the recruitment process for data science high study programme that was conducted in the middle of 2021 at one of the biggest universities in eastern Poland.

Theoretical background: Digital transformation is an irreversible process today. Data produced by people, things, administration units and business organizations can be the source of valuable information. That transformation causes new possibilities for fast development, but also creates challenges for education processes and professional work. Furthermore, the digital transformation resulted in creating new professions like data science (DS). Because of data volume and its importance DS professionals became one of the most wanted specialists in the 21st century, and therefore many universities try to launch new study programs related to automated data processing and try to get the attention of potential students.

Design/methodology/approach: The process was supported with analytics tools Hotjar and Google Analytics. The results presented in the paper base on the analysis of 974 pageviews recorded by Hotjar and activity of 824 page users reported by Google Analytics.

Findings: The analysis showed that web analytics tools are very easy to use in the recruitment process, and that gathered data allows for better understanding of candidates' needs and improving the future requirement processes and tools. Results indicated that the most important topics for candidates were study programme and payment. From the technical point of view the responsiveness of applications used for the recruitment process is crucial because a lot of traffic was generated by both users of desktop computers and mobile devices. The greatest interest in the program was recorded before the holiday months.

Originality/value: The research contributes to academia in the field of recruitment. Paper presents the data science high study programme and indicates the importance of web analytics tools in the university recruitment process.

Keywords: data science, data science education, eMarketing, web analytics, heatmap, recruitment.

1. Introduction

The Internet technology gives broad possibility to share the information all over the world. It allows also for discovering and monitoring the internet users. Using web analytics, the website activity can be tracked and monitored in order to discover the users (potential clients) preferences and needs. The monitoring leads to better organization of promotion, better adjustment of the offer and form of presentation to the needs of the recipients. Nowadays, web analytics can be used in many business areas and for different purposes, including traffic monitoring, e-commerce optimization, marketing/advertising, web development, information architecture, website performance improvement, web-based campaigns/programs (Zheng and Peltsverger, 2015).

Increasing volume of digital data and huge number of open data sources require new methods and tools for its processing. Data science has recently become a revolutionary technology highly wanted by the organizations. Lack of data science experts will sooner or later have very serious consequences for organizations. Business needs analytical tools operated by skilled personnel to extract insights from unstructured data. The data scientist role is becoming increasingly important as businesses rely more heavily on data analytics to drive decision-making as core component of their IT strategies.

Data scientist is positioned as one of the top jobs as far as salary, work demand, and job satisfaction are considered. Therefore, universities are introducing and promoting new study programs related to digital economy like cybersecurity, data science, artificial intelligence. These programs should allow for meeting inspiring academic staff (leading experts), learning the methods and techniques of agile project management, learning frameworks for automated data analysis and sophisticated Python/R tools and finally give opportunity to work as a data science specialist or team leader.

Before the course participants take part in study programme and learn about its valuable content, it is necessary to attract their attention and understand their needs. Recruitment managers continually seek for innovative, cost effective and reliable tools for improving recruitment process.

Data science market is changing very fast therefore, also the recruitment process should be flexible and effective. It is necessary to support it with eMarketing tools and web analytics platforms. Also, the requirements and needs of study candidates are evolving rapidly, therefore analysis based on data collected by the web analytics tools should result in constant improving the recruitment processes to interest and attract potential students.

In this article the authors present methods and tools used for promotion the data science course. The program is provided for master's students and its promotion was supported with web analytics tool Hotjar and Google Analytics. The next parts of the article are organized as follows: In Section 2, literature review, theoretical background related to using web analytics

in students' recruitment process is presented. Section 3 contains the description of used tools and promotion process. In Section 5 study methodology was outlined: research questions, research procedure and the research sample. Section 5 presents the results addressing the stakeholders information needs, geographical scope and interest over the time, followed by a discussion of implications and list of recommendations. Finally, in Section 6, conclusions and in Section 7 suggestions for future work are developed and proposed.

2. The theoretical background

The literature describes many cases of exploring user-web interactions via web analytics (Saura et al., 2017; Jansen, 2009; Kinley and Tjondronegoro, 2012; Zheng and Peltsverger, 2015; Gonçalves and Ramasco, 2008; Thushara and Ramesh, 2016) and using web analytics tools in the recruitment process (Crall et al., 2017; Palos-Sanchez et al., 2018). Many articles also address development of web analytics key performance indicators that can be used on a specific market or by various organizations (Fagan, 2014; Bekavac and Garbin Praničević, 2015; Shaytura et al., 2017; Saura, 2021). However, there are only a few recent publications addressing the web analytics of university recruitment process.

Applying web analytics tools to students' recruitment marketing was explored in the articles published mostly in the last decade. Biella (2013) examines the Google Analytics usefulness in gaining attention of candidates' for studies. He concludes that web analytics tools allow for identifying which media in marketing mix are giving better results and can increase the student enrollment. Smith (2015) addresses using Google Analytics to improve the college website as a student recruitment tool. She prepared the instructional video tutorials that can be used by higher education professionals to make data-driven decisions in optimization of the recruitment website. The dissertation prepared by Neal (Neal, 2020), reports the results of monitoring the university webpage with Google Analytics. The author concludes that webpage visitors use different hardware platforms, but mostly desktop computers and that the highest number of page visits was in the middle of the week (Neal, 2020).

An interesting case of using web analytics and social listening to attract international students was presented by Tripathi. The author stresses that international students are valuable educational and economic contributions in higher education institutions and should be attracted in the recruitment process. He proposes developing a guide for education institutions to draw the interest of international students through web analytics and social listening. The author indicates that internet tools used for recruitment should be constantly monitored, but also the important is to read and analyze the on-line students' discussions related to the university (Tripathi, 2021). Research performed by Mocan and Maniu is focused on trends in higher education marketing, recruitment and technology. They stated that top trends in this area

include website design, search engine optimization, web analytics, but also developing mobile applications and SMS communication (Mocan and Maniu, 2015).

Finally, students' behavior in an adaptive e-learning system was explored by Moissa et al. They used web analytics to collect and visualize data about usage of e-learning platform. They tested the developed tool on two courses and state that there is a need for supplementing web analytics systems with recommendation tool that help the managers take appropriate steps to better adapt internet tools used for communication and promotion (Moissa et al., 2014).

Although in the literature we can find some examples of using web analytics tools for improving the recruitment process, there is still not many papers addressing supporting the students' recruitment process with the internet tools and monitoring user-web interactions during the university recruitment process. Therefore, in the next parts of the paper the authors present the characteristics of simple recruitment landing page and the possibility of use Hotjar and Google Analytics for monitoring and improving the recruitment procedure on the example of international study program in data science.

3. Recruitment process and tools

Recruitment process

Developing countries like Poland can gain a lot from using ICT tools. They have a great chance to promote their economy, businesses, education, and increase the effectiveness of conducted processes. The COVID pandemics has increased the role of ICT both in business, administration, and educational organizations. The market became global. Therefore, the organizations have to use tools and methods to attract global partners or clients. They must increase the scope of influence, which is not possible today without the use of internet technologies. Also, the Polish universities want to be recognized outside the country. They can achieve this goal in many ways, e.g. by improving the quality of scientific work, better publications, attracting the foreign students with innovative study programs, starting cooperation with recognizable companies.

Considering the above Maria Curie-Skłodowska (UMCS) university supplemented its offer with a new program in data science. In Covid conditions it was particularly difficult because all activities aimed at promoting a new program and attracting foreign students had to be carried out only through internet channels. The attractiveness of the study based on program that included: data analytics in business, data integration for business intelligence, programming for data science, advanced data visualization, marketing analytics and decision making, agile project management, robotic process automation, explainable artificial intelligence, but also on cooperation with leading data analytics companies that provide the experts for conducting the

classes. However, before the course participants take part in study program and learn about its valuable content, it is necessary to attract their attention using appropriate promotion tools that allow for attracting international students.

During the Covid pandemics the promotion of recruitment process for data science program was performed mostly via internet channels. The developed content consisted of text materials, graphics and video materials Information about studies were available on:

- dedicated landing page <https://datascience.umcs.pl/>,
- university recruitment platform: <https://rejestracja.umcs.pl>,
- university main page: <https://www.umcs.pl/>,
- faculty main page: <https://ekonomia.umcs.pl>,
- Facebook profile: <https://www.facebook.com/umcslublin>,
- Instagram profile: @umcs_lublin,
- YouTube Channel: <https://www.youtube.com/channel/UCJdeg7E2FxJIIV1euQACzng>.

The promotion was conducted also with the use of special agents that were responsible for Easter Europe (Ukraine, Belarus) and India. According to data received form university recruitment office the main promotional activities were performed in May and then repeated in September.

The analysis presented in this article is based on the data about the usage of dedicated landing page <https://datascience.umcs.pl/>. To collect the data two eMarketing tools Hotjar and Google Analytics were used.

Used tools

Hotjar (Hotjar, 2021) is a powerful tool that can be used for monitoring the online users' behavior. It offers both analysis and feedback tools. Data collected by Hotjar can be presented in graphical/video form or downloaded in a text format for future analysis. The tool is used to improve the web site's user experience and performance. More information about Hotjar can be found on <https://help.hotjar.com>. Hotjar control panel is presented on figure Figure 1.

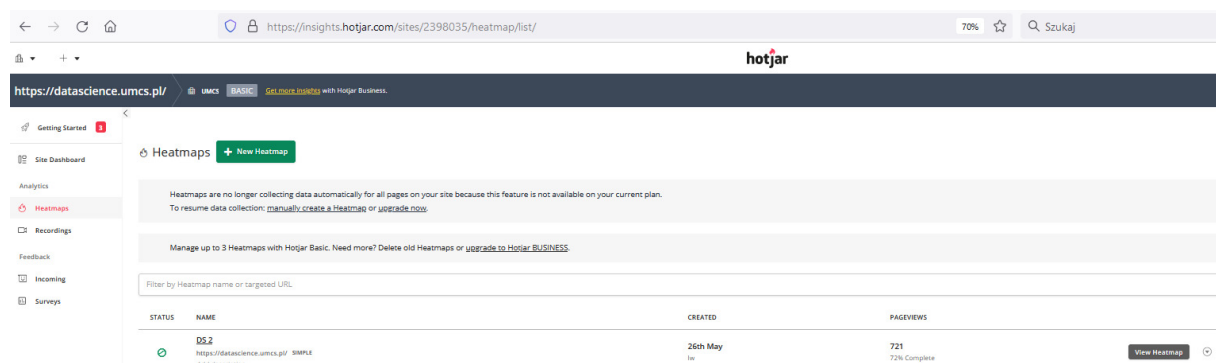


Figure 1. Hotjar control panel.

Google Analytics is service that tracks, analyze and report the website traffic. The service was launched in 2005, and it is one of the most widely used analytics tool. It also offers the mechanisms that can be used for monitoring the mobile application usage. In the recruitment process Google Analytics service was used mostly for collecting the data about geographic scope of promotional activities and interest in data science programme over the time. Sample report generated by Google Analytics based on prepared landing page was shown on Figure 2.

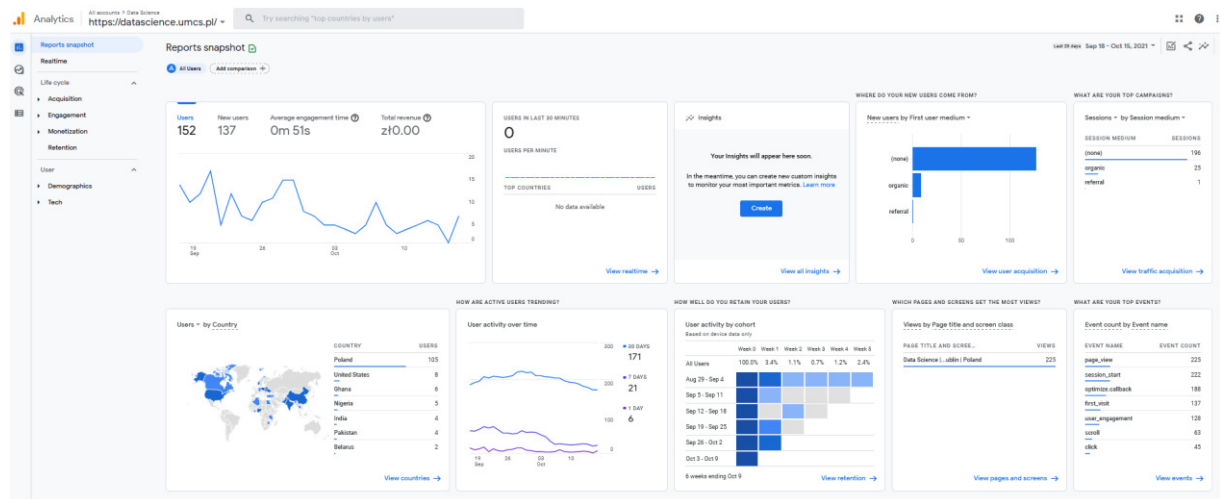


Figure 2. Google Analytics raport based on data science landing page.

4. Research

4.1. The research questions

The data from data science program recruitment process was gathered in order to answer the following research questions:

- What is the most important information for participants of the recruitment process?
- What are the changes in the interest over the time?
- What is the geographical scope of interest?
- What technical aspects should be addressed during the electronic recruitment process?
- What actions should be taken to improve the recruitment process?

In order to answer these questions, the authors developed dedicated recruitment landing page, connected Hotjar application and Google Analytics to the webpage to monitor the users preferences via heatmaps and page statistics.

4.2. The research procedure

The research was divided into four main steps: preparing web page, data collection, data visualization, discussion, and final conclusions. The research procedure is shown on Figure 3.

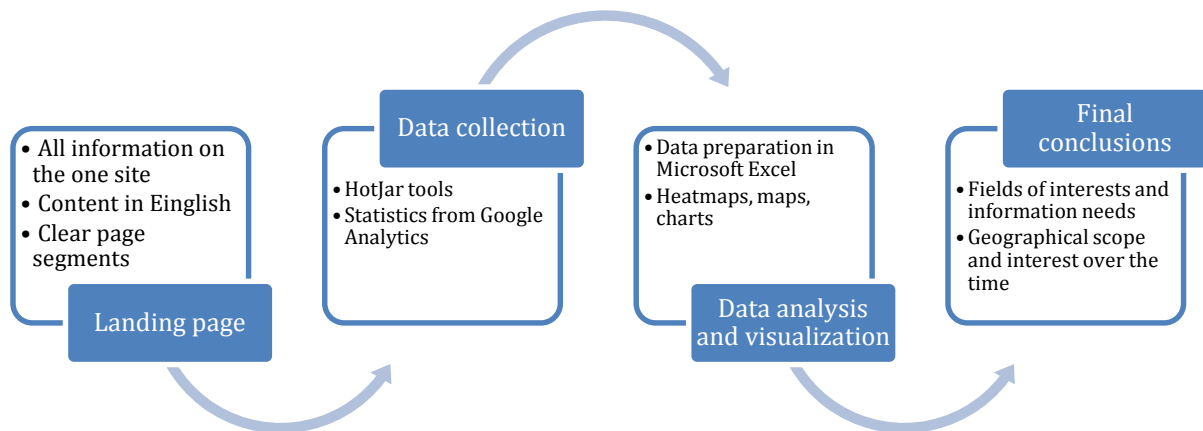


Figure 3. The research procedure.

In the first step the landing page (one site) containing synthetic information about Data Science programme was developed. Presented information and the page structure was prepared in accordance with the expectations of potential candidates and the lessons learned from the recruitment process in previous years. To collect the data about landing page visitors' authors connected the prepared landing page with Hotjar tool and Google analytics by inserting the tracking codes into the header of monitored web page. The data was collected during the entire recruitment process in 2021. Acquired data we analyze online using Google Data Studio and locally, in Microsoft Excel 365. Finally, we prepare and provide the interactive reports to the recruitment office to support them in managerial decision making and responding to changes during the process.

Figure 4 shows the component diagram of our system. The landing page <https://datascience.umcs.pl/> provides the data to the analytical tools: Hotjar and Google Analytics. Hotjar records the interaction of the users with website and allows to understand how they behave during the session – this is an element of the behavioral analytics (IBM, 2013). The data is supplemented by data collected in Google Analytics, which allows us for recording information about the user profiles and their activities in time. For visualization purposes we use Google Data Studio which can be easily integrated with Google Analytics and it turns raw data into interactive reports, which provides better user interface for complex data.

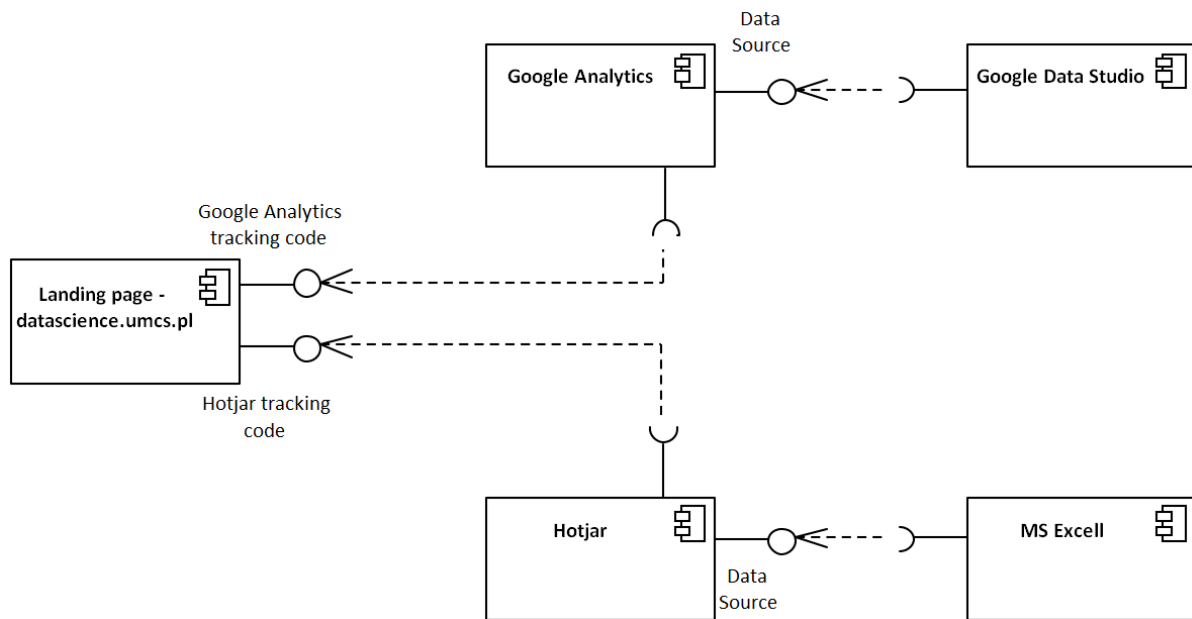


Figure 4. The component diagram of our system.

4.3. Collected data

The data were collected from 12th May till 17th September 2021. According to Hotjar during this period there were 974 pageviews. Generated both by desktop computers, tablets and mobilephone users. The Google Analytics reported 832 page users. The characteristics of page users was shown in Table 1.

Table 1.
The characteristics of page users

Attribute		Source	N	%
Used device	desktop	HotJar N = 974	597	61%
	tablet		16	2%
	mobile		361	37%
Country of origin	Poland	Google N = 832	597	72%
	Nigeria		33	4%
	Ukraine		26	3%
	United States		26	3%
	Belarus		20	2%
	India		16	2%
	China		12	1%
	Azerbaijan		8	1%
	Pakistan		5	1%
	Germany		4	1%
	Other		85	9%

Source: own work.

Landing page users used mostly desktop computers (61%), mobile phones were used by 37% visitors, only 2% were tablet users. Taking into account the country of origin the vast majority of guests came from Poland 72% more than 3% of traffic was generated by internet users from United States, Ukraine and Nigeria.

5. Data analysis and discussion

5.1. The most important information

The landing page contained only summary information about DS offer. It consisted of 673 words, twelve pictures and four movies. The page structure was divided into four sections: Why Data Science?, Studies Program, Fees, Contact. The interest in page section was shown on Figure 5.

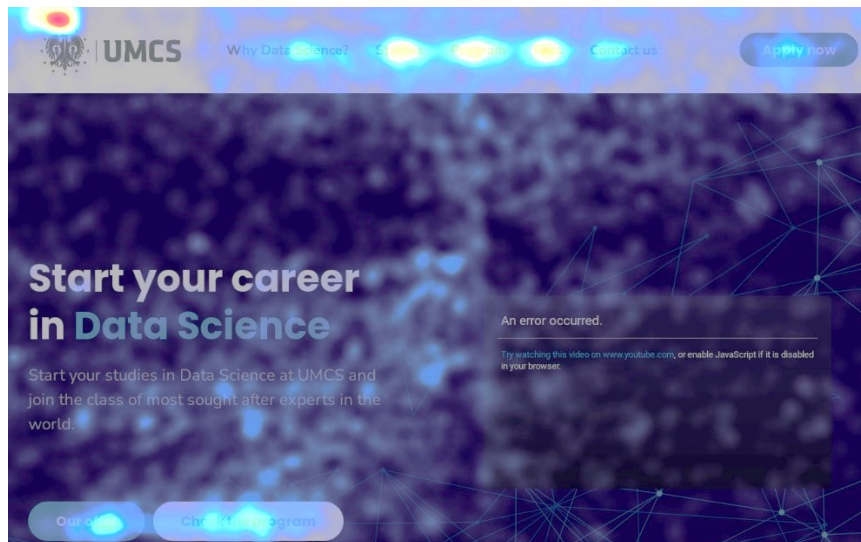


Figure 5. The most clicked page areas – heatmap desktop users.

We can notice that all buttons and links presented on the page were clicked or tapped, so they can be considered as needed. According to the heat map generated by Hotjar the most clocked (tapped) areas were Fees (6,6%) and Program (5,6%). Quite useful was also UMCS logo that allowed for returning to the beginning of the page, but it could be clicked because users thought it would take them to the university's homepage. Frequently used was also the Apply now button that allowed for study program enrollment with the use of the main enrollment system <https://rekrutacja.umcs.pl>.

The most important content, links to the page sections were placed at the beginning of the page. The Figure 6 showed that these elements were noticed by all page users. We can notice that page users didn't have to scroll much.

According to the Figure 6 we can also notice that scrolling over the page were performed in different ways by users of different types of devices. In every case the most visited sections were top part of the page, however tablet users used much more scrolling (orange color) to go to the next sections while desktop and mobile phone users used more frequently clicks (taps) in top menu to go to the appropriate page section.

The transitions between the colors are not sharp except form beginning of the page. That may indicate that some users wanted to read full page content by scrolling, while other used the top menu do visit the right section.

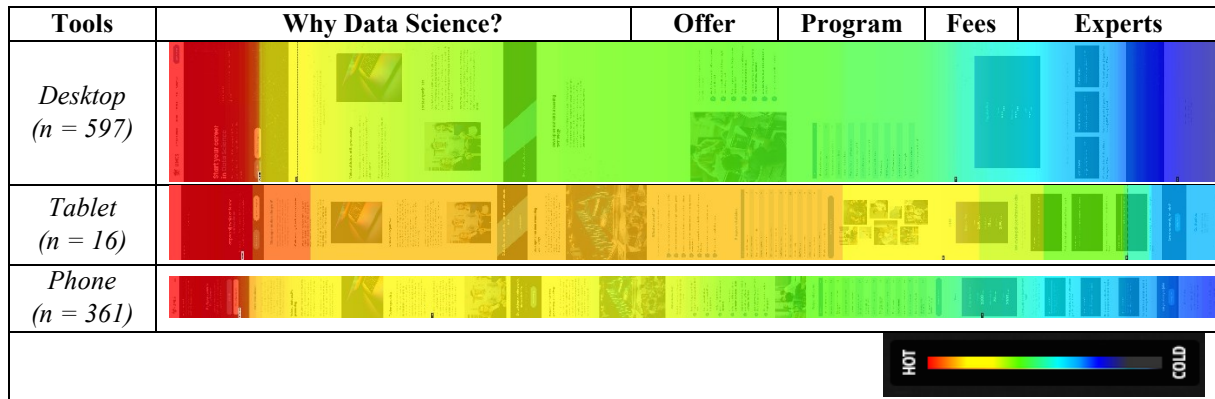


Figure 6. Scrolling over the page.

The analysis indicates that the page structure was prepared in accordance with the users needs. They could quickly find the interesting information using top menu or scroll the page. Therefore, the most crucial sections: Program and Fees were presented at the end of the page.

The analysis of % of page scroll performed by users working on different devices shows that only 10% of both desktop, tablet, and phone page visitors scrolled till the end of page. Slightly over 60% of mobile phone and desktop users reached half the page by scrolling. The most scrolling operations were performed by tablet users.

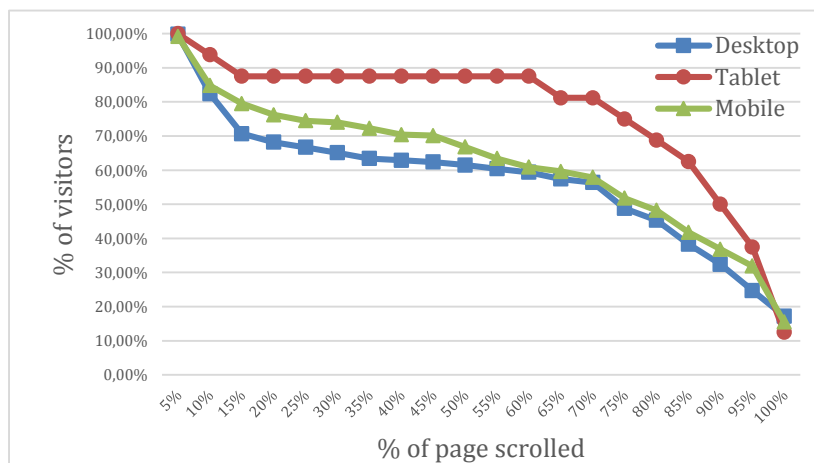


Figure 7. Scrolling over the page.

5.2. Geographic scope of interest

The data science program was developed to attract the foreign students. The studies are paid and conducted in English. Also, the materials published on landing page and other promotion channels were in English. Google Analytics showed (Figure 8) that overwhelming number of users came from Poland (over 60%), while the most represented foreign countries Nigeria, Ukraine and United states had respectively (4%, 3% and 3%). All the foreign traffic on the page was slightly below 40%. That may indicate that despite the promotional activities undertaken, not too many foreign students were reached. So, the managers responsible for the promotion should think about using other, more international communication channels.



Figure 8. Page users by country.

From the other site the topics addressed in the study program, and possibility to improve the English language skills may turn out to be interesting for Polish students. Therefore, despite having to pay fees, they decided to read the terms of recruitment. The high position of Ukraine, Belarus and India could be due to using special promotion agents that were responsible for attracting students from Easter Europe and India.

Interesting is also the huge interest in study program generated from Nigeria. However, a deeper analysis of this phenomenon requires additional data from e-mail communication and interviews with candidates, which now is not available for the authors.

5.3. Interest over the time

The landing page was launched in May 2021. The Google Analytics page usage over the time (Figure 9) indicates that the most traffic was generated in May and June, that is, right after launching the website. In the next months from July to September we cannot observe significant increases or decreases. In these months we can observe up to ten new users per day.

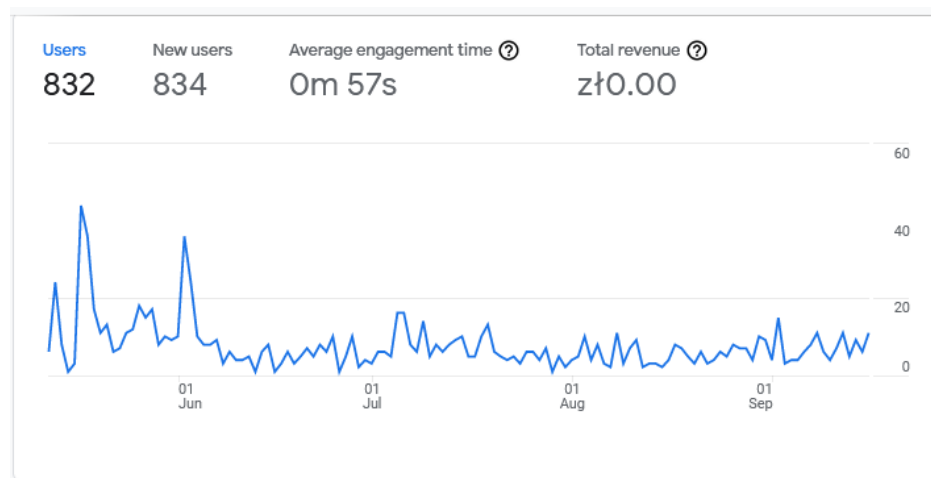


Figure 9. Page usage over the time.

The reason for that may be derived from two facts. First, at the beginning of the recruitment process the promotional efforts and activities were much bigger than in the next months of recruitment. Thus, we can conclude that promotional activities should be repeated over the time, preferably each month (or two) to attract new visitors. Second, we can connect the interest over the time with the huge traffic generated from Poland. In Poland July and August are the holiday months and during this period the interest in educational programs can be minimal. The results indicate that recruitment processes and their promotion should be started before the holidays (May seems to be an appropriate month), however the marketing campaign should be repeated after the holiday, preferably at the beginning of September to gather enough students and start the course in October. According to the information received from university recruitment office the main promotional activities were performed in May and then repeated in September. We can see more interest in data science program in May and June, however after the holiday, interest decreased in the summer months and did not increase in September. This could indicate that it is necessary to undertake additional promotional activities, especially in the autumn period.

5.4. Tools and software used by candidates

From the technical point of view, the important is also the knowledge about the hardware and the software used by the page visitors that many take part in the recruitment process. Google Analytics reports (Figure 10) indicate that the traffic is generated mostly by desktop computers and mobile devices users (99%). However, there were also some users equipped with tablets. The landing page should be available for all these devices, so responsive. It is worth mentioning that it is much easier to add responsiveness to simple landing page, than to the advanced recruitment portal. Responsiveness of every element of big portal is time consuming and expensive, finally some elements may be omitted. Therefore, it is worth to have responsive landing page to make a good impression and attract the student, and in the next step use the dedicated recruitment portal to complete a formal recruitment process.

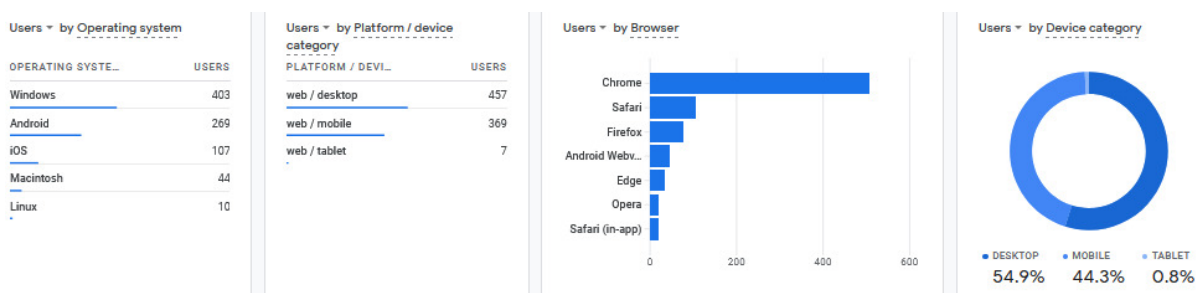


Figure 10. Tools and software used by page users.

When we want to attract international students, we must remember that they may use a diverse software: operating systems or browsers, which also affect the way the website is presented. The statistics (Figure 10) indicate that data science landing page visitors used both Windows ($n = 403$), Android ($n = 269$) and iOS ($n = 107$) operating system. The most used web

browser was Google Chrome, about 61%. Quite popular were also Safari and Firefox, respectively 13% and 10%. The variety of hardware and software indicate that the tools used in the recruitment should be not only responsive, but also tested with the tools that help to check the compatibility of the website with popular browsers.

5.5. Engagement of page users

Google Analytics and Hotjar also provides the reports and videos presenting the webpage users’ engagement. Hotjar offers the video recordings of user sessions (Figure 11), while Google Analytics shows the tables with detailed characteristics of the sessions grouped by device, browser, or operating system (Figure 12).

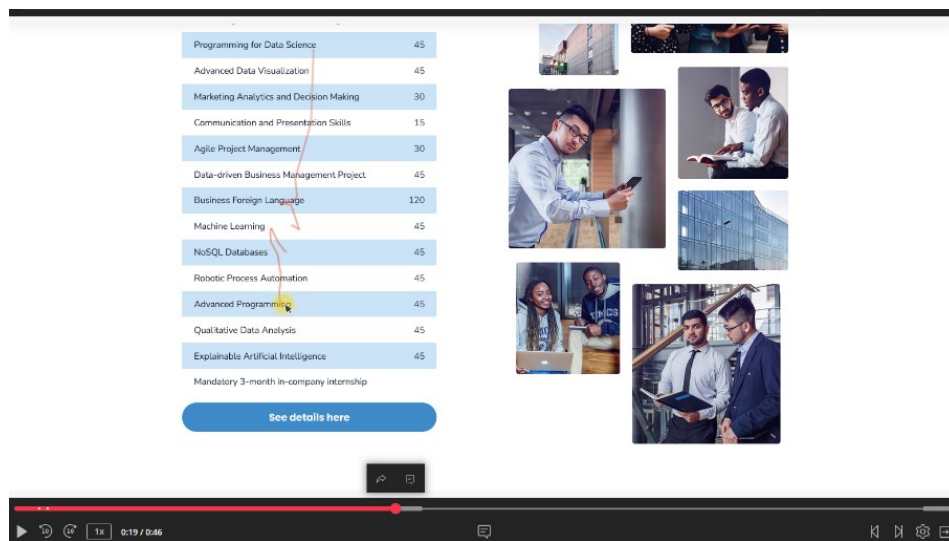


Figure 11. Sample user’s session recording – Hotjar. Source: own work with Google Analytics.

Analysis of 100 recordings provided by Hotjar indicates that the sessions can be divided into three groups short (few seconds), medium (up to few minutes), long (dozen minutes and more). The most represented group was medium session about 70%. The recording analysis indicates that most was starting by clicking the “Check the program” button then reading the program of studies or checking the fees. That confirms the information presented on the landing page heatmaps.

Operating system	Users	New users	Engaged sessions	Engagement rate	Engaged sessions per user	Average engagement time	Event count
Totals	832 100% of total	834 100% of total	652 100% of total	56.79% Avg 0%	0.78 Avg 0%	0m 57s Avg 0%	5,671 100% of total
1 Windows	403	401	367	62.31%	0.91	1m 15s	2,974
2 Android	269	269	175	51.32%	0.65	0m 44s	1,643
3 iOS	107	109	61	45.19%	0.57	0m 24s	650
4 Macintosh	44	46	44	59.46%	1.00	1m 06s	361
5 Linux	10	9	5	55.56%	0.50	0m 20s	43

Figure 12. Users’ engagement by operating system.

Engagement report provided by Google Analytics (Figure 12) indicate that sessions started by desktop computers were much longer than mobile phone users (respectively 1 minute 13 seconds and 36 seconds). The exception are Linux users who have very short sessions (about 10 seconds). The engagement rate (engaged sessions/total sessions) for the landing page is low (57%). The higher rate had desktop computer users (62%), while the engagement rate for mobile visitors was only 49%. According to engagement rate by industry report (Firstpagesage, 2021) in the education sector the engagement rate should be about 70%. The low engagement rate may indicate problems with page navigation or speed, but also the content may not grab enough readers' attention.

5.6. Recommendations

The performed analysis and information collected from mail contact with data science program candidates allow to formulate the recommendations for recruitment process managers. The recommendations address both the content posted on information pages and the monitoring of the recruitment process itself:

- it is worth to prepare dedicated domain and short landing page for promotion the study programs, especially in the COVID situation when traditional face to face contact is strongly limited;
- the dedicated English language webpage is extremely useful when we want to increase the geographical scope of promotion, however, to attract the global audience the landing page should be promoted through the channels with global reach;
- prepared web pages should be equipped with analytical tools, the integration process is very easy and, in many cases, free of charge, the collected data can be a source of valuable information, useful not only for real time page improvement but also allow for better adaptation of the offer to the profile and requirements of the candidates;
- during the implementation process of web communication tools, it is worth to check their responsiveness, and if they are properly displayed in different browsers, because the recruitment traffic is generated both by desktop computer and mobile device user, they use also various browsers;
- the heat maps, video recordings automatically generated by Hotjar software, are very transparent and can be used in the process of designing recruitment pages, their analysis allows not only to select the appropriate information, but also to place it in the appropriate sections.

6. Conclusion

To analyze the values the information needs and the interest in data science programme recruitment process the authors used data gathered by web analytics tools Hotjar and Google Analytics. The performed recruitment process monitoring allows formulating the conclusions addressing both promotion process, technical aspects of used tools, but also the way and the quality of presented information.

Due to the digital transformation stimulated by the Covid pandemics the usage of electronics communication tools in recruitment process is inevitable. Electronic communication channels increase the scope and allow for precise monitoring of user behavior and adaptation of the recruitment process (and the educational) offer to their needs. However, the used tools must be properly implemented and supervised.

Web analytics tools like Hotjar and Google Analytics are not expensive and quite easy to use. They collect the data automatically, however, need the experienced eMarketing specialists for initial customization and right and profound interpretation of the results.

According to the data acquired from the data science landing page analyzed in the article, the most interest in the recruitment process was noticed in May and June so before the summertime, and therefore it is recommended to start and support the recruitment process in the initial phase still during the semester and intensify/renew promotional activities after holidays. The page visitors are most interested in study programme and fees, and detailed questions addressing this area may be the subject of further email communication.

Developing the separate simple landing page generates many benefits, transparency, responsiveness, simpler monitoring, easier interpretation of results, however, it needs integration with the main recruitment portal, there may also be a risk of inconsistent information.

An important issue was also the introduction of a readable dedicated domain datascience.umcs.pl, which facilitated cooperation with SEO and increased readability for the recipients.

7. Future research

Web analytics tools allow to collect very useful data, however the in-depth interpretation often needs additional background information, therefore in the next stages of the research the authors are going to conduct the interviews with recruited students to find out what were the reasons for their interest in data science studies, how did they find out about the programme, and why they have chosen the university.

Finally, an interesting area of research is the comparison of students' recruitment needs between the universities from various countries, with different levels of information society development. It is also worth comparing the opinions of users of light, dedicated page (for single study programme) with complex tool used for whole university students' recruitment process.

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MANAGEMENT OF THE ASSOCIATION FORMATION PROCESS

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Purpose: The aim of the paper is to identify the process of creating an association and to define a model of the process of creating an association that is registered in the National Court Register, as well as to show the role played by the entity managing this process. On this basis the author attempts to answer the research questions: What is the correct model of the association formation process and whether, and if so, to what extent the activities undertaken by the entity managing the association formation process affect the possibility of its creation and the subsequent functioning of the association?

Design/methodology/approach: In order to search for evidence to answer the research questions, the method of legal analysis (normative methodology) anchored in the theory of organisation and management was used, as appropriate for analysing a phenomenon highly determined by legal regulations. The combination of the research method of legal analysis and concepts from the field of organisation and management allows to formulate conclusions on the identification and course of the phenomenon under study, causes and effects of actions taken by the entity managing the process of association formation. The author has used various techniques and tools to collect and analyse data, i.e. participatory observation, legal analysis, analysis of documentation, analysis of judicial decisions and Internet sources.

Findings: The author has identified and defined a model for managing the association formation process and has established the important role of the entity managing this process.

Practical implications: The association formation process management model can be used in practice by those who undertake the management of such processes.

Social implications: One of the basic organisational forms, in which a person can actively influence social life, be creative and realise both his own needs and the needs of others, is the association. The institution of association - as an organisation - seems to be underused by active members of social life. An undeniable problem is the difficulty to direct the process of association creation, there is no popularization of a model of the process of association creation. Therefore, it is necessary to define such a model, perhaps to define a postulate for legislative changes and, above all, to educate and promote it.

Originality/value: The presented analysis is important, because it establishes and shows a model of the association formation process, which can be applied by the entity managing the association formation process, and shows its significance for the later functioning of such an organisation as an association registered in the National Court Register. This research problem, so far, has not been elaborated from the point of view of management science.

Keywords: association management, process management, association organisation.

Category of the paper: research paper.

1. Introduction

In the 21st century, the management of many processes is becoming increasingly complex. This phenomenon seems to be a consequence of the increasing complexity, multifaceted functioning of various organisations. One of such organisations is the association. It is the basic organisational form within which the freedom of association is realised. The freedom of association has been guaranteed by the Constitution of the Republic of Poland (Constitution... as amended; hereinafter referred to as the Constitution of the Republic of Poland). An essential element of every freedom is the possibility to realise it in the way an individual considers appropriate. Such a view on the realisation of the freedom causes that the entity, which has the idea to create an association as an organisation, within which the freedom of association may be realised, faces many problems, has to ask itself many questions, and, as a rule, at the stage of creating the association it has to find the answers, because the proper organisation of the association largely determines its later functioning. The creation of an association is a whole process, a sequence of activities that must be carried out so that the association can not only be created, but also so that it can function properly by achieving certain operational objectives (Schermerhorn, 2008). In this process beside the necessary activities (legal prerequisites) to create the association there can be, and even should be, preparatory (planning) and organisational activities, which will improve the whole process and enable the achievement of the planned goal.

The subject of this research is the management of the association formation process. There is no literature available in management science that addresses the problem of association formation, there is only literature in legal science, which I will use. The specificity and size of this study make it necessary to limit the subject of research to the management of the process of forming an association in Poland, registered in the National Court Register (further on in the paper – KRS). From the legal point of view, associations can be created on the basis of the Law on Associations (The Act of April 7, 1989 – Law on Associations, consolidated text Journal of Laws of 2020, item 2261; in the following, "act" means the Law on Associations without any further specification; "LoA" for short). Apart from this type of associations, in Poland one can create the so-called ordinary associations, which are a simplified form of association and union of associations, associations of local government units and others. The subject of this analysis is the association in its organisational form providing the greatest possibilities of activity, which the mentioned act defines as an "association" – without further specification of its features.

Freedom of association is one of the freedoms guaranteed by the standards of international law. The Universal Declaration of Human Rights of 10 December 1948 already guarantees everyone the freedom of peaceful assembly and association. It also states that no one may be compelled to belong to an association. A similar guarantee of freedom of association is provided for in the International Covenant on Civil and Political Rights of 19 December 1966 and the

Convention for the Protection of Human Rights and Fundamental Freedoms of 4 November 1950, which guarantees that everyone has the right to freedom of peaceful assembly and to freedom of association at all levels, in particular in political, trade union and civic matters (Pisarczyk, 2016).

In Poland, freedom of association is guaranteed not only by international law, but above all by the Constitution and the Law on Associations. The Constitution guarantees the freedom to form and operate associations, trade unions, socio-professional organisations of farmers, civic movements, other voluntary associations, both secular and of a religious nature, and foundations. The guarantee of these freedoms is provided for in the Constitution of the Republic of Poland, both in Article 12 (constitutional principle) and Article 58, which explicitly defines the freedom of association. No association may be formed whose objective or activity would be contrary to the Constitution or an Act. The constitutional guarantee of freedom of association is strengthened by the provision according to which only the court is competent to decide on the refusal to register or prohibition of an association. Other issues, including the types of associations subject to court registration, the procedure for such registration and the forms of supervision have been left to statutory regulation.

2. Preparation (planning) of the association formation process

The first important issue in the process of formation of an association is the choice of the entity which will manage the process. In most cases of decision-making processes, it seems to be advantageous to have one person who manages the process. However, the more complex and multithreaded the process is, the greater the need for participation of other people in the process (Stoner, Freeman and Gilbert, 2001). The fact that the association is a self-governing association of a collegial character and not an entity with a one-person decision-making leadership is not without significance. Therefore, the managing entity should lead the project of creating such an association, with such an organisational structure that it can function without conflict after its establishment. For these reasons, even if the process of creation of the association will be carried out by one person, it must take into account the fact that the subsequent functioning of the association, its management, will have to be collegial.

As the process of the establishment of the association is significantly determined by the legal norms, it seems necessary that the manager himself has the necessary knowledge of the legal limits and possibilities or at least has the possibility of legal consultation. The later functioning of the association may be based on the social work of its members, but undoubtedly the circle of persons with whom the manager of the association should consult some decisions should include a person with knowledge in the field of finance and accounting. Such a circle of

persons potentially gives the possibility to achieve the intended goal – to create an association that will be able to function efficiently and rationally.

It is best for the process of formation of the association, if the person carrying out the process is at the same time willing to be one of the founding members of the association, or at least to be in direct contact with such members. Then the persons who will later manage the formed association will be able to clarify their expectations concerning the functioning of the association. The establishment of these expectations will make it possible to avoid unnecessary activities and complex procedures aimed at changes in the future, and the organisation of the association from the beginning will be able to meet the expectations of its members. In this way one of the main objectives of the entity managing the association formation process will be fulfilled, i.e. to create such an association as the future members of the formed organisation expect.

The definition of the association's objectives and the means to be used to achieve them is not, despite appearances, a simple task, and their determination is essential for the correct implementation of the project, which is the creation of a specific, "tailor-made" association.

An association is a type of voluntary association, self-governing, permanent and non-profit-making (Suski, 2018; Barański, 2019). Therefore, if people would like to pursue profit-making purposes, the form of association will not be appropriate for the pursuit of their goals. As a rule, the basis for the functioning of an association is the voluntary work of its members, however, an association may employ employees and even conduct business activities, however, the income from these activities may not be distributed among the members of the association, but must be used to achieve its statutory objectives (Wilk, 2019).

An association, like other organisations, is characterised by the features of all organisations, non-public as well as public. Each organisation has a specific system of goals and values and has a specific intra-organisational bond (Kožuch, 2004, 2020). All these aspects must be considered in the planning stage of forming an association. The awareness of the purpose of the association is essential. An association has to enable its members to actively participate in public life, to express their views and to pursue their individual interests. Each association independently defines its objectives, organisational structures, action programmes and adopts internal acts (see Article 10 of LoA). Therefore the manager of the association formation process should determine in particular the answers to the questions:

1. what is the purpose of the association,
2. what name the association will have,
3. where the association's headquarters will be located,
4. what the area of operation will be,
5. what the organisational structure will be - whether field units are to be created,
6. what the authorities of the association will be, their mode of election, their competencies,
7. whether board members will have the opportunity to receive remuneration,

8. how the association will be represented, how it will incur obligations,
9. how membership will be acquired and lost,
10. what will be the reasons for loss of membership,
11. what rights and obligations members will have,
12. what will be the method of determining membership fees,
13. how the association will raise funds,
14. whether the association will carry out economic activities,
15. whether it will apply for public benefit status,
16. what will be the rules for amending the Statutes,
17. will electronic means of communication be used for voting,
18. how the association may be dissolved.

The association, as a self-governing organisation, determines the above-mentioned issues itself. The Law on Associations only in a few aspects imposes certain solutions and provides for limitations. Therefore, the role of the entity managing the process of establishing an association is all the more important and it should act in an organised and not spontaneous way (features of organised activity are presented at Bednarski, 1998).

3. Association formation activities

The model of management process includes planning, organising, leading and controlling. The person who manages the association process must take into account various circumstances, including numerous constraints. The planning of the process has to lead to the definition of the goal, to the determination of future activities, to the development of alternative scenarios, to the determination of step by step what has to be done in order to reach the predetermined goal (Schermerhorn, 2008). Planning must take into account the dynamically changing circumstances. The planning of the association formation process aims to make the necessary arrangements for the relevant circumstances that will allow the smooth and effective implementation of the undertaken activities and procedures aimed directly at the formation of the association. These include:

1. founding meeting,
2. minutes,
3. resolution to establish the association,
4. adoption of the statutes of the association,
5. election of the founding committee or association authorities
6. filing an application for entry of the association in the National Court Register.

The whole process of creating an association ends on the day the decision of the registration court to enter the association into the National Court Register becomes final.

One of the limitations of the association formation process is the collegial nature of the activities undertaken – at least 7 persons (Article 9 of LoA). Therefore, **the entity that manages the process of association formation can only fulfil a planning, preparatory, auxiliary, organisational and streamlining function. However, it has no decision-making competence. It is not a formal decision maker** (Knosala, 2005). Its role is in fact reduced to providing a service, the object of which is to plan and organise the process of establishing an association. The Law on Associations stipulates that the will to establish an association must be expressed by at least seven persons, who will adopt the statutes of the association, elect the founding committee or the authorities of the association. There are no provisions formalizing the organization of the founding meeting. However, it is generally accepted in doctrine and jurisprudence that such a meeting should be organised and formal actions should be taken during it.

The organisation of the founding meeting is an essential activity of the association formation process. There are no legal restrictions that constitute formal requirements for the organisation of such a meeting. There need not be any formal notifications, invitations, nor do they have to be made in advance. However, it is essential that at least 7 persons (natural persons) with full legal capacity and not deprived of public rights be present at such a founding meeting. Natural persons of full legal capacity who are of full age and have not been placed under guardianship have full legal capacity. The age of majority is reached when a person reaches 18 years of age. Full legal capacity is also acquired by women who marry after the age of 16 with the approval of the family court. Only the courts are competent to pronounce guardianship and the deprivation of public rights.

Minors have no right to form an association. They can only belong to associations, they can be members, and even minors between the age of 16 and 18 can exercise active and passive electoral rights, i.e. they can elect and stand for election to the board of directors of an association (Article 3 of LoA). In such a board, the majority must be constituted by persons with full legal capacity. Minors under the age of 16 can exercise the right to vote and stand for election only if the association's organisational unit consists exclusively of minors. If a child is under 16 years of age, he/she must have the consent of his/her legal representatives, i.e. a parent or a legal guardian.

The right to form and belong to associations established in Poland, as well as full internal organisational rights, are also available to foreigners who reside in Poland, on the same principles as Polish citizens. However, if they do not reside in Poland, they do not have the right to form an association in Poland, but if the statutes of an association provide for such a possibility, they may be members of such an association.

The entity planning and organising the founding meeting must be aware of the above-mentioned issues. It should prepare for the founding members declarations on fulfilling the requirements described above, which should be signed by them – they will constitute attachments to a later application for registering the association in the National Court Register.

The founders' meeting should be minuted; the minutes should record the course of the meeting, in particular voting on resolutions and their results. Prepared documents should be in three copies, because two will be submitted to the National Court Register (one of which will be given to the supervisory body) and the third copy should be in the documentation kept by the authorities in the seat of the association.

The list of founding members should include: name and surname, date and place of birth; place of residence and handwritten signature (Article 12 of LoA). If the list of members will also include declarations of Polish citizenship, having full capacity to perform legal acts and not being deprived of public rights (Article 3(1) of LoA), this may be one document, but the declarations may be independent documents.

Continuing the founding meeting, after the issues related to chairing the founding meeting, taking minutes of the meeting, establishing the quorum (at least 7 persons), discussion, it is necessary to proceed to passing resolutions. The first resolution should be the resolution on the establishment of the association (with its name). The second resolution, required directly by the law, is the resolution to adopt the articles of association. Both resolutions may in practice be covered by one resolution on the establishment of the association and the adoption of its statutes. It goes without saying that the draft statutes should be presented to the assembly first. Ideally, this draft should be known to the founding members beforehand and consensus on its content should be reached earlier. Probably the earlier, informal meetings of the initiative group, during which the consensus on the content of the statute and on the selection of the association's authorities will be worked out, will allow for efficient and effective performance of formal activities during the founding meeting. In this respect it should be noted that the larger the number of founding members is (there must be at least 7 persons), the more difficult it is to reach a consensus. On the other hand, the more persons who can make constructive comments on the draft statute of the association, the greater the probability of working out a statute that meets the expectations of the future members of the association. The resolution on the establishment of the association and the adoption of its statutes should be adopted unanimously. If more than 7 persons participate in the founding meeting and not all of the participants voted in favour of the establishment of the association, only those who voted in favour become members of the association, the other persons do not become members of the association and further actions are taken only by the founding members.

If there is no consensus on the content of the statutes and the election of the association's authorities, the founding meeting has little chance of success. The previously indicated problems, which must be analysed in the planning and organisational stages by the manager of the association formation, must be included in the statutes. The constitution is the most important internal legal act, which determines the constitution of the association, its organisation and its mode of operation. Already the first issue – the name of the association – may cause problems. The LoA limits the choice of the name of the association in the way that it requires the name to be distinguishable from other associations, organisations and institutions.

Nowadays, in the times of access to search engine results, it is not difficult to check whether an entity with the name we want to give our association already exists. However, the choice of name is also important from the point of view of the intra-organisational bond and the subsequent relations with stakeholders. The relations of such an entity as an association have a diverse and multidimensional character and the name of the association is undoubtedly important not only for the members of the association but also for the potential stakeholders and the possibility of undertaking various forms of cooperation with them (Sojkin, Michalak, 2018). The name of the association must not be misleading, and in particular it must not misrepresent important social issues and affect the rights of others (Judgment of the Supreme Court – Labour, Social Security and Public Affairs Chamber of 5 December 2013, ref. III SK 10/13, OSNP 2015/1/17; Hadrowicz, 2020). The name is a means of individualizing a specific entity – in this case a legal person. It constitutes its personal good and is subject to legal protection. Distinctness of the name from the names of other entities is also aimed at avoiding confusion e.g. as to the identity of the entity which undertakes certain activities, supervisory activities addressed to the association, correspondence, etc.

The determination of the area of operation of the association depends entirely on the will of the association. It may be a defined area of a given town, a locality, a commune, a district, a province, the whole country, or even other countries or a differently defined area. However, the registered office should be in Poland, it is important due to the scope of jurisdiction of the supervisory authority and the court (Barteczek, 2009). In practice it is assumed that by the term "seat" is meant a locality, but there are no contraindications for the seat to be more precisely defined.

Within the area of activity defined in the articles of association, the association may act as a single structure or may have separate local organisational units. In order to set them up it is necessary to provide for such a possibility in the articles of association. In such a case the statute must define the principles of creation and dissolution of such an organisational unit, its organisational structure, organs, including obligatory board, and the procedure of appointment or election of these organs. A territorial organisational unit of an association may, under certain conditions, obtain legal personality. This issue, however, due to the nature of this article goes beyond the scope of the study.

The association independently determines its objectives, which, however, should be within the framework of the realization of freedoms and rights belonging to public law. The purpose of the association may not be contrary to the Constitution, international agreements ratified with prior consent expressed in a law, or any law. The registration court examines only whether the declared aims and ways of achieving them are lawful – legal in the light of the legal order in force on the day of the adjudication. They may be stated in general terms or in very specific terms. The time in which I am writing this paper brings to mind an example of such an objective: "The goal of the association is to help refugees arriving from Ukraine and residing on the territory of Poland". Whereas the means of implementation: "The association pursues its goals

by acquiring and donating clothing, food, cleaning supplies, school supplies to those in need..." Both the aims and the ways of realising them should rather be defined by type. This will allow more flexibility in the association's activities in the future – in accordance with the statutes.

The founding members are members of the association from the moment of its establishment. The statutes have to define the way of acquiring the membership by other persons, i.e. whether it is done by submitting the membership declaration and the resolution of the management board to accept the association, or whether, for instance, an "opinion", a "letter of recommendation" of a member of the association is required. The conditions, requirements and circumstances that have to be fulfilled for a person to become a member are left to the discretion of the association. The statutes must also define the way of the loss of membership – whether it is done by the statutes and the management board only strikes the member off the list, or whether the resolution of the management board about the loss of membership should be made after a prior hearing of the member, if it is possible. The reasons for loss of membership should be defined relatively precisely and should be a reference to the member's obligations (e.g. obligation to pay membership fees). The statutes should define not only the duties but also the rights of the members.

The functioning of any organisation mainly depends on the creativity of its governing bodies. The Law on Associations requires three bodies. These are: the general assembly of members or the assembly of delegates, the management board and the internal control authority. The general meeting of members is the body, which has a presumption of competence in the event that the statutes (or the law) do not specify the competent body in a given matter. Instead of the general meeting of members, the body of the association may be the delegates' meeting (Article 11(2) of LoA). When establishing an association, the question how many members the association will have should be answered. If it is to be an association with hundreds or thousands of members, it seems reasonable to determine in the articles of association that after exceeding a certain number of members, the body instead of the general meeting of members will be the meeting of delegates. The Act does not specify the number of members of the association from which the delegates' meeting may be a body, nor does it provide detailed rules for the election of delegates.

In spite of the fact that the Law on Associations defines a presumption of competence in favour of the general meeting of the association's members (Article 11(1) of LoA), for the sake of clarity of the division of competences of the association's authorities, the articles of association should define which competences belong "in particular" to the general meeting of the members. Traditionally these competences include: passing the directions of the association's activities, electing and dismissing, completing the composition of the management board and the internal control body, considering the reports of the elected authorities of the association, giving the board the vote of acceptance, passing the budget, passing the membership fees, passing the amendments to the statute, considering the appeals from the resolutions of the management board, passing resolutions on the dissolution of the association,

passing resolutions on all the matters not reserved for the competence of other bodies of the association.

The management board and the internal control body are other mandatory bodies of the association. It is generally accepted that the management board and the internal control body are collegial bodies, elected for a specific term of office, but there are no statutory norms that would exclude the one-person character of these bodies. However, one-person or two-person boards are functionally undesirable. A person, who would act as a one-person board in a situation of indisposition or illness, would in fact make the day-to-day running of the association impossible. A similar situation occurs if the board is composed of two members. Then every resolution would have to be passed unanimously. The optimal solution for collegiate bodies is a three- or five-member board, e.g. you can say that "the board consists of 3 to 7 members". The statutes are to specify the procedure for electing the two bodies, as well as the procedure for supplementing their composition and their competences. Proper definition of these issues will make it possible to overcome difficult crisis situations in the future, which are the consequence of personnel problems. It should be clearly defined who, when and how should convene a general meeting of members (delegates' meeting) to elect people for a new term of office or to fill the vacancy. It should also be specified by what majority and quorum the electing body decides on the election. A simple majority, not a qualified majority, is conducive to an efficient election. Similarly, a quorum, e.g. in the presence of at least half of the association members. Ideally, the statutes should provide for "emergency" solutions in the event of low attendance of members at the general meeting. It should be considered whether to provide that, in the absence of the presence of at least half of the association's members, a simple majority of the association's members present is sufficient in subsequent votes. In this context, it is important to clearly define the manner in which the members are notified of the time and place of the convened general meeting. This will allow the validity of the adopted resolutions to be properly assessed. The above remarks are fully applicable to the convening of meetings of the board of directors and the internal control body.

It is very important to define the competences of the elected authorities of the association. Both the competence of the management board and the internal control body must be explicitly defined in the articles of association in order for the bodies to have this competence. Failure to assign a specific competence to the board of directors or the internal control body means that the statutory presumption of competence set out in Article 11 (1) of LoA in favour of the general meeting of members applies. Therefore, at the stage of enacting the statutes, great care should be taken to define, in particular, the competences of the management board. It is undoubtedly advisable to determine that the competence of the board includes the matters concerning the current management of the association's affairs. With the reservation "in particular" it is possible to try to list them in an extensive manner. Irrespective of the definition of the current affairs, the competence of the board of directors to convene a general meeting of the association's members, to represent the association, to incur property obligations should be

determined. If these issues are not properly specified and only generally assigned to the board, the board will always have to represent the association in its full composition. Therefore, if we want to improve the representation of the association, we can, for example, specify that the board is sufficient to represent the association. Therefore, if we want to improve the representation of the association, we can determine, for example, that the joint statements of two members of the management board are sufficient to represent the association (both in the matters of property obligations and other matters concerning the representation of the association). Of course, we can determine various manners of representation and other requirements depending on e.g. the amount, type of liability or the type of legal transaction. The articles of association shall determine whether the members of the management board may receive remuneration for the activities undertaken in connection with their function, and if so, what the rules for determining such remuneration will be.

Although the LoA Act does not impose these competences on the board of directors, the nature of this body, its relation to the other authorities of the association and the concern about the smooth functioning of the association require that these competences are statutorily assigned to the board of directors. Apart from the mentioned competences, the competences of the management board usually include: realisation of the statutory aims of the association, convening of the general meeting of members, implementation of the resolutions of the general meeting of members, drawing up and implementation of work plans and budget, management of the association's property, adoption of resolutions on the admission of members of the association and exclusion of members of the association, on the acquisition, disposal or encumbrance of property up to certain values, representation of the association outside.

Another body that every association must have is an internal control body (Article 20 of LoA). The Act does not specify its name. Both the name and the mode of its election, supplementation of its composition, principles of operation and competences, are left to statutory regulation. Usually the name "audit committee" is given to the internal control body. Traditionally, the competences of the audit committee are as follows: to control the activity of the association, especially of the management board, to submit post-audit motions to the authorities of the association, to present the report of the audit and its activity to the general assembly of members, to submit motions to convene the meeting of the management board and the general assembly of members, to submit motions to discharge the management board of the association.

Every institution needs adequate resources to function. The statutory principle is that an association bases its activities on the voluntary work of its members. However, there is no doubt that raising funds by the association is necessary in practice for its effective functioning. The minimalist solution is to raise funds from membership fees. The act imposes an obligation on entities establishing an association to determine the manner of obtaining financial means, including establishing membership fees. An association as a legal person (after its registration) has legal capacity and may be the subject of rights and obligations. Its assets may be created

not only from the membership fees, but also from donations, inheritances, bequests, subsidies, from public donations (public collections), from the income from its property and from the income from its economic activity.

The final issues to be determined in the statutes are the rules of amending the statutes and the manner of dissolution of the association. Despite the fact that the manager of the association formation process will do his/her best to structure the content of the statute in the best possible way, it may turn out after some time of the association functioning that it is necessary e.g. to determine additional competencies of the elected authorities of the association, or the members of the association will have a different vision of the association development than the founding members, or they will want to pursue other goals than those for which the association was established. In this case, it is necessary to change the statutes. This competence of the association authorities should be entrusted to the general assembly of members (meeting of delegates). If the founding members wish to ensure a higher stability of the contents of the statute, a certain qualified majority and an appropriate quorum may be stipulated for the validity of the resolution, e.g. a majority of 3/5 of the votes in the presence of at least half of the association members (delegates) entitled to vote. Immediately after the adoption of the change of the articles of association, the management board of the association is obliged to notify the registration court, which, if the changes are made in accordance with the articles of association in force to date, enters the changes into the National Court Register.

Similarly to the competence to change the constitution, the competence to dissolve the association should be attributed to the most important organ of the association – the general assembly of members (meeting of delegates). If the articles of association or the resolution does not state otherwise, the members of the management board become liquidators of the association. If the association is dissolved by a court decision, the court orders the liquidation and appoints a liquidator. The property of the liquidated association shall be used for the purpose specified in the articles of association or in the resolution to liquidate the association. If neither the articles of association nor the resolution on the liquidation of the association specified such a purpose, then the court decides on the designation of the assets for a specific social purpose.

All work and discussion on the content of the association's statutes should be concluded by the founding members passing a resolution on the adoption of the statutes. The statute should be an element of the content of the resolution or the resolution should directly refer to the content of the statute being an appendix to the resolution. The resolution must be passed by at least seven persons.

The next activity undertaken during the founding meeting is the election of the founding committee or the association's authorities. In the current legal status the election of the founding committee should be treated as a "fall-back solution" in case it is not possible to elect the association's authorities immediately. Then the task of the founding committee would be to organise a "general meeting of members" which would elect the management board and the

audit committee. The election of the management board is necessary for the registration of the association in the National Court Register, since pursuant to art. 12 of LoA only the management board has the capacity to submit an application for entry of the association in the National Court Register. Neither the founding committee nor even all founding members acting together have this competence. For this reason the entity managing the process of establishing an association should plan, prepare and organise the founding meeting in such a manner that from among the founding members it is possible to elect the management board and the audit committee, applying the norms set forth in the statute.

The management board of the association is competent to submit an application to the registration court for the registration of the association in the National Court Register. At this stage of the association formation process, the association already has a defined name, statutes and authorities. To the application the management board must attach the statute, a list of founders, including their first names, date and place of birth, place of residence and handwritten signatures of the founders, statements on being a Polish citizen, having full capacity to perform legal activities and not being deprived of public rights, a protocol on the election of the association's authorities. The Board must also indicate the address of the registered office of the association. This address is important both from the point of view of the correspondence during the registration procedure, as well as possible later correspondence from the court, from the supervisory authority or from other public institutions. The application for entry of the association in the National Court Register must be signed by all members of the management board.

The registration of an association with the NCR can be done on paper or electronically. If the association will carry out business activities, it is necessary to submit the application in electronic form. When the management board submits an application for registration of an association, which will not carry out business activities, it must choose the form of submission: on paper or electronically.

If the paper form is chosen, the board should submit two original copies of the documents. If the application is in electronic form, the members of the management board should be able to log in to the Court Register Portal, i.e. they must have accounts established on the Portal, and they must be able to sign the application and the attached documents with a qualified electronic signature or a personal signature. Regardless of the form of the application, the application and additional notifications of data and persons comprising the management board and the audit committee are submitted on official forms (KRS-W20 – basic form, KRS-WK – notification of persons comprising the management board, KRS-WK – notification of persons comprising the audit committee. In the course of the registration proceedings the court may appoint a hearing if it finds it necessary to make additional findings. The proceedings to register an association in the National Court Register are free of charge if the association does not conduct business activity. If all the formal requirements have been met by the management board and the association statute fulfils the statutory requirements, then the registration court

issues a decision to enter the association into the National Court Register and delivers it to the management board at the address of the registered office of the association. After the entry to the National Court Register, the association becomes a legal person and may start its activities.

As it results from the above considerations, the process of registration of the association in the National Court Register is not a simple task, especially if there was a necessity to submit the application for entry in the KRS in an electronic form. At this last stage of establishing an association an indispensable element of the process is an earlier, proper planning, preparation and organisation of these activities, which require knowledge and skills not only in the field of organisation, law, but also in the field of IT.

4. Conclusions and recommendations

The institution of an association as a type of association of persons is a means for the realisation of individual interests, an institution within which the members of an association can express their collective interests. As an institution with legal personality, an association not only has the right to express itself in public matters, but it can also take legal steps to achieve its goal. For example, if the subject matter of an administrative case coincides with the statutory aims of the association, the association may acquire the legal status of a participant with the rights of a party in those proceedings (pending a specific case concerning the legal interest of another person) and support the position of that person or present the opposite position.

A position expressed by a single person is very often not heard enough and is not very important in social or political terms, nor is it heard enough by decision-makers. However, a position, a view, an intervention of an institution which brings together dozens, often hundreds, and sometimes even thousands of people has a greater social and political significance. Statements and positions of such organisations as the Association must be taken into account by political decision-makers, not only of local but often also of regional and even national importance.

Not every association will be able to exploit its potential opportunities. In order for this potential to have a chance to bring the expected results, to fulfil the hopes placed in it, the association must be properly formed. An association which, as an organisation, has been around for decades can become an effective, thriving institution. Effectiveness can only be achieved by a properly conducted process of forming an association. For the association to fulfil the expectations of its members, to act effectively, to achieve its goals, the process of creation of the association must first be carried out correctly. The association can be formed even by persons, who do not have special predispositions in this field, but an effective association that achieves its goals can be formed only by persons, who are aware of the need to discuss, to analyse the variants, to choose particular structural solutions of the formed association,

to be aware of the importance, significance and consequences of the choices to be made in the process of the association formation, at all stages of the process management. Only an association "tailored to the expectations and needs" will have a chance to be effective and creative in the social life, where many associations function. The manager of this process must analyse the needs of potential members of the association, properly define the objectives, ways of their realisation, properly define the organisational structure of the bodies and ways of fundraising.

The presented model of association formation will allow the manager of the process to achieve the effect of creating an efficient association that will be able to effectively carry out its activities. As an institution operating in the local, regional, national and even international community, the association will play an important social role in representing the collective interests of its members.

A well-functioning association, effectively representing the collective interests of its members, can help decision makers to solve many social conflicts and can prevent more radical forms of protests, can interact with social decision makers in the field of public order, peace and security (Olejniczak-Szałowska, 2016). The orientation of the public authorities, both governmental and self- governmental, towards social dialogue shows that in many cases of social conflicts it is not necessary to use power measures and associations can play an important role in this dialogue.

There are many associations throughout the country, but very few are creative, vibrant associations. The space of social life, above all in cities, is filled mainly by political parties and foundations. It seems that the institution of association should be popularized, as the most appropriate form of association, which does not create but mitigates social conflicts and is an alternative to political parties.

The popularity of association formation may be supported by the amendments to the Law on Associations in recent years: with respect to the reduction of the number of persons necessary to establish an association (from 15 to 7 persons), the possibility to establish field organisational units and the introduction of the possibility to use electronic means of communication in the functioning of association bodies. A certain barrier to the creation of an association, which should be removed, is the obligation to electronically register an association that intends to carry out economic activities. The obstacle is not only the form of application itself, but the necessity for the whole composition of the board to sign the application electronically at the same time. This can be a real, technical hindrance to the process of establishing an association. In order to popularise this institution, it seems that it would be more appropriate to allow, also when establishing associations that intend to carry out economic activity, the conventional – paper form of submitting an application for registration of an association by a registration court, and the electronic form of submitting an application should be defined as alternative, not obligatory.

All the above considerations, both in the part showing the model of managing the process of creating an association, its stages, and in the final part, allow us to conclude that managing the process of creating an association is a multifaceted, complex task, requiring knowledge, skills, and that the existence of an entity managing this process is necessary to achieve the intended goal, which is the creation of a well-functioning association.

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IDENTIFICATION OF THE MAIN COMPONENTS OF THE COMPETITIVE POTENTIAL OF ENTERPRISES OPERATING IN CRISIS CONDITIONS

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Purpose: The paper aims to identify major components of the competitive potential of enterprises operating at the initial stage of the economic crisis caused by the COVID-19 pandemic. The research hypothesis **H1** is advanced: the scope of business objects affects the selection of enterprise competitive potential components. The concept and nature of competitiveness are discussed and the subject matter of enterprise competitive potential is detailed.

Design/methodology/approach: The theoretical section follows a thorough review of leading specialist literature. The empirical part, on the other hand, uses the exploratory factor analysis, which detects an optimum group of main factors and explains correlations among observable variables, serves to verify the hypothesis. The number of factors is determined by means of the Cattell scree and Kaiser criteria.

Findings: The paper contains the results of research into 253 large enterprises in the Polish economy. Exploratory factor analysis is employed to define the statistically significant components of competitive potential of enterprises active in the initial phase of the economic crisis and the effect of business objectives is explored on the selection of the components of enterprise competitive potential. It is shown that, regardless of business objects, three factors, namely, innovative machinery and equipment, the financial condition of an enterprise, and human capital, are the key components of enterprise competitive potential.

Practical implications: The results can be utilised by entrepreneurs as a guide to the selection of the components of enterprise competitive potential at the times of crises.

Originality/value: The paper presents the results of original research into a representative group of large enterprises which can be generalised to the entire population assuming a confidence level of $\alpha = 95\%$ and maximum error of $\beta = 6\%$

Keywords: Competitiveness, enterprise, competitive potential.

Category of the paper: research paper.

1. Introduction

Competitiveness is an inevitable characteristic of the market economy. It sets directions for all business entities and forces enterprises to take a rational advantage of the resources in place

The resource-based trend defines resources as all assets, abilities, skills, information, knowledge or organisation processes an enterprise has control over that enable it to create and implement a strategy leading to a greater effectiveness and efficiency of an organisation (Daft, 2006, p. 73)

The competitive potential is of particular interest to the resource-based school, therefore, the definitions of this concept commonly refer to such elements as resources, competences, abilities, skills or knowledge. N.G. Boyd, S.C. Hanlon and A.A. Lado (1997, p. 113) believe resources and the skills of their distribution and application generate profits to an organisation and allow for a long-term competitive advantage

Since resources are a major factor of enterprise competitiveness, the literature offers a number of divisions based on different criteria of resource classification. The varied nature and characteristics of the particular resources prevent a division that would unambiguously classify and define all the attributes of resources

The contemporary specialist literature defines a resource as anything that can be thought in terms of an enterprise's strengths and weaknesses (Sopińska, 2006, p. 112). The most common classification divides resources into four categories: financial capital, physical capital, human capital, and organisational capital (Barney, 1997, p. 143), which can be subdivided into more components

The paper aims to identify major components of the competitive potential of enterprises operating at the initial stage of the economic crisis caused by the COVID-19 pandemic

The competitive potential of an enterprise should address both the internal elements of an entity and its business environment. It is most often directly identified with its resources, competences and specific skills available to a given firm, which implies the business objects may affect the choice of competitive potential elements. Therefore, the research hypothesis **H1** is posited: the scope of business objects affects the selection of enterprise competitive potential components

In order to verify the hypothesis, the results are used of research into 253 Polish enterprises and exploratory factor analysis is applied. Statistica 1 software serves as a tool of data analysis

2. The competitive potential of an enterprise - literature review

In the market economy, competition is a fundamental requirement of business activity and allocation mechanism of economic resources in place. Competitiveness consists in an effective operation of businesses in a turbulent competitive environment (Wolak-Tuzimek et al., 2021, p. 284)

Competitiveness has a range of aspects (Łukiewska, Juchniewicz, 2021) rooted in economics, management, history, politics, and culture and is a complex, multidimensional and relative notion whose meaning changes over time and depends on a context, is synonymous with economic power and addressed at diverse levels, including the level of a nation (Doan, 2021; Terzić, 2021), region (Le, Duy, 2021), sector (Cong, Thu, 2020; Srivastava et al., 2006), and enterprise (Mat, Cevger, 2022; Maráková et al., 2021).

Competitiveness is frequently an object of economists' attention, yet is not defined or interpreted unambiguously. In respect of an enterprise, competitiveness is seen as the degree of interaction between the groups of customers' satisfaction and the value to shareholders by constantly improving service quality, the capability to exploit the potentials, to implement or to respond through financial strength (Asree et al., 2010). It is a feature of an effective enterprise connected with the process of competition whereby firms compete against one another (Liao et al., 2015). It can be assumed, therefore, an enterprise's competitiveness is the ability to realise its own goals and achieve better economic results than its competitors.

The competitiveness of enterprises is a system consisting of four interlinked elements, i.e. (Stankiewicz, 2005, p. 79): competitiveness potential (all material and intangible resources of an enterprise), competitive advantage (the effect of effective utilisation of a configuration of competitive potential components), the instruments of competing (the tools and methods of customer acquisition and goodwill creation), and competitive standing (the result of competing).

An analysis of the relations among the individual dimensions of competitiveness suggests the gaining of a desirable competitive standing is conditional on a competitive advantage, which depends on the competitive potential of an enterprise. The resources and skills held by an entity influence the preparation of its product range, which is evaluated by the market and allows for a competitive advantage. A choice of the instruments of competing should follow a detailed analysis of the enterprise's competitive potential and environment. Only once some appropriate instruments of competing are applied can a specific competitive standing be reached.

An enterprise's potential is commonly defined by the literature as a cluster of abilities, skills, capacities, powers and productivity (of a worker or of machinery, equipment, technology) (Sobolewski, Narojczyk, 2018, p. 38), resources and competences held by an enterprise (Bednarz, 2013, p. 26), a system of tangible and intangible resources that allow

an enterprise to apply some optimum instruments of effective competition in global markets (Klimczuk, 2004, p. 206).

Most definitions of competitive potential comprise the notion of the resource. The resource as the foundation of an enterprise's effectiveness and competitiveness is most clearly highlighted by the research and theoretical trend known as *the resource-based view of the firm* or *resource-based theory of the firm*. It presumes the gaining of competitive advantage by an enterprise depends on its resources (Barney, 1991; Kay 1996). In general, this theory sees an organisation as an entity actively searching for some hard to copy, rare, precious and unique configurations of skills and resources and capable of creating, reproducing, and propagating the same (Peszko, 2016, p. 274).

An enterprise's competitive potential may comprise such parts of an organisation's structure as (Brodkowska-Szewczuk, 2009, p. 91):

1. Human capital – the quality of marketing staff (logistics, distribution, sales), of engineering and financial staff, of management staff (propensity for risk, entrepreneurship, and commitment to quality issues), workers (qualifications, work efficiency, creativity).
2. Physical resources (quality, substitutability, complementarity, structure) – machinery, equipment, means of transport, IT infrastructure.
3. Financial resources – the scale of profits, value of net assets, profitability of equity, financial liquidity, monies, and accounts receivable.
4. Latent resources – information, technologies, innovation, firm's reputation, unique skills, informal links with decision-making centres, patents, licences, work climate, corporate culture, product brands, experience, contacts.
5. Organisational resources – decision-making system, organisation of distribution and logistics network, enterprise size, organisational structure, quality management, links with suppliers and clients, monitoring system.

The resources of an enterprise predetermine its competitiveness at present. Relying on characteristics that enable effective competition, it creates the fundamental sources of competitive advantage. Rivalry among enterprises concerns the resources which are unique and unavailable to others. It should be noted, however, the possession of resources alone, treated as assets at the disposal of an enterprise, is insufficient. Competitiveness is decided not by the quantity of resources, but their quality and ability to use them properly

3. Methods

The hypothesis is verified on the basis of research into 253 Polish enterprises by means of exploratory factor analysis.

The survey was conducted in March 2020. The sample was selected at random and consisted of large enterprises active in the area of Poland. 1600 were drawn from that population so as to guarantee each individual in the general set an equal chance of making it into the sample. The data were obtained using the method of Computer-Assisted Telephone Interview (CATI).

$n = 253$ of correctly filed surveys were received, which means, assuming $\alpha = 95\%$ and $\beta = 6\%$, the analysis results are representative of the general population.

The empirical section employed an original survey questionnaire that consisted of two parts: particulars and contents. Some objective criteria are adopted in the former to characterise the sample, including the organisational and legal form of an enterprise, sector of an enterprise, and the region where the enterprise is seated.

Some comments can be made on the structure of the enterprises studied:

1. The limited liability company was the major legal and organisational format among the firms (68.79% of all), while the fewest (2.37%) limited partnerships were examined.
2. Most entities engaged in services and trade (118, or 46.64% of the total), industrial and chemical manufacturing (74 firms, i.e., 29.25%): they all accounted for ca.76% of the entities surveyed.
3. The enterprises were mostly based in the Mazovian (46 in 2020) and Silesian regions (34 firms in 2020). Fewest enterprises were registered in the lubuskie region (2.37% of all the businesses).
4. More than 75% of the enterprises studied had implemented CSR and used an ERP III integrated IT systems.

6 questions were asked in the other section of the survey and the responses were recorded on 10-point ordinal scales, where 1 denoted a low significance and 10 a high significance. This article discusses the results generated for one problem.

1. Please determine the significance of the particular variables as the factors of enterprise competitive potential on a scale from 1 to 10, where: 1 denotes a low and 10 a high significance (16 observable variables were examined, namely: financial liquidity, profitability, equity level of an enterprise, customer loyalty, the method of distribution, integrated IT system, the quality of management staff, the creativity of workers, the condition of plant and machinery, research and development activities, the technical standard of products, new technologies, the creation of a strong product brand, the availability of materials, the standard of servicing, the implementation of Corporate Social Responsibility).

Exploratory factor analysis serves to verify the research hypothesis. It explains correlations and seeks the causes of covariance generated by shared factors in order to identify all factors that may be actually inherent in the correlations of a given system of variables while preserving as much information contained in primary variables as possible, and then to reduce these factors. The number of components, referred to as factors, is then determined by means of two criteria:

- Kaiser criterion (1960), according to which the factors with eigenvalues above 1, or loaded with a minimum of one observable variable, can be retained.
- Cattell scree test (1966), which presents eigenvalues as a linear diagram. The choice of a number of factors consists in finding a point (quantity of components) where the diagram begins to ‘flatten out’. If a descending line becomes horizontal, this is the so-called end of the scree. The components to the right of the scree’s end point represent a negligible variance and mostly random noise.

Statistica 12 software and MS Excel 2016 spreadsheet are utilised as the tools of data analysis.

4. Results

Exploratory factor analysis serves to verify the research hypothesis, while Kaiser criterion and Cattell scree test help to determine the number of factors. The analysis applied to trade and service enterprises identifies six factors and to industrial and chemical manufacturing and other sectors, five factors with eigenvalue in excess of 1. Table 1 shows a matrix of eigenvalues for the factors defined.

Table 1.

The matrix of eigenvalues for the factors describing the competitive potential of enterprises with the particular business objects

Factor	Characteristic value	Percentage of general variance	Accumulated characteristic value	Accumulated percentage
Trade and services				
F1	4.58	28.61	4.58	28.61
F2	1.93	12.09	6.51	40.70
F3	1.77	11.17	8.28	51.87
F4	1.21	7.59	9.49	59.46
F5	1.11	6.94	10.60	66.40
F6	1.01	6.36	11.61	72.76
Industrial and chemical manufacturing				
F1	5.28	33.02	5.28	33.02
F2	2.26	14.15	7.54	47.17
F3	1.76	10.98	9.30	58.15
F4	1.38	8.62	10.68	66.77
F5	1.28	8.00	11.96	74.77

Cont. table 1.

Other sectors				
F1	5.57	34.83	5.57	34.83
F2	2.20	13.73	7.77	48.56
F3	1.33	8.32	9.10	56.88
F4	1.10	6.89	10.20	63.77
F5	1.01	6.32	11.21	70.09

Source: own research.

The figures imply the subsequent eigenvalues, or parts of the variance explicated for the particular six factors (determined for trade and service enterprises) are in the range <1.01;4.58>; for the five factors determined for industrial and chemical manufacturing, enterprises, <1.28;5.28>; and for the five factors determined for other enterprises, <1.01;5.57>. The accumulated eigenvalues for these factors are 11.96, 11.21, and 11.21. respectively. This means this system of factors defining the competitive potential of trade and service, industrial and chemical manufacturing, and other enterprises explains 72.76%, 74.77%, and 70.09% of the total variance, respectively.

In order to arrive at the so-called simple factor structure, the matrix of factor loads is subject to Varimax rotation to simplify the factor interpretation by minimising the number of variables needed to explicate a given factor. Table 2 presents a matrix of factor loads for the factors describing the competitive potential of enterprises, or the correlation between observable variables and the factors introduced. The minimum correlation qualifying as significant is assumed to be 0.7.

Table 2.

The matrix of factor loads for the factors describing the competitive potential of enterprises for business objects

Factor loads (normalised Varimax)						
Principal components (the loadings are greater than 0.7)						
Variable	F.1	F.2	F.3	F.4	F.5	F.6
Trade and services						
V.1	0.08	0.93	0.06	0.15	0.12	0.13
V.2	0.06	0.93	0.10	0.16	0.08	0.04
V.3	0.03	0.24	-0.29	0.06	0.71	0.32
V.4	0.14	0.36	0.73	-0.05	0.07	0.16
V.5	0.17	0.07	0.32	0.22	0.77	-0.11
V.6	-0.05	0.22	0.10	0.80	0.17	-0.05
V.7	0.03	-0.01	0.80	0.04	-0.17	-0.03
V.8	0.12	-0.02	0.77	0.16	0.23	0.16
V.9	0.75	0.16	0.08	-0.23	0.03	0.20
V.10	0.67	-0.06	0.30	0.14	0.11	-0.24
V.11	0.79	0.01	-0.03	0.09	0.17	0.23
V.12	0.72	0.09	0.01	0.40	-0.12	0.06
V.13	0.49	0.08	0.31	0.43	0.06	0.12
V.14	0.15	0.08	0.19	-0.01	0.16	0.86
V.15	0.40	0.06	-0.01	0.58	0.17	0.15
V.16	0.23	0.19	0.05	0.51	-0.15	0.59

Cont. table 2.

Industrial and chemical manufacturing					
V.1	0.08	0.89	0.03	0.01	0.25
V.2	0.04	0.87	0.07	0.19	0.15
V.3	-0.02	0.80	0.06	0.09	-0.21
V.4	0.35	0.10	-0.20	-0.07	0.76
V.5	0.07	0.10	0.41	0.15	0.69
V.6	0.72	0.16	0.05	0.14	0.06
V.7	0.87	-0.09	0.22	0.10	-0.05
V.8	0.73	-0.01	0.11	0.28	0.40
V.9	0.59	0.04	0.39	0.11	0.42
V.10	-0.10	-0.02	0.36	0.39	0.53
V.11	0.16	0.11	0.91	0.15	0.16
V.12	0.33	0.06	0.88	-0.06	0.01
V.13	0.20	0.01	0.33	0.70	0.29
V.14	0.09	0.23	0.06	0.80	0.22
V.15	0.53	0.03	0.20	0.63	0.04
V.16	0.16	0.11	-0.24	0.75	-0.21
Other sectors					
V.1	0.02	0.95	-0.03	0.01	0.06
V.2	0.05	0.90	-0.04	0.14	0.08
V.3	0.08	0.04	0.14	0.90	0.08
V.4	0.23	0.22	0.10	0.03	0.80
V.5	0.18	0.61	0.34	-0.17	0.08
V.6	-0.10	0.20	0.51	-0.05	0.65
V.7	0.31	-0.08	0.80	0.09	0.09
V.8	0.49	0.09	0.37	0.20	0.46
V.9	0.76	0.15	0.26	0.08	-0.03
V.10	0.49	0.06	0.44	-0.26	0.23
V.11	0.86	-0.09	-0.01	0.04	0.18
V.12	0.63	-0.01	-0.00	0.15	0.56
V.13	0.67	0.13	0.29	0.21	0.41
V.14	0.07	0.10	0.73	0.11	0.11
V.15	0.47	-0.15	0.04	-0.01	0.60
V.16	0.54	0.28	0.15	-0.23	0.14

Source: own research.

The values above 0.7 are shown in bold in Table 2. In this way, it is easier to note the variables loading the particular factors.

Six factors are specified with regard to trade and service enterprises. The first (F.1) explains 28.61% of the total variance and is represented with three variables numbered 9, 11, and 12, that is, the condition of plant and machinery, the technical standard of products, and new technologies. Factor two (F.2) explains 12.09% of the total variance and is represented with two variables numbered 1 and 2, i.e., financial liquidity and profitability of enterprise. The third factor (F.3) explains 11.17% of the total variance and is represented with three variables numbered 4, 7, and 8, or customer loyalty, the quality of management staff, and creativity of workers. The fourth (F.4) explains 7.59% of the total variance and is represented with a single variable numbered 6, that is, integrated IT system. The fifth factor (F.5) explains 6.94% of the total variance and is represented with two variables numbered 3 and 5, namely, equity level and method of distribution. The sixth (F.6) explains 6.36% of the total variance and is represented with one variable numbered 14, the availability of materials.

Five factors are determined in respect of industrial and chemical manufacturing enterprises. Factor one (F.1) explicates 33.02% of the total variance and is represented with three variables numbered 6, 7, and 8, i.e., integrated IT system, the quality of management staff, and the creativity of workers. The second (F.2) explicates 14.15% of the total variance and is represented with three variables numbered 1,2, and 3, i.e., financial liquidity, profitability of enterprise, and its equity level. Factor three (F.3) explicates 10.98% of the total variance and is represented with two variables numbered 11 and 12, namely, the technical standard of products and new technologies. The fourth factor (F.4) explicates 8.62% of the total variance and is represented with three variables numbered 13, 14, and 16, that is, the creation of a strong brand, the availability of materials, and implementation of Corporate social Responsibility concept. The fifth factor (F.5) explains 6.80% of the total variance and is represented with a single variable numbered 4, customer loyalty.

Five factors are designated for the enterprises involved in the remaining sectors. The first (F.1) explains 34.83% of the total variance and is represented with two variables numbered 9,11, that is, the technical standard of products and the condition of plant and machinery. The second factor (F.2) explains 13.73% of the total variance and is represented with two variables numbered 1 and 2, financial liquidity and profitability of enterprise. Factor three (F.3) explains 8.32% of the total variance and is represented with two variables numbered 7 and 14, that is, the quality of management staff and the availability of materials. The fourth factor (F.4) explains 6.89% of the total variance and is represented with one variable numbered 3, or equity level in an enterprise. Factor five (F.5) explains 6.32% of the total variance and is represented with a single variable numbered 4, customer loyalty.

As suggested by the literature, the factor names are derived from the variables with maximum factor loads or from a shared characteristic. The names of factors describing the competitive potential of enterprises considering their business objects are listed in Table 3.

Table 3.

The factors describing the competitive potential of enterprises as per their business objects

Factor name	The business objects of enterprises		
	Trade and services	Industrial and chemical manufacturing	Other
Innovative machinery and equipment	F1	F3	F1
Financial condition of enterprise	F2	F2	F2
Human capital	F3	F1	F3
Integrated IT system	F4		
Availability of materials	F6	F4	
Equity level in enterprise			F4
Method of distribution	F5		
Customer loyalty		F5	F5

Source: own research.

Relying on the data supplied by the respondents, six factors loaded with 12 observable variables are identified for trade and service enterprise; five loaded with 12 observable variables for industrial and chemical manufacturing, and five loaded with 8 observable variables for the remaining enterprises.

A comparative analysis of the results for the individual sectors suggests:

1. Three factors, i.e., innovative machinery and equipment, financial condition, and human capital, are the chief components of competitive potential for all the enterprises regardless of their business objects.
2. On a review of the data, three more factors (integrated IT system, availability of materials, method of distribution) are identified for trade and service enterprises and two additional factors, namely, availability of material and customer loyalty as well as equity levels and customer loyalty are determined for industrial and chemical manufacturing enterprises and other enterprises, respectively.
3. Only in respect of trade and service enterprises are two more factors, that is, integrated IT system and method of distribution, identified as the key components of competitive potential, whereas one such factor is specified for the enterprises active in other sectors, namely, equity level in the enterprise.

The exploratory factor analysis shows both some similarities and differences in the structure of factors defining the competitive potential of enterprises depending on their business objects. This implies the hypothesis H1: the scope of business objects affects the selection of enterprise competitive potential components, cannot be upheld.

5. Discussion

The competitive potential of enterprises has been the subject of research by Polish authors (e.g., Stankiewicz, 2005; Trąpczyński et al., 2016; Łada, 2020; Łukiewska, Juchniewicz, 2021).

K. Łukiewska and M. Juchniewicz (2021) published their results concerning dependences between the elements of competitive potential and competitive standing of food enterprises in the European Union, examined by means of econometric models using panel data. The models enable an empirical verification of dependences between some selected components of competitive potential and the competitive standing of an enterprise. The results confirm a substantial impact of manufacturing potential on the share of exports, profitability, and a synthetic indicator of competitive standing, the effect of work productivity on all the indicators of competitive standing analysed. The analysis has proven the competitive standing of food enterprises in the European Union is to a large extent determined by work productivity.

M. Łada (2020) published her assessments of the competitive potential of advanced technology enterprises in the European Union. The potential is characterised with the following indicators: work productivity, labour costs, and the share of advanced technology enterprises in a given country in the total number of this sector's enterprises in the EU. An analysis using a synthetic indicator helps to assess the total competitive potential of the advanced technologies sector and to identify the countries with the highest potential: the Netherlands, Italy, and Germany, given the high shares of the numbers of advanced technology enterprises in the total number of enterprises in the EU. Work productivity is high in the Netherlands, too. This is the only country to exhibit both a high productivity and a high share of technologically advanced enterprises. The Lithuanian, Latvian and Bulgarian economies show minimum competitive potentials. The productivity and share ratios there are low. Poland ranks high among the countries displaying medium competitiveness given a high share of enterprises in the sector and a low productivity.

Analysing their study of 162 industrial processing entities, H. Sobolewski and S. Narojczyk (2018) found quality management and manufacturing to be the strengths of the competitive potential of these enterprises. The firms in the sector, therefore, should primarily build their competitiveness on factors associated with product manufacturing and the possession or creation of effective quality management systems. The entrepreneurs rate research, development, and marketing most poorly.

The specialist literature often defines the components of competitive potential as the sources of competitive advantage, such as innovation (Harris et al., 2000), the financial condition of an enterprise (Wen-Cheng et al., 2011), human capital (Cherkesova et al., 2016), CSR (Abernathy et al., 2017), or organisational structure (Petison, Johri, 2006). This implies the key components of competitive potential are utilised to reach a better competitive standing in the market. This author's results affirm innovative machinery and equipment, financial condition, and human capital are statistically significant components of competitive potential regardless of the business objects pursued by an enterprise.

6. Conclusion

Any enterprise, regardless of its objects, strives for market success, that is, above-average performance in a given sector. Resources suited to the operations of a specific enterprises may become key to its market standing and desirable economic results.

Taking an appropriate advantage of an enterprise's potential and application of suitable instruments of competing lead to competitive advantage and a better competitive standing in the market. It seems very important, therefore, to identify the essential components of the

potential and to explore the effect of business objects on the selection of enterprise potential components.

These results of my survey of 253 large enterprises active in the Polish economy fill a gap in the research into the impact of a sector on the selection of enterprise potential components.

This study has identified statistically significant factors that constitute the competitive potential of trade and service, industrial and chemical manufacturing, and other enterprises. Three factors, i.e., innovative machinery and equipment, financial condition, and human capital are statistically significant components of competitive potential without regard to the business objects of an enterprise. It is also demonstrated enterprises take advantage of some factors unique to their sectors. Trade and service enterprises utilise two additional factors, namely, integrated IT system and the method of distribution, as the main components of their competitive potential, whereas those engaged in other activities utilise a single factor, the equity level.

Exploratory factor analysis clearly indicates the scope of business objects (sector) affects the selection of competitive potential components, since three components shared by all the enterprises studied are identified beside the potential components characteristic of given sectors. This implies the research hypothesis cannot be validated unambiguously

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KNOWLEDGE SHARING BEHAVIORS IN VIRTUAL TEAMS – RESULTS OF EMPIRICAL RESEARCH

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Purpose: Working in virtual teams and realizing projects through ICT tools has become the usual way of collaboration, especially across knowledge workers. Therefore this paper has two research objectives. The first objective is to verify to what extent the virtuality level is correlated with knowledge sharing behaviors. The second objective is to verify to what extent methods of management projects are correlated with knowledge sharing behaviors in virtual teams.

Methodology: To achieve research objectives empirical research was conducted. Based on the previous research, the online survey was designed. The survey was filled out by 336 members of virtual teams. They worked using ICT tools and realize technology projects in the IT industry. Collected data were analyzed by IBM SPSS Imago Pro to test hypotheses.

Findings: The correlation between the level of virtuality and knowledge sharing behaviors did not confirm. The hypothesis that methods of project management are correlated with knowledge sharing behaviors in virtual teams was partly supported.

Research limitations: Research was conducted in technology teams in the IT industry. Virtual team members only from European companies have taken part in the research.

Practical implications: Results can be useful to manage virtual teams not according to overall beliefs but scientific evidence. Based on the results it is possible to identify which variables for knowledge sharing behaviors in virtual teams are significant and which are not.

Originality/value: Only a few studies have explored knowledge sharing in a virtual context. This paper supports scientific evidence of the level of virtuality and methods of managing projects concerning knowledge sharing behaviors as not discovered in earlier research.

Keywords: virtual teams, knowledge sharing behaviors, project management, virtual management, post-COVID era.

Category of the paper: Research paper – empirical research.

1. Introduction

Nowadays collaboration in virtual teams is not an unconventional or unusual way of working. Because of the COVID-19 remote work has become the obvious way of collaboration in many teams and organizations. During the pandemic period, a lot of them were forced to

arrange virtual meetings and conduct projects through information technology tools without face-to-face contact. However, despite the rapid development of virtual teams, still there are many unknowns about them (Kilcullen et al., 2021). Therefore deeper knowledge about virtual teams could be useful for researchers and managers in organizations as well.

Virtual teams usually consist of knowledge workers (Gupta, Pathak, 2018). Because of the geographical distance they use technology tools to share knowledge and work effectively. However, as researchers underlined “Providing technologies and tech support for remote work is necessary, but giving remote workers access to the information they need, when they need it, is mission-critical and may be more of a challenge” (Manko, Rosinski, 2021). This is obvious that providing the information is not only by means of written documentation. Using adequate information is possible only if team members are open to sharing knowledge. Moreover, knowledge sharing was identified as contributing factor to organizational performance (Olan, 2022). Therefore this paper is focused on the knowledge sharing behaviors in virtual teams.

In the literature, virtual team is defined as a group of people who are geographically or organizationally dispersed. They collaborate using communication technologies to accomplish a common and valued goal (Dulebohn, Hoch, 2017, Ford et al., 2017). Virtual team members communicate using technology rather than working during face-to-face meetings (Lim, 2018). It makes virtual cooperation different than traditional (Maduka et al., 2018). Moreover, they often function across the boundaries like proximity, time, space or even institutional affiliations (Schiller et al., 2014).

Virtual teams often are focused on knowledge-intensive tasks which are intrinsically based on information and knowledge (Havakhor, Sabherwal, 2018). Virtual team members create value and build competitive advantages, based on their intellectual resources and intellectual skills. As knowledge workers, they are able to integrate processes with their stakeholders like vendors, customers and suppliers (Gupta, Pathak, 2018). Therefore, researchers as well as business managers are interested in a deeper knowledge about management and functioning of virtual teams for today and for the future (Kauffeld et al., 2022). There is a wide range of collaboration aspects in virtual teams, however, openness to collaboration and sharing knowledge behaviors have significant meaning.

Sharing knowledge behavior in the literature is defined in different ways depending on different perspectives, which is caused by interdisciplinary uses (Shi, Wang, 2022). In some research it is defined as the degree to which employees share their tacit and explicit knowledge with members of their team (Huang, 2009) in others it is the willingness to share ideas openly with other team members (Chan, 2014). Knowledge sharing behaviors consist of knowledge creation, framing and targeting behaviors (Schwartz-Asher et al., 2020). This paper is focused on the collaboration in teams, therefore the used definition of knowledge sharing behaviors is the degree to which employees participate or conduct knowledge sharing activities in the team (Xue et al., 2011).

Currently, in the post-COVID era, organizations are facing the issue of the future way of working, to provide high quality of collaboration and high level of effectiveness (Kauffeld et al., 2022). Now, virtual work is not determined by medical or law factors. Therefore, a lot of managers are looking for the answer for the question “should we come back to the office or should we keep virtual way of working partly or even totally?”. Some of them, simply assume that virtuality has a negative impact on the collaboration and they make a decision to come back. Some of them keep virtual teams because of cutting their office space costs. Others, maintain virtual work because of employees` pressure to collaborate remotely, without necessity to commute. However, there is no unambiguous measured evidence about relation between knowledge sharing behaviors and the virtuality. Therefore, it is necessary to have deeper scientist knowledge about it.

In the earliest research about virtual teams, the virtuality was analyzed in dichotomic way as virtual teams or non-virtual teams. However, in the course of time, researchers recommended that virtuality in teams should be defined as the continuum (Al-Ani et al., 2011, Cheshin et al., 2013, Kirkman, Mathieu, 2005). The level of the virtuality was presented as a more adequate and more relevant approach. Moreover, the level of team dispersion can determine the way of building relations between team members (Charlier et al., 2016). In view of the above, the first research objective is to verify to what extent the level of team virtuality is correlated with knowledge sharing behaviors. Therefore, the first hypothesis is as follows:

H1: The level of team virtuality is correlated with knowledge sharing behaviors.

The development of information and communication technologies have allowed to share remotely domain knowledge and status of virtual projects as well. Organizations adapt different kinds of approach to manage projects. One of the most popular approach is an agile, which includes agile methods like: Scrum, Kanban, Extreme programming or Lean. They are popular mostly in technology organizations but were also implemented in other sectors (Held, 2022). Virtual team members use a method or a few methods to manage projects and they often use supportive project management software solutions (Liebert, Zaczyk, 2019). Different project management approaches, e.g. the lean approach and the agile approach, were analyzed in empirical research, however, still their role is not clearly explicit (Srinivasan et al., 2020). Therefore, the second objective in this paper is to verify to what extent project management methods in virtual teams are correlated with knowledge sharing behaviors. In this regard, the second hypothesis is as follows:

H2: Project management methods are correlated with knowledge sharing behaviors in virtual teams.

Summarizing, the collaboration in virtual teams is used on a daily basis. The significance of knowledge sharing is also underlined. Therefore it could be useful to deliver knowledge on how deal with knowledge sharing in virtual teams and what kind of variables are truly significant. In business community, there is often the perception that information technology

tools and remote work blocks or decrease the level of knowledge sharing behaviors. Often there are also assumptions that some ways of project management methods are better than others.

Despite the fact that the scientist literature provides us with more and more research about virtual teams and knowledge sharing behaviors, still it is not unambiguous. Therefore, the above research objectives were formulated, to make managing of virtual teams easier, basing not only on theoretical assumptions but also on the scientific evidence. It can be useful for scientists and business managers as well. Due to the results, it will be possible to identify which variables really matter and which do not.

2. Research method

In order to realize research objectives, the quantitative research was conducted. The steps taken to achieve them were as follows: literature review, identifying the research gap, formulating hypothesis, preparing the research tool (the survey), collecting database, statistical analysis, conclusions.

The research tool was an available online survey, prepared in the English language. It consisted of four parts. The first section of the survey contained items designed to measure knowledge sharing behaviors. The survey included a validated scale to measure knowledge sharing behaviors (Xue, 2011) published also in empirical studies e.g. (Oliveira et al., 2015). The items in the knowledge sharing behaviors scale were as follow:

- KSB1: I often participate in knowledge sharing activities in my team.
- KSB2: I usually spend a lot of time conducting knowledge sharing activities in my team.
- KSB3: I usually share my knowledge with other members of my team.

In the survey a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used.

In the second part there were questions about the virtuality. According researchers' recommendations (Charlier et al., 2016, Marlow et al., 2018), the level of team virtuality was measured. In order to measure the level of team virtuality respondents defined to what extent they communicate using ICT (%) and to what extent they communicate face-to-face (%).

The third section of the survey included the list of different approaches and techniques to manage projects. There were: agile, scrum, kanban, lean, extreme programming. Respondents also could add an additional way of realizing projects. The answer "I do not know" also was available.

The fourth section was designed to characterize the team composition and respondents. In order to measure team size, respondents entered the number of team members. Apart from the team size, earlier research about virtual teams also included questions about: gender, age, education, work experience, work experience in the position, role in the team (Lim, 2018,

Liu et al., 2018, Lionel, Sangseok, 2018). Therefore, that kind of questions were also used. Team size and the profile of respondents are presented in Table 1.

Table 1.
Team size and the profile of the respondents

Measure	Frequency	Percent (%)
<i>Team size</i>		
Less than 4	48	14,29%
4-6 members	103	30,65%
7-9 members	68	20,24%
10-12 members	47	13,99%
13-15 members	36	10,71%
more than 15 members	30	8,93%
no answer	4	1,19%
<i>Gender</i>		
Male	277	82,44%
Female	51	15,18%
no answer	8	2,38%
<i>Age</i>		
Less than 20	7	2,08%
20-29	87	25,89%
30-39	121	36,01%
40-49	69	20,54%
50-59	18	5,36%
60 and more	5	1,49%
no answer	29	8,63%
<i>Education*</i>		
Student	37	11,01%
Bachelor IT Degree	130	38,69%
Bachelor non-IT Degree	52	15,48%
Master of Art IT Degree	109	32,44%
Master of Art non-IT Degree	72	21,43%
Undergraduate Degree	5	1,49%
MBA Degree	3	0,89%
Ph. D. Degree	2	0,60%
<i>Work Experience</i>		
Less than 1 year	24	7,14%
1-3 years	36	10,71%
4-6 years	54	16,07%
7-10 years	51	15,18%
11-15 years	73	21,73%
16-20 years	45	13,39%
21-25 years	20	5,95%
26-30 years	6	1,79%
More than 30	13	3,87%
no answer	14	4,17%
<i>Work experience in the position</i>		
Less than 1 year	97	28,87%
1-3 years	105	31,25%
4-10 years	94	27,98%
More than 4	25	7,44%
no answer	15	4,46%

Cont. table 1.

<i>Role in the team*</i>		
IT Developer / Programmer	160	47,62%
Leader/Manager	81	24,11%
IT Consultant	76	22,62%
IT Tester	72	21,43%
Project Manager	51	15,18%
IT Analytic	49	14,58%
IT Architect	41	12,20%
Product Owner	31	9,23%
DevOps	29	8,63%
Scrum master/ Agile Coach	18	5,36%
Graphic designer/UX designer	9	2,68%
IT Administrator	6	1,79%
Owner of the company	5	1,49%
Other/Administration post	4	1,19%

*Respondents could choose more than one answer.

Source: own work

Table 1 presents that 336 respondents took part in the research. They worked in IT sector. They were realizing technology project using ICT tools. The respondents in IT teams were chosen because in those teams virtual way of collaboration was the most popular.

After collecting the database, the answers were decoded from words into numbers. The data were imported to SPSS Imago Pro Software for statistical analysis (8.0 version). In SPSS frequent descriptions, descriptive statistics and Pearson correlation coefficient were used.

3. Results

To achieve the objectives of this study, statistical tools were used to analyze the data. All the data were imported to the statistical software system SPSS Imago Pro. The first step was to analyze the variable: knowledge sharing behaviors, as presented in Table 2.

Table 2.

Statistical characteristic of knowledge sharing behaviors (KSB) – frequency analysis

Item:	Min.	Max.	Median	Average	The standard deviation	Variance	Frequency
KSB1: I often participate in knowledge sharing activities in my team.	1	5	4	3,36	1,111	1,233	336
KSB2: I usually spend a lot of time conducting knowledge sharing activities in my team.	1	5	4	3,71	1,057	1,118	336
KSB3: I usually share my knowledge with other members of my team.	1	5	4	3,86	0,968	0,968	336

Source: own work.

As presented in Table 1, respondents' answers were from 1 to 5, the median was 4, the average was from 4,36 to 4,85, the standard deviation was from 0,968 to 1,111, and the variance was from 0,968 to 1,233. For all the items 336 answers were collected.

The next step was to identify the level of virtuality in teams. It was calculated basing on the answers to the question "to what extent do you communicate using ICT (from 0 to 100%)". The level of the virtuality in teams in this sample is presented in Table 3.

Table 3.

The level of the virtuality in virtual teams

The question	Level of virtuality	Frequency
To what extent do you communicate using ICT (from 0 to 100%)	0-10%	27
	11-20%	40
	21-30%	44
	31-40%	44
	41-50%	36
	51-60%	30
	61-70%	30
	71-80%	29
	81-90%	32
	91-100%	24
	Sum:	336

Source: own work.

As Table 3 shows, the level of virtuality across the virtual teams is diverse. Based on that, it is possible to see that the sample is heterogeneous and proves that team respondents with both low and high level of virtuality took part in the research.

The next step was to achieve the objective, the correlations between the virtuality level and knowledge sharing behaviors, calculated by Pearson correlation. The results of the analyses are presented in Table 4.

Table 4.

Correlations between the level of the virtuality and knowledge sharing behaviors (KSB)

		KSB1	KSB2	KSB3	Virtuality (V)
KSB1: I often participate in knowledge sharing activities in my team.	Correlation	1	0,476**	0,404**	-0,024
	Significance		< 0,001	< 0,001	0,662
KSB2: I usually spend a lot of time conducting knowledge sharing activities in my team.	Correlation	0,476**	1	0,567**	0,015
	Significance	< 0,001		< 0,001	0,787
KSB3: I usually share my knowledge with other members of my team.	Correlation	0,404**	,567**	1	0,054
	Significance	< 0,001	< 0,001		0,319
The level of the virtuality (V)	Correlation	-0,024	0,015	0,054	1
	Significance	0,662	0,787	0,319	
	N	336	335	336	336

** Correlation of significance at the 0.01 level (two-sided).

Source: own work.

As presented in Table 4, the correlations between the components of knowledge sharing behaviors are statistically significant ($p < 0,001$), and the correlations are strong (0,404**; 0,476**; 0,567**). However, there is no statistical evidence that the level of the virtuality in team is correlated with knowledge sharing behaviors. **Based on those results it is possible to claim that H1: The level of team virtuality is correlated with knowledge sharing behaviors, was not supported.**

The second objective was related to methods of project management in virtual teams. The hypothesis was as follows: *H2: Project management methods are correlated with knowledge sharing behaviors in virtual teams.* In order to verify the hypothesis, collecting the database was a necessary step. In the Table 5 the list of project management methods which respondents used is presented.

Table 5.
Types of projects management methods in virtual teams

Projects management methods	Frequency	Percentage of responses
1. Agile	171	28%
2. Scrum	135	22%
3. Kanban	89	15%
4. I do not know	80	13%
5. Waterfall	39	6%
6. Pair Programming	31	5%
7. Lean Management	26	4%
8. Prince2	18	3%
9. eXtreme Programming	15	2%
10. Others: (holocracy, spotyfy, Long Term Support)	6	1%
Sum	610*	100%

*Respondents could choose more than one answer

Source: own work.

In Table 5 different types of projects management methods in virtual teams are presented. The most popular were: Agile (28%), Scrum (22%) and Kanban (15%). Part of respondents ticked the answer “I do not know” (13%). The survey included the list of five methods of project management: Agile, Scrum, Kanban, Extreme programming and Lean. However, it was possible to add additional answer, which the respondents used a lot. They indicated also: Waterfall, Pair Programming, Prince2, eXtreme Programming, holocracy, spotyfy and Long Term Support. Large number of respondents picked more than one answer to the question about project management methods.

In Table 6 correlations between methods of project management and knowledge sharing behaviors (KSB) in virtual teams are presented. The results are diverse for each component of knowledge sharing behaviors, therefore, each of them will be described separately. For those relations statistical significance (p -value), the strength of the relationship and direction will be taken into account.

Table 6.

Correlations between project management methods and knowledge sharing behaviors (KSB) in virtual teams

		KSB1	KSB2	KSB3	PMM
KSB1: I often participate in knowledge sharing activities in my team.	Correlation	1	0,476**	0,404**	0,210**
	Significance		< 0,001	< 0,001	< 0,001
KSB2: I usually spend a lot of time conducting knowledge sharing activities in my team.	Correlation	0,476**	1	0,567**	0,104
	Significance	< 0,001		< 0,001	0,058
KSB3: I usually share my knowledge with other members of my team.	Correlation	0,404**	0,567**	1	0,118*
	Significance	< 0,001	< 0,001		< 0,031
Project management methods (PMM)	Correlation	0,210**	0,104	0,118*	1
	Significance	< 0,001	0,058	< 0,031	
	N	336	335	336	336

** Correlation of significance at the 0.01 level (two-sided).

* Correlation of significance at the 0.05 level (two-sided).

Source: own work.

As presented in Table 6, the first component of knowledge sharing behaviors “I often participate in knowledge sharing activities in my team” is correlated with project management methods. This correlation is statistically significant ($p < 0,001$). The direction of the correlation is positive, however, the strength of the relationship is low. The second component “I usually spend a lot of time conducting knowledge sharing activities in my team” is not correlated with knowledge sharing behaviors. The third component of knowledge sharing behaviors “I usually share my knowledge with other members of my team” is statistically significant. However, it is necessary to emphasize that the strength of the relationship is very low.

Taking into account the ambiguous results, **the second hypothesis H2: Project management methods are correlated with knowledge sharing behaviors in virtual teams was partly supported.** The part of relations between project management methods and knowledge sharing behavior were statistically significant, however, the strength of the relationship was low.

4. Discussion

Today knowledge sharing behaviors play a key role and constitute a significant mediator between perceptions of the value in team members' contributions and team effectiveness. Better understanding of the knowledge sharing behaviors can be valuable in competitive and rapidly changing business environment (Lin, Huang, 2020). The question about modern virtual team now is particularly evident (Liska, 2022). Moreover, the COVID-19 influenced the increase in virtual teams work (Chai, Park, 2022). Additionally, different project management methods were popularized. Therefore, the research of the extent to which the level of the

virtuality is correlated with knowledge sharing behaviors was formulated and presented in this paper.

To achieve the formulated objectives, empirical research was conducted. 336 respondents working in ICT virtual teams has filled out the survey. Basing on the statistical analyses, the first hypothesis *H1: The level of team virtuality is correlated with knowledge sharing behaviors*, was not supported, and the second *H2: Project management methods are correlated with knowledge sharing behaviors in virtual teams*, was partly supported. The results inspired to formulate theoretical and practical implications.

Focusing on the theoretical contribution, it is possible to see a deeper understanding of knowledge sharing behaviors in virtual teams. The earlier research, focused on factors influencing knowledge sharing behaviors in virtual communities, included rewards (Wang et al., 2022) knowledge sharing intention (Chen et al., 2009), knowledge sharing self-efficacy, commitment and trust (Chan et al., 2015). In some publications also symbolic convergence perspective (Wei-Tsong, Hui-Hsiang, 2019), perspectives of well-being and organizational behavior (Chung et al., 2016) and network perspective (Deng, Guo, 2021) were used.

Based on the literature review, project management methods and knowledge sharing behaviors were analysed separately and there was no empirical research about relation between them. It shows that different aspects of knowledge sharing behaviors are explored but this topic has not been fully discovered yet.

To sum up, in the conducted research there was no evidence that the level of the virtuality is correlated with the knowledge sharing behaviors. It is very unlikely that the level of virtuality could determine knowledge sharing behaviors. Moreover, project management methods are correlated with knowledge sharing behaviors in virtual teams only partially and this relation is not so strong. Therefore, the conclusion which could be valuable is that the significant impact and antecedence of knowledge sharing behaviors should be looked for in other variables, by means of more complex models.

Practical implications will be presented as case studies, which makes it easier to implement conclusions to business practice. It could be convenient for the management to tell employees: ‘We will come back to the offices because virtual work has a bad impact on the collaboration (knowledge sharing, effectiveness, etc.)’. However, the results of the research did not confirm that assumption. It is less probable that coming back to offices ‘just fixes’ collaboration and increases the level of knowledge sharing behaviors. In business practice virtuality is often ‘blamed for’ the failures in the organization. However, this study suggests that such an interpretation is an oversimplification. The world is more complex. Deeper insights are required into the relations and behaviors among team members.

Practical implication related to the project management methods would be clear. Different methods of project management could be helpful to create a good environment to share knowledge behaviors. However, it is not the crucial factor which could determine and guarantee knowledge sharing behaviors and consequently effectiveness. It is not easy for organizations,

it means that managers should look deeper into their teams. It is necessary to search for antecedence of knowledge sharing behaviors in different areas and different variables. Therefore, the results of this study provide some implications for practitioners who are interested in knowledge sharing within virtual teams.

Despite some theoretical and practical contributions, the study has some limitations. Firstly, it is necessary to stress that the research was conducted in information technology sector. It could have an impact on the results. For the members in such teams, it is not unusual to use ICT tools to collaborate. Videoconferences, asynchronous communication is more common and the level of ICT skills is different from teams in other sectors. The generalization of the results need to be seen with caution but research tools can be adapted to other sectors.

The second limitation is related to the methodology. In this research, knowledge sharing scale (Xue et al., 2011) was used. As the researchers showed (Oliveira et. al., 2015) using different knowledge sharing behaviors scales had no effect on the results, however, it is unknown if using different scales in those research would give the same results. The third limitation is related to geographical and cultural aspects. The respondents have worked in European IT companies. It is possible that respondents from global virtual teams would deliver different results because of different time zones, more asynchronous communication and culture differences.

Future research should also be recommended. However, perhaps firstly it could be valueable to describe the assumptions about this research, that were established before the results have been known. The scientist literature presents only some piecemeal data about significance of virtuality. On the other hand, in daily practice, there is the overall belief about the impact of the virtuality and methods of project management on the collaboration and knowledge sharing behaviors. Therefore, for the research two steps were established. The first was to verify the correlation between variables and secondly, to establish the direction of their impact through using the technique of a structural equation modeling. However, as it turned out, in this research, only the first stage was reasonable. In reference to that and for the future research direction, it is worth to find other variables which could be correlated with knowledge sharing and verify which of them are truly significant and which of them are not. It would be relevant to conduct deeper analyses to check the correlation and also the directions of relations by using the technique of a structural equation modeling, which was not applicable in this research.

The achieved results also enabled to design recommendations on more complex future research and allowed for a more profound study of the knowledge sharing behaviors and virtual teams. Research models including not only variables like knowledge sharing self-efficacy, commitment, trust (Chang et al., 2015), team climate (Xue et al., 2011) competences and leadership (Maduka et al., 2018) artificial intelligence (Olan et al., 2022) but also others variables could be valuable as the future research. Especially as there are many unknowns about knowledge sharing behaviors and virtual teams that still need to be explored.

5. Summary

As the researchers underlined, only a few studies have explored knowledge sharing in a virtual context (Wang et al., 2022). Moreover, working in virtual teams has become daily practice and way of collaboration because of COVID-19. Therefore, this study could help to bridge the gap. Summarizing the study, it is worth to remind that the evidence that the level of virtuality is correlated with knowledge sharing behaviors has not been found. That was an unexpected finding because it is commonly believed that it influences the knowledge sharing behaviors and collaboration in virtual teams. The methods of project management are correlated with knowledge sharing behaviors only partially and the relation is weak. This paper suggests that assumptions concerning the virtual work and sharing knowledge behaviors could largely be an oversimplification. This conclusion is coherent with the statement that ‘the world is not flat’ (Kramer et al., 2017) and the reality is more complexed. Therefore, it is necessary to acquire deeper knowledge about them and different dimensions of virtual teams should be explored, what could be valuable for researchers as well as managers in organizations.

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Nakładem Polskiego Wydawnictwa Ekonomicznego ukazała się monografia pt.: „**Zachowania konsumentów aktywizujące działania przedsiębiorstw świadczących usługi gastronomiczne w turbulentnym i niepewnym otoczeniu**”, autorki Agnieszki Górki-Chowaniec, która stanowi niewątpliwie pierwsze ujęcie problematyki zachowań współczesnych konsumentów w kontekście budowania strategii działania przedsiębiorstw gastronomicznych z uwzględnieniem aktualnych uwarunkowań rynkowych, które pojawiło się w ostatnich latach na rynku wydawniczym w Polsce.

Istotność i rangę omawianych w monografii zagadnień uzasadnia nie tylko argument coraz częstszego uwzględniania orientacji na klienta w prowadzonej przez współczesne przedsiębiorstwa aktywności biznesowej, lecz także niezaprzeczalny fakt, że zachowania konsumentów stanowią integralną część każdej gospodarki, stanowiąc o jej sile napędowej.

Rozwój i budowanie przewagi konkurencyjnej przedsiębiorstw gastronomicznych związane są ze strategiami, które tworzy się i wdraża w celu sprawnego oraz skutecznego zarządzania aktywami w przestrzeni biznesowej. Z chwilą stwierdzenia pandemii zakaźnej choroby COVID-19, wywołanej przez koronawirusa SARS-CoV-2, przestrzeń ta zaczęła cechować się wysokim stopniem niestabilności i dużą dynamiką zmian.

Takie uwarunkowania powodują, że zarządzanie przedsiębiorstwem gastronomicznym wymaga uwzględnienia różnorodnych czynników o charakterze wewnętrznym i zewnętrznym, będących następstwem m.in. sytuacji gospodarczej kraju, dynamiki zmian w obszarze preferencji i zachowań rynkowych konsumentów, obserwowanej reorientacji w stylu i tempie ich życia czy docierających do Polski z dużą częstotliwością europejskich i światowych gastronomicznych trendów.

Uwzględniając powyższe, tylko przykładowe determinanty zmian jakie zostały szczegółowo opisane w książce, autorka rekomenduje wprowadzenie zmian w organizacji, sposobie pracy i zarządzania, które pozwolą szybciej reagować na te zmiany w otoczeniu i wpływać na wzrost poziomu innowacyjności. Niewątpliwym odkryciem metodologicznym jest zaproponowany przez autorkę model strategicznego działania przedsiębiorstw gastronomicznych w okresie pandemii i warunkach postpandemicznych, które Autorka określa mianem „świata straktyki”.

Podkreślić również należy, iż praktyczne zastosowanie wielu zaproponowanych i zaprojektowanych w monografii rozwiązań może przyczynić się do osiągnięcia lepszych wyników ekonomicznych i pozaekonomicznych z realizowanego biznesu.

Nie bez znaczenia dla wartości tej monografii jest opracowanie przez autorkę dwóch narzędzi badawczych: „Zwyczajów żywieniowych Polaków” i „Uwarunkowań korzystania przez konsumentów z usług gastronomicznych”, które mogą przydać się przyszłym naukowcom podejmującym realizację podobnych badań oraz menedżerom opracowującym strategię rozwoju dla swojej gastronomicznej firmy, która będzie musiała przetrwać wiele zmian i turbulentnych sytuacji we współczesnej rzeczywistości.

Monografia stanowi interesujące opracowanie dotyczące problematyki łączącej aspekty zachowania konsumentów i konieczność dostosowywania się do zmian w zarządzaniu przedsiębiorstwem w okresie pandemicznym i postpandemicznym. Monografia ta, stanowi ważną publikację naukową w dziedzinie nauk społecznych, zwłaszcza w zakresie dyscypliny nauk o zarządzaniu i jakości. Ponadto zakres tematyczny niniejszej publikacji jest szczególnie bardzo istotny dla przedsiębiorców w szczególności reprezentujących branżę gastronomiczną, którzy chcąc być konkurencyjnymi na rynku, tym bardziej powinni być zainteresowani tak ważną problematyką.

Zawartość merytoryczna monografii oraz stopień zaawansowania w niej wiedzy mogą być przydatne dla tych wszystkich osób, które interesują się usługami gastronomicznymi i zachowaniami konsumentów w tym segmencie rynku.

Licząca 304 strony pozycja wydawnicza, ze względu na swój zakres tematyczny, może stanowić inspirujący materiał dla szerokiego grona odbiorców – właścicieli i menedżerów, którzy uznają przydatność zagadnień obejmujących proces zarządzania w warunkach niepewności i chaosu, badaczy poruszanej problematyki, wykładowców i studentów zajmujących się tą sferą działalności, a także dla wszystkich zainteresowanych tą problematyką.

Podsumowując merytoryczną zawartość monografii, należy stwierdzić, że posiada ona niekwestionowane walory naukowe i praktyczne, które mogą przyczynić się do nowego postpandemicznego odrodzenia sektora gastronomicznego, co również ma znaczenie dla całego systemu gospodarczego państwa i społeczeństwa, u którego kultura konsumpcji posiłków w restauracji często przewyższa model konsumpcji w domu z uwagi na panującą modę przebywania w przestrzeni społecznej.

Tadeusz Sikora

Agnieszka Górka-Chowaniec: Zachowania konsumentów aktywizujące działania przedsiębiorstw świadczących usługi gastronomiczne w turbulentnym i niepewnym otoczeniu. PWE, Warszawa 2022, ss. 1-304; ISBN 978-83-208-2480-3.