INNOVATION and ENTREPRENEURSHIP

Theory and practice

Edited by
Zdzisława Dacko-Pikiewicz
Katarzyna Szczepańska-Woszczyna
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Table of contents

Piotr Antończyk[1]

The use of assisted reality to improve processes in accordance with the philosophy of Lean Management in enterprises

Abstract: Industry 4.0 has become a reality. Along with the development of digitalisation, solutions are being implemented to streamline existing processes in companies in order to reduce waste in terms of time, resources and transport. The aim of this article is to present the possibility of using Assisted Reality-type systems in companies as a way of eliminating waste in accordance with the Lean Management philosophy. The first part of the article presents the Lean Management system and its most commonly used tools. The second part presents the concept of Assisted Reality and places it within the available XR bandwidth. In the final stage, a description of how Assisted Reality (aR) can improve processes in companies according to the Lean Management methodology is presented. The discussion section indicates further research steps in this area. The paper has been prepared on the basis of a literature search and the analysis and synthesis of secondary sources.

Keywords: Lean Management, Lean Manufacturing, Kaizen, Assisted Reality, Augmented Reality

Introduction

Industry 4.0 has become a reality. The processes of digitalisation, automation and robotisation in companies are being developed or continued. Another argument confirming the increase in digitalisation in companies is the growing number of digital devices with higher computing capabilities, higher operating speed and miniaturisation levels. The development of wireless technologies providing a connection between devices and networks has resulted in an increase in the number of mobile solutions offered. These devices, which additionally are integrated with

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computing systems or other platforms offered on the market, have significantly expanded functionality and capabilities as a result. This has brought about the dynamic development of the concept known as the Industrial Internet of Things, which is explained, among others, in the lexicon created by Gajdzik and Grabowska [2018]. Along with the development of digitalisation, solutions are implemented to improve the existing processes in companies, which are aimed at reducing waste in terms of time, resources and transport in different areas of the company and the more efficient use of resources in organisations. This article will present the possible impact of modern mobile solutions on changing the operating processes in enterprises.

Lean Management

The word 'lean' literally means slim or thin [www1]; however, as Pawlak and Kudelska [2016] wrote, 'lean' means more than slimming down. In companies operating according to this philosophy, the organisation and the processes therein are built in such a way that the customer ultimately pays for the production of the good rather than for the operation (warehouses, administration, transportation, etc.). Lean Management is a business management philosophy that makes it possible to achieve higher profits by improving processes that are oriented to the needs of customers. It originates directly from the automotive industry, and more specifically from Toyota production facilities. As a result of the processes and tools implemented therein, a system called TPS (Toyota Production System) was created, oriented to minimising all costs that do not affect the quality of the final product. As can be found in the available literature, the term 'lean manufacturing' was first used in 1988 by John Krafcik [Mizga and Bogacz, 2015] and was popularised by researchers from the Massachusetts Institute of Technology in Boston [Womack, Jones and Roos, 2008], who published a paper entitled "The Machine That Changed the World", in which they compared parameters, inputs and outputs from Japanese, American and European companies. The concept of Lean Manufacturing enables the effective implementation of lean production in every area of the enterprise. Companies operating according to the Lean Management philosophy are focused on maximising customer value while using as few resources as possible. As Kisiel [2017] put it, the correct implementation of lean techniques and tools provides the opportunity to produce more using less – human effort, equipment, time and space – while getting closer to achieving the goal of delivering the right goods to customers, at the right time and at the lowest acceptable cost.

The concept of Lean Management is not defined unambiguously [Czerska, 2002], as it is referred to interchangeably in the literature as Lean Manufacturing, Lean Management, Lean Production, Lean Thinking, Lean Enterprise or Lean

Organisation [Antczak and Puchała, 2014]. However, Lean Management is the most widely used term for the concept, especially in light of the numerous successful implementations of this concept in the service sector [Mizga and Bogacz, 2015]. The application of Lean Production tools in an enterprise leads to positive effects. These include, for example, the fact that the various elements of the production process are in the right place at the right time, which is known as Just-in-Time. Following the concept of Lean Management, in particular, one should focus on reducing waste in three areas, known as 3M from the Japanese [Wolniak, 2015]:

- Muda – production waste, downtime, unnecessary movements and any kind of waste of time, resources or activities in general that do not provide value to the customer,
- Muri – excessive workload of employees, machines or processes, leading to fatigue amongst workers, frequent breakdown of equipment and associated downtime, etc.
- Mura – inconsistencies and irregularities of activities – management of the flow of all resources to ensure regularity, lack of downtime, and a constant course of individual operations.

When it comes to the most important Lean tools, the following are mentioned [Bicheno, 2000]:

- 5S – derived from the first letters of the Japanese words: Seiri (selection, order), Seiton (systematics, organisation), Seiso (cleaning, cleanliness), Seiketsu (neatness, keeping clean), and Shitsuke (self-discipline, following all rules) [www2].
- Kaizen – a Japanese method for achieving improvements in efficiency without a large financial outlay. In Japanese, kaizen (kai – change, zen – good) means continuous improvement, involving the implementation of continuous, simple and small changes through small steps [Kryś, 2016].
- Just-in-Time (JIT) is a delivery system, the purpose of which is to eliminate waste by supplying the production process with all the necessary items at the required time and in the required quantity [www3].
- Kanban – a production control system. It is an information system that controls the number of manufactured products at each stage of the manufacturing process. Its primary task is to report the demand for products and parts according to customer demand [Dziekoński and Czapiel, 2014].
- SMED (Single Minute Exchange or Die) – the SMED technique consists in reducing the machine changeover time, which, from the point of view of the Lean concept, is one of the types of wastage. Its primary goal is to increase the flexibility of responses to changing customer demand by

reducing changeover time and providing a faster response to changing orders [Krucze and Żebrucki, 2012].
- TPM (Total Productive Maintenance) – a method to ensure the maximum efficiency of machinery and equipment. One of the features of TPM is the introduction of autonomous maintenance of equipment and machinery by operators, which means integrating numerous basic maintenance activities into the production process [Legutko, 2009]. The main goal of TPM is to achieve zero failures, zero accidents during work performance and zero shortages [Świątoniowski, Gregorczyk and Rabiasz, 2011]. TPM is about managing machines in a factory in such a way as to minimise the costs resulting from line stoppages caused by failures.
- VSM (Value Stream Mapping) – A method that allows one to identify sources of wastage and areas for improvement. Value Stream Mapping is performed using three steps: VSA (Value Stream Analysis), VSD (Value Stream Designing) and VSP (Value Stream Work Plan) [Borowiecka, 2020].

In the literature, among the numerous publications on Lean Manufacturing, the tools used in the implementation of this philosophy also include DFMA (Design for Manufacture and Assembly), Heijunka, Poka-Yoke, Standardised Work or the Training With Industry (TWI) programme, which is also identified with the Lean Manufacturing philosophy. This is due to the fact that many tools and methods belonging to this philosophy were developed precisely on the basis of the TWI programme. Therefore, according to Misiurek [2014], Lean Manufacturing and the TWI programme should be treated as a single, fully complementary philosophy focused on improving the efficiency of manufacturing and non-manufacturing processes. The Lean Management concept is successfully applied in the area of services, which also requires the identification of key processes and the diagnosis of emerging sources of wastage, manifested, for example, in downtime, waiting or unnecessary movement. Once the sources of waste are identified, it is possible to eliminate them.

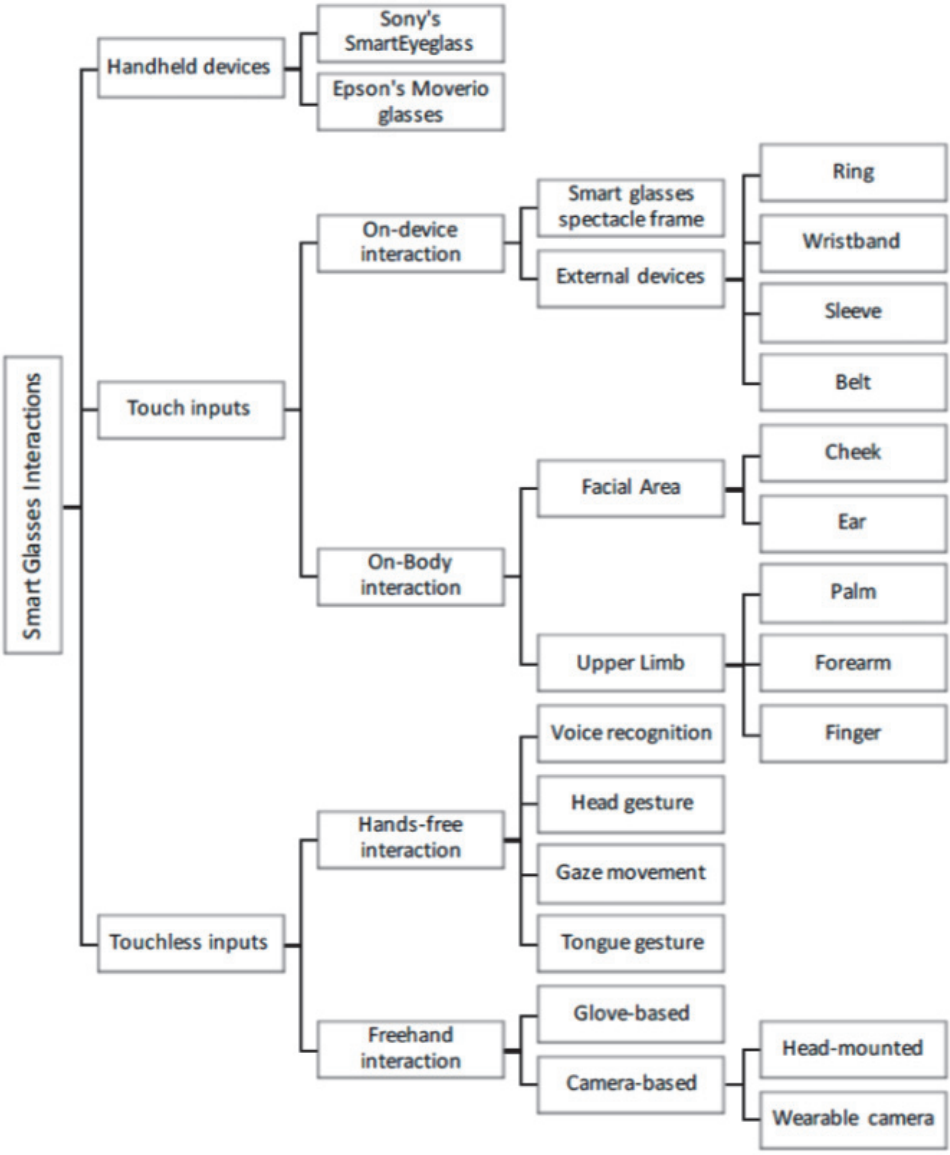
Assisted Reality

In the implementation of the Industry 4.0 concept, augmented reality (AR) and virtual reality (VR) are tools used to support employees and improve their efficiency at work. AR, VR or MR (Mixed Reality) technologies are much more widely known than assisted reality (aR), which is less popular than those previously mentioned. Assisted reality provides access to the right information exactly when the user needs it. It allows the user to maintain full situational awareness. Assisted reality differs from augmented reality in that it does not change the image seen by the user, but only adds an additional layer of information. Thus, the

user does not lose contact with the real world, and the digital image is an add--on. Assisted Reality allows a person to view a screen in their direct field of vision, hands-free. In the literature, however, Assisted Reality (aR), also called Extended Reality, is most often combined together with the concept of Augmented Reality (AR) without an exact distinction. Probably the most common example of the use of assisted reality today is head-up displays in cars, which allow the driver to look through the windshield, but also see a projection of specific information such as current and permitted maximum speed or navigation instructions. Assisted reality technology originated in the aviation industry and was born out of the need to continuously provide pilots with particularly important visual information. In other words, pilots equipped with assisted reality devices were not forced to regularly turn their eyes towards the instrument panel [Kloske and Pêpczynska, 2013].

Although augmented safety systems and devices are gradually being adopted by various industries, their implementation in real-world settings is demanding. During such implementations, system-level interventions (e.g. communication infrastructure, data, management platforms, etc.) are very often required, as well as changed approaches and practices, e.g., new procedures for smart safety devices and the functionality thereof [Podgórski, Majchrzycka, Dąbrowska, Gralewicz, and Okrasa, 2017]. Assisted reality is also used by some types of eyewear, and continuous access to information has led to the label 'smart'. Accordingly, such devices are also called 'Smart Glasses'; the figure below shows the classification by Lee and Hui [2018], who categorised them based on the way they interact with the device.

Figure 1. Classification of smart glasses depending on the means of interaction.



Źródło: Lee, L. & Hui, P. (2018). Interaction methods for smart glasses.

Augmented reality mainly uses displays to visualise content. Ronald Azuma categorised them into three groups: mobile head mounted displays (HMD),

displays that can be held in the hand (e.g., tablet, smartphone), and projector displays. HMD-type displays are most commonly used in aR systems today. They are usually a type of glasses or helmets that generate an image in front of the user's eyes, most commonly using a head-up display or a non-transparent display with a mounted camera that captures the image and then displays it in front of the user's eyes. Advances in technology have facilitated the use of advanced cameras and displays, thus addressing the problem of low resolution and constant depth of the displayed image.

Process improvements resulting from the use of Assisted Reality

As mentioned earlier, a company following the Lean philosophy focuses on eliminating excessive production waste, waste in terms of time and resources (muda), employee burden (muri), and inconsistency and irregularity of operations (mura). An example of combating muda can be the application of assisted reality through the use of HMDs, for the implementation of technical support in the form of a remote expert. The use of the remote expert formula allows for more efficient management of human resources. Less skilled employees on site try to solve the issue (e.g. the resulting fault) on their own. If they do not have the necessary competences, they connect with an expert located in another part of the world through assisted reality devices. Using the remote expert work formula allows one to minimise the costs resulting from line stoppages caused by failures (reduction of downtime). By means of a camera placed near the worker's eyes, the image is transmitted to the expert who has all the necessary information and can assist the worker on site. Another argument in favour of using this formula is a reduction in the time needed to transfer information between branches of the company. Information concerning the improvement of processes within the organisation, the means of conducting training and exchange of knowledge combined with job instructions may turn out to be particularly important.

This form of technical support with the use of HMD devices reduces waste in terms of:

- time associated with the movement of experts, who are more experienced company employees or external consultants.
- financial resources associated with the costs of transporting employees,
- downtime of e.g. production lines, through faster repairs carried out by stationary employees with the help of an expert assisting them remotely.
- physical resources, resulting from the operator being able to work with two hands instead of one, as in the case of using a mobile phone or a handheld camera, for example, to transmit video and sound. HMDs are voice-controlled, so the operator has two hands with which to perform the task at all times.

An example of combating the overloading of employees, machines or processes (Muri), may be the implementation of a digital workflow or service control in the company. The completion of paper-based documentation by front-line employees and its subsequent transcription into central systems (digitised form) wastes time. In addition, it is a duplication of work performed by employees which causes fatigue and problems with completing subsequent tasks. The process of downloading data can be replaced by a digital workflow, using voice control, video and audio recording, and then sending the material to a supervisory unit or supervisor. Another example might be the automatic or on-demand loading of data from sensors and transmitting it to the user, who will receive it on a display near the eye. Data from devices is transmitted using wireless technologies, e.g. BLE (Bluetooth Low Energy), GSM or Wi-Fi. This way, the operator does not waste time walking up to more devices and reading the data individually.

An example of process improvement in the area of non-compliance and irregular activities (Mura) could be the use of assisted reality to verify compliance with the control procedures applied within the company (to reduce losses due to defective products) as well as training and auditing. Functioning processes should be checked regularly to see whether there are deviations during the implementation phase. Another example can be an immediate check of the product received after the production process with a reference object. The parameters of the product after production can be immediately evaluated.

Discussion

The availability of information provided to the user (operator) through the use of assisted reality is very helpful and can contribute positively to improving processes within the organisation, implemented in accordance with the concept of Lean Management. The subject of assisted reality, its possibilities, benefits and risks resulting from its use, is an area which remains relatively seldom explored by researchers in Poland, especially in terms of social sciences. The works that have been written so far on this topic mainly cover the issue of assisted reality in the technical sense. Such publications very often concern the use of assisted reality in the context of a particular industry or area of a company, such as warehouse logistics. Research conducted to date has also shown lower error rates of users during ongoing work when they had remote assistance [Wolfartsberger, 2020] and assisted reality providing new business opportunities [Schirgi, 2019]. The economic and non-economic benefits of using such solutions, in a cross-sectional form, remain an interesting research question. Looking at the applications of assisted reality in relation to the Lean concept, it is also worth considering the validity of using HMD solutions in the training process according to the TWI method. Said method, although extremely effective, is difficult to implement due to the organisation of

work in a plant and the way of conducting workplace instructions. This refers to the time of instruction and the method itself, which also includes preparing an employee for instruction. The TWI method requires additional documentation (e.g. a worksheet or training planning matrix), which could function in digital form in a company. Nevertheless, the successful results presented in the literature [Weber and Buchkremer, 2021] concerning training and error reduction with the use of augmented reality indicate the existence of a research gap in this area for assisted reality as well. Based on the available reports [www5, www6, www7], it is estimated that the market for AR solutions will grow rapidly in the coming years. Therefore, it is worth analysing the social and economic conditions associated with the dynamic development of the AR sector, and especially of assisted reality in terms of its use in different areas of consumer and industrial life.

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Agata Buczak[1]

Business environment institutions in Lower Silesia – how the COVID-19 pandemic defined support for female entrepreneurs

Motivation: The contribution made by women to developing the economy remains a highly topical issue. The considerations regarding the support they are able to obtain from the dedicated entities – business environment institutions (BEIs) – are also justified. An essential and innovative contribution to addressing the problem seems to be focusing the research on cities with poviat rights located in the Lower Silesian Voivodeship: Jelenia Góra, Legnica, Wałbrzych and Wrocław, as well as connecting it with the COVID-19 pandemic, which began in Poland in 2020. This allows for the formulation of the research problem presented in the following questions: What forms of support did BEIs make available to female entrepreneurs in the years 2020–2021? Did female entrepreneurs constitute a special target group for BEIs covered by the study? Were the aid programmes proposed by BEIs appropriate regarding the subject matter and scope of the offer in terms of the ongoing COVID-19 pandemic?

Aim: The analysis of the forms of support offered by BEIs carried out by means of a critical assessment of website content provided by the selected business support institutions in the cities covered by the research allowed for the formulation of the following research hypotheses: 1. BEIs provided numerous offers of support for entrepreneurs at their disposal regardless of gender – no forms of assistance dedicated exclusively to female entrepreneurs were developed; 2. the COVID-19 pandemic resulted in monothematic offers of support for entrepreneurs, i.e. only in the scope of temporarily counteracting the effects of the pandemic rather than in relation to supporting the long-term pro-development activities of the entrepreneurs-beneficiaries.

Results: In the years 2020–2021, the BEIs covered by the presented research offered dedicated support to all entrepreneurs, regardless of gender. However, along with the

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development and continuity of the pandemic, the support offer was diversified, including projects related to counteracting the effects of the coronavirus crisis enhanced by the set of pro-development activities expanding beyond the subject of the COVID-19 epidemic.

Keywords: women entrepreneurship, business environment institutions, Lower Silesia, COVID-19

Introduction

In terms of the recent history of the world, the year 2020 has been recorded as the beginning of a crisis of tragic proportions: economic, epidemic, social, and entrepreneurial. "Coronavirus"[2] was chosen as the 2020 Word of the Year in Poland, which is not surprising in light of the COVID-19 pandemic. Although at the end of 2019 hardly anyone could have predicted such a turn of events, and in fact the modern world at that point in time was focused on unlimited development, consumption, and the material dimension of existence without making allowances for the possibility of such a slowdown or shuddering halt to economic activity, this nonetheless did occur. A significant symbol of this is the word "lockdown", which has been used up to now, and has been inflected by all cases. However, while for some this means the end of a certain stage, e.g. in business or production activity, for others it is an opportunity to "get into the game", to develop a new idea for a company, to introduce innovations, and to take action. This type of behaviour can be called entrepreneurial because it meets the criteria of resourcefulness, looking for and taking advantage of emerging opportunities, taking risks, and being active and profit-oriented. In the literature, the issue of entrepreneurship is considered multidimensionally, multifacetedly, and the analyses are undertaken by researchers from various fields of science, including economics, sociology, and psychology, among others. All this means that the studies on this issue are disproportionately large in relation to the equally crucial aspect of female entrepreneurship, which is extremely important to modern society. The emphasis on the role of women in the economy, especially in Poland, is historically justified, if only in view of the dynamic development of female entrepreneurship after 1989, when following the socioeconomic changes, feminised workplaces began to be closed, as a result of which a huge number of women lost their jobs. At such a difficult time, women began to start their own business activities, although entrepreneurial activities are often considered a male domain. The Polish Agency for Enterprise Development reports that during the entire transformation period, there were relatively more

2 https://www.uw.edu.pl/wyniki-plebiscytu-slowo-roku-2020/ – accessed 10.03.2022.

self-employed women than working men [PARP, 2011: 15]. A female business owner shows entrepreneurial traits that allow her to effectively overcome social barriers and actively participate in economic processes. She is ambitious, determined, and does not take decisions hastily; she is communicative, prudent, able to initiate dialogue and is less prone to sharpening conflicts. Unfortunately, women are often prescribed the role of caregivers, mothers, custodians and guardians of domestic bliss, incapable of making risky decisions, fearful, who are to devote themselves to their loved ones above all, and use any entrepreneurial skills in managing daily errands. Unfortunately, this type of "stigmatisation" is mostly culturally conditioned; it results from deeply entrenched stereotypes, religious beliefs and social roles assigned to men and women, whose attempts to change or modify are often met with a lack of understanding or acceptance of the environment. A number of barriers, inequalities or difficulties are also noticeable in relation to women, e.g. in terms of returning to the labour market after maternity leave and childcare leave, in the scope of exercising the rights resulting from caring for a child under four (e.g. forced consent to working night shift hours). The research interests of the author of this study have for several years been focused on the broadly understood issue of entrepreneurship, including with particular emphasis on the entrepreneurial behaviour of women in Lower Silesia. The problems indicated are highly topical and require further exploration in order for the cognitive gap in this area to be continuously filled and updated. Certainly, the time of the COVID-19 pandemic has not been easy for any group of participants in economic or social life. However, it provides unique research material, namely fields for exploring issues related to, for example, support that entrepreneurs obtained during this difficult period from institutions whose activities are dedicated to providing pro-development tasks, implementing innovative production, management and technological solutions, allocating benefits, and financing or co-financing the business activities of entrepreneurs. In the literature, they are referred to as business environment institutions (BEIs) or the institutional business environment. Embedding the issue of female entrepreneurship in this context fulfilled the abovementioned research interests of the author of the study.

The issue and subject of research included in the presented study result from the consistent completion of the author's interests. The article is focused on reviewing offers of support available for female entrepreneurs in selected cities of the Lower Silesian Voivodeship, where these locations were selected based on the key factor of being cities with poviat rights: Jelenia Góra, Legnica, Wałbrzych and Wrocław. Women entrepreneurs are defined as those who either started or were already running a business in the years 2020–2021. The analysis is based on the reports and databases provided by the Statistical Office in Wrocław, whereas the information available on the websites of business environment institutions over the abovementioned period constituted crucial research material.

The detailed identification of the subject and scope of the research allowed for the formulation of the research problem embedded in the following questions: What forms of support did BEIs make available to female entrepreneurs in the years 2020–2021? Did female entrepreneurs constitute a special target group for BEIs covered by the study? Were the aid programmes proposed by BEIs appropriate regarding the subject matter and scope of the offer in terms of the ongoing COVID-19 pandemic?

The implementation of the research problem was based on the following research hypotheses covering the years 2020–2021:

1. In the analysed period, the BEIs analysed in the research offered support to all entrepreneurs regardless of gender – no forms of assistance dedicated exclusively to female entrepreneurs were developed,
2. the COVID-19 pandemic resulted in monothematic offers of support for entrepreneurs, limiting them to temporary, immediate proposals, resulting from the "need of the moment" in order to counteract the effects of the epidemic situation, thus depriving them of long-term forms of support dedicated to the pro-development activities of the entrepreneurs-beneficiaries.

The research findings and the conclusions formulated constitute a significant contribution to the subject matter of support offered by the institutional business environment to women entrepreneurs in Poland, especially in the context of locating the problem in the Lower Silesian Voivodeship, set against the background of the COVID-19 pandemic. The source literature database is enriched with a structured study based on the literature review, the available statistical data referring to the analysed area, and a reliable, critical analysis of the information provided by the business environment institutions, which, in accordance with the assigned function, presented and offered their services in turbulent times to support the potential beneficiaries in their business activities. The article follows the formula of a "direct addressee" because it is based on the analysis of the existing data available on BEI websites, which in times of limited direct contacts, quarantine and social distancing, were the main source of knowledge pertaining to the available forms of aid for all entrepreneurs. The presented study has also become the basis for the author to undertake and carry out qualitative research among women entrepreneurs from cities with poviat rights in the Lower Silesian Voivodeship, remaining within the research focus.

Research methods

For the purposes of the research goal, the following were performed:

1. A source literature review addressing:
   - entrepreneurship – in terms of definitions, types and determinants,
   - business environment institutions (BEIs) – in terms of definitions and types,

2. Analysis of the selected statistical data concerning:
   - women entrepreneurs from cities with poviat rights in the Lower Silesia Voivodeship – regarding the number of newly established and closed--down business entities in 2020,
   - cities covered by the research observation,
3. Compilation of an inventory of BEIs existing in cities with district rights of the Lower Silesian Voivodeship: Jelenia Góra, Legnica, Wałbrzych, and Wrocław,
4. Analysis of the information placed and available at the time of the study on the websites of the inventoried BEIs relating to 2020 and 2021,
5. Desk research and deduction were adopted as the research methods.

On the basis of the subject literature and the inventory of BEIs in the abovementioned cities, it was assumed that the study would cover the following business environment institutions, along with an indication of their type of activity:

- regional development agencies: the Lower Silesian Regional Development Agency (DARR S.A.) in Szczawno-Zdrój (DARR S.A. is located among the Wałbrzych business environment institutions – it is purposeful and intended due to the vicinity of both cities. DARR S.A. was set up in Wałbrzych and over time changed the seat of its organisation), the Karkonosze Regional Development Agency (KARR S.A.) in Jelenia Góra, ARLEG Regional Development Agency in Legnica, and the Wrocław Regional Development Agency;
- District Employment Agencies (as an intermediary in the transfer of EU funds): Jelenia Góra, Legnica, Wałbrzych, Wrocław;
- business incubators: Integration Incubator of Entrepreneurship, Wałbrzych Business Incubator, Venture Capital Fund in Wrocław;
- academic business incubators: the Lower Silesian Incubator of Entrepreneurship in Wrocław, University Incubator of Entrepreneurship at the University of Economics in Wrocław;
- credit guarantee funds: Credit Guarantee Fund in Jelenia Góra, Lower Silesian Economic Fund in Wrocław, Lower Silesian Park of Innovation and Science in Wrocław, **POLFUND Loan Guarantee Fund** Branch in Wrocław;
- loan funds: Wałbrzych Region Fund, the Polish Entrepreneurship Foundation in Jelenia Góra, Association of Social-economic Investments Branch in Wrocław, Leasing and Finance Agency in Wroclaw;
- technology parks: Wrocław Technology Park, Legnica Technology Park LETIA SA;
- technology transfer centres: Wrocław Technology Transfer Centre, Technology Transfer Centre of the University of Medical Sciences in Legnica, and

the Centre for Innovation and Technology Transfer at the University of Life Sciences in Wrocław;
- Special Economic Zones (SEZ): Wałbrzych SEZ, Legnica SEZ.

It seems reasonable to include a supplement here: in the case of some BEIs, e.g. Wrocław Technology Park (WPT) or the Lower Silesian Regional Development Agency (DARR S.A.), the scope of their activities includes technology parks, business incubators, and technology transfer centres, among others. In order not to mislead the reader as to the number of BEIs surveyed, a comprehensive analysis of the WPT and DARR S.A. offer available on their websites was made.

Definition of key terms and literature review

For the purposes of the completion of this study, it is necessary to explain the key terms that appear throughout. The following subsections present:

- selected definitions of the concept of entrepreneurship, the determinants and types thereof, including the profile of women entrepreneurs from the cities with poviat rights in the Lower Silesian Voivodeship, along with their statistical characteristics, and
- business environment institutions, along with the differentiation thereof by type.

Entrepreneurship – definitions, types, determinants

Entrepreneurship is considered a key factor in economic growth, improving the competitiveness of economies and the prosperity of regions and local communities. The review of economic literature classifies entrepreneurship as an ambiguous term, encompassing economic, cultural, social, ethical, philosophical and psychological aspects and topics. For this reason, the meaning of the term 'entrepreneurship' is related to the researcher who describes it, because the typology will depend on the field in which entrepreneurship is considered – which differs for a philosopher, an economist, and a psychologist. Undoubtedly, however, entrepreneurship has been "always" with human being, although at various stages of his development it is more or less noticed and subjected to detailed research and observation. This is evidenced by the lack of a single definition in the literature that would correspond to all disciplines. Entrepreneurship and deliberations on the essence thereof seem to be endless due to the developmental nature of the phenomenon, adapting to the existing economic and social conditions, the prevailing fashion, customs and laws. Therefore, it is impossible to create one definition that is always up-to-date and comprehensive. Hence, in this part of the study, some terms and the sources thereof will be presented.

In a different approach, entrepreneurship has been characterised as an activity that strengthens potential, which consists of attitude, skills and competences

in the fields of inventiveness, innovation, and launching new ventures, among others; entrepreneurship itself comes down to [Sobiecki. 2003: 20] organising economic resources, taking risks related to running a business, and being an innovator (introducing new products, production techniques, forms of business organisation).

Entrepreneurship is often combined with an effective way of thinking and acting, with the intention to make independent economic decisions, with the ability to act rationally and achieving measurable market benefits in the form of profit [Popowska. 2015: 14]. In the literature, entrepreneurship is also described as the human ability to create, visualise and use opportunities, take control of opportunities, and organise the necessary measures leading to the creation of new goods [Klimek J., Klimek S. 2010: 27].

Researchers who have analysed the issue [Asc, Audretsch. 2003: 6] highlighted the presence of entrepreneurship in all new and dynamically developing enterprises, regardless of their size or business profile. They searched for failures in old companies that required restructuring changes.

Entrepreneurship is treated as a set of features describing the unique behaviour of human teams, institutions, the entire economy, or as an act of creating and building something new – organising and running a business and taking the risk related thereto [Griffin. 1998: 730–731]. In the context of entrepreneurship as a means of creating and building something new, features such as the ability to use ideas and resources that are invisible to others are emphasised [Otoliński. 1996: 15]. These types of skills are certainly extremely important in turbulent times burdened with uncertainty about the coming future, the kind of reality typical of the COVID-19 pandemic.

A multitude of concepts is noticeable in the systematics of types of entrepreneurship. Only selected ones will be cited for the purposes of the study.

S. Kwiatkowski presented the concept of intellectual [Kwiatkowski, 2000: 24] entrepreneurship, emphasising the importance of knowledge and skills possessed by an entrepreneur in entrepreneurial activity. The entrepreneur's general knowledge, knowledge of foreign languages and foreign cultures allow the entrepreneur to notice and take advantage of the opportunities that appear in the environment and opportunities that others do not notice or are unable to take advantage of.

Another significant type of entrepreneurship is family [Klonowska-Matynia, 2017: 37] entrepreneurship, which is determined by the involvement of family members. The family creates a favourable environment that can be the starting point for large-scale entrepreneurship. The main feature here is the interdependence of business and family. Family members share work and property.

The current economic and technological situation as well as widely implemented innovations do not go unnoticed when it comes to the introduction of

the concept of knowledge-based entrepreneurship. Some scientists are certainly right in saying that it is not a "breakthrough" as such, because knowledge has always been needed to start and maintain a business. However, never before has knowledge been viewed as a product, or a factor in development [Powichrowska, 2011: 72].

The terminology of knowledge-based entrepreneurship is very rich and constantly developing. Many researchers believe that any consideration of knowledge-based entrepreneurship should be done through the prism of knowledge itself as the basis of entrepreneurial activities[3]. In this context, the concept is based both upon existing and new knowledge as well as on the integration and coordination of all knowledge resources. According to many authors, knowledge-based entrepreneurship is strongly oriented towards the creation and use of scientific and technological knowledge, which is very important for the development of the knowledge-based society and economy [Popowska. 2015: 67].

In the subject literature, considerations on knowledge-based entrepreneurship also focus on the development of the idea of academic entrepreneurship. The source of these concepts are the activities of universities that employ enterprising, business-active lecturers. Researchers often have the knowledge and skills to generate new ideas and subsequently utilise their full potential in the commercialisation process. As a result, business and scientific relationships are formed that can be used by both parties. It would not be wrong to say that knowledge-based entrepreneurship is a socio-economic driving force, thanks to which innovations are created and developed, and economic growth is noticeable. This is a particularly important problem related to the activities performed by business environment institutions, the characteristics of which are presented in the part of this study below.

The issue of entrepreneurship of small and medium-sized enterprises should not be overlooked, as they are the driving force of, for example, the Polish economy. Entrepreneurship as a concept related to small and medium-sized enterprises is understood as establishing and running small and medium-sized enterprises which are the result of entrepreneurial behaviours [Buczak. 2020]. However, it should be remembered that equating the concept of entrepreneurship only with small and medium-sized enterprises is an unjustified narrowing, as "the concept of entrepreneurship is not synonymous with small enterprises" [Wennekers,

3 1) Audrestch D., Thurik R., Verheul I., Wennekers S. (eds.), Entrepreneurship: Determinants and Policy in a European – US Comparison, Kluwer Academic Publishers: Boston/Dordrecht, 2002; 2) Delmaf F., Wennberg K., Knowledge Intensive Entrepreneurship. The Birth, Growth and Demise of Entrepreneurial Firms. Edward Elgar Publishing, Cheltenham, UK and Northampton MA, 2010, USA, 2010; 3) Malerba F., (eds.), Knowledge – Intensive Entrepreneurship and Innovation Systems. Evidence from Europe. Routledge, London, New York, 2010; 4) Witt U., Zellner, C., Knowledge-based entrepreneurship: The organizational side of technology commercialization. WP, Ecole Polytechnique Federale de Lausanne, 2005.

Thurik. 1999: 47]. Narrowing the definition of entrepreneurship only to activities related to individual entities establishing or running a small enterprise destroys the "spirit" of entrepreneurship, characteristic also of large enterprises, in which entrepreneurs ("intrapreneurs" or "corporate entrepreneurs") also undertake entrepreneurial activity. However, as emphasised by G. T. Lumpkin and G. G. Dess, small companies are an above-average medium in which entrepreneurial individuals can accomplish and develop their ambitions with a full sense of control and responsibility.

For this reason, entrepreneurship defined as the activities of micro, small and medium-sized enterprises plays the role of a "guiding principle" in this study focusing on women who, in the years 2020–2021, established or were already running a business in the following cities: Jelenia Góra, Legnica, Wałbrzych and Wrocław.

In addition to the definition of entrepreneurship and the types thereof, it is worth mentioning the determinants, or factors which affect the founding initiatives of the newly emerging economic entities. It is believed that they can be related to a human being and be of either a local or a universal nature [Siemieniak, Rembiasz. 2017: 350]. In turn, the following features are associated with an entrepreneur: independence, age, education, and gender [Łuczka. 2013: 21].

The source literature presents the concept of factors influencing entrepreneurship, which does not result solely from human action, defined as an effect of both motivational and cognitive factors, including abilities, intelligence and skills [Locke. 2000: 408–429], because external factors also play an important role, e.g. the state of the economy, the availability of venture capital, the activities performed by the competition, as well as government regulations [Shane, Locke, Collins. 2004: 2]. In the context of the coronavirus pandemic situation, it is impossible to refute this theory.

The research results published in the Global Entrepreneurship Monitor Polska 2021 Report [GEM. 2021: 12], in which the main factors responsible for initiating entrepreneurial activities, manifested in starting a business, were also considered to be the desire to earn the living resulting from the absence of job offers on the market as well as an attempt to become wealthy through the possibility of obtaining higher remuneration than when working a full-time job.

The above considerations do not present all the resources concerning the definitions, types and determinants of entrepreneurship. However, they constitute a solid basis for discussing the problem of entrepreneurship among women, who represent a sensitive group of participants in the labour market, and also address the activities related to running a business. In addition to their professional duties, women fulfil many social roles (related to taking care of children, running a household, etc.). They also face certain difficulties in running a business; hence, they need additional support for their ideas connected with entrepreneurial activities.

Female entrepreneurship

In order to meet all the goals identified at the beginning of the presented study, in this part it is necessary to introduce the issue of female entrepreneurship, firstly as a specific branch of entrepreneurship, and secondly as an extremely important phenomenon for the economic and social processes of developing countries, among which Poland can unquestionably be included.

The situation of women in terms of broadly defined entrepreneurship requires them to overcome various barriers, which certainly include socio-cultural conditions, sometimes deeply rooted in stereotypical terms, which unilaterally, uncompromisingly and in a simplified way indicate which roles and features are typically 'female' as opposed to typically 'male'. A woman is generally perceived as emotional, submissive, caring and capable of sacrifice, whereas a man is supposed to be success-oriented, self-confident, rational, aggressive and competitive [Turczak. 2017: 4]. Therefore, 'male' characteristics are certainly considered to be more predisposed towards performing entrepreneurial activities, providing greater competences to run a business. Confirmation of this approach can be found in research by S. Shane and S. Venkataraman, who pointed out that there is a persistent, albeit invisible, gender bias in the entrepreneurial discourse; therefore, women are perceived as merely complementary to the activities carried out by men [Shane, Venkataraman. 2004].

The future of women (labour market participants) and the need to provide equal opportunities were regularly addressed during the World Economic Forum[4] deliberations in the years 2018 and 2020[5], among others. It was emphasised that although there has been a significant increase in the number of women developing or entering entrepreneurial activities over the years, it will take at least another 108 years to fully eradicate the gender gap in global terms. On the other hand, the gender gap in economic opportunities remains the dimension requiring the longest time to become entirely eradicated, and may even take up to 202 years [GGG. 2018: 15]. Gender parity also represents an important issue, as in 2020 it was assessed at the level of 68.6% [GGG. 2020: 5]. Therefore, a great deal remains to be done in terms of levelling the opportunities, e.g. economic, social or entrepreneurial, available to both genders.

As such, it seems necessary to provide support to women entrepreneurs. This has also been indicated in the latest (2021) research findings by Naldi, L., Baù,

4 The World Economic Forum is the International Organization for Public-Private Cooperation. The Forum engages the foremost political, business, cultural and other leaders of society to shape global, regional and industry agendas. It was established in 1971 as a not-for-profit foundation and is headquartered in Geneva, Switzerland. It is independent, impartial and not tied to any special interests. The Forum strives in all its efforts to demonstrate entrepreneurship in the global public interest while upholding the highest standards of governance. Moral and intellectual integrity is at the heart of everything it does; [in]: https://www.weforum.org/about/world-economic-forum – accessed 13.02.2022.

5 1) The Global Gender Gap Report 2018 (GGG 2018). Switzerland: World Economic Forum. ISBN-13: 978-2-940631-00-1.2) Global Gender Gap Report 2020 (GGG 2020). Switzerland: World Economic Forum. ISBN-13: 978-2-940631-03-2.

M., Ahl, H., and Markowska, M., who described the results of their research conducted among Swedish female entrepreneurs–mothers of young children in the publication entitled *Gender (in)equality within the household and business*, regarding the motivation for undertaking entrepreneurial activity. The conclusions highlighted that the partner's participation in sharing childcare (e.g. taking paternity leave) and employment conditions (institutional support in parenthood) are important factors for women who are considering entrepreneurship [Naldi, Baù, Ahl, Markowska. 2021: 914]. Particular attention was paid to the role of formal institutions, which, by promoting a balance between work and family life, can also contribute towards changing the expectations related to gender as regards the roles and responsibilities in households, and thus provide specific legislative support for women's entrepreneurship, making it socially acceptable – and even create a norm based on the fact that fathers take over the role of the child's primary caregiver [ibid., 915].

The source literature focused on female entrepreneurship, as well as the characteristics, barriers and determinants thereof is experiencing a phase of intensive development, which is not surprising when 50% of the women surveyed perceive opportunities for their own business and, in this respect, do not differ significantly from the men surveyed (53%) [GEM Polska. 2021: 58]. This allows one to draw the conclusion that researchers will not fall short of problems to explore.

Female entrepreneurship in cities with poviat rights in the Lower Silesian Voivodeship

At this point, it is worth outlining the image of an entrepreneurial profile characteristic of entrepreneurial women (based on the data provided by the Statistical Office in Wrocław[6]) in four cities with poviat rights in the Lower Silesian Voivodeship, which is the platform for the research, and the results of which will be presented in this study. Due to the fact that at the date of submitting the article for publication, detailed data for 2021 were not available as yet, the abovementioned characteristics will be based on the data for 2020, which is in line with the adopted timeframe as well as the subject matter of the presented study – it outlines the situation in the year of the COVID-19 pandemic outbreak. Table 1 provides the summary of information on the number of economic entities entered in the REGON *[Statistical Business Identification Number]*[7] register, broken down by the owner's gender and the legal personality of the registering entities.

6 Based on data provided by Statistics Poland on 16 March 2021 and 29 July 2021.

7 The basic function of the REGON register is the identification of the national economy entities in an unambiguous and unique manner, which is achieved by assigning unique REGON identification numbers to them [Statistics Poland (GUS). 2014: 8].

Table 1. The structure of national economy entities in the REGON register in four cities with poviat rights in the Lower Silesian Voivodeship in 2020, broken down by the owner's gender and the legal personality of the registering entities.

Year	City	The total number of entities registered in REGON	Number of entities registered by women	Number of entities registered by men	Number of entities registered by the group "Other"[8]
2020	Jelenia Góra	589	204	261	124
	Legnica	661	198	244	219
	Wałbrzych	457	174	200	83
	Wrocław	7791	1851	2802	3138
	TOTAL	**9498**	**2427**	**3507**	**3564**

Source: author's compilation based on the data provided by Statistics Poland on 16 March 2021 and 29 July 2021.

In order to present a comprehensive picture, supplementing the information with the number of entities that were closed down in 2020, but for which 2020 was also the year of commencing the entrepreneurial activity, is justified. A summary of the detailed data in this respect is included in Table 2 (below).

8 The value "Other" for the 2020 data is the sum of the following entities: associations, foundations, sports clubs, constituency offices, housing communities, election committees, level one and two vocational schools, local government nurseries, primary school and nursery units, trade unions, social cooperatives, volunteer fire departments, and religious associations.

Table 2. Cities with poviat rights in the Lower Silesian Voivodeship in 2020 – the number of business entities registered and closed down for which the year of registration in REGON was also the year of closing down their activity.

TOTAL NUMBER OF ENTITIES REMOVED FROM THE REGON REGISTER IN 2020 WHICH WERE **ESTABLISHED BY WOMEN**	TOTAL NUMBER OF ENTITIES REMOVED FROM THE REGON REGISTER IN 2020	2020	**Year**	
71	**181**	7791	**The total number of entities registered in REGON**	**Wrocław**
		1851	**Number of entities registered by women**	
		123	**The total number of entities removed from the REGON register**	
		53	**Number of entities removed from the REGON register which were established by women**	
		457	**The total number of entities registered in REGON**	**Wałbrzych**
		174	**Number of entities registered by women**	
		21	**The total number of entities removed from the REGON register**	
		5	**Number of entities removed from the REGON register which were established by women**	
		589	**The total number of entities registered in REGON**	**Jelenia Góra**
		204	**Number of entities registered by women**	
		12	**The total number of entities removed from the REGON register**	
		4	**Number of entities removed from the REGON register which were established by women**	
		661	**The total number of entities registered in REGON**	**Legnica**
		198	**Number of entities registered by women**	
		25	**The total number of entities removed from the REGON register**	
		9	**Number of entities removed from the REGON register which were established by women**	

Source: author's compilation based on the data provided by Statistics Poland on 16 March 2021 and 29 July 2021.

The presented summary data clearly indicate the predominance of the city of Wrocław over other cities with poviat rights located in the Lower Silesian Voivodeship. This, however, should not come as a surprise – Wrocław is the capital of the voivodeship, the seat of its authorities, and surpasses the other cities covered by the research observation in terms of territorial size and total population. It is unquestionably an international agglomeration with a highly developed cultural, linguistic and educational structure, a city offering potential for life, work and development. It is also evidenced by the number of newly registered business activities, both in the total number thereof and in terms of those registered solely by women in 2020.

In times of crisis, in this case the COVID-19 pandemic, which brought about a period of additional difficulties for participants in all kinds of entrepreneurial activities starting from 2020, it is worth looking for such aid initiatives in the institutional business environment, because it creates conditions for enhancing the establishment of new small and medium-sized enterprises and the functioning of existing ones [Dominiak. 2016: 100]. The characteristics of business environment institutions (BEIs) are presented in the following section.

Business environment institutions – definitions, types

In the subject literature there are various approaches to the institutional business environment, as well as various terms, the most common of which are business environment institutions, economy development support institutions, institutional infrastructure, support institutions, support infrastructure, non-commercial business environment, innovation and entrepreneurship centres, innovation infrastructure and technology transfer, bridge institutions, and innovation catalysts[9]. They differ mainly in the scope of the set of institutions identified as business environment institutions.

The most important tasks of modern economic institutions include stimulating research and development activities and the implementation of results, as well as activities aimed at activating the creative potential in the internal resources of business entities, and increasing the economic potential of regions [Szopik-Depczyńska, Depczyński. 2013: 269]. The PARP report showed that "Innovation and Entrepreneurship centres are partners of the public and private sectors, whose overriding goal is to meet the needs of their key clients – entrepreneurs related primarily to the development of innovative entrepreneurship (increasing the tendencies to innovate in all dimensions, i.e. in terms of products, processes, marketing,

9 1) Burdecka W., *Instytucje otoczenia biznesu*, Badania własne PARP, Warszawa, 2004; Chojnicki, 1999; 2) Dominiak P., Sektor MSP w współczesnej gospodarce, Wydawnictwo Naukowe PWN, Warszawa, 2006; 3) Filipiak-Dylewska B., *Instytucje otoczenia biznesu: rozwój, wsparcie, instrumenty*, Centrum Doradztwa i Informacji Difin, 2009.

management and organisation), promoting experimentation, technology transfer and the commercialisation of knowledge and improvement of competitiveness (including competitiveness based on improved efficiency thanks to new technologies and on the development of know-how)" [Bąkowski, Mażewska. 2014: 8]. The authors of the report emphasise that these institutions are of a non-commercial nature, and their goal is not to maximise profit, but to support the development of entrepreneurship and innovation.

On the market, however, they fulfil service functions, creating a nationwide support network that enables the dynamisation of development processes of individual entrepreneurs.

The PARP [Górzyński, Pander, Koć. 2006: 13–16] report lists the main categories of business environment institutions:

1. units of central administration and their subordinates, e.g. the Polish Agency for Enterprise Development, the Information Processing Centre and the National Science Centre,
2. local government units, including public employment services, social assistance institutions, managing institutions and implementing aid programmes for entrepreneurs and investor service teams,
3. local and regional development agencies,
4. units of research and development facilities (including, for example, units of the Polish Academy of Sciences, laboratories, research and development units, research and development centres, centres of excellence and advanced technology centres),
5. organisations of employers and employees (including e.g. trade unions),
6. producer chambers and associations (including e.g. chambers of commerce and economy),
7. consulting, training and advisory institutions, non-public labour market institutions,
8. the higher education sector (public and non-public),
9. institutions supporting entrepreneurship, including business incubators and business accelerators, industrial parks, technology parks, science and technology parks and entities supporting *spin-off* and *spin-out* companies,
10. networks supporting entrepreneurship and innovation, which include:

- the National System of Services with thematic sub-networks, such as the National Innovation System, Consulting and Advisory Points, Information Network for Business, and Euro Info Centres,
- the National Association of Guarantee Funds,
- the Polish Association of Loan Funds,
- the National Contact Point,
- the National Network of Patent Information Centres,

- the Innovation Relay Centres,
- the Polish Engineering Association – Federation of Scientific and Technical Associations,
- institutions focusing their activities on the process of supporting the innovativeness of companies from the SME sector, i.e. technology transfer centres, technology parks and pre-incubators,
- advisory and consulting institutions,
- financial institutions (banks, investment funds, loan funds, venture capital funds, credit guarantee funds).

When analysing the variety of tasks undertaken, target groups of service recipients or the necessary competences of the staff, business environment centres are classified as [Górzyński, Pander, Koć. 2006: 8]:

- entrepreneurship centres – promotion and incubation of entrepreneurship is offered (often in groups which are otherwise discriminated against), providing support services to small businesses and stimulating the development of peripheral regions or regions affected by a structural crisis (business incubators and / or training and advisory centres);
- innovation centres – the activity is based on the broad promotion and incubation of innovative entrepreneurship, technology transfer and providing pro-innovative services, the activation of academic entrepreneurship and cooperation between science and business. The assumed effect is the development of innovation in terms of products, processes and organisation (parks and / or technology incubators, technology transfer centres, academic business incubators);
- non-banking financial institutions – offering support in the scope of reducing financial discrimination against newly established and small companies without a credit history, and providing financial services adapted to the specifics of new business ventures.

The activity of innovation and entrepreneurship centres consists in supporting enterprises or potential entrepreneurs in three main areas:

- financial support, in which the main functions are performed by para-banking institutions;
- ensuring material (space, access to equipment) or formal (legal personality) conditions for establishing and running a business;
- soft services (providing information, consulting, training, technology transfer support, etc.) offered to companies and potential entrepreneurs.

Properly functioning business environment institutions should therefore significantly affect the development of innovative companies, undertaking new challenges and creating new jobs.

Findings – aid offer for enterprising women

The analysis of information posted on websites (concerning 2020 and 2021) of the analysed BEIs listed above in terms of formulating an offer of support dedicated exclusively to entrepreneurial women, and following the assumption that the proposals of aid solutions were developed by the studied BEIs and are not the offers provided within the framework of cooperation with external entities supporting entrepreneurship not covered by the research observation, showed the absence of such proposals.

The only references in the offers found on the websites of the analysed BEIs, both among their own ones – the specific BEIs covered by the research observation – as well as those provided as part of mutual assistance or cooperation with other entities which particularly signalled their specific dedication to women were as follows:

1. (2020) Project of the Poviat Labour Office in Wałbrzych entitled "Activation of young people unemployed in the Wałbrzych lands and Wałbrzych county districts (V)"[10], where the provisions of the conditions for the recruitment of participants include the following: "The selection of unemployed people recruited to the project will be carried out in accordance with the principles of equal opportunities for women and men and the principle of equal opportunities and non-discrimination, and will aim to increase the professional activity of disadvantaged women on the labour market, which means that a minimum of 78% of the participants will be women"[11];
2. (2020) Project of the Poviat Labour Office in Wałbrzych entitled "Activation of unemployed people over 30 years of age in the Wałbrzych land and Wałbrzych County Districts (VI)", where the following provision appeared: "The selection of people recruited for the project will be carried out in accordance with the principles of equal opportunities for women and men, non-discrimination and will aim to increase the professional activity of disadvantaged women on the labour market, which means that a minimum of 52.01% of the participants will be women"[12];
3. (2020) "The Active Mums[13] Project" – placed on the news page of the Legnica Special Economic Zone, albeit not by the LSEZ but by the Sudety Institute of Regional Development, which is its partner; both entities promote each other within the scope of partnership and cooperation. The aim of the Active Mums project was to activate women returning to work after parental leave;

10 Powiatowy Urząd Pracy w Wałbrzychu, ul. Ogrodowa 5, 58-306 Wałbrzych, https://walbrzych.praca.gov.pl/

11 https://walbrzych.praca.gov.pl/-/11201870-projekt-aktywizacja-osob-mlodych-pozostajacych-bez-pracy-w-powiecie-walbrzyskim-ziemskim-i-walbrzyskim-grodzkim-v- – accessed 14.02.2022.

12 https://walbrzych.praca.gov.pl/-/11150121-projekt-aktywizacja-osob-powyzej-30-roku-zycia-pozostajacych-bez-pracy-w-powiecie-walbrzyskim-ziemskim-i-walbrzyskim-grodzkim-vi- – accessed 14.02.2022.

13 https://lsse.eu/projekt-aktywne-mamy/ – accessed 14.02.2022.

4. (2021) The project entitled "Entrepreneurial women 3.0.[14]" – available on the website of the Poviat Labour Office in Legnica (21) in the Current Affairs tab. It is addressed to women aged over 30 living in the Lower Silesian Voivodeship and belonging to one of the following groups: unemployed, including those experiencing a special situation in the labour market, i.e. women aged 50+, women with disabilities, the long-term unemployed and low-skilled women; poor working women and those employed on the basis of short-term contracts and civil law contracts, whose monthly remuneration does not exceed 120% of the minimum wage; immigrants/re-emigrants; and those leaving agricultural areas. The EUROPROJEKT Advisory and Training Centre was the initiator of the proposal.
5. (2021) The project provided by the Poviat Labour Office in Jelenia Góra entitled "Activation of the unemployed aged 30 and over from the Karkonosze and Jelenia Góra poviats_2020-2021"[15]. The records indicated that the beneficiaries of this offer could include the individuals belonging to at least one of the following groups: the unemployed aged 30 and over, people registered as unemployed, especially those in a special situation on the labour market, i.e. seniors aged 50+, women, people with disabilities, the long-term unemployed, as well as those with low occupational qualifications. The word "especially" clearly indicates that women are not the only recipients of the programme, but are noted in the context of a group of people finding themselves in a specific situation on the labour market.
6. (2021) The project "Your company – Your success!" available on the website of the Poviat Labour Office in Legnica, in the Current Affairs tab[16], as information from the Social Development Agency "ARS" Ltd.[17] (in the amount of PLN 23,050), bridge support (PLN 1,000 each for the period of 12 months). The target group of the proposal includes, among others: unemployed individuals aged 30 and over, including those in a special situation on the labour market, i.e. aged 50 and over, women, people with disabilities, the long-term unemployed and people with low occupational qualifications; immigrants and re-emigrants; poor workers; people leaving the agriculture sector and their families.
7. (2021) The project "Independent Entrepreneurs" – provided on the website of the Poviat Labour Office in Legnica, in the Current Affairs tab[18], as an

14 www.przedsiebiorczekobiety3.eu – accessed 14.02.2022.

15 https://jeleniagora.praca.gov.pl/-/12641789-aktywizacja-osob-bezrobotnych-od-30-roku-zycia-z-powiatu-karkonoskiego-i-jeleniej-gory-2020-2021 – accessed 16.02.2022.

16 https://legnica.praca.gov.pl/-/16499394-nabor-do-projektu-twoja-firma-twoj-sukces- – accessed 16.02.2022.

17 http://arslegnica.pl/ – accessed 16.02.2022.

18 https://legnica.praca.gov.pl/-/15606442-projekt-samodzielni-przedsiebiorczy- – accessed 16.02.2022.

incentive to take advantage of the offer posted by the INCEPT Foundation[19]. The target group of the initiative included: people residing, within the meaning of the Civil Code, in the territory of the Lower Silesian Voivodeship aged over 30 belonging to at least one of the following groups: the unemployed, including those experiencing a special situation on the labour market, i.e. people aged 50+, women, people with disabilities, the long-term unemployed and low-skilled people; poor workers; those employed on the basis of short-term contracts or civil law contracts, whose monthly earnings do not exceed 120% of the minimum wage.

8. (2021) The project provided by the Poviat Labour Office in Wałbrzych entitled "Activation of young unemployed people in Wałbrzych land poviat and Wałbrzych township (VI)", in which the following entry appeared: "The selection of unemployed people to be recruited for the project will be carried out in accordance with the principles of equal opportunities for women and men as well as the principle of equal opportunities and non-discrimination and will aim to increase the occupational activity of women disadvantaged on the labour market, which means that women will constitute at least 69% of the participants"[20].
9. (2021) The webinar entitled "My own company – support for the beneficiaries of EU projects", the announcement posted on the website of the Poviat Labour Office in Wałbrzych, in the Current Affairs tab[21], as an invitation from the European Funds Information Point in Jelenia Góra. Participation was free of charge and, after prior registration and qualification, was addressed to professionally inactive individuals or unemployed people not registered with the labour office, aged 18–29, who lost their jobs after 1 March 2020, the unemployed aged over 30+, including: the unemployed and professionally inactive, low-skilled people, i.e. secondary school graduates, people with disabilities, women, and people aged 50+.
10. (2021) The project "Microloan for starting a business" – financial aid offered by the Polish Entrepreneurs Foundation in Jelenia Góra[22], where the provisions regarding the target group of the offer indicate unemployed people aged 30 and over intending to start a business, especially people aged

19 http://fundacjaincept.pl/projekty/samodzielni-przedsiebiorczy/ – accessed 16.02.2022.

20 https://walbrzych.praca.gov.pl/-/16213338-projekt-aktywizacja-osob-mlodych-pozostajacych-bez-pracy-w-powiecie-walbrzyskim-ziemskim-i-walbrzyskim-grodzkim-vi- – accessed 16.02.2022.

21 https://walbrzych.praca.gov.pl/-/15801612-webinarium-pt-wlasna-firma-wsparcie-dla-beneficjentow-projektow-unijnych- – accessed 16.02.2022.

22 https://www.pfp.com.pl/pozyczki/mikropozyczka-na-rozpoczecie-dzialalnosci-gospodarczej – accessed 17.02.2022.

over 50, women, people with disabilities, the long-term unemployed and low-skilled individuals.

Additionally, it is necessary to indicate that under the Act of 2 March 2020 on special solutions related to preventing, counteracting and combating COVID-19, other infectious diseases and the crisis situations[23] caused thereby, as of 2020 the District Employment Agencies of the cities studied carried out the tasks assigned to them in the scope of the implementation of the package known as the Anti-crisis Shield[24], as well as the so-called activation programmes and the agencies' own projects[25]. A comprehensive analysis of all aid activities carried out by Poviat Labour Offices in the cities of Jelenia Góra, Legnica, Wałbrzych and Wrocław showed that women entrepreneurs did not constitute a special target group of these institutions at the time of the COVID-19 pandemic, because "they had equal chances with other entrepreneurs to take advantage of the statutory tools and aid offers provided for entrepreneurs and entrepreneurship, e.g. co-financing to start a business or obtaining a loan for the creation of a new job from the Anti-Crisis Shield government aid project, and in activation programmes and own projects provided by Poviat Labour Offices, the principle of equal opportunities and non-discrimination was followed, including accessibility for people with disabilities and the principle of equal opportunities for men and women, as well as the principle of sustainable development" [Buczak. 2021: 120].

23 Journals of Laws, 2020, item 374 as amended (PL: Dz.U. z 2020 r. poz. 374 z późn. zm.).

24 1) The Anti-Crisis Shield are instruments intended to amortize and reduce the negative impact of the coronavirus on the economy, and above all on society. It is one of the most comprehensive packages in Europe – [after:] https://www.gov.pl/web/tarczaantykryzysowa/materialy – accessed 06.04.2021.

2) The estimated total value of support under the Anti-Crisis Shield is 212 billion PLN (nearly 10% of GDP). What does this amount consist of?

- A government cash component amounting of approximately 67 billion PLN (2.9% of GDP). It consists of expenses of the state budget, ZUS [Social Insurance Institution] and special purpose funds.
- The government liquidity component amounting of approx. 75.5 billion PLN (3.3% of GDP). It consists of credit holidays and deferred levies, as well as liquidity financing in the form of loans and capital, mainly with the use of financial instruments of the Polish Development Fund Group (PFR, BGK, KUKE, ARP).
- The NBP liquidity package amounting to approx. 70 billion PLN, which will ensure the necessary liquidity and credit conditions [after:] https://www.gov.pl/web/tarczaantykryzysowa/o-tarczy – access 06.04.2021
- Information from 2021: The Anti-Crisis Shield is a package of solutions prepared by the government, the objective of which is to protect the Polish state and the citizens against the crisis brought about by the coronavirus pandemic. It is based on five pillars: Protection of jobs and safety of employees, Financing of entrepreneurs, Health protection, Strengthening of the financial system, and Public investments. The shield is supposed to stabilise Polish economy and act as an investment incentive. It is estimated that the value of aid offered within the framework of the Anti-Crisis Shield and the Financial Shield will amount to over PLN 312 billion.– accessed 16.02.2022.

3) https://walbrzych.praca.gov.pl/dla-pracodawcow-i-przedsiebiorcow/tarcza – accessed 06.04.2021.

25 1) https://walbrzych.praca.gov.pl/rynek-pracy/programy-aktywizacyjne-i-projekty – accessed 06.04.2021.
2) https://wroclaw.praca.gov.pl/rynek-pracy/programy-aktywizacyjne-i-projekty – accessed 06.04.2021.
3) https://legnica.praca.gov.pl/rynek-pracy/programy-aktywizacyjne-i-projekty – accessed 06.04.2021.
4) https://jeleniagora.praca.gov.pl/rynek-pracy/programy-aktywizacyjne-i-projekty – accessed 06.04.2021.

After conducting a thorough inventory and reviewing the offers available in the years 2020-2021 posted on the websites of the analysed business environment institutions from the cities with poviat rights in the Lower Silesian Voivodeship, it can be clearly stated that the following hypothesis: "during the timeframe under analysis, the BEIs covered by the research offered aid to all entrepreneurs regardless of gender – no forms of support dedicated exclusively to women entrepreneurs were offered" has been positively verified.

In terms of approaching the second of the hypotheses put forward at the beginning of this paper, it seems necessary to assess the years 2020-2021 based on a critical analysis addressing the substance of the projects proposed by the analysed BEIs, which will make it possible to determine whether they were monothematic – focused on counteracting the effects of the epidemic situation alone, rather than supporting the long-term pro-development activities of the entrepreneurs-beneficiaries.

In 2020, the range of forms of support for entrepreneurs was significant, but it was dominated by the emergence and development of the COVID-19 pandemic, where aid measures were defined for all entrepreneurs without regard for the gender of the beneficiaries. The offer of some of the surveyed BEIs included the following forms of support for entrepreneurs during the COVID-19 pandemic: liquidity loans[26], development loans[27], revolving loans[28], other special purpose loans[29], and loan repayment extensions[30]. The vast majority of the surveyed BEIs invariably provided their existing services, including webinars[31], training and consultations[32], financial support in the implementation of research

26 1) https://frw.pl/14249/wznowiony-nabor-wnioskow-na-pozyczke-plynnosciowa-poir/ – accessed 29.04.2021.
2) https://dawg.pl/projekty/pozyczka-plynnosciowa-covid-19/ – accessed 29.04.2021.
3) https://dpin.pl/portfolio/pozyczka-plynnosciowa-covid-19/ – accessed 29.04.2021.

27 1) https://alif.pl/pozyczki-unijne/pozyczka-rozwojowa-dla-dolnego-slaska/ – accessed 29.04.2021.
2) https://invest-park.com.pl/pozyczki-rozwojowe-dla-mmsp/ – accessed 29.04.2021.

28 https://frw.pl/13043/pozyczka-obrotowa-w-zwiazku-z-covid-w-ramach-pozyczki-rozwojowej-na-dolny-slask/ – accessed 29.04.2021.

29 1) https://tise.pl/offers/pozyczka-na-efektywnosc-energetyczna-msp-w-woj-dolnoslaskim/ – accessed 29.04.2021.
2) https://frw.pl/11995/mikropozyczka-znow-dostepna-dla-osob-bezrobotnych/ – accessed 29.04.2021.

30 1) https://frw.pl/12139/zloz-wniosek-o-prolongate-w-splacie-pozyczki-online/ – accessed 29.04.2021.
2) https://frw.pl/regionalna-pozyczka-hipoteczna2/ – accessed 29.04.2021.

31 1) https://frw.pl/14547/tworzymy-ponadregionalna-siec-branzowa-pes/ – accessed 29.04.2021.
2) https://frw.pl/14021/wsparcie-dla-przedsiebiorczych-dolnoslazakow-bezplatne-webinarium/ – accessed 29.04.2021.
3) https://invest-park.com.pl/events/zachety-podatkowe-na-inwestycje-i-innowacje/ – accessed 29.04.2021.

32 1) https://frw.pl/12565/szkolenia-pierwszy-biznes-w-sieci/ – accessed 29.04.2021.
2) https://aip.link/oferta-26-minus/ – accessed 29.04.2021.
3) https://www.darr.pl/jak-zadbac-o-relacje-i-radzic-sobie-w-trudnych-rozmowach-z-klientem-zaproszenie-do-udzialu-w-webinarium/#more-579 – accessed 29.04.2021.

and scientific projects[33], renting offices and premises, as well as plots for investments[34], making specialist premises and devices available[35], and assistance in the commercialisation of scientific research[36]. Among the aforementioned activities, no information about them being specifically dedicated to women was found. In the author's opinion, both the website design and content of the examined BEIs, primarily in the tabs entitled "implemented projects" or "our offer", played more of an image-oriented role in 2020 than an offer-oriented one, maintaining the place of a given BEI in the beneficiaries' knowledge space. It resulted, e.g. from suspending the implementation of tasks or freezing the inflow of external funds. Many disruptions in the functioning of the examined institutions were also noted, which resulted, among other things, from the temporary suspension of direct customer service (lockdown), or refusing to accept applications submitted for programmes outside the scope of "coronavirus" relief. 2020 was a difficult time because the pandemic struck suddenly and the decisions made were not based on any previous experience resulting from this dimension of the pandemic crisis. It is not a mistake to state that people acted in the dark, guided by panic, disorientation, and learning from their mistakes. The development of the pandemic situation, the advancement of efforts to develop vaccines, as well as the impact of a certain "getting used to it", "becoming more common" and "taking for granted" the coronavirus existence and the related risks, also significantly influenced the activities of business environment institutions in the following year covered by the research observation.

In 2021, offers of aid and support began to return to the pre-pandemic dimension, i.e. COVID-19 was no longer the main reason to take advantage of the available projects promoted by the specific BEIs, the element of activation and long-term development appeared therein, and the group of beneficiaries was diversified, e.g. through the dimension of creditworthiness (securing the contract execution by the borrower[37]), the quality and purpose of the concept submitted for implementation (e.g. purchase of real estate, production and distribution of energy from renewable sources, projects related to eliminating territorial differences in accessing

33 1) https://wctt.pwr.edu.pl/nowa-edycja-programu-mozart/ – accessed 29.04.2021.
2) https://www.ventureinc.com/pl/ – accessed 29.04.2021.

34 1) https://invest-park.com.pl/invest-park-center/ – accessed 29.04.2021.
2) https://www.paih.gov.pl/strefa_inwestora/parki_przemyslowe_i_technologiczne/legnica – accessed 29.04.2021.

35 https://www.technologpark.pl/oferta-wpt/laboratoria-i-prototypownie/ – accessed 29.04.2021.

36 https://wctt.pwr.edu.pl/oferta-uslugi/transfer-technologii/dla-naukowcow/ – accessed 29.04.2021.

37 https://tise.pl/offers/pozyczka-inwestycyjna-dla-small-midcaps-msp-i-pes-w-programie-efi-efg/ – accessed 17.02.2022.

high-speed broadband Internet, i.e. at least 30 Mb/s[38]), the length of running a business (e.g. a loan only for the enterprises operating before 1 January 2020[39]) – its location (e.g. for an enterprise, the organisational unit of which is situated in Jelenia Góra sub-region[40]) or the location of the beneficiary himself, who is not an entrepreneur (e.g. residence or education in the area of Lower Silesian Voivodeship[41]), representing a specific professional group (e.g. for people desiring to leave the agriculture sector[42]) and not dedicated to a specific gender. What is clearly noticeable is the predominance among the presented proposals of countless webinar initiatives, remote consultations, virtual training sessions and lectures, with the significant diversity therein highly visible in 2021, a departure from the subject matter of "how to survive the coronavirus" and a transition to the level of "find something for yourself and your industry", e.g. the International Brokerage Meeting MOST PRZEMYSŁOWY 2021 [*INDUSTRIAL BRIDGE 2021*] for the following industry sectors: metal and steel, maritime and shipbuilding, transport and logistics, and renewable energy[43]; cooperation meetings dedicated to the medical and pharmaceutical industry – Euro-Asia Medical & Technology Hub[44]; "RYNEK NIEMIECKI [*GERMAN MARKET*] – are Covid and Brexit new opportunities on the German market for suppliers from Poland?"[45]; cooperative meetings for the textile industry representatives such as Textile Connect 2021[46]; Food eirEEN Meet the Buyer & Matchmaking Event 2021[47]; "Conquer foreign markets with the European Funds. Missions and fairs for SMEs from the Lower Silesian Voivodeship"[48]. The information presented above is extremely valuable for the purposes of verifying the hypothesis put forward at the beginning of this part of the study, because it allows

38 1)https://www.pfp.com.pl/pozyczki/druga-regionalna-pozyczka-hipoteczna – accessed 17.02.2022.
2) https://tise.pl/offers/oze-w-woj-dolnoslaskim-pozyczka-na-produkcje-i-dystrybucje-energii-ze-zrodel-odnawialnych/ – accessed 17.02.2022.
3) https://tise.pl/offers/pozyczka-szerokopasmowa/ – accessed 17.02.2022.

39 https://www.warr.pl/pozyczka-plynnosciowa-dedykowana-covid-19/ – accessed 17.02.2022.

40 https://karr.pl/?s=%E2%80%9EPARTNERSTWO+NA+RZECZ+ROZWOJU+DOLNO%C5%9AL%C4%84SKICH+MM%C5%9AP+I+ICH+PRACOWNIK%C3%93W+%E2%80%93+EDYCJA+II%E2%80%9D – accessed 17.02.2022.

41 https://dpin.pl/portfolio/pomoc-dla-mlodych/ – accessed 16.02.2022.

42 https://dpin.pl/portfolio/aktywizacja-dolnoslaskiego-rynku-pracy-iii-edycja-2/ – accessed 16.02.2022.

43 https://ib2021.b2match.io/ – accessed 17.02.2022.

44 https://www.darr.pl/wirtualne-spotkania-kooperacyjne-b2b-euro-asia-medical-technology-hub/#more-803 – accessed 17.02.2022.

45 https://www.darr.pl/bezplatny-webinar-pn-rynek-niemiecki-czy-covid-i-brexit-to-nowa-szansa-na-rynku-niemieckim-dla-dostawcow-z-polski/#more-758 – accessed 17.02.2022.

46 https://www.darr.pl/textile-connect-2021-virtual-matchmaking/#more-732 – accessed 17.02.2022.

47 https://www.darr.pl/wirtualne-spotkania-dla-branzy-spozywczej/#more-672 – accessed 17.02.2022.

48 https://karr.pl/?s=zdobywaj+rynki+zagraniczne – accessed 17.02.2022.

one to draw the conclusion that the offers of support for entrepreneurs-beneficiaries were not monothematic. It is correct to draw the conclusion that the years 2020 and 2021 were different in this respect – 2020 was a year of fear, difficulties in coping with a new, dramatic and unprecedented situation for the modern world, and in terms of the offers supporting entrepreneurs it was dominated by projects "helping to survive and endure" the COVID-19 pandemic. On the other hand, in 2021 "the world" was richer with the experiences of the past, the decisions made, both those which were correct and those less successful in retrospect, losses incurred, expenses incurred, setting directions for activities, opportunities used, noticing a niche and chances for action. This was reflected in the proposals offered by BEIs – the pandemic and counteraction of its negative consequences were not the only determinants of the programmes provided. Because the overall assessment of the "monothematic nature of the support offered" by BEIs concerns two years of the pandemic, it is logical to conclude that the formulated hypothesis has been negatively verified – entrepreneurs received a diversified, manifold offer, and only if they were willing to use it when they met the formal requirements as well as making the effort to fill in the necessary documents could they receive a package of solutions tailored to their needs and capabilities.

Conclusions from the research and proposed corrective actions

The purpose of the presented study was to analyse the proposed support solutions offered by the business environment institutions and dedicated to women entrepreneurs from the four cities with poviat rights in the Lower Silesian Voivodeship during the Covid-19 pandemic. The research was conducted within the following boundaries:

- temporal, covering the years 2020-2021;
- subject-related, focused on the content of websites provided by selected business environment institutions from the following cities: Jelenia Góra, Legnica, Wałbrzych and Wrocław;
- object-related, based on which "female entrepreneurs" were defined as women who either established or were already running a business activity in the abovementioned cities during the analysed period of time;
- conclusion and finalisation, owing to which it would be possible to answer the formulated research questions, verify the hypotheses put forward and, based on the conclusions drawn, propose future-oriented solutions.

In the course of the conducted research:

- the subject literature review was performed, covering the following problems:
  - entrepreneurship, primarily including female entrepreneurship, specifying the definitions, types, determinants thereof and barriers thereto,

  - business environment institutions, indicating their definition and type;
- statistical analyses was conducted, covering:
  - four cities with poviat rights in the Lower Silesian Voivodeship, within the selected data ranges compatible with the subject matter of the entire study,
  - the profiles of female entrepreneurs from the abovementioned cities based on selected statistical data obtained from the Statistical Office in Wrocław, in accordance with the REGON register and PKD [*Polish Statistical Classification of Economic Activities*] codes;
- critical analysis of the content of websites provided by selected BEIs in the cities covered by the research in terms of the proposed forms of support for entrepreneurs in the years 2020-2021 was carried out, with particular emphasis on offers dedicated exclusively to women.

The research activities allowed the researchers to draw the main conclusions, which also fulfilled the role of answers to the formulated research questions; hence, it was possible to verify the adopted hypotheses:

- In the years 2020-2021, none of the numerous aid, support or activation-oriented offers prepared and presented on BEI websites covered by the study were dedicated exclusively to entrepreneurial women(57)49. Thus, women did not constitute a special target group for BEIs in the four cities with poviat rights located in the Lower Silesian Voivodeship.
- Women, as with other entrepreneurs, had the opportunity to take advantage of a wide spectrum of programmes, e.g. financial support (loans on preferential terms, non-repayable loans, subsidies), training, webinars, office rental services or specialist premises. In some of the cases listed in the study, women were indicated as a special, vulnerable group on the labour market; however, no individual projects were prepared for them. This clearly supports the positive verification of the hypothesis that, in the years 2020-2021, BEIs covered by the research offered support to all entrepreneurs without any gender dedication – no forms of aid addressed exclusively to women entrepreneurs were proposed.
- In the author's opinion, the aid proposals presented on BEI websites covered by the research were appropriate, regarding their scope and subject matter in the years 2020–2021. The COVID-19 pandemic, which began in Poland in March 2020 (the first confirmed case of the disease), remains an extremely difficult, complex experience which has changed every aspect

49 In order to resolve doubts regarding the existence of aid programmes dedicated exclusively to women before 2020, it is worth mentioning, e.g. the project "Become a Successful Businesswoman", which was implemented in 2014 by the Wałbrzych Regional Fund – source: https://frw.pl/2956/podsumowanie-projektu-zostan-kobieta-sukcesu/ – retrieved on 29.04.2021.

of existence, i.e. the social, economic, business-oriented, and daily lives of every person. Therefore, it is not possible to only negatively assess the first activities performed at the beginning of the pandemic, which are currently described as somewhat chaotic and unnecessary, e.g. a complete lockdown for some industries, and in the case of BEIs, suspending project implementation, closing institutions and switching to remote customer contacts, reducing the forms of support offered to webinars, remote training sessions and short-term actions to mitigate the "coronacrisis". Uncertainty, ignorance and fear are feelings which frequently lead to irrational decisions, of which anyone who has ever experienced them is well aware. Another issue is the assessment of the number, or rather the absence, of offers from BEI in the cities with poviat rights in the Lower Silesian Voivodeship dedicated only to female entrepreneurs. It is obvious that they could take advantage of all the proposals that were on offer. However, the group of potential beneficiaries is long, as evidenced by the data for 2020 regarding the number of economic entities registered in REGON (see Table 1) – women entrepreneurs did not represent the dominant group registering business activities. Therefore, competition among entrepreneurs willing to take advantage of individual projects is enormous; the opportunities available to women naturally decrease as a result.

- The characteristics of BEI offers, further subdivided into 2020 and 2021, also result from the above conclusion, because in the initial stage of the pandemic development, the aid proposals, if not temporarily suspended, were primarily implemented using the on-line formula, whereas the subject matter of training sessions, webinars or consultations mainly revolved around the possibility of obtaining systemic support (e.g. the Anti-Crisis Shield) and searching for complete information related to the application process. In the second half of 2020, when the situation became more stable, the flagship projects of individual BEI were launched anew (e.g. funds for starting a business offered by Poviat Labour Offices); however, remote work and the need to limit direct contacts, including meetings in larger groups, has become the common practice of the institutional operating policy. This was also reflected in the number of virtual initiatives proposed to entrepreneurs in the subsequent year of the pandemic. In terms of the thematic variety of support activities in online form, 2021 was disproportionately richer than 2020, which allows for the rejection of the hypothesis that the offers provided for entrepreneurs by BEIs were monothematic. To support this negative verification of the research hypothesis, it should also be mentioned that entrepreneurs, both those already running a business and those intending to start a business, as well

as other groups of addressees requiring support (e.g. individuals desiring to improve their qualifications), received a manifold, thematically diversified – in terms of scope, time and funding – offer which still allowed using the determinant of fighting and counteracting the "coronacrisis", but also referred the beneficiaries in: innovation, development, searching for new contacts, both local and international. Therefore, there is no question of the monothematic nature of aid proposals provided by BEIs in the four cities with poviat rights located in the Lower Silesian Voivodeship. If only the recipients of these supporting initiatives were willing to familiarise themselves with and take advantage of them, then, in the author's opinion, no negative remarks can be made as to the diversity of the proposed activities supporting entrepreneurs and posted on the websites of the analysed BEIs.

- In the course of the analyses, a secondary conclusion was also formulated which coincides with the conclusions of the research conducted by J. Ładysz [2020: 102-116] within the whole area of Lower Silesia Province: "there are significant disproportions in the spatial accessibility of BEIs within the area of Lower Silesia Province. All kinds of these institutions are particularly concentrated in the capital of the voivodeship – Wrocław".

The conclusions presented imply the formulation of guidelines which may play a corrective role for the highlighted deficiencies regarding the absence of support offers from BEI and dedicated exclusively to women entrepreneurs. In the author's opinion, it is a significant problem that should not be marginalised or diminished, e.g. by statements about the opportunity which all the potential beneficiaries have to use numerous projects provided to. As the discussion presented above has revealed, women do not constitute the predominant group of entrepreneurs either starting or already running a business, not only in terms of the Lower Silesian Voivodeship, but also in relation to the nationwide trend, which puts them in a disadvantaged position when it comes to competing for access to programmes supporting business activities. Promoting the idea of equal, non-discriminatory access to BEI offers should remain in the interest of the institutions themselves, constituting an idea for promotional activities, a reason for and evidence of "being better than others". In the case of the continuously developing group of women entrepreneurs, it would certainly act as an incentive if their needs were perceived individually, if the special requirements of this delicate and sensitive community taking up entrepreneurial challenges were taken into account. It seems worth considering the establishment of organisational units within the already existing BEI, dedicated exclusively to the implementation of projects related to women entrepreneurs, starting with obtaining funds by designing and conducting a promotional campaign and concluding with the settlement of the entire activity.

According to the author, business environment institutions should also consider the intensification of information and promotional activities covering their products and services, because, as research has shown [Buczak, 2019, 281], "the potential customers are not aware of them" and "the vast majority of entrepreneurs acquire the knowledge about BEI activities from friends and family". However, in order to share such knowledge, they have to acquire it in the first place; therefore, information campaigns should reach the right recipients. For the purposes of achieving the research goal, the presented study analyses the website content provided by business support institutions in four cities with poviat rights in the Lower Silesian Voivodeship, and this medium should be considered highly common and even newsworthy, corresponding to the requirements of the modern times. Nowadays, recognition in the given industry means being available online, setting up an interesting website, and having a social media account. However, meeting the indicated conditions does not guarantee uniqueness, because Internet users are "flooded" by a wave of offers, advertisements and promotions. It is therefore necessary, firstly, to stand out among other offer providers; secondly, to identify the needs of the target group; and thirdly, to diversify methods for reaching the potential beneficiaries. These are the steps which should be taken into consideration by the business environment institutions in terms of their functioning.

The presented study should be considered complete – the adopted research goal was achieved as a result of verifying the formulated hypotheses and obtaining answers to the research questions defined in the introduction, which allowed for the presentation of both conclusions and the post-research recommendations.

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Transport versus Ecology. Consequences for Management

Abstract: The importance of the issue of migration and transport is often underestimated. It has a rich tradition, dating back to the beginnings of the human race. The transport of goods and human beings became one of the foundational pillars of the development of civilisation. For centuries, vehicles have been developed, and so has the infrastructure to help human beings use them. This process accelerated rapidly during the so-called technological revolution and has continued until the present day. Nowadays, it is impossible to imagine economies that do not use mass transport. The car has become a symbol of progress and prosperity. In this context, safety issues have become increasingly important. The social aspects of sustainable development give rise to ever more interest.
The COVID-19 pandemic also increased awareness of the vulnerability of means of transport in such situations. At the same time, it brought about an opportunity to analyse the situation and to use the experience that was acquired during this difficult time. Ideas for combining activities for the protection of the environment, transport safety and its automation in terms of care for people seem deserving of implementation.

Keywords: logistics, transport, infrastructure, ship, railway, car, airplane

Introduction

In the course of time, man has settled in almost every corner of the Earth. Gradually, our species has developed trade and methods of manufacturing various goods through the exchange of experiences and civilisational ideas between different groups of human beings (Haviland 1990, pp. 29–57). Owing to technological progress, means of transport have improved, and nowadays may be found in highly sophisticated forms. However, it was soon ascertained that these were connected with numerous dangers, of which environmental damage, high accident rates, and susceptibility to infectious diseases, as in the recent case of the COVID-19 pandemic,

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deserve particular attention. The specificity of this research has resulted in the necessity of using several complementary methods. Apart from 'standard techniques' such as desk research, it also required the use of the comparative historical research method (Weber 2009, pp. 81–167). The aim of the article is to present aspects of sustainable development in relation to the historical transport approach, as well as the changes in this direction which must be pursued by modern transport.

A brief outline of the development of means of transport in modern times

Although the Middle Ages were not supposed to have seen unequivocal achievements in the field of transport development, those who lived in those times showed a great deal of ingenuity in terms of traveling on water, as exemplified by the journeys made by the Vikings. The traditions derived from antiquity and related to the use of certain means of transport enjoying a social statute were also continued in the Middle Ages. Consequently, how people rode their horses and the type of carriage they could afford implied their place in society. In the era of feudalism, a significant marker of freedom in Europe was the right to move around freely; at a time when most members of society were serfs, who had no right to move without the permission of their feudal lord, it was a major issue. The end of the Middle Ages meant an increase in production and transport possibilities (Fisher, 1957, pp. 411–464). The development of navigation and the discovery of new water routes fundamentally transformed the opportunities which Europeans had for mobility. New forms of production were created, and manufactories in which the division of labour was practiced emerged. Experiments with balloons as a means of transport also began, and many successful attempts were made in this regard. Trade grew in importance, as did fleets. Long distances were no longer insurmountable, although covering them still created serious technical problems. A significant impetus for development was the emergence of the steam engine in contemporary Great Britain. Such engines were applied in all areas of production and transport (Chambers, Grew, Herlihy, Rabb, Woloch I., Janson H.W. (1979), The Western Experience, Alfred A. Knopf, New York 1979, pp. 659–664).

Steam energy was perceived as a significant impetus for the development of means of transport as well as the machines needed for industrial production. Due to this, it was possible to greatly improve the mass movement of goods and people. Sailing ships were replaced by metal ones and armed with modern weapons, which made it possible to gain an advantage over other civilisations. Consequently, the colonial European empires provided space and opportunities to develop and use new means of transport, e.g. hot air balloons. Parallel to the technical development

of the means of transport, there were tendencies to synchronise the organisation of the flow of people and goods. In order to do this, as well as for the purpose of using transport in the military field, Antoine-Henri Jomini (1779–1869), a high-ranking officer of Swiss origin, laid the foundations of logistics which, over time, acquired the status of science.

Under the influence exerted by techniques based upon the steam engine, changes occurred in the area of land transport. Railways were created, using "the force of steam to propel vehicles on wheels placed on the tracks". This concept was also used in France to create a mechanism that in retrospect can be described as the "first car". This "child of progress", however, appeared to be not only large, but also extremely slow.

Internal combustion engines were the next step on the path to further progress. As a result, the first version of the modern car was developed in Germany in 1886 by the mechanical engineer Karl Benz.

Soon after, many attempts in the field of aviation were crowned with the first flight by the Wright brothers in the USA in 1903. This opened up new perspectives for mobility and transport. These achievements had an impact on the military sphere; tanks appeared, and balloons and airplanes were used to obtain information, as well as in combat. In 1938, a helicopter constructed by Igor Sikorsky was launched, and it has enjoyed uninterrupted popularity until the present day. At the same time, assembly lines were developed which resulted in an unprecedented number of manufactured items, including means of transport such as cars, motorcycles, airplanes and ships.

This is related to permanently satisfying the needs of affluent societies, which, in turn, is connected with the mechanism of mass consumption. The production of sophisticated means of transport made it possible for trade as well as tourism to develop on an unprecedented scale. At the same time, many machines became increasingly efficient. It should be indicated that not only do they perform various activities, but also operate increasingly often without the active involvement of a human being, as the examples of drones or autonomous cars/vehicles demonstrate. This last field of the economy, previously unknown, has revolutionised the manner in which people spend their free time, laying the foundations for the 'way of life' of modern man (Cooley; 72–128). At the same time, social references to the means of transport have changed; the possession and use thereof have become commonplace, just as the right to move is nowadays treated as something natural. Nevertheless, there is a link between the ownership of particularly luxurious means of transport and the high ranking of their owners in the social hierarchy. A similar correlation is noticeable, *inter alia*, when it comes to the manner of spending free time and the place occupied by a given person in the system of social stratification.

Transport and environmental pollution

Means of transport have inherent benefits and drawbacks. The latter include the destruction of the environment, which began on a large scale during the technological revolution, which itself was launched in a symbolic sense by James Watt patenting the steam engine in 1769. Manufactories equipped with a steam drive turned into factories – places of mass production. At that moment in history, mankind took the first step along a dangerous path, being unaware of the seriousness of the situation.

The danger of self-destruction soon became clear and obvious in the military sphere, where ever newer and more effective weapons led to enormous losses in conflicts that are described as "wars waged on an industrial scale" such as the American Civil War (1861–1865) as well as both world wars.

Certain self-destructive tendencies can be noted in cases when a clearly economically negative decision for the environment was taken for the sole purpose of achieving profit. This could also be seen in the case of transport; many types thereof which were nature-friendly were usually abandoned or very limited, while those that were harmful to the environment but generated more profit were supported in business circles. The case of the railroad, brutally superseded by the car industry in the USA, is a good example here; in many areas of the country, entire sections of local railways were bought by car manufacturers only for one purpose, namely to destroy them and thus create demand for their own products. Similar, although less spectacular, actions were taken in relation to balloons, especially to the most developed which fulfilled many of the same functions as airplanes, such as Zeppelins. Also, the fact that electric cars lost the battle against engines which were powered by oil-based derivatives back in the 1920s was due in no small part to Rockefeller, who ensured a steady supply of cheap oil to the market.

The same occurred in terms of 'economic concepts of transport' after the Second World War. An example is the entrepreneurship concept based upon an 'ecological account', and specifically drawing attention to the need for localisation of the raw material which should be used in the vicinity. This thought was abandoned, and long transport routes for raw material became reality. Only the discussion on the need to protect the environment, which is gaining in strength and importance, allows us to see the essence of this issue in another context.

Apart from the 'logistics services' of mass industrial and agricultural production and the mass transport of raw materials and products, there is also mass tourism, which involves carrying large numbers of people. All of this has contributed to the deterioration of the ecological state of the Earth (Berend 2016, pp. 130–134).

The destructive processes on our planet have especially intensified during the advanced phase of globalisation. Transport plays a very important role therein;

without it, it would not have been possible to create a gigantic spiral of supply and demand, which in the 21st century has changed the world into the stage of the activity of consumer societies which, due to the specificity of their behaviour, fully deserve the label of 'ecological pests'. Observing the development of transport in modern times, one may come to the conclusion that it was not planned; development resembled *ad hoc* activities, forced by immediate acted economic reasons. The pursuit of profit was decisive.

The transport industry ranks sixth in the classification of the most polluting industries in the world and generates approximately 24% of global carbon dioxide emissions, of which approximately 40% are caused by commercial transport and the rest by passenger transport.

Apart from the emission of harmful substances and noise, safety is also a serious issue in this sector of the economy. The figure of 1.35 million people killed in road accidents each year, not to mention those who are injured and permanently disabled, speaks for itself.

Transport and pandemic threats

The most important driving force behind the production of goods and the development of the means of transport was, and still is, trade. Since ancient times, merchants, motivated by their willingness to conduct profitable commercial transactions, have travelled enormous distances. Undoubtedly the greatest undertaking of this type in antiquity, which continued in the Middle Ages, was the Silk Road, stretching from China to Europe. Not only did it play a significant role in a commercial sense, but also a civilisational one. It was a kind of 'conveyor belt' by means of which various goods, beliefs, fashions etc. were exchanged.

A significant role in this undertaking was played by so-called infrastructure, namely roads with watchtowers and buildings allowing weary travellers to take a rest after a long and strenuous journey. It was often ascertained, however, that, apart from the positives, this type of 'globalisation in miniature' also had significant drawbacks. These included gangs of robbers waiting for merchants as well as diseases that were spread along the Silk Road. It was widely agreed that they were the greatest threat not only to trade as such, but to the safety of the general population. It should be noted that people who lived at the time did not enjoy good health; indications are that parasitic diseases along the Silk Road were widespread.

Tedious wandering, a lack of adequate food and encounters with dangerous bacteria and viruses, often of animal origin, repeatedly led to the outbreak of plagues, and such pandemics decimated the population. The situation on the waterways was no better in this respect, as repeatedly experienced many times by, for example, Italian cities with fleets such as Venice. Many times, sick people who arrived from distant lands brought waves of infectious disease to the city; for this

very reason, the city introduced the custom of a 40-day period of isolation before entering its gates, which was called quarantine ('40 days'). It should be indicated that the germs of the greatest 'plague' in Europe, which ravaged the continent in 1347–1350, were brought by ships, most probably by infected fleas hosted by rats. They came to Europe from Crimea, where the Tatars used dead bodies as a kind of 'biological weapon', throwing them over the walls into the besieged city (Jones 1979, pp. 193–197).

Another pandemic was caused by the discovery of the 'New World', which occurred after the Turks conquered Constantinople in 1453 and blocked the Silk Road, owing to which goods, especially spices, reached Europe. This motivated travellers, of whom Christopher Columbus is the most famous, to seek a sea route to India. This was of course unsuccessful, but led first the Spaniards, and then other Europeans, to the discovery of America. The consequences of their arrival there were tragic; apart from the brutal violence that the inhabitants of this continent experienced, they were devastated by previously unknown diseases brought by Europeans. This, in turn, led to the beginning of the cultivation of sugarcane, tobacco and cotton plantations established by Europeans, which gave rise to the tragedy of genocide and exploitation facilitated by contemporary means of transport.

The industrial revolution was also perceived to be a dangerous time for the world due to the spread of disease germs around the world, although the development of medicine, including vaccination and hygiene, was undoubtedly helpful in controlling pathological outbreaks. Despite this, there were still pandemics that were beyond control, especially when the global population was weakened and malnourished, often because of armed conflicts, as was the case with the Spanish flu, which claimed a huge number of lives. Here the means of transport played an important role in the spread of disease as well. The development of the road network and the improvement in the means of transport have made globalisation as it is today a reality. The development of previously unknown medicines, especially antibiotics, has also filled mankind with hope for better times. It is clear, however, that diseases have not left us; what is more, they take advantage of the opportunities offered by various means of transport. In addition, one 'panacea' or another is ascertained to be only a temporary preventive measure; an example of this is antibiotics, which, when used too often, have led to many bacteria or fungi developing a resistance to them. This has brought about the recurrence of many largely 'repressed' diseases. The potential threat is significant, although often underestimated. It was only the events related to the COVID-19 pandemic and the 'mutating potential' of the virus that revealed the seriousness of the situation. Given the impact which it has on transport, tourism and many other parts of the economy related to interpersonal contacts, management should seriously re-evaluate their current strategies.

Protection of the environment

The process of the technological revolution which began in the 19th century contributed to industrialisation and lifestyle changes for vast numbers of people in different parts of the world. The concept of the 'dictating of economic development', which then developed, meant in practice the subordination of the environment to economic interests. Due to the adoption of this philosophy of action, the state of the Earth's natural resources worsens as mankind reaches subsequent levels of industrialisation and technical development. The widespread practice of 'industrialisation' of agriculture is criticised, together with the associated environmentally harmful crop monocultures and soil contamination. In parallel to the development of negative phenomena, the awareness of the threat to the biological foundations of human existence posed by human economic activity grew among the most enlightened intellectuals. This led, *inter alia*, to the development of ecology (Greek: *οἶκος* – home, environment and *λογία* – science). The list of the founding fathers of this new science is long, including, among others, Aristotle of Stagira (384 BC–322 BC), Theophrastus of Eresos (ca. 371 BC–287 BC), Carl Linnaeus (1707–1778), Friedrich Wilhelm von Humboldt (1769–1859), Charles Robert Darwin (1809–1882), Alfred Russel Wallace (1823–1913), Karl August Möbius (1825–1908), Johannes Eugenius Warming (1841–1924), Vladimir Ivanovich Vernadsky (1863–1945), Arthur George Tansley (1871–1955), Henry Chandler Cowles (1869–1939), and George Evelyn Hutchinson (1903–1991). The term 'ecology' was probably coined by Ernst Heinrich Haeckel (1834–1919).

Despite a gradual increase in environmental awareness, industrial production was undoubtedly central to the hierarchy of business circles (Horowitz, Strong 1971, pp. 486–492). The ruthless system of the exploitation of the Earth's resources, which was present both in capitalism and communism, was beginning to reach the limits of its possibilities. The awareness of the consequences of the policy of nature exploitation and pollution was already high in the 1980s, which prompted circles of intellectuals from various fields to seek a way out of the situation that had arisen.

The discussion on the limits of economic development has become a great step forward. This issue was taken up by the Club of Rome, an international think tank established in 1968 which deals with global problems in the context of the condition of the environment. As a result of the work of this institution, a document entitled 'Limits to Growth' was published in 1972 by the Volkswagen Foundation (Volkswagen Stiftung). The published conclusions highlight the fact that development 'without limits' is not possible, and overexploitation in the scope of economic activity occurs at the expense of future generations. The thoughts contained in the Club of Rome document generated considerable resonance in various circles. In analysing the causes of the progressive degradation of the environment, the Gro Harlem Brundtland Commission criticised the overexploitation of the Earth's natural resources by so-called developed Western countries (Janik 2017, pp. 97–102). At the same time, it

indicated the fact that Third World countries were trying to imitate both the Western way of economic activity and the way of life, which leads to an additional burden upon the ecological system of our planet. In order to improve the poor condition of the environment, it would be vital to seek international solutions and develop a general system of economic activity, taking into account the interests of less developed countries and the requirements of 'sustainable development'. As a result of the growing ecological awareness, the subject of recycling has also become an area of interest of various circles, including politicians and businessmen, owing to which various initiatives in this field began to proliferate (Beck 2004, pp. 85–88).

The recovery of valuable materials has a long history. Its origins are not so much related to environmental protection, as this aspect appeared much later, but to economic calculation. This was the case with, for example, precious metals such as jewellery or iron used for the production of weapons and processed in connection with that purpose. At the beginning of the 20th century, attempts were made to achieve 'savings' by reusing used products. This intensified during both world wars when the lack of certain products led to significant savings and to an effort to use whatever was possible. The British press published special advice on how to 'manage' sparingly, including advice on how to recycle actively. In the 1930s, along with the practice of using metal cans, especially for drinks, initiatives to collect and reuse them were observed. During the war, for example in the United States, campaigns for the use of scrap metal ('Get in the Scrap') were initiated and brought positive results. The post-war period, rich in industrial mass production related to so-called 'mass consumption', has created considerable opportunities for the exploitation of the materials used. Their use on a mass scale was associated with the dissemination of ecological ideas and with the concept of sustainable development. Not only were traditional materials such as scrap metal, paper and glass used, but so were many others that had not even been mentioned before. Although not all initiatives that aspire to the title of recycling deserve to be taken seriously, they are of increasing economic importance, and in many countries entire industries have been created to deal with processing recovered materials. As a result of public pressure, entrepreneurs are increasingly reluctant to flaunt ecologically harmful products, transferring 'unclean' forms of production, as part of 'globalisation', to developing countries that do not have legislative safeguards to stop harmful practices (Steger 2009, pp.113–121).

The same occurs in the case of 'industrialised agricultural behemoths', attempting to create their own 'green image' to convince the public of their noble activities, of which Cargill Incorporated would be an example. Of course, not every movement that deserves the 'ecological' predicate has to be synonymous with sustainable development. The fact is, however, that it was this concept that gained the greatest importance and popularity as well as prominent supporters who were able to implement its principles. It is also characterised by a certain simplicity, because it is

relatively easy to compare the steps taken on its behalf with its basic goal, that is, to leave a clean environment for future generations and, in the minimal version, to leave it at least not in a worse condition than it was in. This, of course, applies to the means of transport and their activities as well.

Consequences for management in transport

Economic circles were able to bypass or overlook environmental problems in the past. This was done particularly 'successfully' over a lengthy period in the area of transport, despite the fact that it has long been known that certain practices were extremely harmful to nature. The situation in this sector largely reflects the state of affairs prevailing throughout the economy as a whole (Cavanagh, Mander 2004, pp. 179–188). For a significant period of time, there was an unwritten code allowing companies to neglect the natural environment in the name of the development of transport (Singer 2004, pp. 14–50).

This kind of practice was widespread in tourism, among others. Both environmental issues and health and safety have become especially important topics in the context of the COVID-19 pandemic, and have to be properly thought through and re-evaluated at the management level.

It seems that, apart from typical logistics challenges, problems related to the development of natural energy sources for transport as well as the issues of the efficiency and safety of mobility will be predominant in the nearest future. This requires a change in the philosophy of operation of transport managers, which, regardless of 'green technologies', should be focused on savings in the field of transporting goods and people. The appropriate choice of factory location can help to avoid unnecessary transport. Contemporary management should not be limited to only one thematic area, but should rather perceive these issues 'globally', in the entirety of various aspects related thereto (Löw M. 2018, pp. 82–86). Management should abandon the separatism of individualistic philosophy in favour of cooperation and collective actions.

In many Western countries, for example the European Union member states, the United States, Canada or Australia, the activities of transport managers should be focused on cooperation in larger projects conducted with the aid of government funds or with the help of international organisations. In this way, companies gain the opportunity to access new technologies and gain experience while implementing them. The change to 'green energy' is already taking place, which is especially true in the case of urban transport, as evidenced by, *inter alia*, the example of the transport company Hamburg-Holstein (Verkehrsbetriebe Hamburg-Holstein) in Germany. Such steps are met with positive social resonance. At the same time, it forces managers to rethink their existing strategies and introduce new elements therein. This should be done in a reasonable and understandable way for the employees of a given enterprise as well as for public opinion (Hannerz 2010, pp. 88–92).

One can expect that the introduction of electric cars will be associated with other problems. The mere use of electric cars, despite the undoubted benefits to doing so, can also be associated with difficulties. These include the heavy use of metals in the production of batteries that are used to power these vehicles. The methods of charging are also not the simplest. Furthermore, their lack of noise emission, otherwise assessed positively, has already proved to be the cause of accidents in the past, as pedestrians did not hear approaching vehicles soon enough. This requires vigilance and openness, including in relation to technical innovations that are meant to solve existing problems.

It seems highly probable that autonomous vehicles will soon be launched on the market. It is difficult to foresee all the elements of the situation connected with this issue. It is not out of the realms of possibility that transport companies will save on work done by humans through the introduction of autonomous driving systems; this may bring about mass redundancies among transport workers and massive unemployment.

Although initially one can expect a large amount of social resistance during the automation of urban transport, there are indications that this idea will be implemented at least in some situations. At the same time, a not insignificant number of activities, especially technical ones, will continue to be performed by human staff as these cannot be replaced by machines.

One should note the growing importance of information technologies in logistics, which results in the necessity of their increased use in transport management, and which in turn implies the purchase of suitable programmes and training employees in their use (Wren 1994, p. 401). Being open to new emerging management and modern possibilities in this area can contribute to many interesting innovations; among others, the 'intelligent' use of the Internet is becoming increasingly popular when using public transport, owing to which it is possible to order appropriate dimensions of vehicles appropriately sized on seldom-used routes, thus saving on costs and harmful gas emissions. When it comes to sustainable development, attention should not only be focused on the issues of narrowly understood ecology, but also cover the social aspects of this concept. In this spirit, recycling should also be dealt with.

The realisation of sustainable ideas also involves the need to track the preferences of governments and states that have an impact on their policy towards transport. In the case of implementing pro-ecological programmes, transport companies, especially those operating in the field of transporting people, can rely on significant subsidies from the authorities when switching to renewable energy sources; the ability to benefit from such opportunities is one of the most important features of an effective manager (Witzel, 2012, pp. 231–232).

Modern transport management must take into account electricity prices, changing labour costs related to the fact that employees are becoming increasingly highly

qualified, the growing importance of technology, including with high ecological values, and the aspects of focusing on recycling. Issues such as water consumption and the reduction of noise emissions are also important. The challenges related to the development of means of transport relevant to urban traffic will increase and force planners to look for new ways to provide that which is required by different groups of people using different means of transport. This will result in increased interest in service-oriented architecture, which may play an important role in organising transport in the future, including when setting out routes, and using devices that improve mobility, such as electric scooters or skateboards, which can reach fairly high speeds. This is problematic due to the fact that there are no adequately safe paths for them. Environmentally friendly city railways should play a greater role, and rail routes should also be expanded. Ticket prices could play a very important role in the success of a functional rail transport system. The vision of drones circulating in large numbers in cities seems ever more realistic; many companies are already making plans to use them for business purposes, mainly for transporting smaller and lighter packages to their customers. Related to this is the need to create a management system for these drones, which would have to take into account a number of conditions related to the topography of the area and its development. It is also important to increase the level of the safety of such operations (Johnson, Turner 2016, pp. 202–203).

Transport managers should work towards the use of modern vehicle information systems; it is also wise to use semi-autonomous systems to assist drivers where possible. Knowledge occupies an extremely important position in the hierarchy of importance in the current changes in transport. For this reason, it is vital to pay more attention to the scientific 'support' for pro-ecological changes in transport in academic circles, both in the form of conducting scientific research and the traditional transfer of knowledge to managers and encouraging them to treat it as part of the implementation of the 'green transport programme' at their companies.

The size of modern transport companies should be taken into account when considering the possibility of them adjusting to the needs of sustainable development. Companies which are too large without proper decentralisation, as a rule, would not be effective in terms of the possibility of the implementation of pro-ecological technologies; yet small companies also have problems with this, and not infrequently, because they often lack the adequate resources to implement 'green technologies'.

An important feature of modern transport managers is sharing acquired knowledge and information (Giddens 1993, p.430). Therefore, appropriate organisations should be established, including think tanks, with both intellectual resources and practical experience as well as material and technical means, facilitating such an exchange of information. The work of managers should also take into account the experiences gained from pandemics, including the most recent one. For example, the

possibility of working from home has consistently proven useful in practice; as a result, many employees are keen to continue to work from their 'home office' even after the pandemic is over. Also, some employers are willing to agree to it because it creates opportunities for savings in the scope of reducing the costs of office space or electricity, and helps to reduce excess road traffic.

At the same time, this pandemic was ascertained to be a great threat to public transport, when commuters were at risk of contracting the virus. This makes the development of action plans for the possible emergence of such threats in the future a crucial element of future planning.

Conclusions

Transport, shaped by civilisation processes, has played an important role in the development of mankind. Without it, important stages of human development would not have been possible. Means of transport significantly contributed to the intensification of the globalisation process, including economic development on a global scale. At the same time, they also play a negative role by polluting the environment either directly or indirectly. The position of transport as an important factor in the destruction of the environment should change in the light of the ongoing transformations and emerging opportunities. For this to occur, the awareness of the need to make changes should increase. An important group in this regard are managers at various levels who, by increasing their knowledge appropriately, should lead the planned changes. This will largely burden them with the need to make employees and the public aware and persuade them of the necessity of the changes taking place.

The modern world, given the advanced process of globalisation, seems to be ever more complicated, and contemporary citizens are confronted with numerous challenges. The transport sector is deemed to be particularly vulnerable to many threats, such as those arising from the pandemic, among others.

The development of technology and the extensive use thereof has led to the degradation of the environment, in which various means of transport have played a significant role. This forces decision-makers operating in the transport sector to rethink the effectiveness of the strategies used to date and to re-evaluate many of the earlier ideas for effective action in this area.

Not only does consideration of the general civilisation aspects of the transport of people and goods allow one to better understand the current condition of transport on a global scale, but also to predict the future changes that may take place therein. It also makes it possible to understand why transport should move towards 'eco-efficiency' without delay and to cease the emission of harmful substances into the atmosphere. This peculiar 'revolution', which is a derivative of the 'ecological revolution' throughout the economy, and which the modern world is facing, means

far-reaching changes in all spheres of human life. This results in a number of challenges for managers, and at the same time is associated with a great opportunity to improve the quality of transport and adapt it to the requirements of sustainable development, especially in terms of safety and 'environmental friendliness'.

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Marcin Cywiński[1]

The implications of innovation in the digital economy

Abstract: Knowledge determines the development of the modern economy. Entrepreneurs who are able to successfully utilise resources create more added value than their competitors. A large number of political documents in the EU or Poland demonstrate the special role of innovation as a key factor in building the competitiveness of the economy, albeit to date there has been no significant improvement in our position in this terms compared to other leading areas. The main obstacle in introducing innovative technological solutions, products or organisational innovations are the lack of knowledge and openness to changes. Unstable legal regulations, deficiencies in the development of institutional infrastructure and staff shortages make the implementation of robotics and automation a necessity. The article attempts to assess the diffusion of innovation in the digital economy.

Keywords: Innovation, Internet of Things (IoT), Industry 4.0, economy, management**,** logistics

Introduction

Innovative activity primarily pertains to the development of the economy, society, ecology or technology. This type of activity is understood as an activity aimed at increasing the propensity to create, implement and apply innovations in the daily activities of each consumer. It is a complicated and multi-faceted process that is always initiated by a human being.

A developed and modern economy, the development of enterprises, decent working conditions, good living conditions, and a knowledge-based society are invariably the most important items in the functioning of each country. The Polish economy, after many years of experience and functioning in various legal systems, is attempting to achieve the indicated goals. However, the most important challenge for the Polish economy is the attempt to reduce excessive structural differences between Poland and highly industrialised countries. It is still necessary to build

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awareness and develop knowledge in society as well as research and implement the research results of innovative processes, without which the modern economy cannot function efficiently. A necessary condition for the implementation of the shaped trends is the consolidation of entrepreneurial and innovative attitudes; the implementation of these attitudes should be based on the integrated development of knowledge with the use of the available technical, economic, organisational and administrative standards. An important task is to observe changes in the mechanism of adaptation of various entities to innovative activity, understood as a tendency to introduce various forms of innovation in particular spheres of management in the face of the limitations of the labour market. The analysis of this mechanism should answer the question of the extent to which economic and social conditions are able, on the one hand, to stimulate and, on the other hand, limit the innovative activity of enterprises. There are many economic and social determinants of innovative processes in enterprises, and as such there are numerous economic and social conditions for innovative processes in enterprises. Among them are the shortages in the labour market and the development of the concept of Industry 4.0. Innovation as a result of cooperation amongst R&D units, taking the market needs of consumers into account, is most often manifested in specific consumer behaviours. Therefore, innovative activity is a sphere of human activity, without which the development of civilisation is impossible, and the choice of forms of functioning of an organisation on the market is a complex process requiring the determination of criteria for the selection of many factors that will affect the implementation of specific strategies.

The main purpose of the article is an attempt to evaluate and analyse the market changes focused on improving the efficiency of logistics processes in Poland and their effect on the diffusion of innovation. The main assumption is the thesis that robotics and automation of supply and distribution processes on the market will be a development trend, especially in the face of staff shortages and the progress of the fourth industrial revolution.

Challenges of the supply and distribution market

Variable customer requirements mean that the approach to the supply chain should be changed, regardless of whether they relate to the traditional market or the e-commerce market. Regardless of whether we are dealing with drones, the Internet of Things (IoT), robotics, or autonomous vehicles, the scope of ICT technologies in logistics is expanding. One may observe this phenomenon especially in the e-commerce industry. Most of the entities active on the market, including those just beginning their activities on the market, are present in the global Internet network. Problems may arise in the scope of using the available Internet tools used by enterprises (Big Data, IoT or Industry 4.0). The specificity of the industries makes it necessary to use the available ICT (Internet and Communication Technology) tools

in their activities, which is the cause of rapid changes on the market. On the other hand, however, this fact should motivate other entrepreneurs to impose available IT tools and solutions and to diffuse related innovations. Process efficiency increases, and distribution channels are shortened. The wide range is distributed to the customer in real time, and sales can be made from anywhere in the world. The dynamic development of purchases brings about the development of large logistics operators and other market participants (4PL / 5PL). The prevailing way of thinking about the process of planning and building a supply network is changing. Process efficiency, optimisation and quality management are no longer a modern solution but an everyday practice. With the development of artificial intelligence, information processing services (cloud computing) are spreading, and the market forces changes and innovations. This is due to increased consumption (despite declines in 2020) and the increasing concentration of the population in urban areas [GUSa, 2022]. According to the UN, in 2030 more than 60% of the population will live in cities, a figure which will rise to as many as 70% in 2050 [ONZ, 2022]. We are slowly seeing the emergence of a new world in which machines and artificial intelligence ensure security of supply and convenience. The development of cellular technology (5G) has made it possible for a very large number of users and devices to use the network at the same time. The next stage of social evolution is beginning before our very eyes. It is possible to observe that the main beneficiary of development is the courier industry. The value of express and parcel services in Poland in 2014 reached a value of PLN 4.3 billion PLN. The following year brought an increase to PLN 5.1 billion PLN, which accounted for 2% of the European market and had a huge impact on the development of the economy [Kawa, 2020]. In 2019, the value of this market in Poland was over PLN 7.9 billion PLN, and in 2020 almost PLN 12 billion PLN [GUS, 2020]. Polish society is increasingly willing to buy merchandise on the Internet (73%), guided by convenience, a wide assortment of products, price and flexibility [Gemius, 2022]. The industry faces many challenges such as, on the one hand, meeting the constantly growing volume of parcels (778 million parcels in 2021, with a forecast of 848 million in 2023), and on the other hand, growing consumer expectations [Gemius, 2022]. According to the data of the Office of Electronic Communications in Poland, in 2020 there were almost 300 courier (parcel) entities. Almost half of all parcels in Poland are delivered in the B2C (Business to Customer) segment as part of e-commerce, and the percentage of online buyers is growing every year. The dynamic development of e-commerce is influenced by the growing mobility and great popularity of mobile devices. The value of the entire e-commerce market in Poland, along with the on-line services, is constantly growing. In 2017, it amounted to PLN 44 billion, in 2019 PLN 61 billion, and in 2021 as much as PLN 93 billion [PwC, 2021]. In terms of logistics, the high volatility of demand is problematic. Nobody refers only to the research on the trend or the classic seasonality of certain products, but to the large accumulation of

orders on certain days. The requirements and expectations of the e-commerce market customers are different in comparison to other sectors of the economy. Courier service providers must tailor their offers to the needs of both the seller and the customer (4PL/5PL). For the seller, quality, reliability, and system integration are most important, while for the buyers, convenience, flexibility, time and price are. In addition, shippers expect extended delivery times and customers expect flexibility with regard to delivery times.

Robotics and automation in the economy

Robots are increasingly often found in the world of logistics. The largest retail chains are constantly increasing their robotics resources, which improve the selection and completion processes. Robots may be found in the e-commerce industry, logistics operators, and suppliers of large retail chains. The robot market has been developing since the 20th century and is characterised by continuous development and sales growth. Manufacturers compete with each other in terms of the quality of the solutions offered, precision, efficiency and responsiveness. Tasks resulting from unfavourable working conditions, high efficiency and accuracy of the work performed, as well as increasing customer requirements result in increased expenditure on innovation and technological development. The robotisation of processes is a global trend. A systematic increase in the number of robots and manipulators used in logistics is currently observed. Industrial robots and manipulators can be used practically in the process of supply, production and distribution.

On a global scale, one may observe a significant increase in the number of robots and manipulators in logistics processes, from 1 million units in 2007, to 2 million in 2017, and up to 3 million in 2020 [Weger, 2022, p. 37]. In terms of categorisation by industry, 39% of robots service the automotive industry, 20% are for the electronics industry, 9% for the metal industry, 7% for the plastics industry and 4% for the food industry. Robots carry out many activities related to the production process. We are currently seeing the rise of a new type of robot – cobots, which are robots designed for direct cooperation with humans, supporting physical, dangerous or precise processes. The price of such cobots has decreased significantly; they are cheap to maintain, simple and safe to use and easy to programme. Thanks to the new software, users without a great deal of IT experience can programme, configure and use them. It is also an area for building new innovative companies. The robotisation of logistics processes undoubtedly allows one to achieve a great many benefits, not only including greater efficiency and effectiveness of the process, the consistent quality of merchandise and generation of fewer material losses, but also better working conditions. It increases work safety and enables the further development of employees through the acquisition of new professional skills. Another advantage of robotic machine handling is the ability to specify the exact date of order fulfilment, which

greatly facilitates the management of production and distribution processes. The key features of workstations are the possibility of controlling the quality of products directly on the production line and the total measurability of the process. It seems that companies using automation need to be aware of the fact that the use of robots is associated with sales growth. Most often, robots are used for welding, assembly, palletising, packaging and depalletising, painting, material processing, object manipulation, pallet transport and loading operations, wrapping pallets, disposal and protection of waste. There are also filling, dosing, inspection and testing robots. The described phenomenon fits well with the market of warehouse processes or courier (parcels) deliveries. Autonomous means of transport are increasingly often observed, such as forklifts, mobile racks (warehouses) and delivery of parcels. The use of autonomous vehicles in transport is particularly important in terms of independence from congestion of communication routes and numerous administrative constraints in the processes of loading and unloading (e-mobility). There is an implication of autonomous vehicles in the distribution of parcels to their destination. Examples include DHL Paketokopter, Amazon prime deliveries, French operator La Poste's drones, or Alibaba store deliveries in Shanghai, Beijing or Guangzhou. Especially noteworthy is the initiative of the American star-up Nuro, which presented an autonomous delivery vehicle equipped with an air-conditioned cargo space and an electric motor [Reuters, 2018]. During the Consumer Electronics Show, Pizza Hut and Toyota jointly presented an autonomous vehicle for meal deliveries [Insider, 2018]. Autonomous vehicles are also present in freight and passenger transport at the company Udelv [O'Dell, 2018]. The service market is also full of autonomous solutions. Vehicles aimed at business customers who are afraid to transport cash are serviced in the banking sector by autonomous vehicles in which cash can be deposited [Grabiec 2015]. This relieves entrepreneurs of the need to limit the transport of cash to the bank on their own. Production processes are a promising field in which to evaluate and analyse the application of robotics. Automatic parcel machines are common in Poland. Statistics show that there are almost 3,000 of them nationwide [Kawa, 2018, p. 14]. They enable one courier to leave several dozen parcels in one place without having to visit each recipient. In practice, this means that the recipient does not wait for the package, but the package waits for the customer. In contrast to classic delivery processes, the route here is fixed and predetermined. The very process of delivering a parcel to a parcel machine does not involve the consumer in any way.

There is a common, though subjective, belief that industrial automation has mainly been introduced in the parcel delivery industry. Robots are already present in warehouse processes, and more companies are applying automation to improve efficiency. Order processing time may be reduced from two hours to five minutes [Cieszyński, 2018, p. 17]. In one of the observed companies, employees do not move around the warehouse. It is the robots that provide them with the necessary components.

Products are stored at a high density (which is impossible in standard warehouses); for example, containers placed side by side in several layers. The robots move on overhead cranes and collect the necessary containers to deliver them to a particular employee. This allows for the elimination of classic communication routes and the densification of the storage area. The most frequently rotating products are stored in the highest value (type X according to XYZ analysis), while less frequently rotating ones are stored at low levels. This allows for better use of the warehouse with the same amount of work by employees in the picking department. The entire process is managed by a computer system. In the new Jeronimo Martins distribution centre in Gorzów (Lubuskie region), modern autonomous forklifts are being tested, accompanying the picker at every step. The vehicle always follows the employee, remaining a safe distance from the rack. This kind of autonomous helper focuses on order picking, avoids obstacles and always adjusts the speed to the current situation. This is possible thanks to sensor systems and lasers that recognise obstacles and empty racks, which are available in both automatic and manual modes.

It is not merely parcel delivery or warehouse processes that struggle with product transportation issues. The supply sector is also facing the challenge of optimising deliveries. A good example is the InterMarche network operating in Poland, which has introduced the possibility of online shopping and personal collection of products (pick-up drive-thru).

Most of the current innovations are designed to adjust the manufacturers' offer to the changing requirements of customers. Robots, in addition to improving the picking process, help to introduce a new assortment to the distribution network. Thanks to this, the storage space is better used, and the costs and risk associated with the introduction of a new product are reduced.

Low employment costs in the industry are one of the basic barriers to the development of automation and robotics. Unfortunately, they do not constitute an incentive to implement innovative process and production solutions in which manual labour is replaced by machines. Employment costs in Poland are still high (despite being competitive with Western countries). The challenge is the availability of employees on the market. Undoubtedly, this phenomenon is conducive to the development of robotics in Poland (especially in the face of the relatively low unemployment rate in the country (5.5%)). Robotisation always eliminates the pressure associated with searching for employees, especially at low levels. Additional barriers related to the purchase of vending machines and robots are the costs of their acquisition, but also of recruiting staff to operate them. According to research by the Market Economy Research Institute, entrepreneurs are afraid of robots due to their complicated activities [Łapiński, 2015]. Additionally, many entrepreneurs (approximately three-quarters thereof) did not implement innovations due to passivity and a lack of good ideas or lack of financing [Łapiński, 2015]. Another reason why robots are not used in

business practice is the small scale of production (production economics). There is also a belief that the implementation of automation will not bring tangible economic benefits [Michałowski, 2021]. Many entrepreneurs do not consider the implementation of robots due to the lack of analyses of how the application thereof will affect efficiency [Michałowski, 2021, p. 22]. Therefore, it is worth noting solutions from the USA, where the benefits of optimisation were noticed by Creator, a company that installed an automated line for the production of burgers, turning restaurants into an assembly line. Distribution centres of chain stores are increasingly often becoming mainly automated, offering intelligent (AI) ordering points, where the role of a human is limited to controlling and expanding the product offer.

Industrial robots and manipulators used in logistics processes most often perform manipulation, transport, packing and palletising operations. The main advantages of robotic applications include: [Dobrzanski, 2016, p. 83]

- round-the-clock availability,
- repeatability, increasing the quality of packed or palletised elements,
- increased efficiency,
- increased flexibility of production, reduced costs,
- reduced risks to the health of employees,
- increased security.

In some production processes, they also ensure that there is no contact between humans and products.

Polish reality shows that human-machine integration is only a plan that is limited mainly to technological changes. It is worth investigating the question of what causes a specific dissonance between industrialised countries and the Polish economy.

Humans against the concept of Industry 4.0

Three elements drive innovation – data, information and knowledge. Data becomes useful when turned into information and subsequently into knowledge. To date, the conversion process has been carried out through human-computer interactions. In the process of social evolution (Society 5.0), we may observe the emergence of a new super-smart society model, based on data (data-driven society) or on knowledge (knowledge-intensive society) [Chaber, 2021, p. 52].

The fourth industrial revolution, commonly known in the literature as Industry 4.0, is a term that most often means the combination of machines, computers and software in an integrated network, controlling production processes, among other things, in order to improve the efficiency of human integration with technology. The new revolution in the industry not only means changes in technology. We may observe the implementation of this concept in new ways of performing work and the role of humans in industry [Januszkiewicz, 2019, p. 67]. Thanks to digitisation, machines have achieved better efficiency, flexibility and precision,

which in turn has resulted in the implementation of automation. Planning and control systems were developed to coordinate the operation of machines and devices within production. One may currently witness system integration and networking. Digitally controlled machines are integrated with people on the Internet using ICT solutions. Materials and finished products can always be identified; they also have the possibility of uninterrupted communication with each other, realising the flow of information between machines and the production system and vice versa.

The direction of changes we are dealing are profound, comprehensive, and can concern in general:

- the elimination of people from work processes – the robotisation and automation of production processes will also lead to changes in the way how economic organisations function; the current challenges we are facing nowadays rather concern changes in and the disappearance of particular professions and the formation of new ones, which is connected with the need to acquire new competences [Ford, 2016];
- changes in the relationship between humans and technology [Kehl, Coenenen, 2016], which are related to the broadly understood subjectivity of humans. Among other things, there are problems that concern, for example, the causative abilities of humans, the scope of their freedom, the conditions and requirements of the responsibility of humans as moral subjects or changes in their rationality [Kiepas, 2021, p. 4];
- social and cultural changes.

Significant changes have already taken place regarding the development of new media and the digitisation processes of various areas of the social and cultural world. Developments in Industry 4.0 are leading to the formation of a post-digital society as a result of progressive digitalisation [Berry, Dieter, 2015]. The areas or directions of changes indicate only the different, currently perceivable possibilities that may arise in the future. The perspective of changes towards Industry 4.0 and Society 5.0 is assessed differently. There are, for example, those who believe that the logic of the development of civilisation was the pursuit of independence from nature (achieved thanks to technological development). However, the progress of civilisation taking place through the subordination of nature and the creation of an artificial world took place in the name of the good of individual individuals, economic organisations and countries. The fourth industrial revolution has definitely changed this point of view in favour of subordinating the interests of individual interests to the interests of the community, which is possible thanks to modern information technologies (Rifkin, 2016, p. 23). These technologies create new opportunities for people to collaborate on a global scale. At the same time, they also allow one to control the consequences of these activities, eliminating negative effects and creating conditions for a fair distribution of the effects

obtained. This results in the emergence of a prosumer society in which newly established technology platforms create the conditions for the development of a culture of sharing, as opposed to mere appropriation (Rifkin, 2016, p. 28). The development of smart technologies, based on digital technologies, has a variety of applications and can be used, inter alia, to monitor the state of the environment, control various devices and processes, and shape various forms of cooperation between people as a consequence. Network dependencies should transform all activities into collaborations as they are implemented because of the interdependencies and relationships with others. Therefore, are the technologies related to Industry 4.0 treated as those that will automatically lead to the creation of optimal relations between humans and the world around us, and consequently between people on a global scale? Perhaps employees are afraid of professional exclusion in favour of robots due to the prevailing belief that they will be replaced by vending machines and robots.

Poland has a population of 38 million people, of whom almost 18 million are professionally active [GUSa, 2022]. As indicated above, progress in the robotisation of industry is progressing ever more rapidly. In 2007, there were 1 million robots. By 2017, that figure had grown to 2 million, and in 2020 more than 3 million. Despite the positive trend, the level of innovation in Poland is below the EU average; for many years Poland has been referred to as a moderate innovator [Osieczka, Stec, 2019, p. 84]. The share of innovatively active enterprises in the industrial enterprise sector in 2020 amounted to 36.7%, and in the Lubuskie region 26.8% [Wegner, 2021, p. 27]. Taking into account the size of enterprises, the highest percentage of innovatively active entities, as in the previous years, was recorded among large companies, or units employing 250 people or more.

The preliminary results of the pilot research conducted by the author using the Delphi method on the population of entrepreneurs in the Lubuskie region show that the reasons for the lack of robotisation result from the fact that entrepreneurs are not familiar with the existing solutions. Therefore, without detailed analyses, entrepreneurs remain convinced that robotisation in their company is unnecessary or they cannot afford such projects.

Conclusions

Each enterprise should undertake all activities aimed at the diffusion of scientific, technical and technological ideas for market success through the constant transfer of knowledge and information between organisations. Determinants of the emergence of innovative processes may be of a complex nature (sociological, psychological, philosophical, historical, organisational, and economic). Of course, they change over time, and each of them may have a different meaning and impact, but they are undoubtedly interchangeable and depend on factors that have an impact on the political and economic situation of the country at a given moment.

When attempting to identify the factors stimulating innovative activity, they can be defined as follows:

- the natural environment,
- state of knowledge,
- the condition of infrastructure,
- the organisational level of companies,
- consumer requirements,
- economic factors,
- sociological factors,
- psychological factors,
- the socio-political situation.

The foundations of innovative activity are the law of nature and the environment in which we live. Nature has the most universal character and influences the environment. Exogenous factors such as social, political, psychological, sociological and economic factors are most important. Thanks to them, it is possible to implement diversified and competitive activities on the market, and to verify them in terms of product and process innovations. Although the trend of diffusion of innovation is increasing, it is currently assessed as moderate. The main parameters limiting the level of innovation in Poland are limited financial resources and a lack of knowledge. Overcoming financial barriers is now possible thanks to many solutions from the financial markets, EU subsidies, Polish government subsidies and organisational solutions of companies providing services in the field of the implications of innovative solutions in the operations of enterprises. For example, managers who perceive the need for robotisation, but who are faced with the barrier of insufficient financial resources at their disposal, will find entities offering robots and industrial manipulators on the basis of equipment leasing. In such a way, costs may be significantly reduced. The company only needs to invest money in a position that can be designed in such a way that it can be used for another process after a certain period of time. The cost of the robot is comprised of a returnable deposit and a monthly fee for its use.

Thanks to cooperation between science and business, the diffusion of knowledge is possible, thanks to which it is possible to create an effective climate for creating innovation, especially in the digital world. This means that the key is to move away from the classic models of implementing innovation (push/pull) towards the coupled (mixed) model. Thanks to cooperation, it is possible to support and shape pro-innovation activities, setting the direction, strength and effectiveness thereof, and stimulating development, because a fear of robotics, automation and the digital world often results from a lack of knowledge.

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Marzena Góralczyk[1]

The value of innovation compared to other values in enterprises as perceived by the young generation

Introduction to the topic under investigation. The article deals with the issue of how young employees of enterprises assess the areas showing values oriented to the sphere of functioning of enterprises in their various aspects and to relations with the environment, more specifically customers. The article utilises the author's own concept illustrating the constructs of these values and its reference in terms of perception by young workers.

Purpose. The aim of the article is to show how representatives of the young generation perceive the value of innovation as a construct against other values, in relation to their own approach to the values oriented towards the functioning of enterprises/organisations in which they are employed.

Methodology. In addition to the review of the literature on the subject of values and their importance, the article also presents the results of the author's own empirical research, conducted in March and at the beginning of April 2022 on a group of people employed in the Lubuskie voivodeship.

Main results. The article presents how the interviewed representatives of the young generation representing the Lubuskie voivodeship perceive the values in their workplace and how they assess their compliance with the expectations of the management staff.

Theoretical contribution. The article uses the author's own concept illustrating the constructs of these values oriented to the sphere of functioning of enterprises in their various aspects and to relations with the environment, namely customers.

Practical implications (if applicable). The author's construct presented herein may constitute a set of indications for further diagnosis and modification of the development paths of an economic entity, including in the perspective dimension, taking the strategic approach into account.

Keywords: values, enterprise, employees, the young generation

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Introduction

Entrepreneurs operating today should face the fact that "[g]lobalisation is the most often perceived feature of the enterprise environment and will certainly remain a very characteristic feature" (Borowiecki, Dziura, 2016, p. 15). Given the current state of affairs, managers striving to achieve a prestigious position on the market, both locally and nationally, and in relation to entities operating on an even wider international scale, constantly collide with the need to meet the requirements of competitiveness. The driving force behind this is the efforts made by all employees in the company. However, it is worth looking at how young employees entering the labour market perceive the values that describe the potential of enterprises, including the values that determine the internal organisational potential and the power to shape them.

The article deals with the issue of how young employees assess the areas showing values oriented to the sphere of functioning of enterprises in their various aspects and to relations with the environment, namely customers. The article utilises the author's own concept illustrating the constructs of these values and its reference in terms of perception by young workers.

The aim of the article is to show how representatives of the young generation perceive the value of innovation as a construct against other values, in relation to their own approach to the values oriented towards the functioning of enterprises/organisations in which they are employed.

The results of empirical research conducted in March and at the beginning of April 2022 on a group of respondents from the Lubuskie voivodship, aged no more than 30, have been presented. They were people working in various entities undertaking different areas of economic activity. It is worth looking at how these issues are perceived by the representatives of the young generation who encounter a new reality, which is the beginning of their professional lives and the first years thereof.

Literature review

The multidisciplinary nature of the category of "values" is evidenced by the fact that they are an issue raised in areas such as social sciences, empirical sciences, and humanities. In the psychological dimension, the sense of values is manifested in the form of human behaviour that is oriented towards needs, norms or preferences (Kowalczyk, 2006). The values directing human activity are an indispensable means of self-realisation and self-improvement (Kowalczyk, 2006, p. 163). "The maturity of the [human] person, his perfection, is essentially the fact that he allows himself to be attracted by real values" (Wojtyła, 1994).

According to K. Blanchard, "[v]alues are views with which a person feels emotionally connected, because he chose them from among many others" (K. Blanchard, 2007). Values represent "guiding principles in people's lives" (Schwartz, Bardi, 2001,

p. 269). For L. Zbiegień-Maciąg, values are "the state of affairs and situations that people value and try to achieve. They are very stable and define what is right and what is desired. They are to perpetuate the actions" (Zbiegień-Maciąg, 2005, p. 48). According to Pratley (2000), "values can be defined as an abstract, collective image of what people consider fair, good and worthwhile. The core values of society are at the core of its culture". Values are an important element of the company's organisational culture, as indicated by leading figures from the world of science such as Cameron, Quinn (2006), and Schein (2004).

The behaviour of members of the organisation is determined by a "set of values" shared by the corporate community. They are referred to as "values in use" (Armstrong 2011). From a sociological point of view, values "guide" the behaviour of groups and communities. Their semantic dimension translates into manifestations of the functioning of enterprises such as their intangible dimensions related to their organisational culture. Management through values can be understood as "the process of transferring the main values of the organisation from the generation of managers to the next generation by taking over responsibilities resulting from the main values and protecting them on behalf of and for the benefit of the organisation and its participants through their institutionalisation" (Stachowicz-Stanusch, 2007, p. 38). This is in line with the views of Sikorski, who states that "cultural assumptions dominating in a given environment shape an appropriate set of values for them", influencing social norms and attitudes (Sikorski, 2009, p. 17). According to A. Stachowicz-Stanusch (2007), the functions of value include the cultural heritage of the enterprise, the catalyst of the atmosphere of organisational stimulation, the element motivating the individual to act and integrating the employee with the enterprise. This "shared value" contributes to the improvement of the competitiveness of a particular economic entity, and the practices implemented in the operational dimension improve its economic and social conditions (Porter and Kramer, 2006).

From this approach, two important aspects emerge: on the one hand, the competitiveness of the enterprise is emphasised; on the other, external orientation, which has a social dimension understood in the context of corporate social responsibility. Achieving mutual benefits, however, has a broader dimension.

According to Borowiecki and Siuta-Tokarska (2015), "(...) the assessment of the competitiveness of Polish enterprises is based on their relatively low innovative activity, there is a lack of essential stimulants of this competitiveness" (p. 64). Creating an organisational climate supporting the innovativeness of enterprises and active participation of employees in this type of activities requires an appropriate information flow system and openness to the process of continuous communication within the organisation (Borowiecki, Dziura, 2016). In order for it to become fully possible, it is necessary to become familiar with the opinions of employees on how

they perceive the importance of innovation, including the context of other values that can build the potential of the company. According to W. Dyduch (2015), the construct of innovation cannot be treated in isolation from others; it is important to relate it to the strategic dimension of the organisation. Innovation should also be treated as a factor that renews the organisation and determines its longevity. In order to maintain it, one should learn how the young generation perceives the values that determine the internal strength of enterprises. It is essential because it is these people – employees of enterprises/organisations – who will influence the directions of development of entities in which they find employment in the future.

Methodology

The aim of the article is to show how representatives of the young generation perceive the value of innovation as a construct against other values, in relation to their own approach to the values oriented towards the functioning of enterprises/organisations in which they are employed.

In addition to the review of the literature on the subject of values and their importance, the article also presents the results of the author's own empirical research. This constitutes a fragment of research carried out in relation to broader, more complex issues in the field of enterprise management.

The research was carried out with the use of a questionnaire-based research tool. Empirical research was conducted in March and at the beginning of April 2022 on a group of people employed in the Lubuskie voivodeship. For the purposes of the article, people who met the age criterion, i.e. belonging to the age group of 30 years and under, were selected from among the respondents. The total number of respondents meeting the given criterion was 95. They included a group of respondents who represented entities diversified in terms of geographic coverage, type of activity, size of the enterprise or capital represented by their employer. A more detailed description of the group of respondents is presented in Table 1.

Table 1. Characteristics of the research population

Description		Number of indications (%)
Gender of respondents	Female	78
	Male	22
Length of tenure in the company/ organisation	Less than 1 year	39
	From 1 to 5 years	55
	From 6 to 10 years	6
Type of workplace	Executive	83
	Managerial	17
Nature of the work performed*	Physical work	33
	Mental work	77

Source: own study based on empirical research.
*Note: Some respondents performed both physical and mental work.

Among the respondents, 78% were women and 22% were men. When it comes to work experience, the majority of people were those who had been employed in a given company/organisation for a period of between one and five years (55% of respondents). 39% had been employed for less than one year, and 6% were people who had worked in a given entity for between six and 10 years. In terms of position, 83% of respondents were employed in executive positions, and 17% in managerial positions. 77% of the respondents performed mental work and 33% physical work – it is important to note that some respondents fell into both categories.

In order to achieve the described goal, the author conducted empirical research using the questionnaire technique. The respondents answered the questions that allowed for the presentation of basic data characterising the enterprises/organisations in which they were employed. The survey did not narrow down the group of respondents in terms of the industry, company size or capital represented by their employer. Table 2 presents the most important elements of the description of enterprises/organisations in which the respondents were employed.

Table 2. Characteristics of enterprises/organisations in which the respondents were employed

Description		Number of indications (%)
The period of operation of the enterprise/organisation on the market	Up to 5 years	22.1
	From 6 to 10 years	11.6
	From 11 to 15 years	17.9
	From 16 to 20 years	11.6
	Over 20 years	36.8
The geographical scope of the enterprise/organisation's activity	Local market	25.8
	Regional market	18.8
	Domestic market	17.8
	International market	37.6
Type of the enterprise/organisation's activity	Production	15.9
	Trade	28.3
	Services	50.5
	Others	5.3
Legal form	State-owned enterprise	11.6
	Private enterprise	82.1
	Other form	6.3
Capital ownership	Polish capital	72.6
	Foreign capital	9.5
	Mixed capital with a predominance of foreign capital	7.4
	Mixed capital with a predominance of Polish capital	8.4
	Equal share of Polish and foreign capital	2.1
Size of the enterprise/organisation	Micro (less than 10 employees)	20.0
	Small (10 to 49 employees)	23.2
	Medium (from 50 to 249 employees)	24.2
	Large (more than 249 employees)	32.6

Source: own study based on the survey research.

The employees surveyed were employed in business entities whose operation on the market varied in terms of duration. The most numerous group were those that worked for companies which had been active on the market for more than 20 years (36.8%). The geographic scope was diverse – some entities were active in more than one market. It was found that the largest group was active on the international market (37.6%). Most of the entities surveyed were private enterprises (82.1%). In

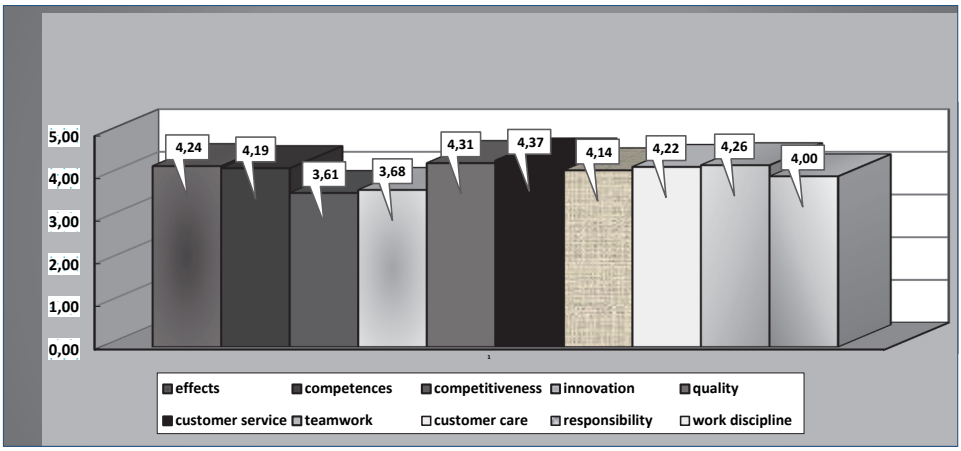
terms of capital ownership, Polish capital was predominant (72.6% of the entities analysed). The largest group of people (32.6% of the respondents) worked in large entities.

Research results

An intelligent organisation builds its potential based on the potential of its employees, which is shaped through the prism of the values they perceive. This also applies to the young generation that is taking their first steps in the area of professional activity. It is necessary to look at how this generation relates to areas that create some reference to the hierarchy of values. It is also important to view this from the perspective of the extent to which the particular values are shared by management and whether there is a convergence of views and opinions in this respect.

The interviewees responded to which of the following areas illustrate the values that are important to them in the company/organisation. A scale of 0 to 5 points was adopted, where 0 meant "not important at all", 1 point – "not important", 2 points – "less important", 3 points – "average", 4 points – "important", and 5 points – "very important". The calculations were obtained using the weighted average and the results obtained are presented in Figure 1.

Figure 1. Perception of areas showing the values which are important to employees of enterprises/organisations



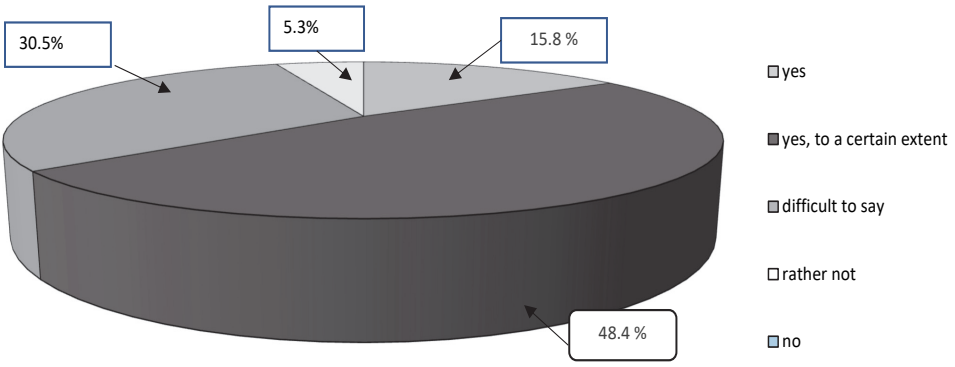
Source: own study based on the results of the survey.

As a result of the research, it was found that all the abovementioned areas are important to the employees surveyed. It bodes well for the future that the younger generation of respondents assigned points (using the weighted average) which in effect gave results in the range from 3.61 to 4.37. It was found that the most

important area illustrating important values is customer service, followed by quality. Other similar positions are occupied by responsibility, customer care, and effects. Innovation was allocated an average score of 3.68 points.

Due to the fact that values act as integrating elements and they are common to all or most of the members of the organisation, it is worth considering whether the values assessed by the respondents are consistent with the expectations of the management staff. In response to this question, the respondents expressed their opinions, which are shown in Figure 2.

Figure 2. Convergence of the areas of significant values given by the respondents with the expectations of the management staff



Source: own study based on the survey research.

Based on the opinions of the respondents representing the young generation, it was found that 64.2% perceived the convergence of their views in terms of values with the expectations of the management staff, as these responded positively, at least to a certain extent. 30.5% of the respondents did not have an opinion in this respect, and only 5.3% somewhat disagreed.

Discussion and Conclusions

On the basis of the research, it seems that management should systematically monitor the perception of key values by employees, including in the context of conditions oriented to the applicable organisational culture. The construct presented herein by the author illustrates the complexity of values which are important to the company and its development as well as with reference to relations with clients, which may constitute a set of indications for further diagnosis and modification of the development paths of an economic entity, including in the perspective dimension, taking the strategic approach into account.

The article demonstrates how the interviewed representatives of the young generation representing the Lubuskie voivodeship perceive values in their workplaces and how they assess their compliance with the expectations of management.

Conscious shaping of an employee-friendly atmosphere in the workplace, and thus also the creation of foundations influencing the success of a company/organisation, requires the ability to look at the work environment through the eyes of employees and make decisions in the context of perceived values. It is worth paying particular attention to newly hired employees who, by getting to know the company and its organisational culture, including the values shared within the company, can significantly contribute to the development of the company thanks to their commitment. Creating the foundations of the "new economy" requires expanding the knowledge potential based on information technologies, "which accelerates the growth of labour efficiency, productivity or the rate of economic growth" (Borowiecki, Dziura, 2016), but also requires acquiring knowledge about how employees of enterprises perceive their workplace, what motivators motivate them to act, and what values are important to them.

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Łukasz Grzegorzek[1]

The concept of shaping competitiveness through product innovation

Abstract: The changes taking place in the global economy and the increasing complexity and unpredictability of the environment are prompting enterprises to seek new ways of securing their competitive advantage. One such solution is to introduce innovation. The issues addressed in this article concern the impact of product innovation on shaping the competitiveness of manufacturing companies on the FMCG market in Poland. Manufacturing companies from the cosmetics sector have been selected for analysis. It has been assumed that manufacturing companies operating on the Polish FMCG market shape their competitiveness mainly through product innovation, since other instruments aimed at increasing the ability of said companies to compete play less of a role. The main objective of the article is to present a model of the innovation management process at a cosmetics manufacturing enterprise that would favour the use of product innovation for the purposes of market competition. To achieve the objective in question, the method of analysing key factors for success has been applied. They are the result of the most frequently used competitive strategy in the cosmetics sector, which is the strategy of standing out. The analysis of that strategy has made it possible to identify maps of strategic groups representing the competitive situation in the Polish sector of cosmetics manufacturers. On this basis, a proprietary model of the innovation management process has been proposed to serve as a solution for shaping the competitiveness of cosmetics manufacturers.

Keywords: product innovation, competitiveness, FMCG market, innovation management process, manufacturing companies

Introduction

Fast-Moving Consumer Goods (FMCG) are part of the market of goods sold. If one were to make a generalisation to some extent, it could be said that such products are part of the reality around us. On the FMCG market, it is the novelty of a product that counts and satisfies customers' curiosity. On the cosmetics market in

1 PhD of social sciences in the discipline of management and quality sciences.

particular, every new product is received with great curiosity as to its effectiveness. Manufacturing companies operating in the cosmetics sector have to constantly compete with one another due to the rapid turnover of products. A certain relationship can be observed here, namely: the faster the turnover of products (goods), the higher the number of stronger arguments for the development of a given company.

Recent years have clearly shown that stagnation is more than likely a death sentence for an organisation, which has to constantly react to what is happening in its environment as well as within the organisation itself. A properly operating information system is indispensable for this, along with various types of feedback. It is also necessary to recognise the people who operate within the organisation and participate in the process of change (transformation). Apart from the above, globalisation, mergers and acquisitions, competition, and multiculturalism and innovation are all factors affecting the direct sales market. Today, as Ricky W. Griffin very aptly put it: 'We really have become part of a global village and have a global economy where there is no organisation completely isolated from the influence of foreign markets and foreign competition' (Griffin R.W. 1998: 81). 'Globalisation is changing the world view and making the world smaller. The entire corporate environment is also transforming, with the changes having become increasingly novel, costly, rapid and difficult to predict' (Penc J. 2007: 22).

'The need for organisations to constantly adapt to a changing environment – and one that can be even revolutionary at times – is not a phenomenon that would be beneficial to the sustainability of the adopted solutions. The changing world creates a demand for new institutions, as well as for a change in the dimension and scope of action of the existing ones, thus making the latter operate under conditions of increasingly strong cooperation between themselves and with new partners' (Raich M., Dolan S.M., Klimek J. 2011: 310). Apart from that, an increasing number of industries and economic sectors are facing the need to participate in the competition with large-scale regional or global groupings. Multiculturalism, including all its 'consequences', has been embedded in today's reality. Contemporary organisations therefore have to operate under dynamic, or downright turbulent, conditions. A great deal depends on the speed of development of new products, a high degree of accumulation of financial assets, the application of global marketing, and the use of *high-speed management* methods characterised by innovation, adaptability, flexibility and efficiency, as well as rapidity.

In such a complex situation, there is a constant struggle to gain and maintain a competitive advantage, which in turn promotes outstanding individuals and enterprises that are innovative and capable of breaking stereotypes; this is vital in relation to the FMCG industry, for instance.

The FMCG market in Poland

The FMCG industry, which is also referred to as CPG (*Consumer Packaged Goods*), has been the most rapidly growing of the numerous market sectors over the last

decade. The industry is global in nature, and highly competitive at that. In general, the terms FMCG or CPG stand for everyday products (fast-moving consumer goods or consumer packaged goods, respectively). Such products are also referred to as essential commodities. They can also be referred to as the opposite of durable products with a shelf life exceeding one year. The former include not only food products, but also cosmetics, cleaning products, hygiene products, alcohol, cigarettes, household chemicals, and over-the-counter medicines. By its very nature, the FMCG market is one of the most dynamic markets and is also highly resilient to financial crises. This corresponds to the thesis that people can start saving on various other expenses, but they cannot simply cease buying food or cleaning products.

Due to the above, FMCG products are also referred to as essential commodities. These are products whose unit price is not high and, when bought in mass quantities, make the manufacturers' profits multiply relatively quickly. Hence the phrase 'fast-moving' in the name of these goods, since they quickly disappear from shelves and therefore need to be delivered to the shops frequently. The vast majority of products that we can buy in grocery shops, superstores and hypermarkets belong to the fast-moving consumer goods group. What is important for the FMCG industry is that these are goods that are bought by consumers virtually every day. Customers very often make decisions that are not always based on rational considerations. That is because they do not ponder the choice of yoghurt, lipstick or beer for anywhere nearly as long as they would the choice of a television set or an expensive bicycle. For this reason, manufacturers must constantly fight to ensure that their goods are well displayed in shops, and they must also constantly offer their customers novelties, following or even creating consumer trends. FMCG companies therefore compete against one another, launching ever newer products, copying their rivals' solutions, intensively researching the market, and constantly implementing new marketing strategies. The specific nature of the FMCG industry is further emphasised by the requirements and pressure placed on the quality of such products (e.g. the requirement for certifications such as ISO, HACCP and GOST, as well as increased control of manufacturing processes).

There are various growth strategies prevalent in the industry. Many companies focus on the manufacturing of only one type of good, while others develop a wide range of products. 'The FMCG market is divided into a modern trade market (retail chains, hyper- and supermarkets) and a fragmented traditional market, which is formed by various types of group purchasing organisations and franchising chains' (Kozera G. 2013: 6–7). From the beginning of March 2020 to the end of February 2021, 'the sales dynamics of FMCG products in terms of value increased by 4.1 per cent compared to the corresponding month last year. The value of the entire fast-moving consumer goods market in Poland has risen to PLN 201 billion, according to NielsenIQ data.' (Stępniak Ł. 2022).

For the purposes of this article, the FMCG market has been chosen for analysis because, as a result of the innovative activities of companies, fast-moving consumer goods:

- are ageing faster;
- have shorter life cycles – lasting not a few years, but sometimes only a few months.

Furthermore, it can be said that the market in question is interesting for several reasons:

- because of the state of competition that characterises it;
- because of the number of new products introduced on that market each year (it is estimated that there are several hundred new products in various groups);
- because of the high volatility of that market, which makes it demanding for manufacturers;
- because it caters for the basic needs of consumers with both normal and luxury products;
- because of the characteristic way in which manufacturers generate their profits – sales of individual FMCG products generate little profit, whereas mass sales make the profits earned by the manufacturers operating on this market multiply;
- because it is a high-value and growing market.

Product innovation management in manufacturing enterprises

Due to the sheer scale of the FMCG market, there is a great deal of competition therein. In order to build a competitive company operating in that industry, one would need to use the most sophisticated of methods. Knowledge of product turnover and cost optimisation comes in handy at this point. Enterprises operating on today's dynamically growing market must therefore be innovative, efficient and flexible in their actions. A key role – apart from improving distribution and storage methods or creating distribution groups – is played and will continue to be played by innovation. 'The result of innovative activities is an increase in the value of the organisation and gaining a competitive advantage on the market' (Szymańska A.I. 2012: 147). Innovation serves to satisfy future customer needs, so 'innovation should now become an essential strength of every organisation and should be permanently inscribed in its management system and culture. It is a basic condition for the efficient operation of enterprises in a market economy' (Szymańska A.I. 2012: 160). Particular attention is paid to the need for efficient management of innovation implementation processes. Innovative organisations must be characterised by their ability to efficiently launch new products, technologies and organisational methods. In terms of the implementation of key and

changing development goals, an organisation must create an appropriate climate for innovation, while tracking the effectiveness of the actions taken, modifying its organisational structure, and developing a system of incentives for change (Szymańska A.I. 2012: 147).

Product innovation management among FMCG manufacturers plays a strategic role in planning corporate development activities in the long term, and is also one of the greatest assets determining the success of such organisations. The innovation management process is complex and multi-faceted by nature. It is not simply narrowed down to a given company's subsidiary in a particular country, but begins centrally and internationally, and is planned over time. It is a process that takes place annually at the international level, where it is then transferred to the local level in its implementation and management phases. Only if it is properly prepared in terms of the process itself is it able to achieve the desired result and bring a successful product to the market in the most efficient way possible while allowing the supplier or manufacturing company to stay one step ahead of the competition.

When it comes to product innovation management, an important element for companies is their ability to deal with unexpected situations, uncertainty and incomplete information, and crisis management at times, as well as anticipating the behaviour of their competitors. This is an extremely important aspect because in practice, it sometimes turns out that during the market launch of a new product the process in its annual phase is not quite in line with the plan and original assumptions, or that certain circumstances or ad hoc and unexpected situations arise that have not been taken into account. This is the area of new product management that requires special attention, speed of action and accurate decision-making in the frequent absence of complete market information.

One of the elements of innovation management as seen from a supplier's perspective is taking steps to source novelty, ideas and inspiration from outside the organisation. These are well-thought-out and well-planned decisions. Firstly, it involves getting people into the organisation who have long experience of creating and developing new products and other companies, often from among their competitors. This allows them to bring in their know-how as well as a change of perspective on the market, on the consumers and their behaviour, and on trends. Such people are often a source of inspiration and are able to draw attention to aspects that can be easily overlooked in the everyday business reality. Secondly, for many large manufacturing companies, the acquisition of both big new 'brands' and developing small brands are also the source of new products and product innovation. It is not uncommon for highly imaginative and innovative brands to not be able to reach critical mass on their own, and thus not be able to break through a certain ceiling. That is why large-scale manufacturers often seek out such brands and acquire them on a buy-back basis. Next, the new owners invest heavily in those

brands in terms of marketing support, and the brands themselves use the already established distribution channels of the large companies to reach the consumers. The result is a dramatic expansion of those new products on the market.

The process of product innovation management is dynamic and changing, and requires quick, accurate and specific corrective actions – it is the result of constant competitive struggle as well as the changing market situation. The success of any organisation is the composite result of successive steps taken over time. The innovation process in cosmetics companies consists of the following main steps:

- step 1: confrontation, alignment and determination of the direction of work;
- step 2: planning the 'where and when' of implementation;
- step 3: developing recommendations for sales;
- step 4: selection of distribution channels;
- step 5: manufacture of the product;
- step 6: adaptation of the product to the specific market requirements;
- step 7: creation and implementation of a marketing strategy;
- step 8: creation and implementation of a sales strategy;
- step 9: creation of a marketing and promotional activity plan (the so-called Promo Calendar);
- step 10: financial analysis of the activities undertaken.

The abovementioned innovation management activities are of a long-term and strategic nature, and are a kind of investment by manufacturing enterprises which is aimed at delivering further product innovation to the market. The introduction of the innovation process described here may help diversify the product range and actually create it for completely new customers. The process in question unleashes creativity and makes it possible to notice areas, solutions and applications that have hitherto been ignored or overlooked. It is also a way of discovering innovators as well as innovation-prone areas that can then be subject to dynamic development. For many enterprises, this is an opportunity for further development, as well as to strengthen their competitiveness (Wirkus M., Lis A.M. (eds.) 2018).

Building the competitiveness of manufacturing enterprises

Direct competitors of a given manufacturing enterprise come from the same sector, which is understood as a group of companies manufacturing substitute products. The essence of competitiveness is therefore that a company meets the needs of its customers more effectively and efficiently than its market rivals do (Porter M. 1992). Building the competitiveness of manufacturing enterprises on the FMCG market is an extremely complex process. The actions taken need to be approached systematically. Every entrepreneur should be aware that the competitive advantage obtained is an impermanent state, which is decisively influenced by the company's environment and the behaviour (actions) of its competitors.

For the purposes of this article, it is worth referring to David Aaker's model at this point. The model in question shows the process of shaping competitive advantage by means of the following: the assets held by a given enterprise, the chosen area of competition (output market, competitors), and the strategy for competing, i.e. the way of undertaking competitive struggle (Aaker D.A. 1989: 85). It is necessary to thoroughly analyse the operating conditions of manufacturing companies on the FMCG market and to react to any unfavourable developments relatively quickly; in terms of the actions taken, one has to stay ahead of the competition. In a market economy, however, achieving a sustainable competitive advantage is a prerequisite for an enterprise to be able to operate in the long term. To gain such an advantage and not lose it, it must be original. Therefore, the possibility of maintaining the achieved competitive advantage in the long term depends to a large extent on the uniqueness of the method used, the capacity for substitution, the potential of the company, the dynamics of changes in the environment, etc. A complex of ventures aimed at surpassing the company's competition is thus indispensable. Competitiveness can also be perceived as a three-part formula: adaptability to a changing environment; a certain type of competitive advantage in terms of the marketing mix; and the enterprise's position in relation to its main competitors (in both financial and market terms). The competitive position is the result of applying specific advantages on the market and is always determined relative to competitors within a sector or strategic group. Thus, a change in the competitive position of an enterprise over a certain period of time makes it possible to assess the effectiveness of the competitive strategy – with the latter being a means of acquiring the chosen competitive advantage in order to achieve the intended competitive position.

Globalisation has imposed extremely difficult conditions on organisations, forcing the need for constant (and sometimes even revolutionary) adaptation to an ever-changing and increasingly complex environment in order to survive. 'Competitive conditions on global markets are becoming increasingly difficult – globalisation is changing the existing rules of the game. The changing world creates a demand for new institutions, as well as for a change in the dimension and scope of action of the existing ones, thus making the latter operate under conditions of increasingly strong cooperation between themselves and with new partners' (Raich M., Dolan S.M., Klimek J. 2011: 310). The market, at least in Europe, is becoming increasingly fragmented, both culturally and in terms of consumer habits.

A market-dominant company may adopt one or several strategies: a market leader strategy, a market pretender strategy, a follower strategy, or a market specialist strategy. Which of the competitive marketing strategies a given company ultimately adopts (not only for the FMCG market) depends on its position in the industry. One of the competitive strategies is to *compete on quality*. Most often, this type of strategy is used by manufacturers of goods placed at the higher end of the price spectrum, thus competing to develop the most diverse formulas and technologies to improve product

quality. An example of this is cosmetics manufacturers citing in their TV commercials the results of studies, tests developed by independent hygiene institutes, etc. attesting to the superior quality of the products they offer. Due to the dynamic development of the FMCG industry, some kind of *change in the attitudes and behaviour of managers* is indispensable, as well as *a change in the thinking perspective*. It was and remains necessary to change the management's thinking perspective. If, as in many cases, they have so far been focused mainly on performing their operational duties, the emphasis now has to be placed on thinking in terms of strategic objectives related to the development and implementation of a change in the operating model. This is a long-term process, but the outcome should be the formulation of a strategy, the development of a medium-term and operational plan, and its subsequent translation into all functions and areas of a given company. It is essential to base one's actions on the assumption that teamwork, interdepartmental cooperation and the exchange of information are the most important. As the market continues to develop, we may also witness increasingly intense *consolidation processes* that determine both the market and competitive strength of the current market players. Every company is looking for the most efficient ways to implement sales, one of which may be to use an external sales force, i.e. *sales outsourcing*. Sales is usually the most important and very sensitive link in the management strategy – it is a key task for any company selling products or services, and especially for companies selling FMCG products.

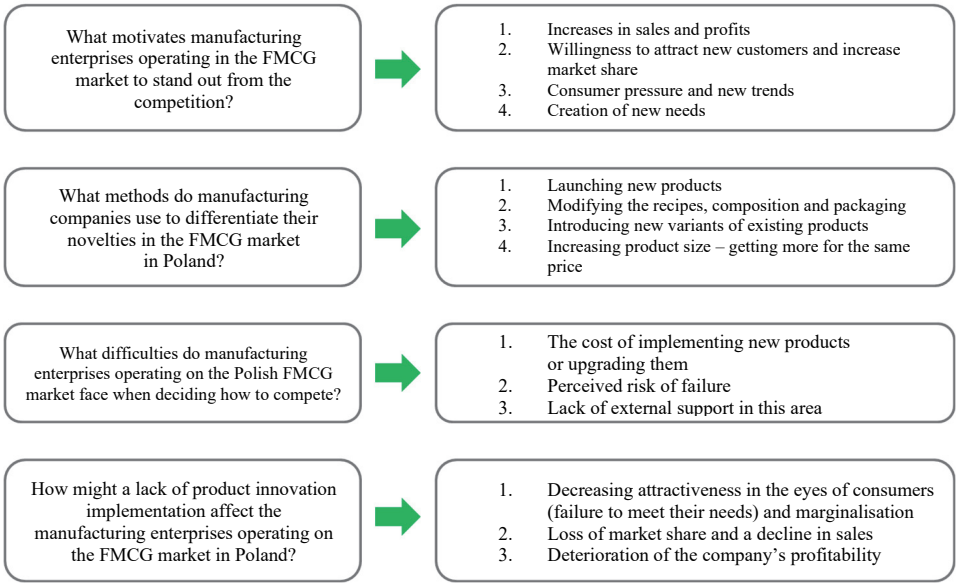
In an environment of intensified competition, the ability to stand out is of crucial importance. One of the basic strategies can be applied to the FMCG market, consisting of differentiating the product or service offered by the company to create something that would be considered unique across the industry. 'There can be various ways to differentiate: through product design or branding, technology, product features, after-sales service, or the after-sales network. Ideally, a company should differentiate itself in several respects simultaneously. It should be emphasised that a differentiation strategy does not allow a company to overlook the amount of costs involved, but they are not the primary strategic objective as such. If differentiation can be achieved, it becomes a viable strategy for obtaining a higher-than-average profit rate in a given sector, for it creates a defensible position against five competitive forces, albeit in a different way from that of a leading item in terms of costs' (http://pl.wikipedia.org…). A differentiation strategy therefore requires ongoing innovation.

Manufacturing companies in the Polish FMCG market – research findings

Due to the fact that competitiveness should be analysed within a given sector, as well as due to the limited possibilities of including the manufacturers of various FMCGs in the research, the area of analysis has been narrowed down to the cosmetics sector. The

cosmetics market in Poland is mainly shaped by mass sales and wide distribution. It is not easy to break through in that market, and the competition therein is similar to that of the oligopolistic competition model. The oligopolistic nature of that market is expressed in its structure that indicates the existence of a few major players accounting for almost 70% of sales. These are mainly multinational corporations (L'Oreal, Henkel, Nivea, Unilever, Procter & Gamble, and Colgate-Palmolive), who *de facto* shape the cosmetics market in Poland and set behavioural trends. This, in turn, results in a high degree of transparency on the market in terms of the methods used in the competitive struggle, the dominant form of which is to stand out from one's competitors. This strategy does not allow a company to overlook the amount of costs involved, but they are not the primary strategic objective in this case as such. A key tool for implementing this strategy is launching innovative products on a regular basis.

Figure 1. Problems and motivations of manufacturing enterprises on the FMCG market



Source: own study.

As a result of the analysis of the sector conducted using the strategic group method,[2] three key strategic groups of cosmetics manufacturers on the FMCG market in Poland have been defined, and the competitive strategies they use in the sector have been identified. *The first strategic group* consists of companies that use their high

2 The companies performing best at shaping the structure and specific character of the cosmetics market in Poland were selected – 25 enterprises account for 98% of cosmetics sales in Poland.

technologies to deliver new products to consumers on an ongoing basis. It is in this group that the key battle for *leadership* among the competitors takes place. *The second strategic group* is made up of companies that pursue a strategy of selling high-quality products at an adequately high price. This also shows that consumers are willing to pay more for cosmetics, thus expecting higher quality. *The third strategic group*, on the other hand, is formed by companies selling their products at relatively high prices and at the same time often organising price promotions. They pursue a *'High-Low'* strategy – high standard prices and frequent low promotional prices.

The analysis carried out using the strategic group method has shown that most of the companies – when using high technology – are able to deliver new products to the highest standard very often (on an ongoing basis), thus competing for leadership among their competitors. Other companies are less technologically developed, but they nevertheless attempt to launch new products regularly at the very least. More often than not, this is the group that follows the leaders.

The quantitative and qualitative research involved key market players[3] with whom detailed surveys were conducted using the Delphi method (expert opinion survey). This approach has made it possible to obtain more precise and detailed answers regarding the actual market situation. Due to the specific character of the distribution and sales of cosmetics on the Polish market, the interviews with experts from cosmetics companies were limited to eight individuals holding managerial positions. Information was obtained on the ways of competing on the Polish cosmetics market, as well as on the activities related to the shaping of the product range.

Based on the interviews with the experts, information was obtained on the current state of product innovation at manufacturing companies operating on the market in question, as well as on whether manufacturing companies from the cosmetics sector are investing in product innovation and what impact this has on raising the level of their competitiveness. The study was also focused on the following: barriers to implementing innovation; sources from which companies obtain funding to implement innovation; and an assessment of the competitive position in relation to competitors.

The results of the quantitative and qualitative research have shown that:

1. The majority of companies operating on the cosmetics market effectively pursue a strategy of standing out.
2. The strategy of standing out is mainly implemented through product innovation. All of the surveyed companies have introduced over 20 new or upgraded products over the course of three years (their average share of total sales is 28%).

3 The research was conducted in 2018, among eight cosmetics companies accounting for almost 70% of cosmetics sales on the FMCG market.

3. For the vast majority of companies, product innovation is the single most important factor for success, which allows them to build an advantage over their competitors on the cosmetics market.
4. Considering the results of the innovation introduced, three-quarters of the companies have declared that those activities contributed to the strengthening of their competitive position, and in the case of the remaining companies it allowed them to maintain their current market position.
5. The sources of competitive advantage on the cosmetics market are: product innovation, branding, product quality and manufacturing costs.
6. Consumer behaviour that influences the companies' choice of competitive tools includes: high interest in novelty; rationalisation of choice (price to quality); the desire for immediate satisfaction of a need; and following fashion.
7. The tools that enable companies to implement their competitive strategies include: implementation of product innovation; experience/market knowledge; and manufacturing technology.
8. In order to pursue their competitive strategies, cosmetics companies must: undertake cooperation with their environment; launch new products; and intensify promotional activities.

Model of shaping competitiveness through product innovation at enterprises that manufacture cosmetics

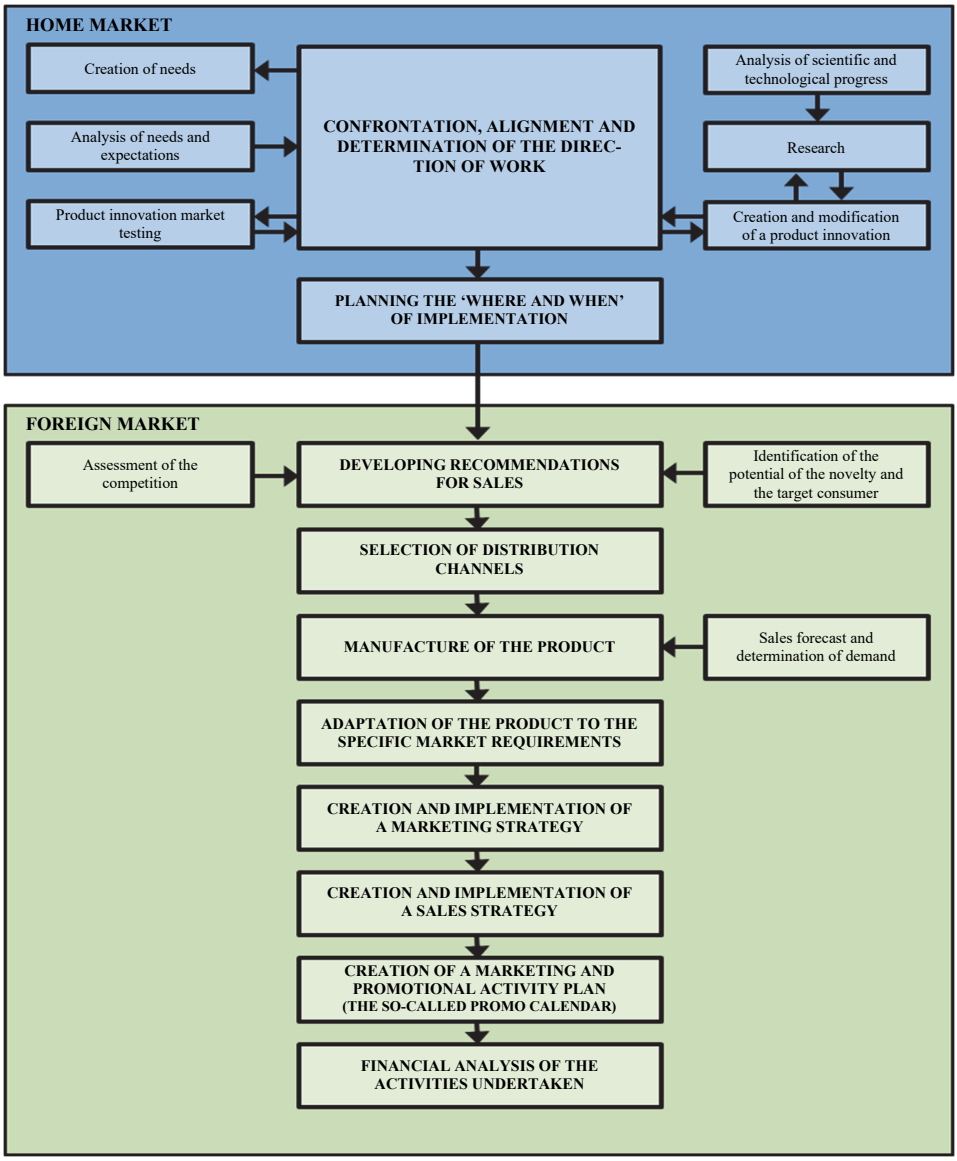
As a result of the analysis of the product innovation management process, a model of the innovation management process has been developed and illustrated with the example of cosmetics manufacturers; it favours the use of product innovation as a factor that shapes competitiveness (Figure 2). The model illustrates the process of shaping competitiveness through product innovation on the FMCG market.

The proposed model is of a planning and operational nature, showing what sequences of activities should be carried out inside an organisation by specific operational units in order to effectively market new products. The model presented in the figure below promotes the use of product innovation in market competition.

This model demonstrates that the innovation management process must:

- be planned (over time);
- be methodical;
- be structured;
- concern an appropriate time horizon (several years ahead);
- involve locally and internationally various operational units of an enterprise at each stage: R&D, Marketing, Sales, Logistics, and Controlling, while simultaneously defining their roles and responsibilities.

Figure 2. Model of the innovation management process illustrated with the example of cosmetics manufacturers



Source: own study.

Innovation management is complex and multi-faceted by nature. Only proper preparation in terms of the process itself makes it possible to achieve the desired result and bring a successful product to the market in the most efficient way possible

while allowing the supplier or manufacturing company to stay one step ahead of the competition. The success of any organisation is thus the composite result of the abovementioned successive steps taken over time.

Conclusion

The conducted analysis clearly shows that manufacturing enterprises from the cosmetics sector shape their competitiveness by introducing product innovation. As can be seen from the considerations laid out above, by introducing product innovation, companies have gained new customers and increased their market share. Changes in product ranges have allowed the majority of companies to strengthen their competitive position, while others have maintained their current position on a given market. The role of product innovation in shaping the competitiveness of manufacturing companies is therefore decisive.

In the course of the research carried out, it has been recognised that the result of innovation activities is an increase in the goodwill of an organisation, as well as gaining a competitive advantage on the market. 'On the other hand, however, innovation is associated with the organisation incurring certain financial expenditures. Therefore, when an enterprise decides to implement a particular innovation, such a move should be preceded, first of all, by an analysis of the amount of financial outlays required to achieve certain objectives and the anticipated benefits resulting from the implementation of a particular innovation' (Szymańska A.I. 2012: 147). The results of the research also prove that it is necessary to be flexible in terms of the solutions adopted – one should analyse the possible attitudes and behaviour of potential customers and, according to the conclusions generated, to reach out to individuals as well as specific groups. An important conclusion comes down to the fact that the solutions adopted are characterised by a relatively short lifespan. This, in turn, supports the idea of continual monitoring of the market and a constant search for innovative solutions.

As a consequence of the research carried out, the following conclusions have been drawn:

1. Manufacturing companies operating on the Polish FMCG market shape their competitiveness primarily through product innovation.
2. Through the use of high technology, an enterprise is able to deliver new products to the highest standard on an ongoing basis.
3. By introducing product innovation, companies have gained new customers, increased their market share and strengthened their competitive position. It follows from the above that the implementation of product innovation enables companies to compete effectively for customers.
4. In no case have changes in the product range had a negative impact on the market situation of the surveyed companies in the cosmetics sector.

5. Launching innovative products is a process; therefore, companies need to know how to manage this process properly.

In conclusion, it can be said that in order for companies to maximise their competitiveness, it is crucial to manage the process of launching product innovation in a conscious and planned manner. It is necessary to constantly offer novelties to customers, while following or even creating trends. The decision to implement a particular innovation should be preceded by an analysis of the financial outlay required to achieve certain goals.

The cosmetics sector in Poland constitutes a fairly important area of economic activity. The growing importance of this sector has resulted in increased competition and increased activity among the manufacturers. There is evidence that demand for products from the cosmetics sector will continue to grow in Poland. 'In 2020, a resident of Poland spent almost EUR 100 on cosmetics on average. This amount is forecast to increase to nearly EUR 126 in 2025. (…) The average market growth[4] is expected at 4.4 per cent per year, thus expanding the market to a value of EUR 4.7 billion in 2025' (*Polski rynek kosmetyczny…*). It is therefore legitimate to conduct further research in relation to more than just the area in question.

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Analysis and Assessment of Relationship Management Exemplified by Bituminous Coal Companies in Poland

Abstract: The activities of coal mining companies in Poland are subject to a long process of transformation. Their operation is closely linked to certain external conditions that shape their internal relations. At the same time, through skilful management of relations, they influence their environment and the whole economic system in which they participate. The way coal mining is organised must ensure that the planned activities are carried out, so an effective management and execution system plays a key role. The article discusses the theoretical aspects of managing and leading people. It also analyses and evaluates the management of the activities of coal mining companies against the background of the current situation of this industry in Poland, based on the diagnostic survey method and the opinions of stakeholders.

Keywords: management, leadership, relations, coal mining

Introduction

The concept of management is a complex one, which communicates the significance and the content of actions taken as a result of it (Koontz, 1961, p. 186; Boddy, 2017, p. 11; Kaehler, J. Grundei, 2019, p. 7). Management consists in ensuring stability of daily action performance. Management encompasses activities comprising current and strategic planning, proper organisational infrastructure, and incentive and control activities. In turn, the core of HR management consists in causing the subordinates to take actions compliant with the superior's intention, which are aimed at meeting a defined goal.

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The concept of management also depends on the definition of leadership. The difference lies in the fact that management is a group of activities related to the managerial position within the structure of an enterprise, while leadership should primarily be associated with a specific person. Depending on the rank and area of management and the specific nature of organisation and its environment, various breakdowns of managers' qualifications, features, knowledge and skills become useful. The significance of conceptual skills grows at higher management ranks, while the importance of technical skills is reduced. Hence, a modern manager should have leader skills, be able to manage relations, and persuade others to follow his vision of development. He should have knowledge and high professional qualifications and manifest professionalism with respect to all processes taking place in an enterprise.

The purpose of the paper is to present the essence of organisation and HR management. Subsequently, the efficiency of the management and the executive system of a bituminous coal company will be analysed and assessed by its stakeholders. The goal defined in this way is conducive to adopting the following research hypotheses:

1. The current management system of a bituminous coal company is ineffective.
2. The currently functioning executive system of a bituminous coal company requires significant investment expenses.

Review of Reference Books

Operation of every company, organisation or state comprises management processes, which are supplementary and intertwine, but which also may stand in opposition. In multiple academic publications management may be defined in an ambiguous way. Management may be exercised in a functional mode, as an act of management, and institutional one, referring to managers and persons holding managerial positions. In turn, HR management is tantamount to 'guiding the individuals.'

Most researchers, starting with H. Fayol, believe that management is a set of actions encompassing such functions as planning, organisation, motivation and control, focused on the organisation's resources (HR, financial, material, information and knowledge) implemented with the intention of accomplishing the organisation's goals in a skilful and efficient mode (Fayol, 1916, p. 6; Godwin, 2017, pp. 78–85). At the same time, the efficiency of management and the success of an organisation entail the ability to use proper means to accomplish the desired goals and tasks (Drucker, 1954; Stroh, Northcraft, Neale, 2002). Based on the concept of function, R.W. Griffin determined management as a whole series of actions (leading to making a decision, planning and organisation of work, control and guiding human resources) focused on accomplishing precisely defined and efficiently implemented goals of an organisation, wisely and purposefully using all

the organisation's resources to this aim (Griffin, 2013, p. 5; Daft, 2016 p. 4). The next definition characterises management in a similar way: management is called the coordination of an organisation's resources, acting with people and through people, in an efficient mode (Robbins, Coulter, 2016, p. 39). Hence, management consists in the impact of an entity (a manager, owner) on an object (an enterprise or its elements) in line with the designated goal and leading to its implementation, in line with the will of the entity, via human factors, which are the primary capital of an organisation (Drucker, 1954, p. 17). In another interpretation of the concept of management, special emphasis is put on the survival of an enterprise and afterwards the aspect of its development is tackled. In this approach, the concept of management consists in conscious performance of tasks allowing for survival and determination of a direction of operation, creation of a mission and goals related to development (Bleicher, 2011). Management may also be seen as a process of exercising authority and leadership, a concept of a system and a game process (Naylor, 2004, p. 355; Gulati, Mayo, Nohrian, 2017, p. 8; Bateman, Snell, Konopaske, 2018, p. 226). Furthermore, management should be discussed as eliciting behaviour or shaping important factors related to the dynamic of organisational changes. In this approach, management consists of rational formation of dependences among elements of an organisational system and between the system and its environment. It goes without doubt that management is furthermore connected with observance of specific provisions of the law and rights forming a basis for the initiation of managerial activities.

The management system forms an important element of an enterprise, even though it is a concept inadequately defined in the area of management and quality sciences. However, the deficiencies do not refer to the questions how to manage (normative statements), which are embedded in the economic practice and used to solve specific problems of management, yet to cognitive statements, referencing the sole essence of management. The management system is an element of an operating system; a sub-system used to manage and one of the elements of an enterprise. It is its driving force, which should generate efficiency and allow for (Kast, Rosenzweig, 1972, pp. 447–465; Bieniok, 2018, p. 33:

1. harmonisation and dynamisation of growth,
2. increased efficiency of resource management,
3. improved work organisation,
4. precise determination of competence and accountabilities of employees,
5. reduction in the volume of documents and costs of archiving,
6. improved image of an enterprise and increased competitiveness at the markets.

Furthermore, a management system is defined as a consistent set of rules, goals and criteria, means and methods of making decisions, connected to managerial

and executive elements. It is thus assumed that an enterprise management system is a dynamic construct, dependant on its author, which is created, lasts, is shaped and subject to transformations. It forms an integral, critical sub-system of an enterprise's system, comprising information and decision-related elements, technology, market and human resources (Witczak, 2008, p. 25, 104, 127, 208, 212, 245).

In the concept of the enterprise management system, L.J. Mullins and H. Urlich distinguish managerial activities bound to executive activities, i.e. a management sub-system and an executive sub-system (Urlich, 1978; Mullins, 1993, p. 368, 373). A similar standpoint is presented by A. Stabryła, who divides an enterprise system into the management and executive sub-systems and then defines the latter as the production system (Stabryła, Trzcieniecki, 1980, p. 302). Furthermore, the researcher formulated a definition that says that the 'production system is a dynamic one, functioning as a process, in the course of which – on the one hand – an information and decision-making relationship takes place among the individual sub-systems and on the other, there are executive activities, referring to a specific object (Stabryła, Trzcieniecki, 1986, p. 131; Stabryła, 1991, p. 102). At the same time, the management system transforms information into decisions, fulfils the superior roles and performs managerial functions that are indispensable for the functioning of the executive system. Hence, existence of every company determines the goal of operation, has basic impact on the structure and the process of management and on the formation of all types of relations. This is of particular importance for individual sub-systems of an enterprise, which exert a significant impact on the entire course of the production process. In every production enterprise, the executive system and the division into individual sub-systems is different. This follows from the performed functions and the specific determinants of operation as well as the subordination to specific rules of HR management.

Management is a process aimed at coordination of actions of teams. In this aspect, the process of impact of the superiors on the subordinates takes place on two levels: in a direct way, by communicating instructions, creating a climate within the organisation and a coordinated system of supervision, and in an indirect mode, by determining the material and financial conditions of work, standards of conduct and scopes of authority, duties and accountabilities for meeting the organisation's goals. HR management is thus a process of motivating, leading and impacting the activities of the subordinates, according to the defined rules and directly refers to persons who remain in a professional relationship (Drucker, 1973, p. 400; Kaehler, Grundei, 2019, p. 24). Its core is the inter-personal impact, pertaining to the mode in which a director influences his subordinates to accomplish the pre-defined team and organisational goals. It consists in continuous solving any problems that emerge in the superior – subordinate relationship. It is related to the differentiation of human behaviour, reactions and feelings, because persons who have

different views, who carry their own baggage of experience and harbour specific expectations differently perceive their role in an organisation and the role of the superior managing the organisation.

Management should be effective, i.e. it should consist in performance of proper actions and lead to the accomplishment of the desired goal. The efficiency of management is understood both in the categories of economic efficiency, in reference to the effects compared to the incurred costs, but also to non-economic efficiency, related to the benefits for the employees and their professional development. Management that is efficient should rely on rational decisions made in consultation with peers. A person managing an organisation or a team is in charge not only of own actions, but also the actions of persons reporting to him/ her. Due to this, making decisions is considered the most important part of the management process, while the efficiency of action is assessed most often on the basis of its results. A director or a manager should be able to shape people in a way to make them capable of shaping themselves, act as their own bosses and creatively share what they have accomplished with people with whom they work (Blackburn, Rosen, 1993, pp. 49–66; Okpara, 2016; Szczepańska-Woszczyna, 2020). Furthermore, the idea of modern HR management is to impact the employees in a way that they strive for improvement of the situation and results of their work of their own volition.

Managers are active in various organisations and use diverse forms and measures of impact, defined by cultural and legal standards in various periods of economic and scientific development. Modern managers should be comprehensively educated and should have the ability of flexible adjustment to every situation. They should have, primarily at higher management levels, not only professional education, but also specialist knowledge. They should be characterised by professionalism and cooperation skills with respect to work with employees and fostering friendly atmosphere. The efficiency of managers' work, both in an organisation and within the environment, is confirmed by the accumulated social and relational capital, built in observance of such fundamental values as wisdom, knowledge, objectivity, intelligence, logic, open mind and extensive horizons. In turn, managers at the medium and lower level of professional relationship should be familiar with the process of task performance in the subordinate teams. In such case, professionalism frequently tends to be the only determinant of accomplishing a status and their actual authority. Furthermore, a manager – if work is performed in an international environment – should have knowledge about cultural diversity and speak in the peers' language. The managers should set high moral standards, related to such traits of character as, among others, reliability, honesty, veracity, sincerity and kindness, which seems to be the basic determinant for building trust in professional relations. They should have the ability to strategically plan the future accomplishments of an organisation, think and act in a creative way in order to create a vision of prospective development of an organisation.

An important factor is also the ability to engage the employees in the preparation of a strategy of operation of an enterprise. Apart from it, such aspects as: management of information and communication, building intellectual capital of an organisation, organisational culture and structure and adjusting it to the needs of the organisation, functioning in a specific economic-social and cultural context are also basic issues.

Efficient management may be accomplished by following various management styles, such as autocratic, transactional, consulting, co-participating or delegating (Taucean, Tamasilaa, Negru-Strauti, 2016, pp. 66–75; Namiq, 2018). Furthermore, management as a group of activities performed by a manager within the structure of a company is inseparably associated with leadership. Leadership consists in affecting the conduct of others. It takes place when one person is capable of causing desired behaviour of another person with a view to accomplishing a common goal and success of an organisation (House, Hanges, Ruiz-Quintanilla, 1999, p. 184; Zabolotniaia, Cheng, Dacko-Pikiewicz, 2019; Ahadiat, Dacko-Pikiewicz, 2020). Reference books present the following types of leadership (Conger, 2004, p. 162; Riggio, 2004, p. 159; Brown, Eisenhardt, 1997, pp. 1–34; Gemmill, Oakley,1992, pp. 113–129; Hartog, House, Hanges, 1999, pp. 219–256):

- charismatic, ideological or emotional, focused on accomplishing objectives of an organisation, its members and the leader who has a clearly defined vision of development;
- coordinative, when the manager shapes the interpersonal relations and shares power;
- anarchic, when it is created in a network structure, when the idea of a specific project emerges and the employees organise their work on their own;
- transactional, which forms a contract for an exchange of reciprocal services between a leader and an employee;
- transformative, which is a response to the specific vision of development of an organisation.

It is nowadays believed that a manager or a leader becomes more efficient when the range of his management or leadership styles is greater and a proper style can be matched to a specific situation.

Leadership is a part of management; a manager plans and organises, while a leader has to make sure that people will follow him (Maccoby, 200, pp. 57–59). A given person can be a manager or a leader, a manager and a leader or none of the two. Apart from it, a leader enjoys authority among people and has power that is voluntarily accepted (Toor, Ofori, 2008, pp. 61–67). In an informal organisation, leading means causing things to be done by others, but in compliance with the leader's will.

All of the factors listed above make up a certain whole, form the basis of the practice of human management and constitute determinants of efficiency of managing modern organisations encompassing (Fayol, 1949; Homburg, Workman, Jensen,

2002, pp. 38–60; Boyt, Lusch, Naylor, 2001, pp. 321–330; Uzuegbu, Nnadozie, 2015, pp. 58–72; Pathak, 2014; Rodrigues, 2001, pp. 880–889; Rajiani *et al.*, 2018):

- knowledge, skills, managerial competence,
- responsible choice of personnel,
- proper style of management, mode of impacting the subordinate team,
- reasonable decisions, based on consultations with peers,
- continuous improvement of teams and actions,
- in-depth analysis of opportunities and risks to actions taken,
- efficient communication within and outside the organisation and sharing knowledge,
- care for professional development and motivation of team members,
- control of team actions.

Summing up the discussion above: managers take care of the best performance of the entrusted tasks (Cieślińska, 2007, 3–12). In turn, leaders persuade others to accept their vision, set the directions of long-term growth of an organisation and its strategic goals, treat people in a more intuitive and empathic mode. The difference lies in the fact that a manager pays attention to how something is done, while a leader to how the actions and decisions affect the participants of such actions (Zaleznik, 2004). Modern organisations need both managers and leaders. In particular, they need leaders with managerial skills and managers with leader features. Competence of this type should be a part of the adopted strategy, because it is a source of competitive edge. Unfortunately, it has to be noted – as follows directly from the observation of economic practice – that not all managers are efficient in managing human resources. What is more, very few managers deserve the name of organisational leaders (Bhasin, 2016, Mtengezo, 2009).

Situation of Bituminous Coal Mining in Poland in SWOT Analysis

Bituminous coal mining in Poland has significant geological coal deposits at its disposal, which guarantees continuity of extraction in order to ensure energy security of the state. Furthermore, the extraction industry has experienced mining personnel and modern scientific and research potential, characterised by a high level of knowledge about risks related to mining and efficient prevention of such risks, at hand, which is also greatly important. The competence of this type is necessary with respect to the extraction of coal in the area of Upper Silesia (Górny Śląsk). At the same time, the mining industry is struggling with a considerable paralysis in adjusting the production capacity to the demand for coal, and is incurring individual cost of exploitation as compared to other coal producers at international markets. This calls for the modernisation of mines with large deposits which are, however, located at great depths, and the necessity of incurring high cost of other work in mining pits. On the other hand, significant concentration of mining

companies offers a possibility of introducing organisational changes consisting in merging companies into multi-mining area plants, which greatly shortens the way of mining personnel to the workplace.

Bituminous coal mining is characterised by a high technological potential related to the mechanisation of walls, yet the low level of its use (time of operation of machines and mining devices in many mines does not exceed 40% of the wall availability time) remains a still unsolved problem. All the factors above, combined with high costs of mining investments, result in insufficient scope of replacement investments and a low level of the production process innovation (processing and sale of bituminous coal), especially bearing in mind the unilateral nature of its use (as a resource for the production of electric energy and heat in the simple combustion process), which aggravates the difficult economic and financial situation of coal producers.

Furthermore, bituminous coal mining has inefficient organisational structure, which extends the decision-making process and compromises efficient flow of information. In turn, the excessive quantity of IT systems and the insufficient degree of their integration results in 'information chaos.' A significant problem in the bituminous coal mining sector is the system of wages, and specifically lack of a link between the increases in wages and work efficiency and excessive fragmentation of wage components. In turn, advantageous circumstances offer a possibility of efficient cooperation among the entities of bituminous coal mining sector in the area of production and in auxiliary realms, such as, among others: financial solutions, exchange of information about suppliers, information about technological and market trends.

Bituminous coal mining sector generates approx. 1 percent of the state's GDP and is an important employer at the labour market. Bituminous coal in Poland is still considered a priority resource, while coking coal is seen as strategic in the European Union. Hence, the Polish state accepted the obligation of implementing an energy security policy and pursues an efficient coal policy along with stabilisation of the situation on the coal markets. The overall energy balance in Poland is characterised by a high demand for primary energy, including electricity and heat from coal-based fuels (approx. 45%), which means that in the medium time perspective, it will remain the main component of the energy mix. Furthermore, even though certain seasonal changes in coal purchases for households have been noted, there is a significant demand for peak power for the industry, which is conducive to the supply of bituminous coal.

The difficult situation of the industry is further aggravated by the dropping prices of petroleum and gas and an increase of targets of carbon dioxide (CO_2) emission reduction, tightening of environmental standards, as well as changing socio-economic situation in the region, which translates to an increase in prices of electricity for the industry and households (Kasztelewicz, 2015, p. 4, 11; Makieła *et al.*, 2022; Makieła, Michałek, Stuss, 2022). Accounting for a significant dependence of the

domestic coal market on the international trends and sale prices of coal and other energy resources, investments in technical development become a must. Lack of investments or significant delays in their performance in mining and in energy sector entities relying on bituminous coal leads to reduced competitiveness, especially due to the fact that there is excess bituminous coal at the global markets and the competition is severe, in particular in the east and in areas that so far played a marginal role, such as Australia, the Republic of South Africa, the US and Mozambique.

When assessing (SWOT analysis) the internal factors and those from the external environment that affect the operation of the mining industry, it must be stated straightforwardly that the strong sides and the opportunities do not counterbalance the effects of adverse factors (weak sides and threats), which affect their operation. The analysis of internal factors shows the adverse economic and financial situation of coal producers on account of high unit costs of extraction, which are related to exploitation under strongly urbanised areas and at increasing depths. Attention is drawn to the insufficient degree of investments in new longwalls and a low level of innovation of the process of production. Problems related to ineffective organisational structures are highlighted, along with disadvantageous employment structure and low optimisation of work systems; they are combined with the consequences of management errors. Furthermore, external factors of mining activities, on account of their character and dominance, may considerably hinder and in consequence lead to liquidation of bituminous coal mining in Poland.

Even though the operation of the mining industry in Poland – given the range and the force of impact on the economic environment – is still an important branch of industry, yet the changing environment is formulating another approach to the industry. Hence, it becomes necessary to work out such mining and energy policy that assumes increase of technical and economic efficiency of extraction by striving to reduce the costs of production and to increase the working time productivity. Investments in modern and efficient coal extraction technologies should be boosted and clean carbon technologies should be developed, curbing the effects of fossil fuel combustion in the energy sector.

Postulated further rigorous limitation of carbon dioxide emission to the atmosphere and specific decisions on climate protection taken by the European Union pose a significant threat for the Polish economy. However, they are also becoming an opportunity for changing the way of looking at the role of bituminous coal. The European Union leads the way in fighting with global warming and sets specific objectives for the reduction of emission and all its members are liable for observing the adopted regulations.

A theoretical discussion about company management and the essence of HR management, along with presentation of an overall situation of bituminous coal mining in Poland is an introduction to a research process pertaining to the

assessment of efficient functioning of the management and the executive systems of mining companies in the opinion of their stakeholders.

Study Methodology

The research process regarding the analysis of operation of the management system and the executive system of a bituminous coal mine encompassed quantitative and qualitative studies. 380 persons took part in the questionnaire survey, 357 men (93.9%) and 23 women (6.1%). Ten experts, practitioners and theoreticians of bituminous coal mining who hold the positions of presidents, deputy presidents of coal companies, directors of mines/ groups of mines and their cooperating partners at managerial positions took part in individual in-depth interviews (100% men). The choice of experts for quality studies depended on their familiarity with the specific nature of operation of a bituminous coal enterprise, position held, professional knowledge and competence in the area of bituminous coal mining restructuring. The specific nature of activities conducted by the bituminous coal enterprises affected the structure of respondents on account of sex.

Questionnaire surveys were carried out in four groups; the largest group of respondents were managers of mines/ groups of mines, working at three positions: maintenance managers, higher level supervisory personnel and supervisory personnel – almost 48% of the respondents. Furthermore, clients – coal recipients (over 21%), clients – suppliers of machines, mining devices and services who formed the smallest group (7.6%) and trade unions as the representatives of the employees (over 23%) also took part in the survey. Taking the respondents' age into account, 45+ persons were dominant, who constituted over half of the respondents. The second group comprised persons aged 36–45 (over 31%), while the smallest group of the respondents were persons younger than 25 (less than 1% of the respondents). As far as the age of experts is concerned, six persons were aged 50–60, two persons were aged 36–49 and two persons were older than 60.

Study Performance

Performance of the study process presented in the paper was aimed at assessing operation of the management and executive system of a bituminous coal facility with a view to verifying the adopted study hypotheses:

1. The current management system of a bituminous coal facility is ineffective.
2. The currently functioning executive system of a bituminous coal facility requires significant investments.

Table No. 1 presents an outline of frequency for the respondents' opinions about lack of efficiency of the management system in the compared professional groups.

Based on the value of the reliability quotient, a statistically significant dependence was found between affiliation to one of the compared professional groups

and the opinion on lack of efficiency of the management system, $\lambda(24)=61.48$, $p<0.001$.

Table No. 1. Respondents' opinions about lack of efficiency of the management system

Management system is ineffective	Group													
	1.		2.		3.		4.		5.		6.		7.	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Disagree strongly	2	4.3	8	11.9	7	10.3	2	4.0	7	23.3	1	3.4	10	11.1
Disagree	**21**	**45.7**	**27**	**40.3**	**35**	**51.5**	18	36.0	**15**	**50.0**	**17**	**58.6**	**22**	**24.4**
No opinion	11	23.9	21	31.3	9	13.2	**26**	**52.0**	6	20.0	2	6.9	**31**	**34.4**
Agree	11	23.9	8	11.9	13	19.1	4	8.0	2	6.7	6	20.7	22	24.4
Strongly agree	1	2.2	3	4.5	4	5.9	0	.0	0	.0	3	10.3	5	5.6
Total	46	100	67	100	68	100	50	100	30	100	29	100	90	100

n – number of respondents, % – group percentage, 1– maintenance managers, 2 – higher level supervision, 3 – supervision, 4 – electric utilities, 5 – coal vendor, 6 – supplier of machines, devices and services, 7 – trade union representative.

Source: author's own study based on the performed studies (n=380).

The majority did not agree with the presented opinion. The managers strongly disagreed with the opinion. In the group of trade union representatives, 32 persons in total disagreed and strongly disagreed with the opinion that the management system was inefficient; 27 persons in total agreed and strongly agreed with the opinion that the management system was inefficient. Apart from it, this professional group had the most respondents who had no opinion (31 persons, i.e. 34.4%). In the group of persons who worked in the energy industry, there were more persons (26 i.e. 52% of the respondents) who did not have any opinion.

Next, table No. 2 presents an outline of frequency for the respondents' opinions about underinvestment of the executive system and the necessity of its restructuring in the compared professional groups.

Table No. 2. Opinions of respondents about underinvestment of the executive system and the necessity of its restructuring

Executive system is underinvested	Group													
	1.		2.		3.		4.		5.		6.		7.	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Strongly disagree	7	15.2	7	10.4	11	16.2	3	6.0	5	16.7	1	3.4	18	20.0
Disagree	**28**	**60.9**	**36**	**53.7**	**41**	**60.3**	21	42.0	**19**	**63.3**	**18**	**62.1**	**49**	**54.4**
No opinion	9	19.6	12	17.9	12	17.6	**24**	**48.0**	4	13.3	8	27.6	17	18.9
Agree	2	4.3	11	16.4	3	4.4	2	4.0	2	6.7	0	0	5	5.6
Agree strongly	0	0	1	1.5	1	1.5	0	0	0	0	2	6.9	1	1.1
Total	46	100	67	100	68	100	50	100	30	100	29	100	90	100

n – number of respondents, % – group percentage, 1 – maintenance managers, 2 – higher level supervision, 3 – supervision, 4 – electric utilities, 5 – coal vendor, 6 – supplier of machines, devices and services, 7 – trade union representative.

Source: author's own study based on the performed studies (n=380).

Based on the value of the reliability quotient, a statistically significant dependence was found between affiliation to one of the compared professional groups and the opinion on underinvestment, $\lambda(24)=46.07$, $p<0.01$. The managers (130 persons, i.e. 78.9% of this professional group) strongly disagreed with this opinion. In the group of trade union representatives, 67 persons, i.e. 74.4% in total, disagreed and strongly disagreed with the opinion that the executive system was underinvested. Furthermore, the group of persons working in the energy sector had the most respondents (48.0%) who did not have any opinion.

Hence, most respondents did not agree with the opinion that the current management system of a bituminous coal facility is effective and that the currently functioning executive system requires significant investments.

In the quality studies, the experts were asked the following questions:

1. How do you assess the system of management of mines/ groups of mines?
2. How do you assess the currently functioning executive system, is it necessary to restructure it?

In their responses, the experts assessed the management system diversely. The assessment differed depending on their outlook on the determinants of operation of mines and groups of mines.

With respect to the second question, in the experts' opinions, the basic issue of correct operation of the executive system is: *selecting and properly assigning the personnel to the tasks and improving their qualifications. Next, by means of simplifying the system of wages, better work performance and motivation to work should be enforced. If one has a team that one can rely on, it is necessary to take care of modernisation of the machine park.*

Apart from it, efficient restructuring of the executive system also requires:

– *improvement of work organisation, system of management and motivation of employees and management of the executive system,*

while the following aspects are of fundamental significance for the correct functioning of the executive system:

– *correctly performed preparatory work;*
– *investments in new longwalls and assessment of deposits;*
– *diversification of production activities.*

A significant obstacle in the management of mine executive systems is:

– *absence of managerial personnel from medium to top level;*
– *lack of independent thinking on the part of supervisory personnel.*

Furthermore, decisions are required which will allow for:

– *rebuilding the extraction potential and making the state independent from coal import, in order to function independently from market fluctuations and prices of coal around the world;*
– *creating good conditions of work for the employees;*
– *supplying proper coal extraction equipment, compliant with their expectations and needs.*

Only one expert – when responding to the question asked – positively assessed the executive system in his mine/ group of mines by saying:

– *in our mine, I would only slightly modify the executive system. Generally, it responds to the needs; in case of necessity it should be adjusted to them. The mode of work organisation in the executive system has to guarantee performance of tasks – there are relevant people responsible for it. Bad work organisation prevents performance of stipulated plans and accomplishment of quality; you always have to react on an ongoing basis.*

The majority of study participants had numerous reservations as to the currently functioning executive system. They mentioned that extraction activities are complex and only uninterrupted work (organisational and managerial interaction) of all system elements allows for its efficient operation.

When presenting their remarks, the experts – performing the assessment – offered specific solutions to increase the efficiency of the executive system of extraction. In their opinion, people have the greatest impact on the functioning of the executive system. At the present moment, lack of qualified employees and

managerial personnel is noticeable who would be accountable for the managerial decisions made. Apart from it, a rapid change is needed in the incentive scheme, the system of employee wages and the management system which is going to guarantee efficient management of the executive system.

Study Results

Moving on to the specific results of the questionnaire survey pertaining to the assessment of the management system, it must be stated that there is a significant dependence between affiliation to one of the compared professional groups participating in the survey and their opinion. Most respondents did not agree with the statement about lack of efficiency of the management system (Table No. 1). The managers from all professional groups strongly disagreed with it. In the group of trade union representatives, 32 persons believed that the management system was efficient, because in spite of all the difficulties related to coal production, extraction was taking place. Only 27 respondents expressed opinions about inefficiency of the management system. Apart from it, this professional group included the most respondents who did not indicate their assessment (31 respondents had no opinion, which makes up 34.4%). These persons were wary of speaking about the subject or were not aware of the overall economic situation of the bituminous coal mining sector. In the group of persons working in the energy sector there were 26 respondents (i.e. 52% of the respondents) who also had no opinion. In this case, it may be concluded that they preferred not to assess the system with respect to which they cannot take a stance. The above study results have shown that the majority of managers did not see the necessity of changes in the management system in which they participate, which may follow from growing accustomed to such mode of management and the fact that they are unable to critically assess their own actions. However, in spite of such opinion, according to the author of the study, the management system may become more efficient and should better perform the functions for which it has been designed.

In turn, with respect to the analysis of the executive system and the necessity of its restructuring (Table No. 2), the respondents – depending on the type of professional group to which they belonged – differed in their opinions. Nevertheless, they strongly disagreed with the opinion about the necessity of additional investments. Only the 'I have no opinion' group had more persons working in the energy sector than in other professional groups. The respondents believed that the executive system performs its role, even though it is still encumbered with many years of neglect as far as opening new longwalls is concerned. If there are no investments of this type, prepared in advance (in the mining industry, investment planning is extended and it amounts to – depending on the scale of investment – even up to 5 years; as a rule, there are 2–3 year periods), there is no coal, no profit or it is proportionately

lower. In the past period of competitive coal prices at the world market, lack of development and preparatory work resulted in lack of coal from the Polish mines.

This type of approach to the necessity of growth of investments in the mining industry in the opinion of authors of the paper attests to the respondents' tendency to abide by the old standards of operation, which rule out a change in the mode of operation of the mines. Changes are perceived as threatening and they are accompanied by a feeling of mistrust to the decisions made by the top level managers and fear of loss of jobs.

In line with the conclusions presented above pertaining to the assessment of efficiency of the management system and the assessment of operation of the executive system and the necessity of its restructuring, the respondents and the experts for the most part presented completely opposite stances. In the questionnaire survey, the respondents believed that the executive system fulfilled its role and the management system was acceptable. In turn, the experts, making a general assessment, pointed to long-term investment neglect in the executive system in multiple aspects and shared their critical views on the managerial skills of the managers. They pointed to specific examples of neglect, incompetence and cardinal investment and management errors (among others when setting up networks of integrated mines), which influenced a drop in the level of coal extraction.

However, taking into account the results of the performed studies and the opinions of all stakeholders of the bituminous coal mine facilities, it may be stated that the study hypotheses analysed in the paper have not been confirmed.

Discussion

The conclusions from questionnaire surveys offered unexpected results. In spite of numerous negative opinions and examples of lack of efficiency of the management system of coal production and underinvestment of the executive system, the majority of the respondents concluded that the present-day situation was satisfactory or decided not to share their views. This situation reveals a low level of awareness of individual professional groups, in particular the group of managers, and lack of knowledge about the market situation and limited prospects for performing mining activities in the present-day shape. Furthermore, it shows the overall discouragement and lack of interest in changes introduced in the mine operation systems. However, taking the experts' opinions into account which manifest great care and concern about the irregularities in the functioning of the executive system (exploitative deposit management related to resignation from extracting remnants of coal deposits, failures of mining equipment), necessity of investments in opening new longwalls (without investments there is no development), modernisation of the machine park, introduction of innovative coal extraction and processing technologies and changes in the mode of perception

and combustion of bituminous coal, it must be concluded that performance of this study procedure has been fully justified.

The executive system of individual mines is identical because it stems from certain mining standards. All the elements that make it up, i.e. development work, preparatory work, reinforcement of walls, extraction and transport of coal to the surface, require investments in replacement of worn machine park and modernisation of the underground infrastructure (guarantee of transport of employees to the work place) and ground-level infrastructure (among others: shafts, means of coal transport, coal processing plants) of the mines. Very considerable financial outlays must be made that should – eventually – comprise the profit from every ton of sold coal, allowing for stable operation. If one thinks about the coal mine industry seriously, coal mines should be wound up in locations where extraction is not economically justified.

According to the study, individual groups of stakeholders are not aware of all the problems faced by the bituminous coal mining sector. During the discussions held with the respondents, it was ascertained that the management system should undergo thorough restructuring. Serious problems with work organisation were highlighted, which are visible in general and in individual mines. Spontaneous administrative decisions were mentioned, which have adverse impact on the level of extraction, add up to employee dissatisfaction and reduced motivation to work. It was explained that the bituminous coal mining has a hierarchical system of management, where any sort of human initiative has been lost. Employees do not wish to be held accountable for the decisions made because they are not treated like partners. Such regime of subordination to the superiors is primarily related to the necessity of discipline of work underground and threats resulting from coal exploitation. Nevertheless, incorrect managerial decisions affect the entire extraction process, evoke significant resistance and dissatisfaction of the employees and directly impact the relationship management in whole.

Conclusions

Managers of bituminous coal mines should be aware of the necessity of changes, in particular in the area of work organisation and improved efficiency of extraction. Nevertheless, in the course of the study process they claimed – which was surprising – that the executive system fulfilled its role and did not need restructuring, while the management system was acceptable. In turn the experts, making a general assessment, pointed to long-term investment neglect in the executive system in multiple aspects and shared their strongly critical views on the managerial skills of the managers.

The presented study results attract special attention to the absence of interest of the owners and managers of various levels in increasing the efficiency of operation

of the coal production systems in individual mines and significant backlogs in handling the information policy for the mining personnel.

Transformation of the bituminous coal industry is a necessary and difficult task which is happening here and now. It is all the more difficult because the mining industry is one of the elements of the energy system, a guarantor of the state's energy security, which requires comprehensive political decisions. Scheduled liquidation of mines, even though dispersed over time, will have economic, technical and social effects for the mining industry and mining-related environment of individual employees. Hence, it is important to make use of the existing productivity, the employees' intellectual capital and the development potential of the region to guarantee the prospective potential. This development potential may be pursued in the next several years of the operation of the mining industry and subsequently transferred to other spheres of operation.

The discussion initiated in the paper does not exhaust the extensive issues related to the management of bituminous coal production in Poland. However, it forms an important and valid aspect of economic activities, leading to specific remedial actions and encouraging further theoretical and empirical discussions on the subject.

Magdalena Kot-Radojewska[1]

Job Crafting Among Administrative Employees of Public and Non-Public Universities in the Silesia Province

Abstract: The aim of the paper is to find an answer to the question whether a phenomenon of job crafting can be observed among administrative staff in public and non-public universities in the Province of Silesia. The research uses a Polish version of the scale – a Job Crafting Questionnaire developed on the basis of the Job Crafting Scale (JCS), which is used to measure the job transformation conceptualised within the job requirements – resources model and was formulated based on the results of exploratory factor analysis and confirmed by the results of confirmatory factor analysis. The questionnaire consists of three forms of job crafting, namely task crafting, relational crafting and cognitive crafting. 209 university employees in the Province of Silesia were surveyed. The research was conducted based on some assumptions of the grounded theory. Research results were analysed by means of basic descriptive statistics (arithmetic mean (M), median (Me), standard deviation (SD), the coefficient of skewness (S) and Pearson correlation coefficient (r). Public and non-public universities were compared by means of the Mann-Whitney U test, as well as the t-test for the independent sample to compare variables which measure job crafting in total and within three subscales. The relationship significance was assessed by the t- test. Using statistical tests, a level of significance $\alpha = 0.05$ was assumed. The metric properties of the tool to study job crafting were also proven. Job crafting results obtained for the research sample are high, with higher results related to non-public universities. In addition, the results are more homogeneous in non-public universities than in public universities. Also, job crafting in one area has a greater impact on how the situation in another area looks like in public universities, compared to non-public universities. Although in both types of universities each area of job crafting studied remains in a statistically significant relationship, in the case of non-public universities, these relationships are weaker than in the case of public universities. In both types of universities, the strongest correlation is between task crafting and relational crafting.

Keywords: Employee engagement; Intentions; Job crafting; Job performance

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Introduction

Job crafting as an expression of positive impacts at work has been an object of growing interest both among academics and practitioners (Rogala, Cieślak, 2019, p. 445). In Polish literature, job crafting tends to be called 'kształtowanie pracy' [job formation] (Kasprzak, Michalak, Minda, 2017, p. 459; Minda, Kasprzak, 2018, pp. 145–161) or 'przekształcanie pracy' [job transformation] (Rogala, Cieślak, 2019, pp. 445–457). Job crafting relies on an assumption that greater efficiency of employees and also greater satisfaction with work and well-being of employees relies, to a significant extent, on creative potential and own initiative of the employees at every level of the organisation. As part of job crafting, the employee takes independent initiative with respect to aligning the performed job to own needs, requirements and resources held (skills, competence and talents), which consists in physical and cognitive modification of activity and professional tasks thanks to which it acquires a personal dimension (Berg *et al*., 2010, p. 179) and is aligned to individual employee preferences. Activities taken by the employee are conscious and purposeful and have the nature of changes pro-actively introduced to work (Bruning, Campion, 2018 pp. 499–522) that help the employees maintain but also raise motivation and energy for work. In job crafting, it is essential that the initiative with respect to work modelling is on the side of the employee and not the superior, as in the case of, for example, the job enrichment method (Slemp, Vella-Brodrick, 2014, pp. 957–977). By deciding to craft own jobs, employees expand their resources, develop and take new challenges (Hakanen, Peeters, Schaufeli, 2018, pp. 289–301). In short, job crafting can be defined as performance by the employee of physical and cognitive changes in tasks or relations as part of the performed work (Wrześniewski, Dutton, 2001, pp. 171–209).

Literature Review

Job crafting generates a number of benefits not only for the employee, but also for the employer. Among others, it arouses positive emotions and shapes positive stances with respect to work (Ko, 2011; Van de Riet, 2015), increases satisfaction from work (Berg *et al*., 2010), employee engagement (Bakker *et al.,* 2012; Leana *et al*., 2009; Tims *et al*., 2012), more efficient functioning under pressure of time and in stress, formation of social relations (Slemp, Vella-Brodnik, 2014), reduction in the level of professional burn-out, reduction of the level of absence at work, better coping with changes, increase of efficiency (Ghitulescu, 2006, pp. 30–47; Tims, Bakker, Derks, 2014, pp. 1–15), growth of creativity (Hu, Wang, Long L., 2020, pp. 659–668), decrease of boredom (Oprea, Barzin, Virga, Iliescu, Rusu, 2019, pp. 723–741), professional development proceeding in the positive direction (Bakker and Demerouti, 2014, pp. 309–328), increase of well-being (Boehnlein, Baum, 2020), or feeling the sense of the performed work. Accepting

liability for own well-being at work and providing the duties performed by the employee with significance is one of the key needs (Wrześniewski, Dutton, p. 179), also affecting greater engagement in job modelling. The employees know what duties they perform and how and that is why they can create optimum work environment and engage in interventions when it is necessary to prevent negative effects such as demotivation or decrease in efficiency (Berings, De Fruyt, 2004, pp. 349–364).

Relying on the job crafting model presented by A. Wrześniewski and J. Dutton (Wrześniewski, Dutton, 2001, pp. 179–201), three forms of job crafting may be distinguished: task crafting, which consists in change of the number, type or character of tasks; relational crafting that refers to changes in the number, type and intensity of relations, as well as the style of interaction, and cognitive crafting, expressed in a change in the perception of tasks and their sense.

Activities initiated by the employees as part of job crafting are affected by a number of factors, both related to a given individual (Bandura, Lyons, 2014), as well as the character of work (Lyons, 2008) and its demands (Petrou *et al.*, 2012).

Actions in the realm of job crafting require adequate circumstances (Wrześniewski, Dutton, 2001, pp. 171–209). Primarily, the employee must feel motivated to initiate action. Such motivation may result from such needs as control, sense of work, positive self-assessment, cooperation with others, sense of accomplishment and self-growth. An important element is also the employee's belief that a change may be introduced and thus the employee must have certain autonomy of action. Furthermore, less control on the part of superiors and greater freedom of action makes it more probable that an employee will be open to certain changes introduced in a grass-roots mode that improve his/ her work. It is also emphasised that such features of personality as, for example, self-efficacy (Roczniewska, Rogala, Puchalska-Kaminska, Cieślak, Retowski, 2020) and a pro-active personality (Rudolph, Katz, Lavigne, Zacher, 2017, pp. 112–138; Xu, Jiang, Wang, 2019, pp. 848–872; Szczepańska-Woszczyna, 2020) have major significance for taking actions with respect to job crafting.

The superiors' feedback provided to the employees and support for the employees is also greatly important (Ghitulescu, 2013; Zabolotniaia, Cheng, Dacko-Pikiewicz, 2019; Ahadiat, Dacko-Pikiewicz, 2020; Rajiani *et al.*, 2018). Allowing the employees to modify and personalise the performed work is also conducive to the formation of a good atmosphere in the workplace and reciprocal relations based on partnership, mutual respect and trust. On the other hand, engaged employees may be more pro-active and inclined to take actions with respect to crafting their own work to a degree higher than others (Hakanen, Perhoniemi, Toppinen-Tanner, 2008, pp. 78–91).

It is also important to note that job crafting does not consist in one-time or incidental actions, but is an ongoing and systematic process (Wrześniewski, Dutton, 2001, pp. 171–209; Kasprzak, Michalak, Minda, 2017, p. 459).

Without doubt, job crafting is conducive for the employees to combine their work with individual predisposition, interest, values or even talents. Apart from several of the aforementioned positive effects resulting from job crafting, one cannot forget about the employee's joy and pride deriving from the performed tasks.

Methods and Materials

Accounting for the specific nature of operation of public and non-public universities and the impact of job crafting on, among others, efficiency of organisation, work atmosphere, ability to accept risk, level of employee engagement and loyalty to the organisation, a study was carried out among the administrative employees; its purpose was to find an answer to the question whether the phenomenon of job crafting occurs among employees of public and non-public universities. The study was also aimed at answering the question about the types of behaviour which – as part of job crafting – are applied by the administrative employees of public and non-public universities. The applied study tool was the Polish version of the Job Crafting Survey based on *Job Crafting Scale (JCS)* (Tims, Bakker, Derks, 2012, p. 80), i.e. the scale that is used to measure job crafting, conceptualised as part of the model: requirements at work – resources and was formulated based on the results of exploratory factor analysis and confirmatory factor analysis confirmed by results. The survey encompasses three forms of job crafting: task crafting, relational crafting and cognitive crafting. The study process was carried out based on some assumptions of the grounded theory.

The analysis of study results was carried out, first of all, with the use of basic descriptive statistics (arithmetic mean (M), median (Me), standard deviation (SD), coefficient of skewness (S) and Pearson's linear correlation coefficient (r)). Secondly, a comparison of public and non-public universities was carried out with the use of Mann-Whitney test (Mann-Whitney test that is used to compare two populations from the point of view of the variable measured on the ordinal scale, but also when the studied phenomenon is quantity-based, yet shows significant divergence from the standard distribution) (Wiktorowicz, Grzelak, Grzeszkiewicz-Radulska, 2020); in this case, it was used to compare the answers to individual questions pertaining to job crafting; t-Student test was used for independent samples to compare variables that measure job crafting – in total and as part of three sub-scales. The assessment of significance of the relationship was made with the t-Student test. With the use of statistical tests, the level of significance was adopted at $\alpha = 0.05$.

The metric properties of the tool to study job crafting were confirmed by applying exploratory factor analysis (accuracy) and Cronbach's alpha (reliability). The exploratory factor analysis (EFA) allows for assessing whether and which sub-scales of variables should be distinguished as part of a given scale (Tabachnick and Fidell, 2007). The sample size is adequate to the analysis of this type (n = 209) (Comrey, Lee, 1992). After verifying the initial conditions, i.e. correlation among scale items, among others with the use of the KMO measure (Kaiser-Meyer-Olkin Measure of Sampling Adequacy, which should exceed 0.5) and Bartlett's Test of Sphericity, where it is expected that $p < \alpha$) (Wiktorowicz 2016: 299), estimation of model parameters was made, using the method of main components for this purpose (adaptation of the basic Hotteling method for the purpose of factor analysis) (Walesiak, Bąk 1997, pp. 75–87). The number of factors was confirmed using the Kaiser and Cattel criterion (scree plot), while for the purpose of finding the solution (indication of items linked to a given factor), rotation of factors was made (Varimax) (Wiktorowicz, 2016, 299–301). Cronbach's alpha used for the assessment of reliability may adopt values from the range of [0; 1] and the threshold value is usually assumed at 0.7 (Rószkiewicz, 2011, 28). Calculations were made with the use of IBM SPSS Statistics 25.0.

Sample Structure

The study covered 209 university employees in the Silesia Province, where 40.7% were persons working at public units, while 59.3% worked at non-public units. Almost 83% of the respondents were women; this percentage was slightly higher at non-public universities (86%) than at public universities (79%). Almost half of the respondents were persons aged 35–44; approx. 30% were younger than 35 and only 5% were 55 or older. The last percentage is higher at public universities (approx. 11%) than non-public ones (1%), where there are slightly more persons younger than 35 among the respondents of non-public universities (34%) than public ones (22%), cf. Table No. 1. In both types of universities, approx. 2/3 persons declared higher education, while additionally every tenth person had third level education. The percentage of persons who completed post-graduate studies that is twice as high among the respondents at non-public universities (as compared to public ones) is noteworthy. With respect to the positions held, approx. 60% of respondents are specialists/ independent employees; more than every third respondent holds a managerial position (more often middle level). Both types of universities do not differ significantly in this respect. On the other hand, with respect to job seniority – in general and at the university – the respondents who work at public universities differ from those who work at non-public ones, i.e. their job seniority is higher (especially in the second case, it is related to the longer period of operation of such units). At non-public universities, over 80% of

the respondents have not worked for more than 10 years, while over a half work from one to five years. At public universities, certain 'cycles' of employment are visible: approx. 25% persons work at the university between 1–5 years, but also approx. 25% work for 11–15 years, 22% for over 20 years, and only 6% of persons for less than a year. As far as the overall job seniority is concerned, public universities stand out: almost half of the respondents have over 20 years of work experience (Table No. 1). Generally speaking, except for work experience of less than 1 year, distribution of the remaining groups is more or less even and if work at the university is taken into account, almost half of the respondents have worked for 1–5 years.

Table No. 1. Sample structure according to type of university

Specification		Total		Public		Non-public	
		n	%	n	%	n	%
Total		**209**	**100.0**	**85**	**40.7**	**124**	**59.3**
Sex	Woman	173	82.8	67	78.8	106	85.5
	Man	36	17.2	18	21.2	18	14.5
Age	Younger than 25	9	4.3	1	1.2	8	6.5
	26–34 years of age	52	24.9	18	21.2	34	27.4
	35–44 years of age	101	48.3	35	41.2	66	53.2
	45–54 years of age	37	17.7	22	25.9	15	12.1
	55–64 years of age	9	4.3	8	9.4	1	0.8
	65+	1	0.5	1	1.2	0	0.0
Education	Secondary	18	8.6	15	17.6	3	2.4
	Higher	133	63.6	52	61.2	81	65.3
	Post-graduate	37	17.7	9	10.6	28	22.6
	Doctoral education	20	9.6	8	9.4	12	9.7
	Other	1	0.5	1	1.2	0	0.0

Specification		Total		Public		Non-public	
		n	%	n	%	n	%
Position held	Specialist or independent employee	121	57.9	53	62.4	68	54.8
	Middle level manager	47	22.5	15	17.6	32	25.8
	Managerial staff	27	12.9	8	9.4	19	15.3
	Other	14	6.7	9	10.6	5	4.0
Period of employment at the university	Less than a year	26	12.4	5	5.9	21	16.9
	1–5 years	87	41.6	20	23.5	67	54.0
	6–10 years	25	12.0	10	11.8	15	12.1
	11–15 years	31	14.8	22	25.9	9	8.3
	16–20 years	14	6.7	9	10.6	5	4.0
	Over 20 years	26	12.4	19	22.4	7	5.6
Overall job seniority	Less than a year	3	1.4	1	1.2	2	1.6
	1–5 years	26	12.4	7	8.2	19	15.3
	6–10 years	39	18.7	14	16.5	25	20.2
	11–15 years	43	20.6	11	12.9	32	25.8
	16–20 years	38	18.2	12	14.1	26	21.0
	Over 20 years	60	28.7	40	47.1	20	16.1

Job Crafting at Universities in Silesia Province

Administrative employees of universities in the Silesia Province completed the job crafting surveys. With respect to each statement, they chose a stance on the scale from 1 to 6, where a higher number of points means a higher grade. Table No. 2 presents the distributions of answers to individual questions and shows the basic descriptive statistics in total for the entire sample.

Table No. 2. Job crafting in the opinion of employees of public and non-public universities (excluding teaching employees, research staff members and teaching and research staff members) in the Silesia Province

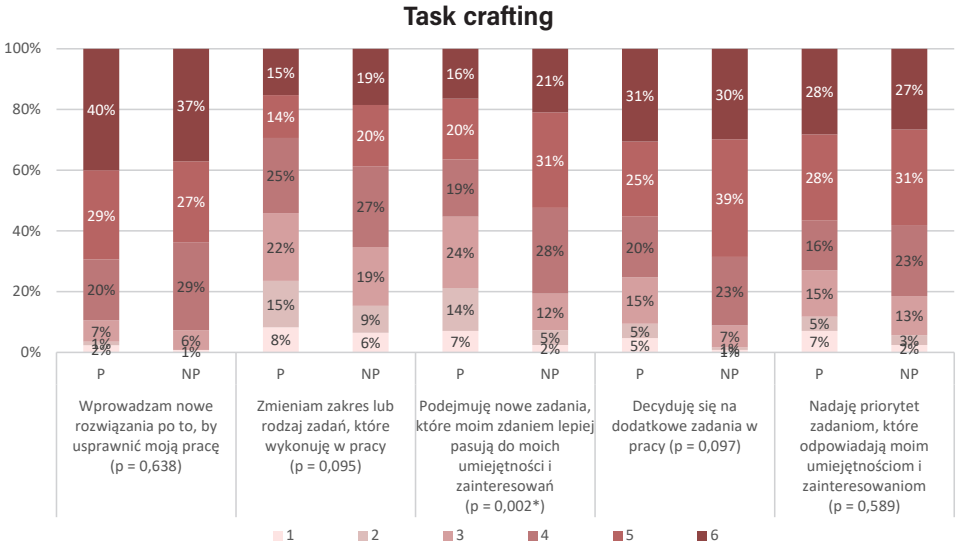
Variable	Specification	Percentage of answers for grade						Statistics			
		1	2	3	4	5	6	M	Me	SD	S
V1	I introduce new approaches to improve my work	1.4	0.5	6.7	25.4	27.8	38.3	4.92	5	1.08	-0.94
V2	I change the scope or the type of tasks performed at work	7.2	11.5	20.6	25.8	17.7	17.2	3.87	4	1.47	-0.21
V3	I take on new tasks which, in my opinion, match my skills and interests better	4.3	8.6	16.7	24.4	26.8	19.1	4.18	4	1.38	-0.49
V4	I decide to take on additional tasks at work	2.4	2.4	10.5	21.5	33.0	30.1	4.71	5.	1.21	-0.94
V5	I prioritise tasks that suit my skills and interests	4.3	3.8	13.9	20.6	30.1	27.3	4.50	5	1.35	-0.82
V6	I think about how the job gives me life purpose	9.1	6.7	15.3	14.8	21.5	32.5	4.31	5	1.64	-0.65
V7	I think about the significance of my job for my company's success	5.7	9.1	13.9	20.1	30.1	21.1	4.23	5	1.46	-0.62
V8	I remember about the significance of my work for the broader community	7.7	7.7	21.1	20.6	24.9	18.2	4.02	4	1.48	-0.41
V9	I think about the ways in which work positively impacts my life	6.7	5.3	13.4	17.2	27.8	29.7	4.43	5	1.50	-0.81
V10	I reflect on the role my job has for my overall well-being	4.3	3.3	11.0	16.7	29.2	35.4	4.69	5	1.37	-1.04
V11	I make an effort to get to know people at work	2.9	3.8	17.2	23.0	27.8	25.4	4.45	5	1.30	-0.60
V12	I organise or attend work related social functions	17.7	15.3	20.1	17.2	17.7	12.0	3.38	3	1.64	0.04
V13	I organise special events in the workplace (e.g. birthday celebrations of a colleague)	19.1	14.4	16.3	12.9	20.1	17.2	3.52	4	1.77	-0.06
V14	I choose to mentor new employees (officially and unofficially)	1.9	4.3	15.8	22.0	26.8	29.2	4.55	5	1.28	-0.62
V15	I make friends with colleagues who have similar skills or interests	4.8	10.5	13.9	26.8	25.8	18.2	4.13	4	1.40	-0.49

M – average, Me – median, SD – standard deviation, S – skewness coefficient.

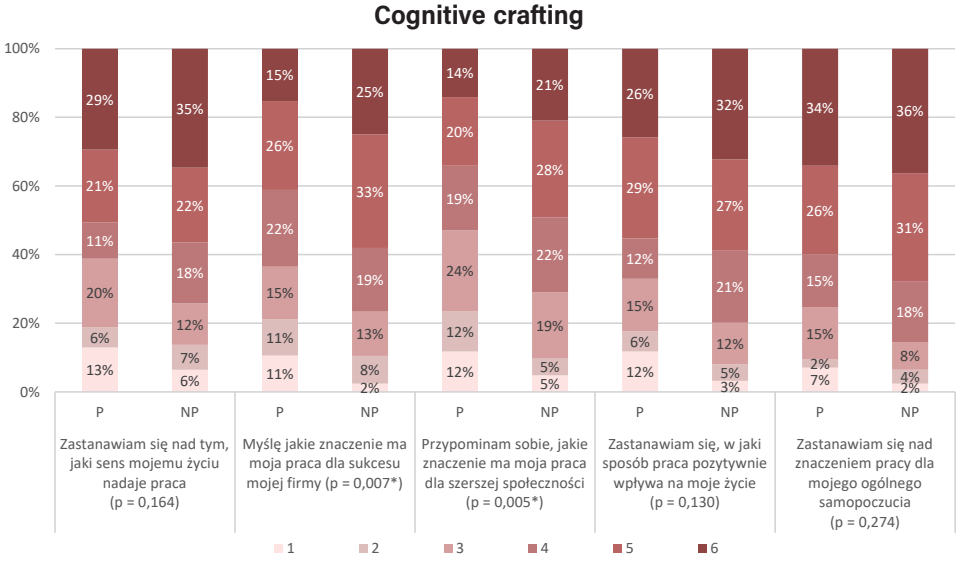
The variant 'I introduce new approaches to improve my work' was graded the highest – the average is 4.92, and half of the respondents assessed this aspect at 5 as a minimum (in total, persons who graded it at 5 or 6 make up 2/3 of the respondents, while the highest variant was chosen by almost 40% of people), cf. Table No. 2. The next two places are occupied by issues assessed equally high – the average is approx. 4.7, Me = 5. These are: 'I take on additional tasks at work' (63% of responses at 5–6) and 'I reflect on the role my job has for my overall well-being' (65% of responses at 5–6). Median at the level of 5 refers to 9 out of 15 analysed issues; for five it amounts to 4, and for one aspect – 'I organise or attend work related social functions' – to only 3. In case of the last issue, half of the respondents chose an answer not higher than 3, and 1/3 – not higher than 2, while the highest percentage are persons who chose answer 1 (almost never) – 18% (as compared to not more than 10% with respect to other questions). It is worth noting that all items on the job crafting scale are characterised by rather weak (potentially moderate) variability – for each of the items, the standard deviation is not more than 50% of the mean. Relatively greater variability (variation coefficient of approx. 50%) refers to two items with the lowest grade, V12 and V13; for other variables, the variation coefficient is on the level of 22–38%. The skewness of distribution of these variables is also low – the skewness coefficient is lower (with respect to the absolute value) from 1, only for the V10 item it amounts to S = -1.04 (Table No. 2). This confirms that for the purpose of assessing the metric properties of the scale, these variables may be treated as quasi-quantity (they have over 5 items, while their distributions are not strongly asymmetrical).

Whilst comparing detailed answers to individual questions of the job crafting survey (Fig. No. 1), it should be noted that with respect to the 'task crafting' area, the greatest differences between public and non-public universities refer to the statement 'I take on new tasks which, in my opinion, match my skills and interests better' (p=0.002). Significantly higher assessment refers to non-public universities – over a half of persons indicated answers 5 or 6 (in case of public universities, analogous percentage of 36%), while only 7% chose answers 1 or 2 (as compared to 21% of public university employees). The median here is higher at non-public universities (5 as compared to 4 for public universities), the mean is also higher (4.44 vs. 3.80) – cf. Table No. 3. Also items 'I take on new tasks at work' and 'I change the scope or the type of tasks performed at work' are assessed higher at non-public universities, yet the differences could be deemed statistically significant at a higher level of significance ($\alpha = 0.10$). In turn, the remaining two issues are assessed similarly at both types of universities.

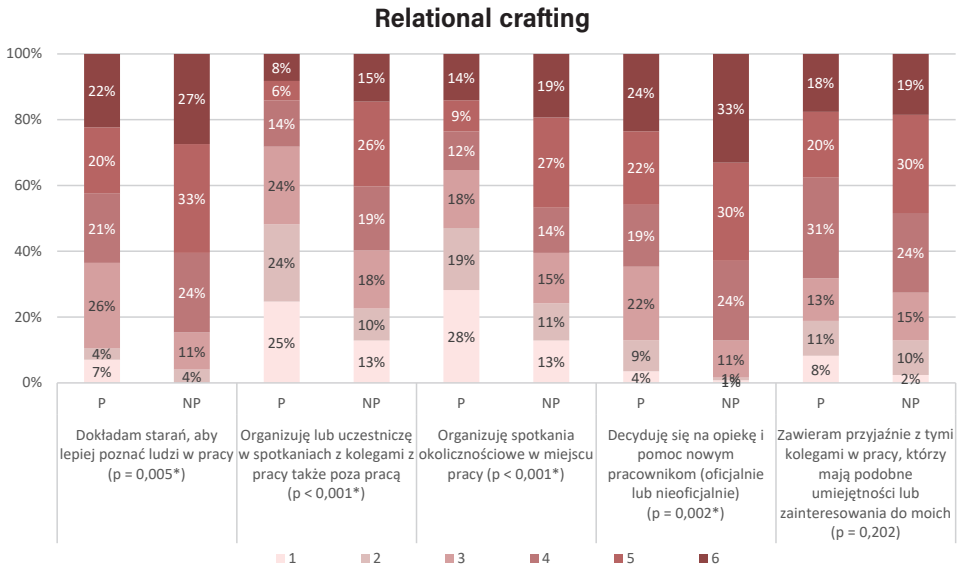
Fig. No. 1. Job crafting according to type of university (percentage of indications)



[I introduce new approaches to improve my work; I change the scope or the type of tasks performed at work; I take on new tasks which, in my opinion, match my skills and interests better; I decide to take on additional tasks at work; I prioritise tasks that suit my skills and interests]



[I think how the job gives me life purpose; I think about the significance of my job for my company's success; I remember about the significance of my work for the broader community; I think about the ways in which work positively impacts my life; I reflect on the role my job has for my overall well-being]



[I make effort to get to know people at work; I organise or attend work related social functions; I organise special events in the workplace; I choose to mentor new employees (officially and unofficially); I make friends with colleagues who have similar skills or interests]

p – probability in Mann-Whitney test, * statistically significant differences (α = 0.05).

'Cognitive crafting' in two areas differs significantly with respect to the type of university. This refers to the significance of work for the broader community (p = 0.005) and to the success of the organisation (p = 0.007). Higher grades were recorded for non-public universities – the share of high grades (5 or 6) reached 40–50% there, while lowest grades (1–2) were at 10% and the mean was 4.3–4.8. Analogously, the percentages for public universities amounted to approx. 40% and 25% respectively, while the mean was on the level of 3.7–3.9. The results pertaining to the issue 'I reflect on the role my job has for my overall well-being' were at the highest level – the mean amounts to 4.53 for public universities and to 4.81 for non-public, the median is at 5 in both groups. In turn, the issue 'I remember about the significance of my work for the broader community' was assessed the lowest (M=3.66, SD=1.6 for public universities and M=4.27, SD=1.4 for non-public ones), Fig. No. 1, Table No. 3.

Table No. 3. Job crafting in the opinion of employees of public and non-public universities (excluding teaching employees, research staff members and teaching and research staff members) in the Silesia Province

Variable	Specification	Public			Non-public			p
		M	Me	SD	M	Me	SD	
V1	I introduce new approaches to improve my work	4.93	5.00	1.17	4.92	5.00	1.02	0.638
V2	I change the scope or the type of tasks performed at work	3.67	4.00	1.50	4.01	4.00	1.45	0.095
V3	I taken on new tasks which, in my opinion, match my skills and interests better	3.80	4.00	1.51	4.44	5.00	1.23	0.002*
V4	I decide to take on additional tasks at work	4.47	5.00	1.43	4.87	5.00	1.00	0.097
V5	I prioritise tasks that suit my skills and interests	4.39	5.00	1.50	4.58	5.00	1.24	0.589
V6	I think about how the job gives me life purpose	4.09	5.00	1.74	4.45	5.00	1.55	0.164
V7	I think about the significance of my job for my company's success	3.88	4.00	1.55	4.47	5.00	1.34	0.007*
V8	I remember about the significance of my work for the broader community	3.66	4.00	1.56	4.27	4.00	1.37	0.005*
V9	I think about the ways in which work positively impacts my life	4.19	5.00	1.67	4.60	5.00	1.35	0.130
V10	I reflect on the role my job has for my overall well-being	4.53	5.00	1.50	4.81	5.00	1.26	0.274
V11	I make an effort to get to know people at work	4.11	4.00	1.46	4.69	5.00	1.11	0.005*
V12	I organise or attend work related social functions	2.78	3.00	1.52	3.79	4.00	1.59	<0.001*
V13	I organise special events in the work place (e.g. birthday celebrations of a colleague)	2.98	3.00	1.77	3.90	4.00	1.68	<0.001*
V14	I choose to mentor new employees (officially and unofficially)	4.18	4.00	1.44	4.81	5.00	1.09	0.002*
V15	I make friends with colleagues who have similar skills or interests	3.96	4.00	1.49	4.24	4.00	1.33	0.202

M – mean, Me – median, SD – standard deviation, p – probability in Mann-Whitney test, * statistically significant differences ($\alpha = 0.05$).

The greatest differences between public and non-public universities were recorded in the last group, i.e. relational crafting. Only one issue, 'I make friends with

colleagues who have similar skills or interests', does not show any significant differences (p=0.202). In the remaining areas, the persons working at non-public universities had significantly higher results. The highest grade was recorded in both groups in reference to decisions to mentor new employees (officially and unofficially) – at both types of universities, the employees willingly accept this task. For non-public universities, M=4.81, SD=1.09 and 2/3 persons gave high grades (5–6), 90% – at least 4. In the case of public universities, these results are not as high, yet M=4.18, SD=1.44; almost half of the respondents chose answer 5 or 6, while 2/3 – at least 4. Much lower results were recorded in reference to two other issues: 'I organise or attend work related social functions' (in the case of public universities, half were low grades and only 28% were answers graded at 4 or more, M=2.78, median at 3, while for non-public universities, M=3.79, Me=4 and 23% of low answers) and 'I organise special events in the work place' (in the case of public universities, half were low grades, only 25% were answers at 4 or higher, M=2.98, Me=3, while for non-public universities M=3.90, Me=4 and 24% of low responses) – Fig. No. 1, Table No. 3.

Assessment of Properties of the Tool to Measure Job Crafting

The tool for measuring job crafting has well-known, good metric properties. Its utility for studying administrative employees of universities in the Silesia Province is confirmed by the results of exploratory factor analysis (EFA) and assessment of reliability. The EFA indicates the occurrence of three factors on the job crafting scale and their composition is compliant with the original tool (Table No. 4). The first factor comprises variables describing the sub-scale of cognitive crafting (CC) i.e. v6–v10. This factor explains 35.5% of variability of the latent variable, and its reliability is high (Cronbach's alpha amounts to 0.857). The values of factor loads are high here (above 0.5 for all items). The highest level of link with the F1 factor is recorded for variable v9 'I think about the ways in which work positively impacts my life' and v10 – 'I reflect on the role my job has for my overall well-being.' The second factor encompasses variables v11 – v15 comprising the sub-scale of relational crafting (RC). It explains approx. 13% of variance of the latent variable, while Cronbach's alpha amounts to 0.795 (which confirms high reliability of the scale in the examined population). Also in this case, the factor loads are high (minimum 0.630), while the highest values from the point of view of explaining relational crafting were assigned to two variables: v12 'I organise or attend work related social functions' and v13 'I organise special events in the workplace.' The last factor encompasses variables from the task crafting (TC) area. It explains approx. 11% of variance of the latent variable, while Cronbach's alpha amounts to 0.755 (and thus also this sub-scale has high reliability). Factor loads in this case have slightly lower values, yet for every variable they are higher than 0.5. The following variables are the most important here: v3 – 'I take on new tasks which, in my opinion, match my

skills and interests better', v2 – 'I change the scope or the type of tasks performed at work' and v4 – 'I decide to take on additional tasks at work' (Table No. 4).

Table No. 4. Job Crafting – Results of Exploratory Factor Analysis

Variable	Specification	F1	F2	F3	Own value
V9	I think about the ways in which works positively impacts my life	**0.841**	0.172	0.173	0.766
V10	I reflect on the role my job has for my overall well-being	**0.832**	0.077	0.014	0.699
V6	I think about how the job gives me life purpose	**0.772**	0.141	-0.021	0.616
V7	I think about the significance of my job for my company's success	**0.715**	0.185	0.295	0.632
V8	I remember about the significance of my work for the broader community	**0.658**	0.175	0.290	0.547
V12	I organise or attend work related social functions	0.034	**0.799**	0.107	0.651
V13	I organise special events in the workplace	0.031	**0.795**	0.085	0.639
V11	I make an effort to get to know people at work	0.277	**0.659**	0.201	0.552
V15	I make friends with colleagues who have similar skills or interests	0.212	**0.656**	0.024	0.476
V14	I decide to mentor new employees	0.190	**0.630**	0.421	0.609
V3	I take on new tasks which, in my opinion, match my skills and interests better	0.265	0.190	**0.759**	0.682
V2	I change the scope or the type of tasks performed at work	0.079	0.043	**0.735**	0.549
V4	I decide to take on additional tasks at work	0.186	0.160	**0.708**	0.561
V1	I introduce new approaches to improve my work	-0.040	0.160	**0.618**	0.409
V5	I prioritise tasks that suit my skills and interests	0.451	-0.002	**0.501**	0.454
Percentage of explained variance: for a given factor		35.5	12.8	10.7	
Total		35.5	48.3	59.0	

Bartlett sphericity test χ^2 (105) = 1316.9; $p < 0.001$*. KMO = 0.835.

Summing up, the study confirms that when assessing job crafting, it is necessary to take into account three sub-scales; each of them comprises five items consistent with the original tool. At the same time, a summary assessment of job crafting (JC) may be performed based on 15 items – the reliability of the scale as a whole is high, as testified by Cronbach's alpha at the level of 0.863. In the next step, four summary assessments were created as the sum of points received for items comprising a given scale. Each of the sub-scales of job crafting (TC, CC and RC) may thus adopt values from the range of [5; 30], while job crafting (JC) in general from the range of [15; 90]. The higher the value of summary variable, the higher the assessment of job crafting (in general and in a given area).

Summary Assessment of Job Crafting and Assessment of Dependence Among Scales

The results received in the studied population are high – the average assessment of job crafting (JC scale) is approx. 64 with the maximum of 90 points, while half of the respondents assess them at not fewer than 65 points. (Table No. 5). At the same time, the results significantly differ (in the t-Student test $p < 0.001$) – on average, lower results were received at public universities (mean and median at approx. 60) than at non-public ones (both statistics at approx. 67). A greater degree of diversity of results was received at public universities (at non-public ones, the assessment is more unanimous).

Table No. 5. Job crafting (overall and sub-scales) – in general and comparison according to type of university

Statistics	Job crafting (JC) [15; 90]			Task crafting (TC) [5; 30]			Cognitive crafting (CC) [5; 30]			Relational crafting (RC) [5; 30]		
	T	P	NP	T	P	NP	T	P	NP	T	P	NP
Minimum	23	23	28	5	5	8	7	7	7	5	5	7
Maximum	90	90	90	30	30	30	30	30	30	30	30	30
M	63.89	59.61	66.83	22.19	21.26	22.82	20.03	18.00	21.42	21.68	20.35	22.59
Me	65.00	60.00	67.00	22.00	21.00	23.00	20.00	18.00	22.00	22.00	21.00	23.00
SD	12.57	14.25	10.35	4.65	5.33	4.01	5.53	5.65	5.01	5.94	6.37	5.47
S	-0.48	-0.15	-0.42	-0.51	-0.45	-0.25	-0.18	0.30	-0.45	-0.64	-0.45	-0.74
p	<0.001*			0.023*			<0.001*			0.007*		

Min. – minimum, Max. – maximum, M – mean, Me – median, SD – standard deviation, S – skewness coefficient, p – probability in t-Student test for independent samples, * statistically significant differences ($\alpha = 0.05$); T – Total, P – public universities, NP – non-public universities.

As far as the remaining scales are concerned, the results are high – the means are at the level of approx. 20–22, while the maximum is 30 pts. (Table No. 5). In reference to each dimension of job crafting, there are significant differences between persons working at public and non-public universities, both with respect to task crafting, relational crafting and cognitive crafting: the scores of the employees of non-public universities were significantly higher. Greater differences refer to cognitive crafting (where the means differ by approx. 3.5 pts) than relational crafting (difference of more than 2 pts.) and task crafting (difference of approx. 1.5 pts.). Cognitive crafting at public universities is assessed the lowest at 18 pts. (Me also

amounts to 18), while the highest results were recorded for task crafting (M=22.8) and relational crafting (M=22.6) at non-public universities (half of the respondents from this group assesses this aspect of work at not fewer than 23 points). The distributions of variables are presented graphically (histograms) in Fig. No. 2.

The assessment of job crafting in individual areas is significantly bound in the statistical sense – both in general terms, as well as for both types of universities. The distribution diagrams (Fig. No. 2) confirm the positive correlation among individual sub-scales of job crafting, while the correlation coefficients indicates that its strength is moderate (Table No. 6).

Fig. No. 2. Job crafting – distributions of sub-scales and their correlations

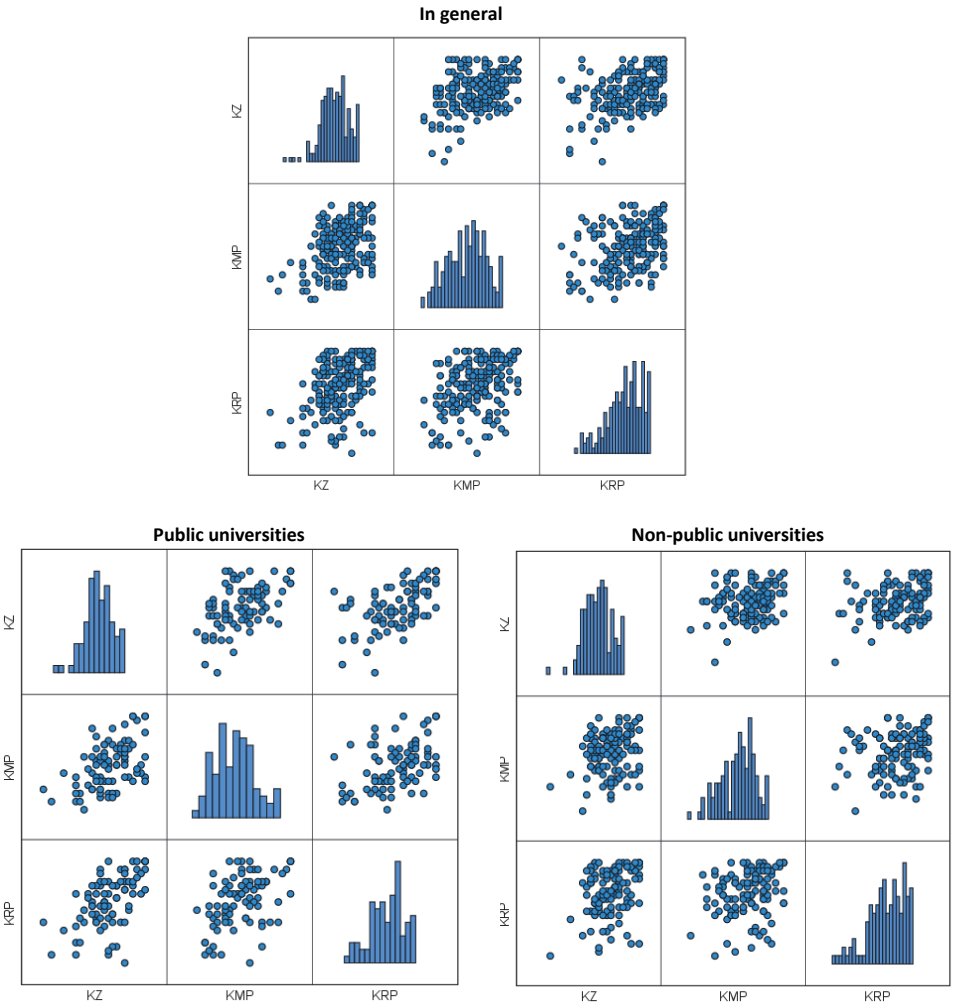


Table No. 6. Correlations among individual dimensions of job crafting – in general and according to type of university

		In general			Public			Non-public		
		TC	CC	RC	TC	CC	RC	TC	CC	RC
TC	r	1	0.395	0.449	1	0.500	0.562	1	0.233	0.295
	p		<0.001*	<0.001*		<0.001*	<0.001*		0.009*	0.001*
CC	r	0.395	1	0.389	0.500	1	0.471	0.233	1	0.251
	p	<0.001*		<0.001*	<0.001*		<0.001*	0.009*		0.005*
RC	r	0.449	0.389	1	0.562	0.471	1	0.295	0.251	1
	p	<0.001*	<0.001*		<0.001*	<0.001*		0.001*	0.005*	

r – Pearson's linear correlation coefficient, p – probability in significance test of correlation coefficient, * – statistically significant dependence ($\alpha = 0.05$)

Correlation coefficients among individual sub-scales of job crafting amount to approx. 0.4 (correlation is relatively strong). Correlation that is almost twice weaker is observed in the case of non-public universities as compared to public universities, and thus at public universities, stronger job crafting in one area translates to the situation in another area. In turn, in the light of statements of employees of non-public universities, in their case each of these areas of job crafting remains in a quite weak (yet statistically significant) relationship. Thus, insofar as the approach to tasks at work on the part of employees of non-public universities does not significantly translate to their approach to relations at work and how they perceive their work in their system of values, then at public universities, this relation is much stronger. Similar conclusions refer to how the approach to relations and thinking about work translate to other areas of job crafting. At both types of universities, the correlation between task crafting and relational crafting is the strongest. In particular, this refers to public universities (r=0.562), yet also at non-public universities, the correlation for these two areas is stronger than for others, yet the strength of the relation is weaker (r=0.295).

Recapitulation

Summing up the compiled results of the survey conducted among administrative employees at public and non-public universities in the Silesia Province, it must be stated that in the studied populations, the majority were employees of non-public universities, women and persons aged 35–44 with higher education. It is interesting to note that twice as many employees of non-public universities – as compared to public ones – completed post-graduate studies. Specialist and independent positions were dominant among the respondents. Public and non-public universities differed significantly as far as work experience at the university is

concerned – persons working at public universities had longer work experience, similarly to the overall job seniority.

As far as the results received in the job crafting scale are concerned, it is clearly noticeable that the majority of the respondents introduce new solutions in their work to improve it. Also a significant portion of the respondents decide to accept new tasks at work and reflect on the role of the job for the overall well-being of the respondents. The majority of the respondents mentor new employees (officially or unofficially), as well as make efforts to get to know their colleagues. A considerable number gives priority to tasks that suit their skills and interests. On the other hand, few organise or attend work related social functions and organise special events in the workplace (e.g. birthday celebrations of a colleague), as well as change the scope or the type of tasks that are performed at work.

Taking the type of university into account, in a part pertaining to 'Cognitive Crafting', the statistically significant differences refer to two areas – significance of work for the community in general and significance of work for the success of the organisation. For both, generally higher grades were recorded for non-public universities as compared to public universities. At both types of universities, the highest results refer to the statement 'I reflect on the role my job has for my overall well-being.' The respondents considered the statement about the significance of their work for the community in general the least significant.

When comparing the results of studies at public and non-public universities, the difference in the area of 'task crafting' should be noted – the greatest disproportion refers to the statement 'I take on new tasks which, in my opinion, match my skills and interests better' – in this case, in reference to non-public universities, a significantly higher grade was recorded in comparison to public universities. Also the employees of non-public universities as compared to public universities more often decide to accept additional tasks and change the scope or the type of tasks performed at work.

In the last area, pertaining to the relational crafting, most statistically significant differences were recorded between the public and non-public universities (the exception was the statement pertaining to making friends with persons with the same interests or skills). In the remaining four statements, the persons working at non-public universities received significantly higher results. In general, at both types of universities, the highest grades refer to the statement related to the decision to mentor new employees (officially and unofficially).

The results with respect to job crafting received in a given community are high, while higher results refer to non-public universities. Furthermore, at non-public universities, the results are more uniform than at public universities.

It is also worth noting that at public universities, job crafting in one area exerts greater influence on the situation in another area as compared to non-public

universities. Nevertheless, at both types of universities, each of the studied areas of job crafting remains in a statistically significant relation (in the case of non-public universities, these relations are weaker than in the case of public universities).

At both types of universities, the strongest correlation takes place between task crafting and relational crafting.

The results received in the study may indicate certain recommendations for the management practice. 'A university should be entrepreneurial, foster climate and space conducive to development of creative stances of students and employees' (Santarek, Bagiński, Buczacki, Sobczak, Szerenos 2008, p. 141). According to the study, employees initiate actions in the realm of job crafting at both types of universities, yet employees of non-public universities do it to a greater degree. This may follow from the fact that non-public universities are less hierarchic in decision-making processes and much more flexible in operation: less bureaucracy also affects the speed of decision making, efficient communication and inclusion of employees in decision-making and strategic processes, better availability of authorities and decision-makers, as well as greater inclination to introduce innovations (Fazlagić 2013). Without doubt, job crafting on the part of administrative employees at every level is an innovative action, which allows them to react fast and to flexibly adjust to the context of work and thus facilitate implementation of organisational changes and job improving changes (Chmiel, Fraccaroli, Sverke, 2017). Obviously, job crafting is, by assumption, a grass-roots initiative; nevertheless, it is worth introducing conditions that are conducive to its development in an organisation. What is more, managers may encourage the employees to independently adapt to changes by creating possibilities for self-regulation (acquiring control) in uncertain, changing environments.

Sławomir Króliczek[2]

Leaders of the future in turbulent times of change and uncertainty

Abstract: An analysis of the relevant literature reveals that effective leadership is a major challenge for modern leaders. The primary goal of the article was to present the role of leaders of the future in organisations. Also presented were the differences between the development of leaders and the development of leadership in economic entities. Selected leadership systems were also discussed, particularly those which support a new model of leadership. All models presented in this article share certain characteristics, including a lack of hierarchy within the organisation and employees being free to make decisions. Examples of organisations employing the new leadership model were presented. The new models of management offer a range of advantages for the employees, and thus also for the organisation itself. This means that modern management should differ from its previous versions. In light of the above, this is a vital issue which merits further analyses by researchers.

Keywords: Leader, leadership, management, managers, management 3.0

This article is an attempt to analyse the attitudes, behaviours and actions of leaders, as well as factors which significantly impact the performance of organisations. For this purpose, leadership and leading are also given a cursory overview. A great deal of attention is paid to the position, identity – in the general sense – and role of the leader of an organisation. In addition, popular models of leadership are presented, as is the evolution of leadership caused by global transformations. An important part of the paper also focuses on systematising the terminology used to analyse the subject matter. This is of great importance, as it makes it possible to properly understand, and subsequently also to make use of, various terms. Conflicts regarding ambiguous and at times unclear terms frequently lead to their misuse in practice. An added value of this article is the diversity of the examples cited and the references used in the research concerning the subject matter.

The functioning and the continued development of an organisation are largely contingent upon its employees, the leader and their traits. Leading a team of

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subordinates, who should be perceived as important actors within an economic entity, is a very difficult and important challenge. Above all, it requires adequate preparation, the ability to set clear and transparent goals, to motivate employees and being constantly driven to self-develop.[3] All actions taken by the leader are multi-dimensional and multi-aspectual in nature. If only for the above reasons, it is valid to claim that the role of the leader of an economic entity is a very important one. Leadership is undoubtedly a highly popular subject, as evidenced by the ever-increasing number of papers being published in the field. One of the reasons for this is the belief that all actions taken by leaders impact the functioning of their economic entities, which succeed or suffer failure as a result. The first analyses of this topic were conducted between 1900 and 1945. It should be noted that no single, ironclad rule to which leadership is subject exists; however, it is still possible to identify certain constituent traits of leadership. The relevant literature describes leadership as a relationship based on influence, which characterises the various actions of the leader and his or her supporters.[4] The term also refers to the primary aspects of positive leadership.[5] Leadership is also defined as the power to generate ideas, which are subsequently driven by collective actions. This is most frequently facilitated by a concrete vision. The process of influencing another individual or group of individuals focuses primarily on steering actions which directly contribute to achieving a common goal.[6] J. Malczyk lists four vital aspects of leadership, namely the person, the process, the position and the achievement of results. Leadership occurs when the influence of the leader has a motivating effect on their subordinates. This type of influence stimulates strategic thinking and actions. It should be kept in mind that nothing motivates subordinates as effectively as a leader with a positive image and charisma. Thus, it is important that they are seen as a role model by their subordinates. The actions and behaviour of a leader should also raise no concerns and be in line with any verbal declarations. It is therefore evident that leaders are perceived primarily through the lens of personal leadership. A leader is only viewed as such if their subordinates acknowledge the leader's relevant traits, including personality traits, skills, experience, knowledge, interests and abilities. In other words, a leader is a person who is able to exert influence on the psychological (including a sense of identity and skills), emotional (including fostering autonomy) and institutional (rewards and penalties, norms, rules and procedures – which

3 M. Geryk, *Rola przywódcy a skuteczne zarządzanie organizacją w zmiennym otoczeniu*, (in:) *Współczesna problematyka wybranych zagadnień prawnych i ekonomicznych*, M. Geryk, A. Pławska (eds.), WSZ, Gdańsk 2016, p. 92.

4 B. Rożnowski, P. Fortuna, *Psychologia biznesu*, 1st edition, Wydawnictwo Naukowe PWN, Warsaw 2020, p. 321.

5 R. Karaszewski, A. Lis, *Czy koncepcja pozytywnego przywództwa może stać się paradygmatem w naukach o zarządzaniu?,* Nauki o Zarządzaniu 2(27), Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław 2016, p. 73.

6 R. Kozłowski, *Przedsiębiorcze przywództwo – opis zjawiska i próba oceny*, 'Management Forum', no. 1, vol. 4, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław 2016, pp. 25–26.

comprise the motivation system) assets of other people.[7] On the other hand, K. Eikenberry and W. Turmel define the term as willingly following someone whose actions lead to the achievement of a certain result. It can therefore be claimed that leading is undoubtedly a very complex process, one which should be perceived as a specific action, abilities and aptitude, as well as bearing responsibility.[8]

Leadership, as well as its function and role in an organisation, has fascinated humanity since the dawn of time. It should be noted that our changing reality is accompanied by an evolution in the functioning of various economic entities and their organisational cultures. Modern transformations resulting from the internationalisation of the economy, globalisation, the development of computers and other technologies, market competitiveness and instant culture have had a tremendous impact on the life of every human being and their (immediate or more distant) environment. In particular, the rapid progress resulting from these changes has contributed to the emergence of an alternative model of society. This model emphasises agency, treating people as individuals, knowledge, values, experience, abilities and skills. The relevant literature contains numerous publications and research reports, the primary goal of which was to identify the essence of leadership and leadership skills. However, researchers have so far been unsuccessful when it comes to defining a set of attributes which every leader should have. Nevertheless, it has been determined that an immanent trait of every leader is the ability to lead people effectively. Although this may appear obvious, it should be kept in mind that not every leader possesses this ability. Therefore, the concept of leadership and its evolution across various turbulent transformations merits a discussion. All such changes have had an impact on every area of human activity and the reality in which humans operate. D.A. van Seters and R.H.G. Field, in an attempt to trace the evolution of leadership, list the main periods for all existing theories known to them, which they organise into nine eras:

1. The personality era – related to the great man theory and involving analyses and interpretations of the lives of major historical figures, people who performed great deeds and shaped reality in accordance with their visions; such characters include Julius Caesar, Napoleon and Alexander the Great, whose leadership primarily consisted of building strategic plans, courage, eagerness to lead their subordinates and inspiring them to work together, thus allowing them to succeed;[9]

7 J. Majczyk, *Stworzyć lidera. Od wizerunku beniaminka do rozgrywającego w biznesie*, Wydawnictwo Naukowe Wydziału Zarządzania Uniwersytetu Warszawskiego, Warsaw 2019, pp. 13–14.

8 K. Eikenberry, W. Turmel, *Przywództwo na odległość. Jak być skutecznym przywódcą zespołów rozproszonych*, M. Justyna (translator), Dom Wydawniczy Rebis, Poznań 2019, pp. 12–16.

9 M. W. Kopertyńska, *Przywództwo w organizacji czynnikiem sukcesu*, Acta Universitatis Wratislaviensis no. 3695 'Przegląd Prawa i Administracji' CIII, Wrocław 2015, p. 255.

2. The influence era – which focused on sources of power and the application thereof;
3. The behavioural era – which focused on the effective and ineffective actions of leaders respectively;
4. The situation era – where the focus was on leadership being utilised in specific moments;
5. The contingency era – a focus in particular on various factors which resulted in leadership occurring;
6. The transactional era – in addition to incorporating all of the above theories, it is also characterised by the ability to differentiate between roles and social interactions;
7. The anti-leadership era – focused on questioning the essence and meaning of leading. Its proponents promoted various leadership substitutes;
8. The culture era – its main purpose was to stimulate subordinates to lead themselves;
9. The transformational era – which takes into account the actions of leaders in a changing reality.[10]

G.C. Avery, on the other hand, organises existing leadership models using a holistic and multi-aspectual approach which distinguishes between four paradigms:

- classical,
- transactional,
- visionary,
- organic.[11]

It is important to note that the first three paradigms mirror the above eras of leadership models. The final one can be seen as the next step, an era which focuses on communication in its broadest sense. From this perspective, leadership is viewed as an interaction and assumes an interdisciplinary character. When discussing the subject at hand, it is important to be cognisant of the modern perception of the development of leaders and the development of leadership. It can often be observed in the literature that these terms are used interchangeably by a certain group of practitioners and theorists. However, a certain group of researchers identifies significant differences between them, and is of the opinion that the two terms are not to be conflated. D.V. Day lists what he considers to be certain major differences between the development of leaders and the development of leadership.[12]

10 K. Grzesik, *Od rozwoju przywódców do rozwoju przywództwa, czyli od rozwoju kapitału ludzkiego do rozwoju kapitału społecznego organizacji*, (in:) P. Wachowiak, S. Winch (eds.), *Granice w zarządzaniu kapitałem ludzkim*, Oficyna Wydawnicza Szkoła Główna Handlowa w Warszawie, Warsaw 2014, p. 226.

11 K. Grzesik, *Od rozwoju przywódców do rozwoju przywództwa…*, op. cit., pp. 225–227.

12 *Ibidem,* p. 229.

Table 1. Differences between the development of leaders and the development of leadership

Point of comparison	Development of leaders	Development of leadership
Type of capital	People	Society
Fundamental competencies	Intrapersonal	Interpersonal
Leadership model	Individual	Relational
Basic skills	Self-awareness Self-regulation Self-motivation	Social awareness Social skills

Source: based on K. Grzesik, *Od rozwoju przywódców do rozwoju przywództwa, czyli od rozwoju kapitału ludzkiego do rozwoju kapitału społecznego organizacji*, (in:) P. Wachowiak, S. Winch (eds.), *Granice w zarządzaniu kapitałem ludzkim*, Oficyna Wydawnicza Szkoła Główna Handlowa w Warszawie, Warsaw 2014, p. 229

In light of the above, the differences between the development of leaders and the development of leadership are significant. The development of leaders emphasises competencies and skills, which comprise attributes such as knowledge, abilities and credibility. This, in turn, may be interpreted as investing in what is broadly defined as human capital. This type of development fosters fundamental skills, which include self-awareness, self-regulation and self-motivation. Self-awareness comprises traits such as confidence and knowledge of oneself, as well as emotional awareness. Self-regulation, on the other hand, is understood to include traits responsible for adapting to our changing surroundings, taking responsibility for our decisions and self-control. Lastly, self-motivation manifests primarily in the ability to display initiative and become involved in projects.

In contrast, the development of leadership should be viewed through the lens of social capital, major aspects of which include mutual relations, coexistence and working together. The foundations of leadership consist of interpersonal skills, which are based on awareness (empathy, being service-oriented) and social skills (being team-oriented, dispute and conflict management, bonding).[13]

Modern leadership is typically rooted in rational leadership, which only accepts rational sources of power. This point of view assumes that entities entering into a mutual relationship are, first and foremost, mature professional ones.[14] Thus perceived, leadership serves a very important function in any organisation. It therefore appears that leadership is not to be conflated with the position a person holds or any type of hierarchy. In this context, the leader may be anyone who is able to

13 *Ibidem.*

14 M. Czajkowska, *Sprawiedliwość jako wartość w przywództwie organizacyjnym*, Wydawnictwo Uniwersytetu Łódzkiego, Łódź 2020, p. 79.

assume control of the situation and steer the course of events in the right direction. Therefore, this also covers the case of temporary leadership. In this model, after a task has been completed, the leader may return to their original position, which may or may not have been related to the function they temporarily assumed. This example demonstrates that leadership affects every member of the organisation, who should all feel that they are being treated equally. However, it is important to mention certain exceptions which are directly related to the application of the principle of justice in its broadest sense. While certain people do become effective leaders, for others leadership is a major challenge which causes them to suffer emotional damage. Not every person can adapt to become a leader, make rapid and correct decisions and perform in stressful conditions. This is why, according to Rawls, the correct solution is to deprive such people of the privilege of being able to lead others. Self-directed work teams are currently becoming increasingly popular. The goal in this context is for every employee in an organisation to possess self-control and self-awareness skills. In any event, the primary goal is for every employee to become their own leader. In an organisation, every leader serves a different function. However, by far the most important function of all should be to foster an organisational culture, the primary goal of which is to drive employees to strive towards rational leadership. This goal is pursued by numerous organisations. However, some entities implement the modern leadership model only on certain levels, or apply it to selected elements. In practice, organisations which employ the model only superficially do exist.[15]

The most popular theories in support of the new leadership model are remote leadership, self-leadership, authentic leadership and turquoise leadership.[16] The Management 3.0[17] and lean management[18] models also deserve special mention. Remote leadership is related to distributed leadership, both of which have grown in popularity in recent years. It is often the case that employees perform their tasks outside their workplace, which may be a local office, branch or headquarters. Leaders may need to lead their teams while on business trips. At times, they must also lead their teams from another country than where the company is located. In such situations, it is important to realise that, in addition to working from a different location, employees also perform their duties at various hours. As a result, leaders of the future must also effectively manage teams whose members

15 *Ibidem*, pp. 80–95.

16 *Ibidem*, p. 95.

17 J. Appelo, *Zarządzanie 3.0 Kierowanie zespołami z wykorzystaniem metodyk Agile*, I. Jakóbiak, J. Zatorska (translators), Wydawnictwo Helion, 2016, pp. 42–45.

18 A. Byrne, *Jak zrewolucjonizować firmę dzięki Lean Management czyli jak prezesi, dyrektorzy i właściciele wykorzystują zasady Lean Management do transformacji swoich firm i do zwiększenia wartości dostarczanej klientom,* First edition, Wydawnictwo Lean Enterprise Institute Polska, Wrocław 2013, pp. 49–73.

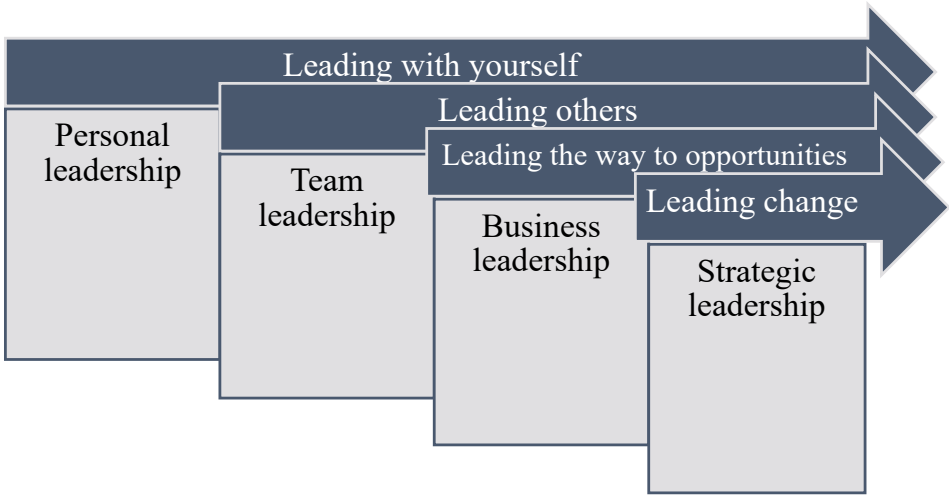
are scattered across the globe, which is undoubtedly a very difficult task, though not an impossible one. This certainly requires dedication, as well as a great deal of time and effort from the leader. In *Remote Leadership,* K. Eikenberry and W. Turmel develop a system which they dub the 'Three-O' model. The authors encourage leaders to combine the foundational elements of leadership, which include the end result, the leader and the employee, with management. This model emphasises the use of modern IT and communication tools. Such a solution not only facilitates the effective management of a distributed team, but also makes it possible for leaders to fulfil a range of other necessary responsibilities. The authors consider leadership and its roles to be of primary importance, while the location of individual employees and managers is secondary. The publication touches upon the important issue of having to lead in various conditions and situations. It also emphasises that technology should be viewed as an asset to be used in modern management, and not as an obstacle. Thus, no effort should be spared to ensure that all tools are used at work in a responsible and reasoned manner, resulting in success. Building trust remotely is a very difficult task, and is certainly not something that happens spontaneously. Thus, a methodical and professional approach to the issue is required. Lastly, the essence of leadership should always consist in the leader being focused not only on the end result, but also on their own needs and the needs of their subordinates. This is why one of the greatest challenges that leaders face is effectively motivating subordinates to engage in various initiatives, and ensuring that this engagement is maximised. The publication also stresses the fact that a leader cannot do everything on their own; delegating responsibilities should be a part of the daily life of the organisation and its management. In light of the above, the primary responsibilities of a leader should be to strive towards a model in which every employee is capable of performing tasks, as well as being responsible for and performing them in an effective manner.[19]

The self-leadership model was first introduced in the 1980s. In the literature, it is described as a process in which the leader controls their behaviours, thus exerting influence on themselves via an individual set of competencies. Directing one's actions and influencing oneself are presented as being primarily rooted in what is broadly defined as self-awareness. This, in turn, should have a tremendously positive influence on taking effective actions in real-life scenarios. A self-leader primarily focuses on self-improvement, autonomy, expanding his or her self-awareness, confidence and individual effectiveness. It can thus be said that this type of leadership relies in particular on being aware of one's aims,

19 K. Eikenberry, W. Turmel, *Przywództwo na odległość…,* op. cit., pp. 11–296.

knowledge, experience, skills and values.[20] C. Sikorski believes that self-leadership primarily requires a partnership-based organisation, one in which most relationships are horizontal. Such organisations consider expanding their employees' knowledge far beyond their professional specialisations to be a major goal. The reasoning behind this is that the more educated the employees are, the less direction they require. People who possess diverse knowledge freely and eagerly strive to further expand their skills, and wish to share them with others. Such employees very often generate various ideas and offer creative solutions for which they are capable of assuming full responsibility. According to Sikorski, strong motivation is a necessary requirement for autonomous and responsible decision-making. This motivation serves as an individual stimulus, and may be rooted in ambition, engagement or a degree of interest in one's responsibilities. It also bears noting that motivating oneself can often be significantly more difficult than motivating subordinates.[21] The literature thus lists four fundamental levels of self-leadership, which are presented below.[22]

Image 1. Levels of self-leadership.



Source: based on D. Miąsek, B. Bliźniuk, *Samoprzywództwo i Spiral Dynamics – implikacje dla coachingowego stylu zarządzania*, 'Coaching Review' 1/2014, p. 21.

20 D. Miąsek, B. Bliźniuk, *Samoprzywództwo i Spiral Dynamics – implikacje dla coachingowego stylu zarządzania*, 'Coaching Review' 1/2014, pp. 19–20.

21 Cz. Sikorski, *Autorytaryzm i partnerstwo*, 'Zarządzanie Zasobami Ludzkimi', no. 6/2011, p. 119.

22 D. Miąsek, B. Bliźniuk, *Samoprzywództwo i Spiral Dynamics…*, op. cit., pp. 16–18.

Although it is a highly complex management process, self-leadership also offers a wide range of advantages, including independence, responsibility, trust, creativity, positively influencing others, the ability to collaborate and coexist, a sense of satisfaction, increased positive energy driving action and an increased sense of self-worth. Of course, each of the advantages listed above first and foremost constitutes a part of increased engagement. This means that, in turn, they positively impact conscious decision-making and the resulting sense of responsibility. Therefore, it is vital that managers facilitate the development of self-leadership. Of tremendous importance in this context is not only the leader, but also the organisational culture of the company, which is also shaped by the leader and other individuals. It is important to provide working conditions whose primary aim is to motivate, support and inspire leaders. In summary, effective self-management is necessary to be able to serve the extremely important leadership function. Modern leaders are increasingly required to approach work and management in a holistic manner.[23]

Authentic leadership can be defined as leadership that is strictly transparent, open and honest. In the 20th century, G. George, a Harvard University professor, took an interest in researching authentic leadership. In his view, this type of leadership encompasses elements such as learning from one's actions, practices and experiences, discovering oneself, as well as one's values and principles, balancing one's sources of motivation (intrinsic and extrinsic), the ability to share responsibilities with subordinates, team building, the ability to collaborate and coexist, as well as integrating individual elements of one's own existence (house, workplace, family, friends). In 2003, F. Luthans and B. Avolio posited that an authentic leader is a person who is self-aware, tenacious and transparent in their leadership.[24] Based on this, one can conclude that this type of leadership comprises primary attributes such as self-awareness, an internalised moral perspective, a degree of relational transparency, being open to feedback and ethical conduct.[25]

Currently leaders increasingly strive to lead turquoise organisations, which are viewed as the next step in their evolution. In 2014, F. Laloux published his book *Reinventing Organizations,* which is based on a concept originally introduced by Clare Graves and expanded by D.E. Beck and C.C. Cowan in 1996. The publication was widely popular, particularly in management-related circles. Laloux concludes that turquoise organisations are the most developed and effective forms of human collaboration. In this model, every level of human awareness development

23 *Ibidem*, p. 19.

24 P. Korzyński, *Przywództwo w erze cyfrowej. Sposoby pokonywania ograniczeń na platformach społecznościowych*, Wydawnictwo Poltext, Warsaw 2018, p. 35.

25 P. Zbierowski, *Przywództwo w kontekście pozytywnym – autentyczność lidera i kapitał psychologiczny*, 'Organizacja i Kierowanie' no. 2/2017, p. 156.

was assigned a different colour.[26] In a turquoise organisation, every employee is of fundamental importance, and should be treated as an individual possessing agency, as well as constituting the main capital of every economic entity. Effective leadership is contingent upon a variety of factors, the most important of which is providing working conditions which motivate and actively involve employees in achieving shared goals.[27] The most important competencies of the employees of a turquoise organisation primarily include a well-established value system aligned with the mission and vision of the company. In addition, communication and interpersonal skills are also valued. The leader should foster physical, intellectual, and also emotional engagement. Most importantly, this results in the employees being passionate about their tasks and striving to self-develop, and in turn helping to develop the organisation as well. A major milestone on the path to such success is undoubtedly working on the self-awareness of subordinates, who should profess the same values while also being focused on the mission and vision of the organisation.[28]

Table 2. The meaning of the colours used in turquoise leadership

Colour	Purpose	Meaning	Example
Red	Short-term	Leadership based on intimidation and fear.	Gangs, mafia
Amber	Recurring	Characterised by a formalised hierarchy and strict rules.	Military, police, government agencies, the Catholic Church
Orange	—	Employee competencies matter. Profit, responsibility and innovation are important.	Corporations, investment banks
Green	Long-term	Customer satisfaction is of tremendous importance, as are shared values based on partner relationships.	A well-functioning family perceived as a social micro-organisation
Turquoise	Long-term	People are the most important actors. No bosses or divisions, equal rights	FAVI, Buurtzog[29]

Source: author's own work based on A. Jeznach, W. Eichelberger (co-author), *Szef, który ma czas. Ewolucja zarządzania – dziennik budowy turkusowej firmy*, Wydawnictwo One Press, Gliwice 2017, p. 19; D. Miąsek, B. Bliźniuk, *Samoprzywództwo i Spiral Dynamics – implikacje dla coachingowego stylu zarządzania*, 'Coaching Review' 1/2014, p. 21.

26 A. Jeznach, W. Eichelberger (co-author), *Szef, który ma czas. Ewolucja zarządzania – dziennik budowy turkusowej firmy*, Wydawnictwo One Press, Gliwice 2017, p. 19.

27 A. Pocztowski, *Zarządzanie zasobami ludzkimi. Strategie – procesy – metody,* Polskie Wydawnictwo Ekonomiczne, Warsaw 2007, p. 187.

28 A. Kałwa-Rojczyk, *Funkcjonowanie turkusowych organizacji w kontekście kompetencji pracowniczych*, 'Studia i Prace WNEIZ US: Problemy Teoretyczne i Metodyczne' no. 51/2 2018, pp. 49–50.

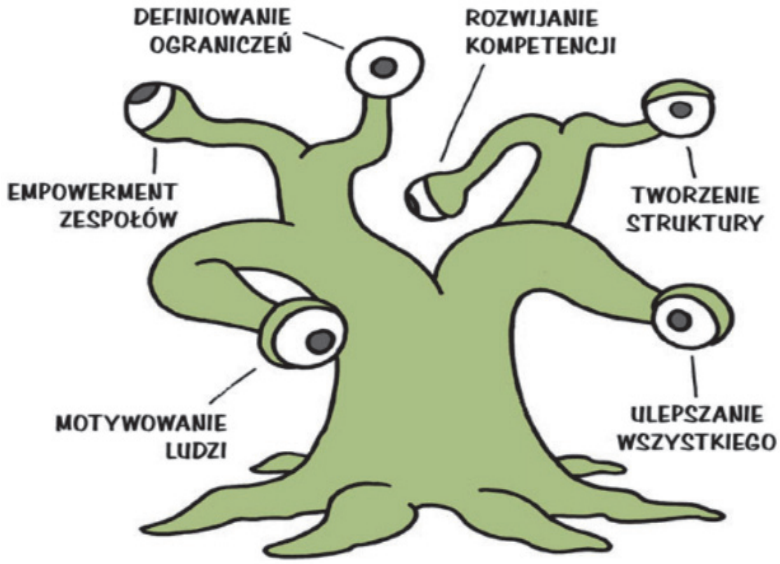
29 R. Szrajnert, *Turkusowa organizacja (turkusowe zarządzanie), model rozwoju firmy*, https://www.rafalszrajnert.pl/turkusowa-organizacja-turkusowe-zarzadzanie/, [accessed on: 15 February 2022].

A turquoise organisation is based on collaboration and communication in the broadest sense of these terms. Its employees perform their duties autonomously, jointly building the mission of the organisation. In addition, the rules which apply to every employee are clear, and every subordinate, no matter what their position, feels that they are an important element of the organisation. Their collaboration is based on mutual trust. It is important to remember that common goals can only be achieved if all parties can trust one another and treat one another fairly. A turquoise organisation supports neoliberalism in its broadest sense, as well as a different type of competition within the company. It bears mentioning that building such an organisation is difficult, and many decision makers are simply afraid of this model. This should come as no surprise, as the lack of a defined hierarchy and employee freedom still make for a relatively controversial and definitely suspicious system of management. However, as demonstrated in Table 2, organisations which have successfully implemented this model do exist, and have been able to succeed in the long term as a result. Managers are often faced with the following question: if the organisation encounters any difficulties, should the previous management model be reimplemented? However, it is precisely in the face of adversity that a turquoise organisation demonstrates its full power. In such situations, the employees "take matters into their own hands" and work even harder. It is often the case that, in difficult situations, employees are capable of generating new ideas and innovative solutions, which certainly does contribute to achieving long-term success.

On the other hand, Management 3.0 grants the leader insight into his or her responsibilities within the organisation and the complexity of managing teams in turbulent times. This model also demonstrates how a leader should strive to adapt to the constantly changing reality, instead of focusing on predictability and at times random actions which are not always effective. The Management 3.0 model is described extensively and transparently in a publication by J. Apello, who illustrates it using the following figure known as 'Martie. The Management 3.0 Model'.[30]

30 J. Appelo, *Zarządzanie 3.0 Kierowanie zespołami z wykorzystaniem…,* op. cit., p. 43.

Figure 1. Martie. The Management 3.0 Model



Source: https://agilehunters.com/zarzadzanie-3-0-czym-jest-przywodztwo-w-duchu-agile/, [accessed on: 15 February 2022].

Martie illustrates the six elements of Management 3.0, which include aligning constraints, energising people, empowering teams, developing competence, creating structure and improving everything. From the perspective of Management 3.0, the employee is the most important element of every organisation. A major responsibility of leaders should be to act in a way which ensures that their subordinates are active, creative and motivated to engage in projects. Teams are capable of self-organisation, but this requires the leader to empower them with regard to trust and authorisation in the broadest sense. It is also worth mentioning that only an organisation whose teams are complete and characterised by mutual trust, and whose leader contributes to developing their competencies, can expect to achieve long-lasting success.[31]

Many modern leaders utilise the lean management model in their work, doing so for a minimum of two reasons. First, lean management can be used as a strategic weapon whose purpose is to improve effectiveness and performance. Second, responsibility towards employees in a broad sense serves an important role. This means that caring about subordinates and facilitating their development are a priority. Therefore, effectively building the organisation's strategy around this model is very important. This task is very difficult yet vital, as it must involve concise and

31 *Ibidem*, pp. 329–330.

simple goals without constraining the development of subordinates. It is important to remember that even the most complex strategy can be executed by employees, as long as it aligns with their personal goals. Another equally important step is to define the core values of the organisation, which should serve as guidelines. Core values should pertain to several key issues, and it is important to avoid lofty dreams or wishful thinking in favour of concrete, simple and lasting values which the organisation can accept and profess.[32] This management philosophy is also related to the lean manufacturing model, which has been employed by the popular car manufacturer, Toyota, for more than three decades. Every single indicator in businesses utilising this model reaches unparalleled levels, and not only in the manufacturing sector; this model is also growing in popularity in the service sector. It consists in shortening the path between a client submitting an order and their receipt of the goods or service, in a bid to limit waste as much as possible. Waste, in this context, is defined as any human activity requiring a certain amount of effort, but which adds no value. Eliminating waste offers various advantages, including shortened delivery times, freeing trapped funds and decreased manufacturing costs.[33]

The above description of leadership models demonstrates that they all share certain characteristics. The first of these is sharing power with subordinates, which should be viewed as a vital skill of any leader. Of course, the feasibility of this depends on the maturity of the subordinates themselves. The situation will undoubtedly differ across various types of businesses. The second shared characteristic is that power is distributed, which occurs in every model described above. This is a long-term process which should encompass the entire organisation, as opposed to a single area.[34] Another shared characteristic is that every employee is viewed primarily as an important actor. This means it is important to take into account the needs of subordinates, as well as to effectively motivate them and foster their engagement. Leaders should also remember that the development of the employees contributes to the development of the organisation. This is why it is vital to effectively organise projects in which employees want to participate in order to improve their skills and expand their knowledge.

It is important to remember that modern leaders operate in an ever-changing environment characterised by either a glut or a dearth of information, acceleration, mobility, unpredictability, network structure, complexity, competitiveness and uncertainty. Nevertheless, the responsibility of the leader often consists in making correct and rapid decisions which will have consequences in the future. It is very

32 A. Byrne, *Jak zrewolucjonizować firmę dzięki Lean Management…*, op. cit., pp. 49–63.

33 A. Łazicki, M. Lewandowski, *System zarządzania przedsiębiorstwem – techniki Lean Management i Kaizen,* Wydawnictwo Wiedza i Praktyka sp. z o. o., Warsaw 2014, pp. 7–9.

34 M. Czajkowska, *Sprawiedliwość jako wartość…*, op. cit., p. 79.

often the case that strategic, innovative and tactical decisions cannot be postponed. Therefore, when making a particular choice, leaders rely not only on rational analyses of extensive data, but also very frequently on their own experience and intuition.[35] Every crisis and its resulting changes constitute the natural environment in which leaders must operate. When everything proceeds in accordance with the strategy, the responsibilities of the leader are limited to administration. However, when an unexpected situation, crisis, problem or difficulty arises, such an occurrence is of major importance to the leader. This means that the leaders of the future are those who can transform the majority of threats to their companies into opportunities, and who can significantly facilitate the functioning of their organisations and strengthen their position on the competitive market.[36]

Summary

The primary goal of the article was to present the role of leaders of the future in organisations. Also presented were the differences between the development of leaders and the development of leadership in economic entities. An analysis of the relevant literature reveals that effective leadership is a major challenge for modern leaders. Their immanent traits are primarily the ability to effectively lead others, treating subordinates as individual actors, as well as properly motivating them to engage in their responsibilities. In addition, it is also vital that the leader provides employees with working conditions which facilitate their holistic development. These responsibilities appear relatively difficult, and must be adapted to a constantly evolving environment. Many of the global transformations occurring today, including technological and communications progress, as well as economic and political development, preclude the application of tried and tested models. As a result, the actions of the leader should align with the needs of the clients and those of the competitive market.

Selected leadership systems were also discussed, particularly those which support a new model of leadership. This comparison led to the formulation of an important conclusion. It was discovered that all models presented in this article share certain characteristics, including a lack of hierarchy within the organisation and employees being free to make decisions. Examples of organisations employing the new leadership model were presented. It should be emphasised that it is thanks to this model that they are able to achieve success in the long term. It is vital that changes are always applied to the entire organisation, as only this approach guarantees lasting benefits. The new model of management offers a range of advantages

35 K. Malewska, *Doskonalenie potencjału intuicyjnego współczesnego menedżera*, 'Nauki o Zarządzaniu' vol. 4(17), Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław 2013, p. 87.

36 B. R. Kuc, *Trudna droga do przywództwa wyższej generacji*, 'Master of Business Administration' 3/2011, Akademia Leona Koźmińskiego, p. 85.

for the employees, and thus also for the organisation itself. Society, which operates in a changing environment, seeks new stimuli, which are primarily provided by self-leading organisations. These are characterised primarily by trust and collaboration based on what is broadly defined as communication. This means that modern management should differ from previous versions. In light of the above, this is a vital issue which merits further analysis.

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Andrzej Kulis[1]

The impact of the COVID-19 pandemic on the pass rate for the state driving exam at regional road traffic centers in Słupsk and Zielona Góra

Abstract: The main goal of this article is to present the impact of the pandemic on the pass rate of the state driving exam for the category B driving license at the Regional Road Traffic Centres (WORD Centres) located in Słupsk and Zielona Góra. The specific objective is to compare the pass rate at these centres located in the north and west of Poland during the pandemic compared to the period before.
The article formulates the thesis that the pandemic had a negative impact on the pass rate of the state driving exam for the category B driving license at the Regional Road Traffic Centres (WORD Centres) located in Słupsk and Zielona Góra. This means that the number of people who achieved a positive result in the state driving exam had decreased. One of the reasons for that state of affairs may have been the suspension of classes in driving schools for a two-month period from March 2020 until the beginning of May of that year.

Keywords: driving exam, COVID-19, road traffic centers, pass rate

Introduction

When the new COVID-19 virus appeared, nobody could have expected that it would spread so quickly around the whole world, causing the deaths of millions of people. Since the beginning of the pandemic, 424,277,135 cases of the disease have been recorded worldwide, of whom 5,886,957 people have died[2]. This situation has contributed to the adoption of certain decisions and actions by the

1 Private University of Environmental Sciences, Radom.

2 https://news.google.com/covid19/map?hl=pl&mid=%2Fm%2F02j71&gl=PL&ceid=PL%3Apl (access: February 21, 2022).

governments of particular countries, which were primarily aimed at stopping the spread of the virus. Mandatory wearing of face masks was introduced, initially in closed areas (e.g. shops, pharmacies, churches, commercial premises, including hairdressers and beauty salons). The obligation was later extended to open areas. Moreover, restrictions designed to limit interpersonal contacts and socialising were introduced. Additionally, specialist "COVID" hospitals were established. With the increase in the numbers of daily infections, a number of public facilities were closed (e.g. restaurants, gyms, and swimming pools).

In addition, ongoing intensive work to develop a vaccination that would effectively stop the spread of the virus or relieve its symptoms was carried out. However, time pressure and the continued mutations of the coronavirus significantly impacted the timespan of the work. Despite this, vaccinations that at least relieved the symptoms of the infection have been developed. Currently 10,572,623,165 doses of COVID-19 vaccinations have been issued worldwide whereby 4,322,423,769 people have received all the necessary doses (are considered to have been fully vaccinated)[3].

All the actions taken affected the functionality of the entire global economy as well as the economy of each country. Business activities were significantly limited, which had a huge impact on income. Service enterprises were the most affected. The affected entities of this type include Regional Road Traffic Centres (PL abbreviation: *WORD – Wojewódzki Ośrodek Ruchu Drogowego*) operating in Poland.

In order to verify the aforementioned thesis, statistical data were provided by the abovementioned driving schools for the following periods:

- 2018–2019 – before the pandemic,
- 2020–2021 – during the pandemic.

The COVID-19 pandemic

in recent times, the COVID-19 pandemic has played a major role in the business environment. The word 'pandemic' comes from the Greek 'pan' (all) and 'demos' (people). It is defined as an epidemic that occurs over large areas of the globe – several continents as well as countries – and is characterised by high incidence[4]. To date, the term 'pandemic' has mainly been associated with the spread of plague, cholera or smallpox in previous centuries. However, its most recent popular uses have been in terms of the HIV virus which causes AIDS, or avian flu.

In recent months we have dealt with the COVID-19 pandemic and mutations to the virus, which have affected the whole world. One of the reasons for the rapid

3 https://news.google.com/covid19/map?hl=pl&mid=%2Fm%2F02j71&gl=PL&ceid=PL%3Apl&state=4 (access: February 21, 2022).

4 http://www.przeglepidemiol.pzh.gov.pl/slowniczek-terminow-epidemiologicznych (accessed: January 20, 2022).

spread of the virus, often mentioned by global health organisations, is migration across different countries and/or continents[5]. Due to the current situation, relevant restrictions have been taken (within particular countries) of which the main purpose is to prevent the spread of the virus. In Poland the entity responsible for monitoring epidemiological threats is the Chief Sanitary Inspector together with the Director of the National Institute of Public Health – National Institute of Hygiene[6].

However, for some business entities, mainly those operating in the service area, these activities have had a negative impact on their business activities. This also impacted the Regional Road Traffic Centres (WORD Centres) located throughout Poland.

The functioning of regional road traffic centres

in this article two Regional Road Traffic Centres will be the subjects of research, namely those in Słupsk and Zielona Góra.

The Regional Road Traffic Centre in Słupsk was established by the Ordinance of the Voivode No. 26/98 of 20 April 1998, pursuant to art. 116 sec. 1 and art. 120 par. 1 of the Act from 20 June 2020 – Road Traffic Law[7]. In accordance with art. 116 of the above Act, the Regional Road Traffic Centre (WORD) is a local governmental legal entity; however, the legal basis of the activity is the Statute established in accordance with Resolution No. 188/2000 of the Management Board of the Pomeranian Voivodeship of 15 September 2000.

The Regional Road Traffic Centre (WORD) in Słupsk deals with a very wide spectrum of business activities, mainly examination and training sessions aimed at the improvement of road safety, including the following:

- conducting a state driving exam for candidates in order to obtain the right to drive vehicles of all categories of driving licenses,
- conducting a state driving exam for those who wish to broaden their qualifications in terms of driving licenses and checking the qualifications of drivers,
- training sessions for people applying for examiners' qualifications, candidates of all categories (basic and additional ones),
- conducting courses on the transport of dangerous goods,
- organising courses of road safety knowledge,
- conducting courses for people directing the traffic,
- organising training sessions in the field of road traffic control,

5 J.C. Semenza et al., Observed and projected drivers of emerging infectious diseases in Europe, "Annals of the New York Academy of Sciences" 2016, t. 1382, nr 1, s. 73–83, https:// doi.org/10.1111/nyas.13132.

6 A. Kicman-Gawłowska, *Nadzór nad chorobami zakaźnymi w świetle Międzynarodowych Przepisów Zdrowotnych,* „Przegląd Epidemiologiczny" 2008, t. 62.

7 Journal of Laws, Dz. U. Nr 98, poz. 602, oraz Nr 160, poz. 1086 z póź. zm.

- cooperation with associations dealing with road safety issues.

The Regional Road Traffic Centre (WORD) is managed by a director who is appointed and relieved of his/her duties by the Board of the Pomeranian Voivodeship. The director, in addition to managing the centre, acts as an external representative of the centre and is responsible for the performance of particular tasks.

The Regional Road Traffic Centre in Zielona Góra is a local government legal entity. It was created in February 1998 by the Voivode of Zielona Góra on the basis of the Road Traffic Act[8]. Following the administrative reform, the centre is supervised by the Board of the Lubuskie Voivodeship.

The tasks of the Regional Road Traffic Centre (WORD) in Zielona Góra include:

- cooperation with the regional road safety council,
- cooperation with starosts in the scope of supervising training sessions,
- organisation of state exams to verify the qualifications of those applying for driving licenses and drivers,
- organisation of exams verifying the qualifications of those applying for driving licenses within the scope specified in the international agreement whereto the Republic of Poland is a part,
- conducting qualification courses,
- conducting training courses in the area of road safety,
- conducting re-education courses in road safety,
- organisation of classes for students applying for a bicycle card,
- providing the Marshal of the Voivodeship and starosts with information and statistics pertaining to pass rates for individual training centres and instructors,
- conducting other educational activities within the scope of road traffic and transport.

The Regional Road Traffic Centre (WORD) is managed by a director who is appointed and relieved of his/her duties by the Board of the Lubuskie Voivodeship. The director performs an external representative function and is responsible for the performance of particular tasks set out in the Road Traffic Act and the statute. The director of the centre is authorised to perform legal actions independently on behalf of the centre.

State driving license exam

The main task of each Regional Road Traffic Centre (WORD) is to conduct the state driving test. This exam is divided into two main parts:

8 Journal of Laws Dz. U. Nr 98, poz. 602, oraz Nr 160, poz. 1086 z póź. zm.

- theoretical – the conditions and mode of this part are described in the regulation of the Minister of Infrastructure of 28 June 2019[9].
- practical – the conditions and mode of this part are described in the regulation of the Minister of Infrastructure of 28 June 2019[10].

Theoretical exam

During this part of the exam, the examinee must demonstrate their theoretical knowledge in the areas of:

- rules and regulations for safe movement of a vehicle on a public road,
- traffic-related hazards,
- obligations of the driver and owner of a vehicle,
- procedures in emergency situations.

The exam is conducted in electronic form on a computerised examination device. The candidate should indicate the correct answer to the questions displayed randomly by the computer system. There is no possibility of returning to an unanswered question. The questions displayed reflect situations that drivers may face in real traffic.

The theoretical part of the state exam includes 20 questions on basic knowledge and 12 questions on specialist knowledge in the area of particular categories of driving licence. Each question has only one correct answer. Different "values" of questions have also been introduced, depending on their importance for road safety:

- 3 points – a question of high importance for road safety,
- 2 points – a question of medium importance for road safety,
- 1 point – a question of low importance for road safety or order of road safety.

Each category of the exam lasts 25 minutes. The maximum possible total of points is 74. Candidates must obtain a score of at least 68 points to pass the exam.

Foreigners have the option of signing up for the theoretical exam in English or German. Deaf people have the opportunity to sign up for a theoretical exam with the presentation of questions and answers in sign language.

The theoretical test may be divided into six stages:

1. checking the identity of the examinee, indicating the computer station, and starting the exam,
2. familiarisation with the instructions pertaining to the examination system,
3. mock exam,
4. state exam,
5. presentation of the result,

9 Dz. U. z 2019 r. poz. 1206.

10 Ibid.

6. checking incorrect answers – this part is available only to people who have completed the exam with a negative result. It allows a candidate to familiarise himself or herself with the questions which were answered incorrectly.

Since 24 August 2014, the regulations governing the validity of the theoretical exam have been removed. Based on the above, all theoretical exams which as of 24 August 2014 resulted positively and were valid on that date are valid for an unlimited period.

Practical exam

This part of the exam is to demonstrate that the person applying for a driving license can apply traffic regulations in practice. Each candidate should:

- have a valid identity document allowing the examiner to verify the identity of the person being examined,
- have glasses, contact lenses, hearing aids, etc. if such indications are included in the medical certificate.

The practical exam may be divided into five stages:

1. confirmation of identity, introduction of the examiner,
2. checking the technical condition of the vehicle and preparing it for driving,
3. performing tasks on the manoeuvring area,
4. performance of tasks in road traffic – this part of the exam is carried out to verify the skills of the candidate in accordance with the road traffic regulations, operating a vehicle in a manner which is safe, energy-saving, efficient and does not hinder other road users; the examiner pays specific attention to:
   - how to perform manoeuvres on the road,
   - behaviour towards the other road traffic participants,
   - the ability to assess potential or actual road hazards,
   - response efficiency in case of danger,
   - usage of the vehicle controls.
5. review of the exam – after the practical part of the state exam is completed, the examiner discusses the result of the practical part with the examinee in detail, and if the result is negative, gives feedback with particular reasons for the final result.

Stages 1–3 and 5 are performed in the manoeuvring area.

The practical part of the category B driving test is recorded. Recording exams other than category B is permitted.

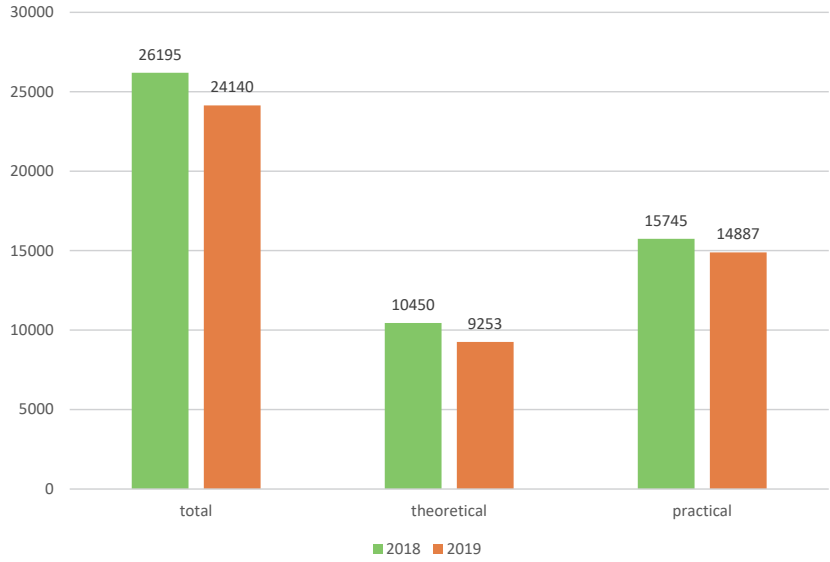
Research methodology – data analysis

The analysis was conducted on the basis of the data provided by the two centres[11] which are the subjects of this study. The period of 2018–2019, before the pandemic, was compared with the period of 2020–2021 when COVID-19 spread throughout the world. The study was focused on the state category B driving exam. The total number of exams conducted, both theoretical and practical, was taken into consideration. After that, the results were further subdivided in the context of obtaining a positive result (percentage values) in each of these parts.

Pass rate of the driving licence exam in 2018–2019 – category B

Regional Road Traffic Centre in Słupsk

Chart 1. Total number of exams conducted, with further division into theoretical and practical parts

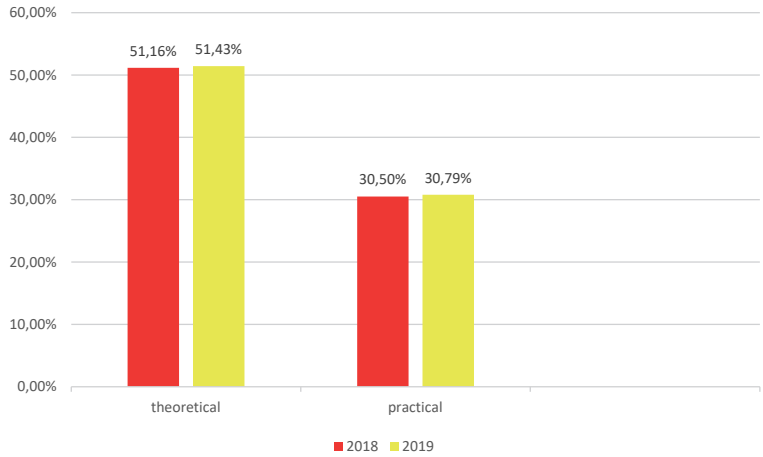


Source: own study based on the shared data.

In the analysed period, the total number of state examinations conducted for category B driving licenses remained at a relatively constant level, as it did following division into theoretical and practical parts. There was no drastic increase or decrease.

11 http://www.bip.word.slupsk.pl/strona,statystyka-egzaminowania (accessed: 22 February 2022), https://wordzg.bip.gov.pl/statystyka-egzaminow/zdawalnosc-w-word-zielona-gora-wszystkie-podejscia.html (accessed: 22 February 2022).

Chart 2. Pass rate of the state exam for the category B driving license (%)

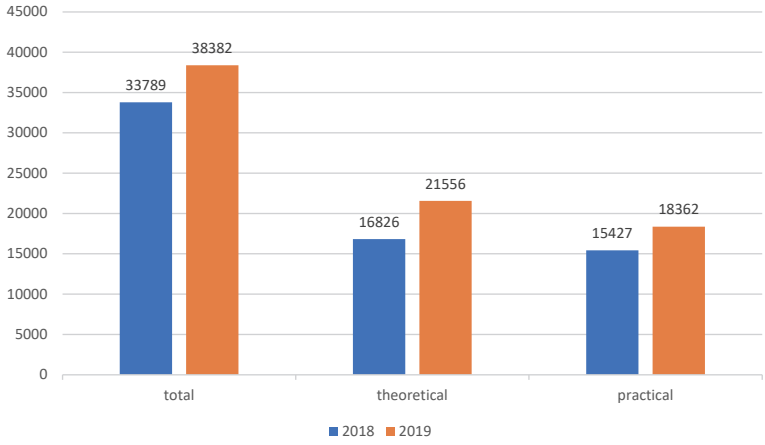


Source: own study based on the shared data.

The pass rate for the theoretical part of the exam was much higher than for the practical part; however, in 2018–2019 it remained at a relatively constant level.

Regional Road Traffic Centre in Zielona Góra

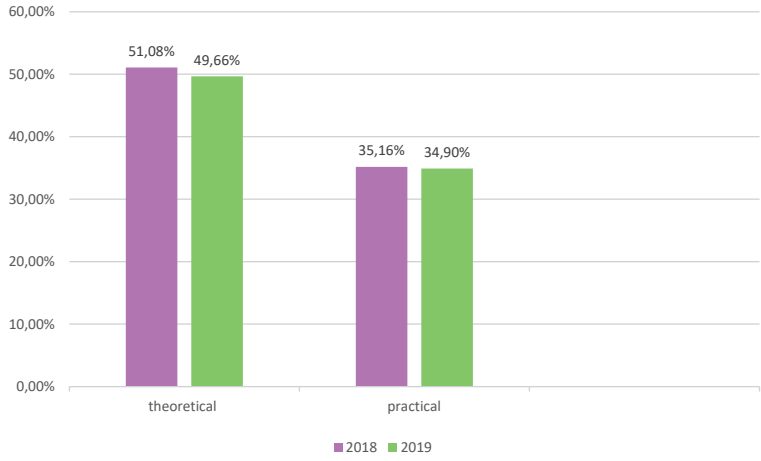
Chart 3. Total number of exams conducted, with further division into theoretical and practical parts



Source: own study based on the shared data.

In 2019 there was a slight increase in the number of state examinations for category B driving licenses, both theoretical and practical, compared to 2018.

Chart 4. Pass rate of the state driving exam for the category B driving license (%)



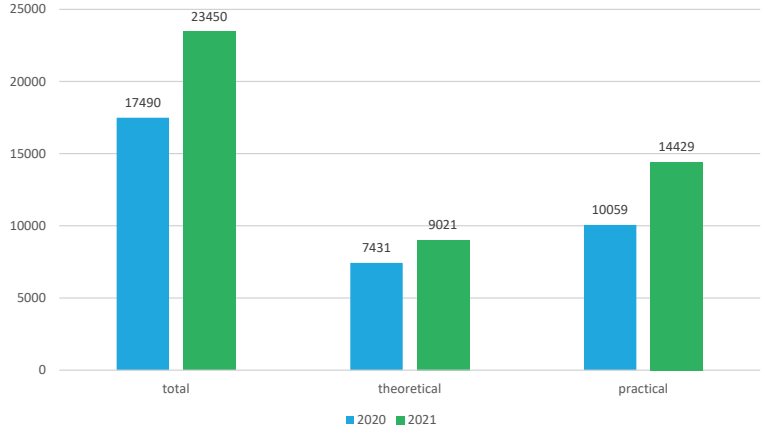
Source: own study based on the shared data.

In the analysed period, there was a slight decrease in the pass rate of the state driving examination for the category B driving license, for both the theoretical and practical parts.

PASS RATE OF THE DRIVING LICENCE EXAM IN 2020–2021 – CATEGORY B

Regional Road Traffic Centre in Słupsk

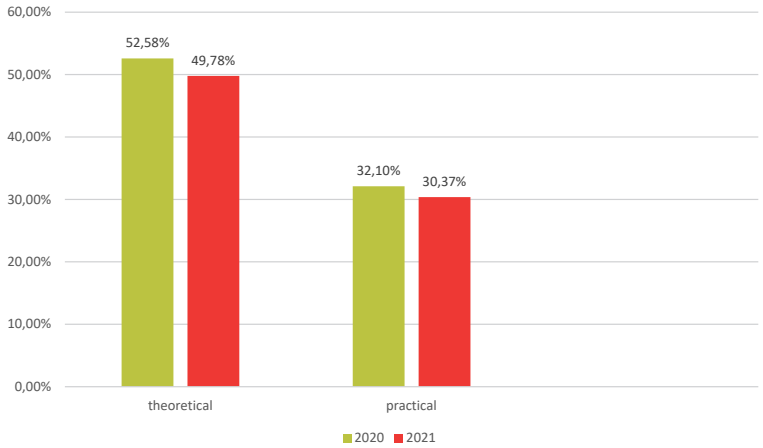
Chart 5. Total number of exams conducted, with further division into theoretical and practical parts



Source: own study based on the shared data.

In the years 2020–2021 at the Regional Road Traffic Centre (WORD) there was an increase in the number of state driving examinations for category B driving licenses conducted in terms of both the theoretical and practical parts.

Chart 6. Pass rate of the state driving exam for the category B driving license (%)

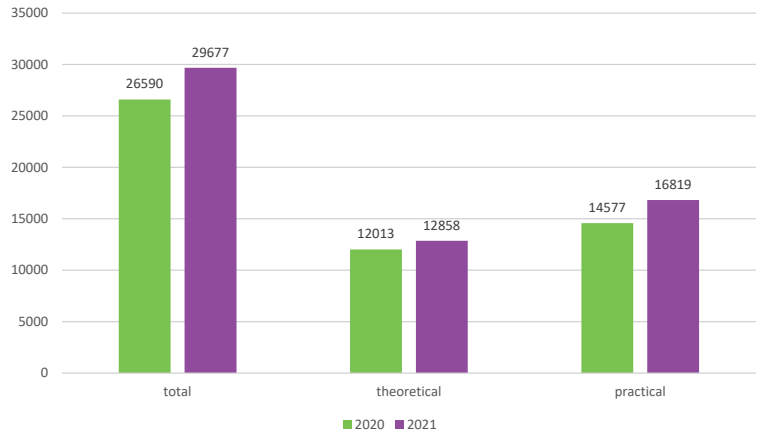


Source: own study based on the shared data.

In the period under consideration there was a slight decrease in the passing percentage rate of the state category B driving license exam, for both the both theoretical and practical parts.

Regional Road Traffic Centre in Zielona Góra

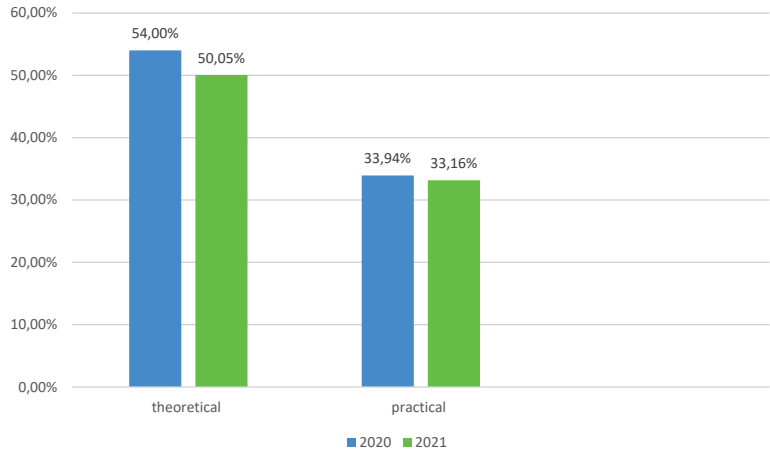
Chart 7. Total number of exams conducted, with further division into theoretical and practical parts



Source: own study based on the shared data.

The Regional Road Traffic Centre (WORD) in Zielona Góra recorded a slight increase in the number of state driving examinations in the year 2021, in terms of both the theoretical and practical parts.

Chart 8. Pass rate of the state driving exam for the category B driving license (%)



Source: own study based on the shared data.

In the years 2020–2021, there was a slight decrease in the pass rate of the theoretical part of the state category B driving test. In terms of the practical part of this exam, a relative balance was maintained.

Summary and conclusions

Table 1. Comparative pass rate of the state driving exam for the category B driving license at WORD Centres in Słupsk and Zielona Góra (%)

Year	WORD Słupsk		WORD Zielona Góra	
	theory	practice	theory	practice
2018	51.16	30.50	51.80	35.16
2019	51.43	30.79	49.66	34.90
2020	52.58	33.10	54.00	33.34
2021	49.78	30.37	50.05	33.16

Source: own study based on the shared data.

Based on the data in the table above, one may confirm the validity of the research hypothesis. Both the theoretical and practical parts of the state category B

driving license exam have not changed significantly in the context of passing rates (in percentage terms) in the period of 2018–2021 which was the subject of analysis. Only the number of exams conducted has changed, which reflects the pandemic situation since 2020. However, there has been no direct impact on the passing rate, either in theoretical or practical terms.

For that reason, the hypothesis was verified negatively. The pandemic did not affect the rate of passing the state category B driving license exam (based on the example of WORD Słupsk and WORD Zielona Góra).

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Dariusz Lizak

Introduction to business ethics in organisations

Abstract: This article is dedicated to business ethics in both the theoretical area and in economic practice. The description of the theoretical area presents the meaning of ethics as a field of knowledge and human choices which depend on the perception of moral norms and principles. In the area of ethics and business, the author focuses both on attributes that combine ethics and economic efficiency and on problems related to the development of the discipline, which make it dependent on education and the operationalisation of research development.

Keywords: ethics, business ethics, manager-leader, personalistic and phenomenological leadership, servant leader, corporate social responsibility CSR, social networks, knowledge in organisations, social relations

Introduction

The academic discipline of business ethics is without a doubt developing dynamically in Poland, where academic output, the diversity thereof and attempts to systematise it, when combined with economic practice, allow one to conduct research processes with prospects for further development. The economic reality and ethical responsibility of the participants of an organisation are developing even faster, and will be evaluated irrespective of the perception of the organisation itself and its environment.

What is the ethical responsibility of the participants in an organisation, and what should be the impact of ethics on contemporary economy? These are the key questions asked by the academic community in an attempt to extract the importance of ethics in the development of an organisation. No less important is the significance of ethics in business activity and its impact on organisational effectiveness for the organisation itself, especially in the face of dynamic changes on the labour market. The organisation and its surroundings are people who remain in continuous relations and mutual interactions, while the consequence of these relations are economic effects. Business ethics, both as a science and as a field of economic life, cover the behaviour of people in the organisation and its surroundings in the process of planning and executing activities and the effects of those activities.

Outline of Ethics in theory and practice

The basis for any reflections in the area of ethics, including business ethics, are the basic issues of general ethics, especially the theory of value and the theory of morality. These considerations concern the moral act of evaluating human conduct in relation to ethical norms and criteria of human morality. According to A.B. Stępień, morality is linked to a rational, conscious and free human act in relation to its performer (actor)[12]. Said author discusses an assessment of the so-called actor in relation to ethical norms recognised in a specific social environment as moral values applicable to the assessment of human behaviour.

The theory of value in ethics concerns the motivations and prerequisites of human activity in every environment. There are many types of hierarchies of values, but those related to the organisational environment include utilitarian, hedonic, cognitive and cultural values. In general, we can say that ethical values are those that show us what to choose, what to strive for and what to desire[13]. This practical dimension of ethics shows us how to make choices between what is good and what should be avoided. In the economic sphere, actions refer mainly to achieving efficiency, i.e. the contribution made to the action should not be greater than the expected stream of gains from the action. The relationship between morality and economics is the same as the relationship between the principle of righteousness and the principle of efficiency[14]. The operationalisation of the research problem between ethics and economics is a study of the relationship between the principle of righteousness and the principle of efficiency. Both in the economic sphere, related to the efficiency of our actions, and in the sphere of the rightness of our conduct, we can distinguish a common category of responsibility. Categorisation of responsibility works both as a factor of internal regulations, referring to the attitudes and behaviour of participants in an organisation, and external[15] factors, i.e. the legal and moral dimensions of the relationship between the subjects and the environment. Responsibility can relate to the preventive (ex-ante) and causative (ex-post) dimensions. The preventive and the causative character function inseparably,[16] because the focus on the functioning of responsibility in the preventive dimension prevents the negative impact of errors in the causative dimension.

Business ethics, or ethics related to business activity, can be described as a set of norms, values and features related to the moral satisfaction of acting for the benefit

12 A.B. Stępień: *Wstęp do Filozofii. Prace Wydziału Filozoficznego 65, issue 3.* Lublin TN KUL, 1995, p. 103–104.

13 *Etyka w służbie biznesu.* Ł. Sułkowski, G. Ignatowski (ed.), łódź 2013, p. 15.

14 Op. Cit., p. 16.

15 Karczewski L, Kretek H. (ed.): *Etyczne i społeczne uwarunkowania biznesu.* Studia i monografie. Politechnika Opolska, Opole 2015, p. 32–35.

16 Karczewski L, Kretek H. (ed.): Op. cit., p. 36.

of society, respect for man and the environment, observance of moral principles and the law, and justice[17], among others. Business ethics is a broad concept which combines social ethics with individual ethics.

Changes and discussions in ethics as a science, and especially from an organisational perspective, indicate multidirectional, often inappropriate, use of the terms of organisational ethics, management ethics and business ethics. P. Fobel believes that considering organisational ethics equal to management and business ethics is the incorrect approach from a theoretical point of view. Organisational ethics is a much broader concept than the others, referring to all elements of the organisational system[18] and the relations between them. P. Fobel also points out that business ethics and applied ethics are specific areas that should be treated separately in the context of methodological and epistemic development of knowledge[19] so that the scientific development of both disciplines can be examined by researchers in relation to the specific environment which it concerns. A correct approach to organisational ethics research should include the determination of the scope of the assessment of human activities, which, depending on the research objective, will focus on the organisation itself and its impact on the environment, including its stakeholders, such as owners, suppliers, customers, business partners, competitors and the sector in which the organisation operates.

Scientific research shows that leaders and genuine managers with leadership qualities have a decisive role to play in shaping ethical attitudes and behaviours among employees. A good leader-manager, while highlighting the importance of ethical behaviour, should take care of an employee's individual development and increase his/her competences. The statement that an example should be set from the top down is justified in creating ethical attitudes aimed at perpetuating ethically justified actions and shaping a strong organisational culture through these actions. All attitudes and activities of the organisation's leaders may directly influence the reinforcement or destruction of attitudes and reactions of employees in the moral sphere.

A leader's attitude, depending on their skills, can have both a positive and negative impact on shaping an atmosphere of understanding and observance of ethical conduct. We can look at the morality of a leader by putting their own interests before those of the organisation. It is the moral courage and responsibility of a leader that can effectively contribute to the pro-social shaping of ethical principles in an organisation. Jaramillo, Bande and Varela point out that sales staff who trust their

17 Karczewski L, Kretek H. (ed.): Op. cit., p. 143–144.

18 Karczewski L, Kretek H. (ed.): *Etyka biznesu i społeczna odpowiedzialność organizacji wyzwaniem XXI w*. Studia i monografie. Politechnika Opolska, Opole 2013, p. 87.

19 Karczewski L, Kretek H. (ed.): Op. Cit., p. 88.

supervisor are more likely to adopt and incorporate ethical[20] behaviour in real actions, which have a consistent impact on their relationships with counterparties in the transactional area.

S.B. MacKenzie, P.M. Podsafoff and G.A. Rich emphasise the importance of an atmosphere of trust, especially in the sales force environment, from employees towards leaders, supervisors and senior managers[21].

Research by B. Victoria and J. B. Cullen points to a high level of perception among employees of the need for ethical behaviour in organisations where each employee is treated as a subject[22]. Concern for the employee is expressed through the so-called need for servitude towards employees and other stakeholders. The above is in line with the theory of personalistic leadership, in which the manager creates an atmosphere conducive to the development of all employees through morally responsible actions.

Personalistic leadership derives from phenomenological leadership, the basis of which is to strive to strengthen the value of others through oneself and through dialogue[23]. This attitude is closely related to the term "servant leadership", in which the manager-leader, by supporting others, strengthens autonomous values in them. According to Greenleaf, there are ten principles of servant leadership that influence human[24] creative activity:

1. Listening. This means listening to the entire human being: body, mind, and soul;
2. Empathy. The ability to penetrate, feel, understand and to accept the uniqueness of others;
3. Healing. A soothing, but not calming, magical influence that gives the power to transform and integrate;
4. Awareness. Self-awareness and the awareness of others – of the power of leadership;
5. Persuasion. Convincing, leading, but not forcing;
6. Conceptualisation. Conceptual development, targeting, finding a delicate balance between strategic and tactical objectives;
7. Foresight. Farsightedness, intuition showing the distant consequences of decisions taken;

20 F. Jaramillo, B. Bande, J. Varela: *Servant leadership and ethics: a dyadic examination of supervisor behaviors and salesperson perception*. Journal of Personal Selling & Sales Management, Vol. 35, No.2, 2015, p. 108–110.

21 S.B. MacKenzie, P.M. Podsakoff, G.A. Rich: *Transformational and transactional leadership and salesperson performance*. Journal of the Academy of Marketing Science, 29, 2001, p. 116–120.

22 B. Victor, J.B. Cullen: *The organizational bases for ethical work climates.* Administrative Science, 1988, p. 101–125.

23 B. Bombała: *Przywództwo w perspektywie teoretycznej i empirycznej*. Prakseologia no. 151, 2011.

24 R. K. Greenleaf, *The Servant Leader Within: A Transformative Path* (ed.) H. Beazley, J. Beggs, L. C. Spears, Paulist Press 2003, p. 14,15.

8. Stewardship. Leadership, management of the common good;
9. Commitment to the growth of people. Engaging people in development: personal, professional and spiritual;
10. Community. Building a community.

A relationship, albeit not one of power, is defined as reaching an agreement that affects the achievement of the goals of a particular social group. Understood in this way, leadership in an organisation is therefore an action aimed at the development of employees in the context of their qualifications, competence and motivation, giving special incentives to create an ethical climate and organisational culture in which man has the greatest value as an individual and subject of the collective.

Looking after the maintenance of a specific ethical climate in an organisation creates an opportunity to build a key filter, which supports both thinking and acting, interpreting and subordinating ethical behaviour[25]. An ethical filter in an organisation can function fully if the subject in the organisation is a human being rather than subjectified work that is to be done by them as a mere employee. By using a simple method of communicating ethically desired behaviours, the company is able to control the behaviour of employees in the organisation. The management process in the organisation cannot limit the development of ethics in the organisation[26]. People in an organisation are the supreme[27] value and work done by man should constitute the ethical dimension of all their actions.

The subjectivity of a human being depends mainly on his or her actions. As long as it is a strongly structured activity and is subordinated to imposed rules and principles, the process of subjectivisation is slow[28]. The hypothesis that the process of human subjectivisation in an organisation has an impact on its efficiency may be an interesting direction for the development of organisational ethics research. Theses defined as a result of research on human subjectivity and its influence on the value of an organisation may concern broadly understood organisational ethics as well as leadership and the behaviour of an individual in the organisation. In the long term, this type of research can focus on the study of changes in organisational culture.

Ethics will never be abstracted from economic life, even though economic conditions are constantly changing. In business activities, we can distinguish four strategies of acting when making moral[29] choices:

25 F. Jaramillo, B. Bande, J. Varela: Op. Cit., p. 118.

26 G. Kvĺle · Z. Murdoch: *Making Sense of Stigmatized Organizations: Labelling Contests and Power Dynamics in Social Evaluation Processes.* Journal of Business Ethics, (2021), https://doi.org/10.1007/s10551-021-04810-7.

27 B. Bombała: Op. Cit., p.18.

28 A. Węgrzecki, *Zarys fenomenologii podmiotu*, Ossolineum, Kraków 1996, p. 62.

29 Ł. Sułkowski, G. Ignatowski: Op. Cit., p. 19.

1. We may refer to a value or other values and norms that protect it – this will be called moralising or ethics of beliefs;
2. We can concentrate only on the means, without referring to the goal, i.e. the value, which is very rare, because most often we are aware of value if not *explicitly* then *implicitly* at the very least. This will be a purely social-technical activity;
3. We strive for a value (purpose) by choosing the means that we consider adequate or applicable. This is a position close to ethics of responsibility;
4. In pursuit of the objective, we refer to various values, which we treat instrumentally as a means of achieving the objective. This position may resemble acting according to certain values, which serve as a means and a tool.

For many managers, discussing ethics, creating a formalised code of ethics, and using the principles of the code in confrontation with people in the organisation is a very difficult issue. The very need for the existence or non-existence of ethics in business should not be discussed, although there are many who are sceptical of its development. Describing ethics in the context of business development, both in theory and practice, becomes particularly important in building a competitive advantage. Business ethics broadly refers to compliance with the law, concern for the economic results, CSR (Corporate Social Responsibility) policy, concern for relations and ties with stakeholders, as well as standards and moral criteria sanctioning relations within the organisation. Nothing should justify ethically irresponsible actions, even if the behaviour and decisions of managers are exclusively profit-driven. Ethics and profit are not mutually exclusive; organisations that can combine both values can more easily achieve specific goals in a strategic perspective. An interesting research issue in the area of profit-oriented organisations may be the study of ethics and its influence on shaping organisational culture. Another research issue, in the context of managers' behaviour, may be an analysis of the declarativeness of the functioning of ethics in relation to practice.

Ethics as a theoretical subject should play an important role in education and academic learning. The lack of foundations, both theoretical and practical, worsens the perception of the understanding and the need for ethics in social relations. The question of how to make the subject of ethics interesting for students is a key challenge for educators, as there is a general view that ethics, as an academic subject, is not particularly interesting.

Improving the efficiency of an organisation through ethically-conditioned activities

The efficiency of actions in economic practice can be improved by basing them on moral values which make it easier to integrate business into society and achieve

economic[30] success. Moral values transferred through the social network of an organisation can permanently contribute to the development of the organisation through greater efficiency in obtaining information from the environment for the company and transforming information into knowledge resources. Organisations that highlight their ethical values in their surroundings imply openness and trust of stakeholders.

P. Drucker, in his reflections on the essence of capital which has a fundamental impact on the development of society, points out that the use of the capital of knowledge is also an ethical issue. He highlights the fact that a lack of knowledge is an action, or a lack thereof, that is immoral in relation to an individual's approach to economically and effectively justified actions[31]. Co-responsibility outlined in the area of ethical activities, in relations between related parties, is important both in the formation of knowledge and in determination of a lack of knowledge[32]. Awareness of a lack of knowledge in a relatively important area of cooperation plays an effective role if the organisation uses the awareness and the need to supplement the knowledge base. An example is CSR (Corporate Social Responsibility), which has a significant impact on maximising profit by preventing the effects of negative decisions taken in the past and their impact on future (ex-ante) decisions[33]. In other words, CSR is the pursuit of maximising the profit of a company, including rejection of the negative effects of the operation of such a company, such as collusion, environmental degradation, deterioration of working conditions, etc. On the other hand, CSR is also the responsibility of an organisation to do more than just drive profit for its shareholders[34]. The above statement will not be true if the organisation creates the appearance of functional CSR by creating a so-called "smokescreen" for ethically irresponsible activities. As organisational practice shows, companies also commit socially irresponsible actions – Corporate Social Irresponsibility (CSI). These actions result in violations of the law, social and ethical principles for the purpose of maximising profit. The activities defined by CSI can also occur in companies that take socially responsible[35] actions, thus creating a fake, manipulated, false image of the organisation.

30 Ł. Sułkowski, G. Ignatowski: Op. Cit., p. 22.

31 P. Drucker: *Post-capitalist Society*, Butterworth-Heinemenn, Oxford 1993, p.18, 19.

32 Karczewski L, Kretek H. (ed.): Op. Cit., p. 39.

33 Karczewski L, Kretek H. (ed.): *Etyka biznesu i społeczna odpowiedzialność organizacji wyzwaniem XXI w*. Studia i monografie. Politechnika Opolska, Opole 2013, p. 466.

34 Kietliński K., Martinez-Reyes V., Oleksyn T.: *Etyka w biznesie i zarządzaniu*. Oficyna Ekonomiczna, Kraków 2005, p. 132.

35 M. Greenwood: *Stakeholder engagement: Beyond the myth of corporate responsibility*. "Journal of Business Ethics". No. 74(4), 2007, p.316–327.

CSR allows an organisation to build social relations with the recipients of goods which it produces; on the other hand, it can contribute to building the competitive advantage of the organisation, especially where the fight is very intense[36]. An organisation's activity in relation to socially responsible actions is a long-term, image-oriented and relational investment.

The impact of ethics on relations inside and outside the organisation in a relational context cannot be ignored. The inability to build interpersonal relationships may cause conflicts and limitations in motivation which may inhibit the development of business in the context of innovation and entrepreneurship. A lack of trust between workers, dissatisfaction with work and rigidity of norms and rules reduce ethical behaviour and entrepreneurial[37] activity. Formal actions by the company must not cause resistance among employees and induce the opposite of ethical behaviour. In an ethically responsible organisation, methods of shaping an ethical culture should take into account the use of tools that eliminate unethical behaviour[38]. In an ethically responsible organisation, it is important to create an atmosphere of openness, characterised by easy access to all relevant information and open communication between employees. The organisational climate is an element of the employees' perception of the work environment and the organisational culture indicates the way how employees act in the organisation[39]. As a result, problem solving is more efficient and the organisation itself learns and gains new experience.

Formation of knowledge depends on an atmosphere of openness and the possibility of direct[40] communication, thus creating a special source for building organisational efficiency. For an employee, clear and very specific ethical principles set the right framework of conduct.

Adapting incentive schemes to the ethical principles of the organisation is considered important yet difficult. L. Karczewski and H. Kretek, in their research on the level of application of ethical principles in incentive systems, point to poor adjustment and the need to make changes and introduce an adjustment model. The consequences of adjustment problems have an impact on external and internal relations and thus influence the formation of social capital in the organisation. The main element of shaping social relations, including ethically-conditioned relations,

36 C. Porębski: *Czy etyka się opłaca?* Znak, Kraków-Kluczbork 2000, p.25–26.

37 W. Dyduch (2001): *Kapitał społeczny organizacji pożywką dla przedsiębiorczości i innowacyjności.* Internet: http;// www.zti.com.pl/instytut/pp/referaty/ref42_full.html; accessed on 21.06. 2013.

38 **T. Jannat, S. Alam, Yi-Hui Ho, N.r A. Omar, Chieh-Yu Lin:** *Can Corporate Ethics Programs Reduce Unethical Behavior? Threat Appraisal or Coping Appraisal.* "Journal of Business Ethics", (2021), https://doi.org/10.1007/s10551-020-04726-8.

39 C. **Guillem Cabana, Muel Kaptein:** *Team Ethical Cultures Within an Organization: A Differentiation Perspective on Their Existence and Relevance.* "Journal of Business Ethics". (2021) 170:761–780.

40 *Kapitał ludzki a konkurencyjność przedsiębiorstw:* Op. cit., p. 26.

is trust, which translates into the credibility of the employee and the organisation and facilitates business[41] transactions. Socially responsible organisations continuously maintain and create a so-called dialogue with their surroundings, the aim of which is to understand the needs of the environment and to build positive social[42] relations. Subjectivisation of people's lives in an organisation creates a good climate in terms of moral rules and principles. Activities in the social sphere have a positive impact on the culture and moral values of the company, which has a direct impact on the value of the organisation.

Conclusions

From the point of view of liberal theories, especially orthodox ones, the free market contrasts ethics with economic rationality and economic activity. According to extreme liberals, ethics are opposed to the principles of increasing economic efficiency by maximising profit[43], which excludes ethics from the group of issues which are important to economic theory. According to them, ethics do not exist in the economic sphere, and consequently society and individuals should not transfer ethical values from one's private life to one's professional life. A lack of understanding or a lack of willingness to understand the human nature links radical views to the creation of false theses of human functioning in economic life, isolated, according to extreme liberals, from private life and human nature. The above view seems all the more unjustified, since it is in the area of relations between people, including applicable principles of ethical nature, that phenomena occur which initiate consumer needs and behaviour that have a significant impact on economic activity.

Many scientists in the field of management point out that it is the people in an organisation, their competences, relationships and motivations that build the success of the company. Management practitioners are particularly aware of the level of effort with which success is achieved and the level of effort required to maintain it, and of what has an impact thereon in reality. Practitioners and academics are aware of the fact that success is a combination of multiple factors, including the company's perception of ethical aspects. An increasing number of companies see the need for sustainable development through the combination of economic, environmental, social and ethical goals.

It seems of vital importance to provide education and make the subject of Ethics interesting not only for students but also for secondary school pupils, and adjusted to various aspects of both social and economic life.

41 Karczewski L, Kretek H. (ed.): Op. Cit., p. 147–151.

42 A. Sulphurkiewicz: *Personalizm i społeczna odpowiedzialność biznesu. Inspiracja i współpraca.* www.odpowiedzialnybiznes.pl, 07.03.2019.

43 L.V. Ryan CSV, Sojka J. (ed.): *Etyka biznesu*. Wydawnictwo Polskiej Prowincji Dominikanów "W drodze", Poznań 1997, p. 57,58.

It is easier to say that ethics have a positive impact on the activity of an organisation than to confirm it in an empirical manner, which makes ethics a research topic inaccessible to many researchers. This can be changed through education and by looking at ethics in the areas of social, economic and political life.

There is no justification for the statement that business and morality are separate and mutually exclusive areas. Business operates in the sphere of human relations and material interactions, and where human relations are evaluated, choices and decisions are made in the moral sphere.

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Ewa Osuch-Rak[1]

The innovation capacity of small and medium-sized enterprises in the space sector in Poland

Abstract: The Polish space sector is still developing, but it has huge potential for innovation. A breakthrough moment for the sector came in 2012, when Poland became a member state of the European Space Agency (ESA). Poland's accession to the ESA and the increased access of Polish entities to its financial instruments provided the general impetus for increased efforts to develop the space industry in Poland. The main aim of the study is to evaluate the significance of the use of financial instruments offered by the European Space Agency and European Union by small and medium-sized space enterprises in Poland for the innovative capacity of these enterprises. The study included the development of a model for assessing the innovative capacity of space industry SMEs and the verification of this model on the basis of an empirical study using the multiple case study method.

Keywords: space industry, space policy, SMEs, innovation capacity, financial instruments

Introduction

The space industry is currently identified as one of the drivers of innovation development, not only in Poland but also worldwide. Its significant role in this process stems from a number of external effects that it generates, contributing to the technological development of other sectors of the economy and to raising the standard of living and security of citizens. However, innovation processes occurring in this industry have a specific character. Their most important features include, among others, a high level of complexity and interdisciplinarity, technological advancement, the necessity of engaging significant financial resources and the long period of return on investment. Therefore, financial instruments offered by international organisations such as the European Union (EU) and the European Space Agency (ESA) play a special role in stimulating innovation processes in the space sector.

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Poland became a member state of the European Space Agency in 2012. Poland's accession to the ESA and the increased access of Polish entities to its financial instruments provided the general impetus for increased efforts to develop the space industry, especially small and medium-sized enterprises (SME) which constitute approximately 80% of all Polish companies in the space sector and approximately 50% of all entities involved in space activities in Poland. Polish SMEs in the space sector are actively pursuing financial instruments available under the European Space Policy. Since 2012, the number of Polish entities declaring interest in participation in ESA programmes has increased from 50 to over 350, of which almost 100 entities are SMEs. Within the framework of a programme dedicated exclusively to Polish entities – the Polish Industry Incentive Scheme (PLIIS) – the value of contracts concluded with the ESA between 1 January 2015 and 30 September 2019 amounted to EUR 28.9 million, which means a "return" of the Polish contribution to ESA of around 77%. The success rate of Polish entities is approximately 40%, which proves the high substantive quality of the submitted applications and the high development potential of the beneficiaries.

Innovation processes in the space industry and the ways in which financial instruments affect the actors in this industry constitute an important research problem from the perspective of both theory and practice. The main goal of this paper is to examine the significance of the use of financial instruments offered by the European Space Agency and the European Union and by small and medium-sized space enterprises in Poland for their innovation capacity. The growing importance of innovation capacity is the result of the assumption that companies compete through the ability, among others, to develop and commercialise new products, or reorganise operations, rather than with new products (Lawson B., Samson D. 2001); hence, the innovation capacity of the company can be considered an indicator of innovation success (Stawasz E. 2014: 97).

The following research methods were used in this paper:

- literature studies on innovation capacity, the space industry, financial instruments for the space industry from the EU and the ESA, and methods for measuring innovation capacity, in particular for SMEs;
- analysis of secondary research on the space industry, space SMEs and their activities within EU and ESA support programmes, the innovation activities of these enterprises, EU and ESA policies in the field of support for SMEs, as well as the innovation, industrial and space policy of Poland and the EU;
- an empirical study on the impact of EU and ESA financial instruments on the innovative capacity of space SMEs in Poland using a multiple case study method, as well as a questionnaire survey among managers and specialists of SMEs in the Polish space sector.

Due to the complexity of the issue of innovation capacity of space SMEs in Poland, this study cannot be free of limitations. Attention has mainly been focused on the concept of the innovative capacity of enterprises, which to a large extent refers to the internal processes taking place in these companies. To a lesser extent, it takes factors related to the environment of these entities into account. The proposed conceptual model is also not free of limitations. The identified areas will certainly not exhaust the complex issue of the possibility of actively forming the innovative capacity of SMEs. They constitute a set of what are, in the author's opinion, the most important factors that can affect the innovative activity of enterprises, and which the use of external sources of financing can significantly influence.

Methods for assessing the innovation capacity of enterprises

The concept of innovation capacity is derived from the resource-based theories of the firm, which assume that competitive advantage is gained by firms through the use of scarce and unlimited resources – human, material and capital – at their disposal (Wernerfelt B. 1995: 171–174), as well as from the theory of dynamic capabilities, which implies the ability to reconfigure internal and external competencies in response to rapid changes in the external and internal environment (Teece D. J., Pisano G., Shuen A. 1997: 515).

The source of a company's innovative development may be the resources it possesses, but its success or lack thereof depends directly on its ability to use them (Pierre Fernandez, 2018; Teece D. J., Pisano G., Shuen A. 1997: 515). The creator of the concept of 'dynamic capabilities', D. J. Teece, uses the term 'dynamic' to refer to the ability of an organisation to renew competencies to achieve compliance with the changing business environment. The term 'capability', in turn, emphasises the role of strategic management in adapting, integrating, and reconfiguring internal and external resources to achieve compliance with the demands of that environment (Teece D. J., Pisano G., Shuen A. 1997: 515). Thus, dynamic capability helps to maintain, improve, and also reconfigure the set of resources and skills in response to changes in a dynamically changing environment. Innovation capacity is a kind of bundle of resources, skills, and dynamic capabilities focused on innovation activities (Pierre A., Fernandez A.-S., 2018).

The complexity and diversity of innovation processes in the economy, the intangible, inherent and dynamic nature of innovation capacity, as well as the need to take into account a number of different factors in its assessment, resulting from the conditions of the industry and the national innovation system, mean that there is no single universal method for assessing an enterprise's innovative capacity. Despite many challenges related to the evaluation of innovation capacity, numerous attempts have been made in the literature to develop a set of measures reflecting this particular dimension of a company's development capability. Classifications and examples of innovation

capacity measures are discussed in detail in studies by L. Se (2020), M. Dziallas and K. Blind (2018), F. Gault (2018), and the OECD (2018), among others. The purpose of this review is therefore to present the most important methods for assessing the innovation capacity of firms with a particular focus on measures suitable for SMEs.

The most common approach to assessing innovation capability is the measurement of *inputs* that stimulate innovation (*innovative inputs*) and the measurement of innovation effects (*innovative outputs*) (Doroodian M., Nizam Ab Rahman M., Kamarulzaman Y., Muhamad N. 2014: 2). The indicators belonging to the first group include expenditures on research and development (R&D) activity, the number of employees employed in research and development departments and the involvement of risk capital, among others (Rutkowska-Gurak A. 2010: 1). Indicators in the second group most often include measures based on patent statistics, as well as the number of innovations implemented by a company. Both approaches have been integrated within the *Oslo* methodology, widespread in the European Union and the OECD, in which the focus is on measuring the innovative activity of enterprises rather than on innovation itself. Therefore, the focal point of the analysis is the so-called "innovation dynamo", i.e. a complex system of factors shaping innovation at the enterprise level (Geodecki T. 2010: 32).

Currently, as noted by both theoreticians and practitioners who evaluate innovative capacity, the evolution of measures related to the innovativeness of enterprises is observed. E. Milberg and N. Vonortas distinguish four generations of innovation measures (Milberg E., Vonortas N. 2004: 1–4)

- the first generation, in which indicators reflected a linear model of innovation emergence, focused on input metrics such as R&D investment, education expenditure, capital expenditure, research personnel, number of university graduates employed, and technology intensity;
- the second generation, in which input measures are supplemented by indicators of the direct and indirect output of S&T activities (throughput and output indicators), e.g. the number of patents, scientific publications, the number of new products and processes, trade in advanced technologies, and changes in the quality of products supplied;
- the third generation, during which aggregate innovation indicators and indices (e.g. Global Innovation Index, European Innovation Scoreboard) were predominant, based on research and the integration of publicly available data, used mainly to assess the innovation capacity of national and regional innovation systems (Vértesy D. 2016: 5);
- the fourth generation, which is developing nowadays and includes in particular measures related to innovation processes in the areas of knowledge (e.g. technical and management knowledge, intangible assets), cooperation networks (e.g. the number of ties within the R&D network in which the

given enterprise participates) and conditions for the development of innovative activity (e.g. size of market demand, quality of public policy and infrastructure, social attitude and conditions for development of innovative activity).

Classical input and output measures of innovativeness are widely used to assess the innovative capacity of enterprises. The greatest challenge which lies therein is to capture the essence of innovative capacity. Researchers of the issue most often set it in the innovation processes of companies; therefore, the central element of contemporary models of evaluation of innovative capability of companies are measures connected with these processes (the fourth generation of measures).

It should be noted that some methods of assessing innovative capacity are of a universal nature, i.e. they apply to all categories and types of enterprises. One of them is proposed by R. Adams, J. Bessant and R. Phelps, who pay special attention to the process of innovation management in an enterprise, considering innovation capability a direct result of this process (Adams R., Bessant J., Phelps R. 2006: 38). To evaluate the innovation management process, they qualify seven areas of a company's activity, characterised by the following factors (Adams R., Bessant J., Phelps R. 2006: 38):

- resources – financial and material resources, human resources, tools;
- knowledge – knowledge generation, knowledge resources, information flow;
- innovation strategy – strategic orientation, strategic leadership;
- organisation and culture – culture, structure;
- *portfolio* management – risk/return levels, use of optimisation tools;
- project management – project effectiveness, tools, communication, collaboration;
- commercialisation – market research, market testing, marketing and sales.

The authors of this concept base the evaluation within the identified areas and factors on classical measures such as R&D expenditures, the number of employees involved in innovation processes, the availability and use of tools and techniques for supporting creativity (resources); the number and value of patents, the number of ties maintained with external organisations and sources, and the number of contacts with customers (knowledge); involvement in diversified financing channels, and a clear expression of whether the organisation has an innovation strategy (innovation strategy). However, they stress that any assessment of a company's innovation capability is a complex process, and the choice of metrics depends on the individual needs of the user in terms of, among other things, the comprehensiveness of the assessment, the data available and the amount of effort the user can devote to the task.

V. Boly, L. Morel, N. G. Assielou, and M. Camargo presented a model for assessing innovation capacity in relation to small and medium-sized enterprises,

proposing 196 criteria for assessing innovative capacity within 15 areas of so-called "good practice". These areas include, among others (Boly V., Morel L., Assielou N. G., Camargo M. 2014: 611):

- design activities,
- project management,
- an integrated strategy,
- project portfolio,
- knowledge management,
- skills management,
- collective learning processes,
- research and development activities,
- customer relations.

Focusing also on management processes in the company, the authors propose a model for the evaluation of innovation capacity based on innovation practices or "observable phenomena", which include identifiable processes, documentation and records, tools and implemented systems. For example, when evaluating design activity, they consider the existence of a design department within the structure, the use of design methodologies, or the use of professional design software (CAD), among other things; when examining integrated strategy, they consider the formalised planning processes (roadmap) and reports prepared after strategic meetings, among other things; and when analysing R&D activity, they consider the appointment of an R&D manager within the company, a separate R&D budget, and research infrastructure, among other things. This model can be a useful tool for assessing the innovative capacity of SMEs due to its open, progressive nature. It can be modified depending on the character and industry in which the enterprise operates, adding new measures in the form of observable processes and phenomena.

Another method of assessing innovative capacity is proposed by H. Forsman, who directly refers to the concept of dynamic capacity, identifying three variables of innovative capacity of small and medium-sized enterprises, namely (Forsman H. 2011: 743):

- the level of R&D expenditure, as a variable representing a firm's internal resources;
- the level of innovation skills, reflecting the dynamic innovation capacity of the enterprise;
- contributing to the development of innovation through *networking*, exemplifying the company's external relationships.

In this model, individual variables are characterised by specific sets of measures. Thus, in relation to skills, the following are assessed: entrepreneurial skills, knowledge utilisation, risk management, *networking,* business development, change management and market and customer knowledge. On the other hand, under

the variable external contribution to innovation development through *networking*, in particular, three elements which determine the value of *networking* are assessed – the impact of networking on knowledge creation, resource acquisition and enterprise development activities.

Models for assessing the innovative capacity of enterprises have also been developed on Polish soil. One of these was proposed by L. Kozioł, who, on the basis of the results of studies of companies from the Malopolska Region, identified the following factors of innovative capability: managerial and employee competences, IT infrastructure used, organisational structures and processes, cooperation, so-called knowledge alliances and knowledge (Kozioł L., Wojtowicz A., Pyrek R. 2014: 116). On the other hand, a method for assessing the eco-innovative capabilities of enterprises was proposed by M. Pichlak, who very clearly distinguished the dynamic capabilities component in her model. This is understood as the ability of an enterprise to identify market opportunities, the ability to use these opportunities for its own purposes and the ability to reconfigure resources and competencies in response to changes in the environment. Dynamic capabilities were separated from eco-innovative capabilities, defined in this model as the ability to generate streamlining and radical innovations. In her model, the author also integrates components such as organisational effectiveness defined by financial and non-financial indicators, leadership style, as well as the turbulence inherent in the environment (Pichlak M. 2020: 141).

In the development of the innovation capability model, the conclusions of the study carried out by M. Dziallas and K. Blind. These authors have assigned particular measures to the areas of enterprise functioning involved in consecutive stages of the innovation process (Dziallas M., Blind K. 2018: 1). The differentiation of measures in terms of the level of advancement of the innovation process is an innovative approach, but also a very desirable one, because in the case of many burgeoning high-tech industries, including the space sector in Poland, many ideas do not go beyond the research and development sphere. However, thanks to their innovative activity, e.g. within industry cooperation networks and acquiring contracts from the European Space Agency, enterprises increase their capacity for innovation. Indicators concerning the first phases of the innovation process are important for organisational processes in the enterprise, in particular for the decision-making and strategic process, as well as for the allocation of resources and decisions concerning further activity.

The assessment of innovative capacity is also of interest to institutions offering support to enterprises. For example, a report from the Interregional Cooperation Operational Programme 2007–2013 assessed the relevance of projects funded under this programme to the innovative capacity of SMEs. Innovative capacity was evaluated according to criteria such as access to finance, the ability to improve

skills in innovation process management, marketing and promotion of innovative activities and innovative products and services, R&D capacity, *networking* and co-operation with external partners.

Models of the evaluation of innovative capacity can play a significant role in the assessment of the effectiveness of spending public funds, and therefore can have significant implications for the creation of innovation and industrial policy in terms of the development of support instruments, or the formation of a system of incentives for innovative activity in specific industries. Methods for the evaluation of innovative capability are also necessary to manage and control the process of selection of innovative ideas and concepts that appear in the enterprise and, in particular, to effectively allocate the resources of the enterprise and to assess their efficiency at each stage of the innovation process (Dziallas M., Blind K. 2018: 1). Indicators of the innovative activity of the enterprise can also be used for benchmarking in the field of innovativeness, determining the development gap in fields such as technology, knowledge, specialised personnel, organisational structures, as well as when acquiring external financial resources for innovative activity (Białoń L. 2010: 184).

Model of innovation capacity of space enterprises in Poland

In order to construct a model for assessing the innovation capacity of space enterprises in Poland, a conceptual model has been developed which takes into account the results of the literature research. In accordance with the theory of innovation systems, this study also takes the conditions arising from the national innovation system and the industry innovation system into account. However, in order to achieve the research objective of, in particular, presenting the nature of the impact of EU and ESA financial instruments on the innovative capacity of space enterprises in Poland, it is necessary to isolate the enterprise as a specific subsystem. Such an approach is useful for the purpose of creating a theory of relations between different elements of the system involved in the process of technological and organisational change. Moreover, according to the approach of A. Pierre and A.-S. Fernandez, the study focused on factors specific to the group of small and medium-sized enterprises, and – where possible – on high-tech enterprises. At the same time, due to the early stage of development of the space industry in Poland and the limited possibility of commercialisation of products through a complex and lengthy process of validation and testing of innovations in real conditions (e.g. in space), the model took the area of internal processes in the company into account to a greater extent than the area related to the results of innovative activities.

The adopted methodology for the development of the conceptual model of innovative capacity of space industry SMEs in Poland is sequential in nature and includes, in particular, the following stages:

1. operationalisation of the concept of innovative capacity of space industry enterprises on the basis of the study of the literature on the subject and the author's own experience of working in a space industry enterprise;
2. identification of the most important areas and factors of innovation capacity of small and medium-sized space enterprises on the basis of the literature survey, using the author's practical knowledge of the space industry;
3. developing a research model based on the data obtained from the literature survey to guide the study and develop a survey questionnaire;
4. conducting a multiple case study using the constraints established by the model on the example of selected companies;
5. conducting an inference based on the multiple case study of the companies conducted specifically using the questionnaire and the answers to the research questions posed.

Based on the review of the literature in the field of economics and finance, as well as management and quality sciences, the basic aggregated areas and factors which have the greatest potential in terms of shaping the innovation capacity of space enterprises, as well as their corresponding measures, were identified. In addition, those with the greatest potential to be influenced by financial instruments and the way they are used by the enterprise are included. The model for assessing the innovation capacity of space enterprises, according to the adopted theoretical assumptions, takes into account:

- enterprise resources (whether and how EU and/or ESA financial instruments can affect particular groups of resources which are key to the innovative capacity of the enterprise):
  - financial resources (means of evaluation: value of contracts/projects, R&D expenditures, training expenditures, diversity of financing sources)
  - human resources (means of evaluation: the number of employees with higher technical education, the involvement of the management in the innovation process),
  - technical resources (means of evaluation: technical infrastructure, patents);
- innovation process (whether and how financial instruments can influence the innovation process, the central element of innovative activity of the company):
  - sources of innovation (means of evaluation: diversity of sources of knowledge and innovation);
  - number of ties (means of evaluation: ties within the industry);
  - organisation of the innovation process (means of evaluation: formalisation of organisational processes in the enterprise);

  - innovation strategy of the company (means of evaluation: having an innovation strategy, mission, vision, goals, overall evaluation of the project portfolio);
  - products (means of evaluation: number of implemented products in the space industry, number of implemented products outside the space industry, share in the value chain of the space economy);
- dynamic capabilities (whether and how financial instruments can affect the dynamic capabilities of companies, determining their ability to adapt to the requirements of the environment):
  - ability to reconfigure the resources and competencies of enterprises in response to the requirements of the changing environment (means of evaluation: determining the readiness and how to analyse changes in the environment, determining the readiness for change in the enterprise).

Another important element of the model is the context of the innovation environment, including in particular the conditions arising from the EU innovation system, the country and the industry. All the abovementioned areas and factors are closely interrelated and may play an important role in shaping the innovative capacity of small and medium-sized space enterprises in Poland.

Results of a study of the innovative capacity of enterprises based on the examples of three space SME case studies

Sampling was carried out using the results of the space industry enterprise survey. The survey of companies operating in the space industry was conducted in January 2021. It covered companies with the status of small or medium-sized enterprises, which were verified using the following criteria:

- belonging to the group of SME companies (verification on the basis of the company declaration);
- having a registered office or a subsidiary in Poland (verification on the basis of KRS entry);
- active in the space sector (membership of the Polish Space Industry Association (SPACE PL) and registration on the ESA competition portal, EMITS).

Thanks to such a set of criteria, the research sample included only enterprises that are actually actively involved in the creation and development of space technologies in Poland. An enterprise strictly providing consulting services was eliminated from the research group. Thus, 39 small and medium-sized enterprises developing space technologies, mainly in the fields of the use of satellite data and databases, ground and on-board space software, as well as electronics, mechanics

and automation, took part in the survey. The survey was carried out independently. On 10 January 2021, a survey questionnaire was sent to space SMEs in Poland in the form of an email, covering 39 questions, including:

- four general questions (number of employees, percentage of technical graduates employed, ownership structure, period of operation of the company);
- eight questions on the EU and/or ESA financial instruments used (number of instruments, total value of instruments and types of support schemes);
- 27 questions in the areas of innovation capability identified in the literature survey, i.e. the resource area, the innovation process area and the dynamic capability area.

By 20 January 2021, 13 responses had been received, including eight survey returns and five refusals. The overall return rate was 21%. In the refusals, the respondents stated the following reasons: the questionnaire raises strategic issues of the company's activity (one company from the Wielkopolskie voivodeship); the company is currently in the process of being liquidated (one enterprise from the Mazowieckie Voivodeship); the enterprise's employees are not able to fill in the questionnaire because of the number of projects implemented (two enterprises, one each from the Małopolskie and Mazowieckie Voivodeships); the enterprise does not use EU and/or ESA financial instruments (one enterprise from the Dolnośląskie Voivodeship). Due to the low rate of return, the survey questionnaire was sent again to 26 enterprises on 21 January 2021. By 26 January 2021, three returns had been received. The total return rate was therefore 29%. The survey questions were answered by company executives, e.g. CEOs, CIOs, CFOs and technology development directors.

Of the companies from which questionnaires were returned, cases were selected that were most relevant to the aims of the study (Stewart J. 2012: 73). They are exploratory in nature, i.e. through them the author will attempt to answer the main research question of whether EU and/or ESA financial instruments affect the innovative capacity of space SMEs in Poland, and if so, how. The selection of these cases was based on a preliminary analysis of the general conditions of the activities of the enterprises (genesis of establishment, size, location, number of EU and/or ESA projects implemented, period of activity, media visibility). Three enterprises qualified for the study: one based in Łomianki near Warsaw (Mazowieckie Province), one based in Gliwice (Silesian Province), and a third located in Gdynia (Pomeranian Province).

All the companies surveyed actively use the financial instruments of the European Space Agency. The ESA space project portfolio of two of them includes five R&D works, while one of the SMEs indicated that the number of contracts it has with the ESA is six. However, the total value of contracts at each of the companies surveyed does not exceed EUR 1.5 million. Two of the companies surveyed

have implemented ESA space projects only under the PLIIS programme intended exclusively for Polish entities. Under this programme, the most recent tenders were announced and awarded by ESA in 2020. One of the companies has also used financial instruments under the auspices of European Space Agency's optional programmes aimed at entities from all ESA member states, in particular the Future EO – Earth Observation programme, which includes the application of artificial intelligence to the use of satellite data.

It should be emphasised that none of the surveyed companies used financial instruments offered by the European Union. On the other hand, the portfolio of projects implemented by the surveyed entities includes space projects of a research and development nature co-financed by the European Union under the auspices of national operational programmes, e.g. the Intelligent Development Operational Programme or the Regional Operational Programme for the Mazowieckie Voivodeship 2014–2020.

Results of the study

The study found that the use of ESA financial instruments affects all areas of the innovation capacity of firms as identified by the author of this paper. However, it has a varying degree of impact on the factors classified within these areas and characterised in the model. Unfortunately, due to the lack of detailed data and information on the remaining SMEs in the space sector in Poland, the impact of financial instruments offered by the EU was not demonstrated. However, the very fact that none of the enterprises which returned completed questionnaires are implementing projects under the auspices of EU space programmes may constitute an important conclusion of the study.

The author of this paper has identified several reasons for this. Firstly, most of the competitions under LEIT – Space "Horizon 2020" were addressed to entities implementing research at a low level of technological readiness (58% are implemented as research and innovation actions) (Horizon Dashboard 2021), mainly to scientific and research institutions. Therefore, the very design of the programme may have discouraged SME entities from applying for funding. Secondly, enterprises taking part in EU competitions were evaluated in terms of criteria such as scientific excellence, the impact of the results of the project on the areas defined in the competition programme, as well as the manner of project implementation and the composition of the consortium (Horizon 2020 LEIT-Space 2016–2017 2021). For Polish space sector SMEs, the priority is, above all, to ensure their financial liquidity and remain active on the market. At the same time, EU financial instruments represent a much higher level of formalisation than ESA contracts. They require the preparation and submission of an extensive project application, the execution of the project launch procedure (signing of the consortium agreement,

determination of staff salaries), and then the settlement of the funding according to strictly defined requirements. ESA contracts are characterised by a lower level of formalisation; furthermore, the funds constitute a payment for work done and are not subject to the procedure of settlement as grants are.

Access to financial resources related to the use of ESA financial instruments by Polish SMEs in the space sector plays a key role in increasing their innovation capacity. This confirms the views of many authors in Poland and abroad, identifying factors in the innovative capacity of enterprises (e.g. M. Pichlak (2020), K. Poznańska (2017), W. Pełka (2007), E. Mansfield (1988), R. Simonetti, D. Archibugi and R. Evangelista (1995), M. J. Madeira Silva et al. (2014)). The highly specialised nature of the space industry, which is inextricably linked with R&D, requires large financial outlays to carry out the work, i.e. to maintain adequate scientific and technical staff, to equip laboratories and workshops, to purchase components to develop concepts and build prototypes, to conduct tests and to validate the work, often over a long period of time. Companies that have not obtained external support are often unable to continue operating in this high-investment industry; hence, the observed phenomena of change of industries or liquidation of their activities.

The area of financing plays a multi-faceted role in the innovative activities of space SMEs. Firstly, as already mentioned, it constitutes an important resource, allowing companies to maintain financial liquidity, as well as to develop their own technical infrastructure (in the form of laboratories, specialised apparatus and equipment), which is necessary for the implementation of European Space Agency contracts. Secondly, it can actively influence the area of new knowledge in the field of disposition of financial resources, knowledge of finances, controlling and disbursement of financial resources, as these areas also constitute an important factor of the innovative capacity of the company (Illmeyer M., Grosch D., Kittler M., Priess P. 2017: 69). Thirdly, the use of financial instruments, in particular within the framework of government programmes and other institutions financing research and development, allows companies to increase the stock of industrial and technical knowledge, which can positively affect the innovative capacity (Audretsch D. B., Link A. N. 2019: 1112). The quality of certain types of resources, in particular knowledge and human resources, depends to a large extent on the financial resources of the enterprise (Dymitrowski A. 2014).

The study also confirmed the assumption that the use of ESA financial instruments acts as a kind of catalyst for obtaining external funding from other sources. Thanks to the implementation of ESA contracts, companies initiate space ventures and develop them initially to TRL 4. This level is sufficient to obtain additional funding. In addition, a positive evaluation of the conceptual solution by the European Space Agency is confirmation of the company's knowledge and competence. However, in this context, attention should be paid to the types of

programmes under which enterprises participate in ESA contracts. In fact, most entities have used instruments under the PLIIS programme, addressed exclusively to Polish entities, where the international competition factor has been eliminated. The use of ESA financial instruments therefore usually results in projects that are national in scope. The use of ESA financial instruments does not translate into raising external private funding. This is because such financing is associated with high barriers both on the part of the investor (long period of investment return, division of rights from profits) and the enterprise (high level of innovativeness of the venture, strictly defined business model, high entrepreneurial competence). However, the participation of Polish SMEs in acceleration programmes for the space sector may indicate growing competences in applying for funds from private external entities.

In most concepts of innovative capacity of SMEs, in particular high technology ones, knowledge and competences of employees are emphasised as key determinants of generating new ideas and creating innovative projects. For the innovative capacity of this specific group of enterprises, specialised staff with a technical education profile are also important (Romijn H., Albaladego M. 2002). Most of them are increasing the involvement of employees, especially in research and development works. Young entities, which are developing most dynamically and whose structure is just beginning to take shape, may significantly increase the level of employment thanks to the use of ESA instruments.

Moreover, among the most important factors of the innovative capacity of enterprises, the strong role of leadership and the involvement of management in the innovation process is mentioned (as indicated by: M. Doroodian et al. (2014); M. Saunila and J. Ukko (2012); A. Pierre and A.-S. Fernandez (2018)). The competence, skills and attitude of management, which gives direction to the innovative activity, activates the potential hidden in the tangible and intangible resources of the companies and co-creates the organisational culture of the entity conducive to innovative activity. The use of ESA financial instruments influences this factor, albeit mainly in organisations at the initial stage of development, as in the case of human resources. This may indicate a high level of involvement of the managerial staff in the innovation process in entities operating on the market for more than 10 years, or a low readiness for changes in the management area. Meanwhile, the increased involvement of management in the innovation process could be a signal that space activities are an important aspect of the company's present functioning, as well as a direction for future development.

Weak impact in the area of resources has been identified particularly in relation to employee training and obtained and/or filed patents. The researched entities did not increase expenditures on training, which may lead to the conclusion that the innovative character of research and development works is oriented towards

obtaining knowledge from other sources and in a different, more individualised way. Therefore, this may be an important feature of the innovation system of the space industry and a conclusion concerning the pattern of the learning process occurring in this industry in Poland – the space industry is dominated by the method of acquiring knowledge based on experience and learning through interaction (Doing, Using and Interacting, or DUI), and to a lesser extent based on the production and use of codified scientific and technical knowledge (Science, Technology and Innovation, or STI). In the industry innovation system, inter-organisational learning plays a special role, which is reflected in the establishment of alliances, strategic alliances and other forms of inter-organisational cooperation by companies (Dolińska M. 2015: 294).

The research shows that, in the space industry in Poland, patents are not an important tool for intellectual property protection. This property, being a derivative of knowledge, R&D processes, and the coordination of activities, is a strategic resource of enterprises, the disclosure of which may mean a potential loss of technological advantage and high profits in the future. Therefore, the most common form of protection of intellectual property of space industry SMEs is keeping it secret. This conclusion can also be applied to the area of the innovation process – in order to assess the results of innovation activities of space companies in Poland, a different measure than the number of patents should be used, related, for example, to the place of these entities in the space economy value chain in Europe or worldwide.

Sources of innovation among SMEs in the space sector in Poland are relatively diverse. According to the companies surveyed, the most important are R&D works carried out within SMEs. This confirms the theory that enterprises of a higher innovation level base their activity mainly on their own research and development works. However, it should be pointed out that these enterprises also use external sources of innovation to a large extent, which they do not declare directly. Examples of these sources of innovation are external contacts and relations with the European Space Agency and with system integrators – customers for whom solutions are developed.

The importance of the use of ESA financial instruments by the enterprises surveyed for the development of ties and cooperation networks should be emphasised. It may be stated that regulatory bonds, i.e. rules resulting from legal solutions, as well as customs or good practices promoted and disseminated by industry organisations, are of key importance in the developing space industry in Poland. ZPSK, to which all surveyed entities belong, was identified as the most important industry organisation. Its importance is underlined by the fact that, according to the author of this paper, the Union's membership constitutes one of the criteria of delimitation of the space industry in Poland.

In the context of the space sector in Poland, the importance of participation in the European and global space economy value chain should also be noted as a key element of the learning process and transfer of knowledge and innovation (Zeng D. Z. 2017: 298). In order to increase innovation capacity, it is important to establish inter-organisational cooperation, but also to strive to include as many Polish entities as possible as suppliers and sub-suppliers to tier 1 enterprises. The formation of an effective learning pattern in the space industry in Poland and the development of absorption capacity, which means the ability of enterprises to search for and identify the value of new, external information, assimilate it and apply it for their own purposes (Bessant J. R., Tidd J. 2011), will be an important catalyst for the development of their dynamic capabilities.

Most models for assessing the innovative capacity of SMEs emphasise the strategic importance of the structured innovation process (e.g. R. Adams, J. Bessant and R. Phelps (2006); V. Boly, L. Morel, N. G. Assielou, M. Camargo (2014); M. Dziallas, K. Blind (2018)), so less emphasis is placed on the outcome of this activity. The lack of an innovation strategy, formalised processes and a defined organisational structure in enterprises can be a significant barrier to development, especially given the limited resources of small and medium-sized enterprises. The use of ESA financial instruments by Polish SMEs in the space sector has an impact on increasing the level of formalisation of processes in enterprises, primarily through the introduction of regulations, new methods of documenting R&D works, notification of new projects, the introduction of work quality policy and innovation strategy. Thus, by imposing standards, enterprises have limited the freedom of action, which may, however, result in a higher level of organisational and technical culture.

According to the author, the formalisation of processes in space sector SMEs in Poland has facilitated the declaration of the level of readiness for changes concerning resources, goals and the way enterprises operate, among other things. Readiness for change is one of the most important factors in the area of dynamic capabilities of enterprises. It reflects the potential actors have to generate change, and it also indicates the positive orientation of actors towards change. Organisations that perceive change as a positive phenomenon, bringing with it opportunities for development, are more effective in implementing changes than organisations that perceive change as a negative and risky phenomenon (Werkman R. A. 2009: 674). In addition, the increase in financial, human and technical resources allowed the entities which were the subjects of this study to be more flexible in shaping organisational and innovation processes. Readiness for change determines the potential of enterprises to introduce changes, but it does not prove the ability to implement them. Therefore, it can be assumed that the condition for maximising results in this area of innovation capability is for enterprises to simultaneously build the ability to implement changes. However, the study shows that SMEs in the space sector in

Poland do implement changes. These mainly concern resources, both human and technical (employment of employees, extension of technical infrastructure), as well as processes in the field of marketing and promotion (launching a website, new ways of promoting products).

Readiness for change can also be related to the intensification of the process of analysing changes taking place in the business environment. Thanks to the use of ESA instruments, it has a more organised and systematic character. However, in SMEs this process is mainly carried out by the management, which may be an additional confirmation of the key role of the management in creating conditions for the innovative development of the enterprise and shaping its innovative capacity. Additionally, enterprises do not use dedicated tools for analysis. The analysis of the environment is therefore performed systematically, but still in a non-professionalised way. Meanwhile, the analysis of changes taking place in the environment surrounding SMEs from the space sector in Poland is important because of the high level of complexity of the environment, the dependence of the functioning of the space sector on decisions of national and international bodies, the commonly occurring spillover effects of space activities, and the necessity of taking into account the needs of individual customers in their activities to an increasing extent.

Conclusions

The research proved that the most important factor in the emergence of the space industry in Poland was the accession of that nation to the European Space Agency in 2012. Poland subsequently received access to financial instruments in the form of tenders organised under ESA's mandatory and optional programmes, including the PLIIS programme, directed exclusively to Polish entities, whose task was to prepare them to compete for ESA contracts in international competition. On the basis of empirical studies, it was shown that small and medium enterprises are the core of the Polish space industry, with the greatest potential for development.

However, the use of the potential of SMEs in order to ensure a permanent effect of the development of this specific group of enterprises for the economy in the form of new jobs or an increase in innovativeness and competitiveness depends on a continuous and systematic development of organisational systems of these enterprises, the expansion of the scale of their activities and the use of opportunities on the market. Therefore, it can be concluded that a sustainable effect in the form of continuous accumulation of knowledge in the industry and a constant presence at higher and higher levels of the global value chain of the space economy depends precisely on the innovation capacity of individual enterprises.

The research shows that the European Union grant procedures, which are the main mechanism for the distribution of funds in the EU space industry support system, are rooted in priorities that are the essence of the entire economic and

social system of the European Union. These priorities primarily include free competition, cooperation, the pursuit of excellence, especially scientific excellence, and support for groups of entities encountering the greatest barriers to development (e.g. SMEs). In turn, the procedures of tenders and contracts, under which ESA financial instruments are distributed, reflect the most important principles of the Agency's industrial policy, i.e. the principle of preference of entities from member states or participating in ESA programmes (domestic preference) and the principle of geographical return. ESA industrial policy also implements tools for the management of ESA space technologies, aimed primarily at increasing the technological capabilities of space companies. It should be emphasised that in terms of both EU and ESA support systems for the space industry, an important place is occupied by small and medium-sized enterprises, to which a number of specially dedicated financial instruments are addressed. The EU instruments go mainly to scientific and research entities and public institutions, enterprises with an extensive structure (large companies) and already with an extensive network of international contacts. ESA instruments, on the other hand, are mainly used by companies, especially SMEs, to improve their technological competence and to develop products that can secure their place in the European or global space economy value chain.

As a result of the study, it was also confirmed that the use of ESA financial instruments affects all areas of the innovative capacity of enterprises, identified by the author of this paper, in particular the areas of resources (financial, human, technical), innovation processes (innovation sources, number of ties, organisation of the innovation process, innovation strategy, products) and dynamic capabilities (the method of analysing changes in the environment, readiness for changes in the company). However, it affects the factors classified within these areas to varying degrees.

The study showed that the use of ESA financial instruments has the greatest impact on the financial resources of SMEs in the space sector in Poland, the increase in which also determines the increase in expenditure on research and development in these companies. As a result of the technologically advanced nature of the SME space industry, enterprises mainly create and expand the existing technical infrastructure in connection with the implementation of ESA contracts. Depending on the stage of development and the number of projects implemented at the same time, these companies make changes in the area of employment. However, one of the priorities is the development of engineering staff, which is a strategic resource of small and medium-sized space enterprises in Poland.

The study also confirmed that the use of ESA financial instruments acts as a kind of catalyst for obtaining external financing from other sources. However, it should be noted that in most cases these are external national sources in the form of public instruments. In light of the empirical research carried out, it has also been shown that the use of ESA financial instruments influences the involvement

of managers in the innovation process. However, the scale of changes in this area depends, as it does in the case of employment, on the time when enterprises operate on the market. For entities at the initial stage of development, the scale of changes may be much greater.

It should be stressed that all the aforementioned areas and factors of innovative capacity of space industry SMEs in Poland are closely interconnected. ESA financial instruments influencing one of the areas of innovative capability also generate effects within another area. The study demonstrated a significant impact of ESA financial instruments on the innovative capacity of space SMEs in Poland. The broad impact of ESA financial instruments, going far beyond the impact in the financial area, was also confirmed. Additionally, the areas and factors of innovative capacity of space industry SMEs in Poland identified and characterised in the model were positively verified. However, according to the author, the model of evaluating innovation capacity requires modifications in light of empirical research, e.g. in the scope of taking into account to a greater extent the effects of innovative activity of SMEs from the space sector in Poland, which will become more significant along with the development of this sector, or extending the scope of assessing dynamic capabilities so as to obtain a picture of not only the potential changes, but also the actual changes occurring in companies.

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Monika Płońska[1]

Digital sustainability – the importance of sustainable and digital transformation in decarbonising enterprises and achieving sustainable development goals

Abstract: Climate and decarbonisation strategies are becoming the cornerstone of corporate sustainability management. While the goal of achieving carbon neutrality by 2050 is a popular market practice, operationalising this goal remains a challenge. Decarbonising businesses requires investment and technological advances. Digital transformation is becoming an increasing ally of sustainable transformation. In this article, I analyse Industry 4.0 digital technologies that support sustainability management and may become a tool by means of which to achieve decarbonisation goals. I also cite the results of a study conducted by Accenture on European companies' investments in new technologies, as well as their potential to be among the Leaders of Tomorrow.

Keywords: digital sustainability, sustainability, digital transformation, decarbonisation, climate change

Introduction

The latest IPCC (Intergovernmental Panel on Climate Change) report, which was published in the middle of 2021, shows unequivocally that mankind is responsible for global warming, and that we must move away from the idea of counteracting climate change towards adapting to the changes, because it is already too late for counteraction. Global warming is occurring faster than scientists previously

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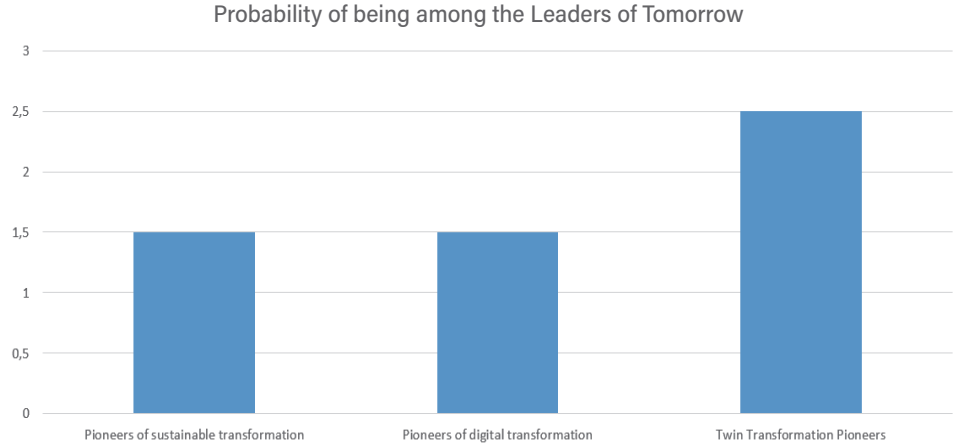
thought, and according to the latest forecasts we will reach or exceed a global temperature of 1.5 degrees above pre-industrial levels within the next decade or two. According to the scientists who wrote the report, avoiding 1.5 degrees of warming is almost impossible, but we can still maintain a level of warming near this critical threshold and mitigate the consequences of global warming that would result from approaching and exceeding an increase of 2 degrees above pre-industrial levels. Scientists point to society's reliance on fossil fuels as the main reason why the planet has already warmed by 1.2 degrees Celsius – as a result of greenhouse gas emissions such as carbon dioxide and methane. The report clearly blames carbon pollution for rising temperatures and makes it clear that the only way to slow and ultimately reverse warming is to reduce greenhouse gas emissions to zero. The IPCC report is also a call for a global energy transition to take place as soon as possible. To avoid the extreme consequences that accompany global temperature, greenhouse gas pollution would have to be reduced by 45% by 2030 and 100% by 2050. The IPCC stresses that these deep cuts in emissions will have to be rapid and far-reaching, and will require unprecedented changes in all aspects of society. Such unprecedented societal changes will need to occur in many dimensions of society, e.g. the largest carbon emissions in the United States come from transportation (29%), followed closely by electricity (28%), industry (22%), commercial and residential buildings (12%) and agriculture.

Climate transformation requires adequate investment, access to technology and support for the most vulnerable sectors that will not be able to adapt quickly. It requires commitment and motivation to change from all market players. Digital sustainability is the use of technology in everyday business applications to improve the environment for sustainable development. The concept is gaining popularity as it provides an opportunity to reduce the impact that technology can have on the environment and climate. To achieve digital sustainability, organisations are embracing digitalisation. Companies adopting sustainable digital transformation as a goal can use digital processes, tools and forecasting models to measure the potential benefits against the impact their success may have on the environment. These same companies can then work to mitigate the potential environmental impact of their operations while connecting consumers with valuable goods and services. There are several determinants behind digital sustainability initiatives, including attention to a growing population and increasing demand for remote IT support software.

The report "No decarbonisation without digitalisation. Sustainable development needs digital technologies", published by PKN ORLEN in cooperation with Accenture and which was co-authored by the author of this paper, presents analyses which indicate that only 32% of European companies in the economic recovery phase after the COVID-19 pandemic will be able to enter the phase of profitable growth. This group is referred to as the Leaders of Tomorrow. These are companies

that have positive operating profit calculated from the fragile phase of the pandemic (the second half of 2020) to the rebound phase (the first half of 2021), with stable or better operating profit between each phase. At the same time, as many as 19% of the companies surveyed, referred to as Falling Angels, face significant challenges in returning to the growth path which they were on prior to the COVID-19 crisis. Combining digital transformation with transformation based on sustainability goals (Twin Transformation) will enable companies to make efficiency gains while achieving carbon neutrality. According to the analysis and experience of Accenture, companies that are engaged in Twin Transformation are 2.5 times more likely to be among the Leaders of Tomorrow. Most European companies are well prepared to join the Double Transformation. However, they need new business models to prepare for the challenges which await beyond 2030 – such as moving towards carbon neutrality.

The ratio of the likelihood of becoming Leaders of Tomorrow among companies that are pioneers of sustainable transformation, pioneers of digital transformation and twin transformation compared to companies that do not meet any of these criteria.



Source: Accenture

Sustainability is an integral part of economic development in all countries, even when attention is diverted away from it. The balance between humanity's need to produce and the desire not to destroy the planet in the process is constantly challenged and vacillated. With the disruptive new models that Industry 4.0 has shown the world, and the ever-increasing opportunities in technology, production and improving the way businesses operate, there is the question of sustainability as a driving force by means of which to achieve decarbonisation goals. How will new business models impact sustainability, and will they succeed in putting the future of humanity in the spotlight?

According to the Boston Consulting Group's 2015 report on Industry 4.0, nine technological advances in particular have created the fourth revolution: autonomous

robots, simulation, horizontal and vertical systems integration, the Industrial Internet of Things, cybersecurity, the cloud, additive manufacturing augmented reality, and Big Data and analytics. In her article "What Industry 4.0 means for sustainable development" in the international journal Industry 4.0, Bulgarian researcher R. Tsvetkova identified the opportunities and chances offered by the technologies of the fourth industrial revolution, according to BCG's classification for achieving sustainable development goals, the same technologies are also pointed out by Accenture:

Artificial intelligence

Artificial intelligence is the ability of machines to exhibit human skills such as reasoning, learning, planning and creativity. It enables the understanding of a wide range of available data (e.g. from sensors in an industrial plant or from a camera). Based on this data, patterns of action are created. AI increases the efficiency and productivity of a company by automating processes or tasks that previously required a great deal of manual work and analysis. AI can also make sense of data, the scale of which is beyond human interpretation. Examples include virtual assistants, image analysis software, search engines, speech and facial recognition systems, systems that support autonomous cars, drones, and the Internet of Things.

AI has the greatest impact on the digital transformation of the economy and the achievement of the goals of Agenda 2030, the Green Deal and the Paris Agreement. It permeates most Industry 5.0 technologies and addresses global climate issues – from monitoring climate trends, to predicting weather events, to specific solutions to reduce or completely eliminate greenhouse gas emissions.

Capgemini Research Institute's 2020 report "Artificial Intelligence in the Fight against Climate Change" looks at the impact of artificial intelligence in the fight against climate change. As indicated by data from a survey of 800 directors in 400 organisations, this will not be achieved without educational activities, raising awareness and improving competences. Polish companies are not ready for this change either – last year 28 Polish listed companies emitted 28.2 million tonnes of greenhouse gases into the atmosphere, and to date only 1% of the WSE reports data on CO2 emissions (in 2021 this was made obligatory). Based on its research, CRI estimates that artificial intelligence is expected to help organisations reduce greenhouse gas emissions by 16% over the next three to five years. The use of AI in climate action could help organisations meet up to 45% of their total greenhouse gas reduction targets set by the Paris Agreement by 2030.

Two-thirds (67%) of the organisations surveyed by CRI have set long-term business goals in the fight against climate change. Adaptation is also on the rise, with more than half of organisations (53%) going beyond pilot programmes in implementing AI. As a result of using AI, the companies surveyed have reduced

greenhouse gas emissions by 12.9%, improved energy efficiency by 10.9% and minimised waste by 11.7% over the past three years.

Modelling and simulation technologies

Modelling and simulation technologies are a key factor in the development of Industry 4.0. They are central to the modern design, piloting and operation of new products. New virtual prototyping capabilities, as well as automation in manufacturing industries, increase productivity and improve the quality, design, piloting and support of new products.

Horizontal and vertical system integration

Horizontal and vertical system integration represents integration between different value chains and between layer functionality within an organisation. This integration allows for a greater understanding of all processes, as well as better synergies within and between organisations.

Cloud technologies

Cloud technologies are not just a way to integrate services and cut costs in IT spending – they are a disruptive factor. In manufacturing, but also everywhere else in business, cloud technologies are changing processes and the people who operate them, opening the door to approaches and outcomes that have never been implemented before. It could even be said that cloud technology is 'democratising communication'.

Cloud computing

Cloud computing is the provision of computing power and related services by an external provider. The data is not stored on one's own drives, but with the use of external resources. Usually, the customer pays only for the services actually used, which reduces operating costs and allows for more efficient use of the infrastructure. This eliminates the need to manage one's own servers, install software or deal with administration. This technology enables access to large computing capacities at a fraction of the cost of buying technical infrastructure.

Data migrations from on-premises locations to the public cloud can result in a global reduction in CO_2 emissions of 59 million tonnes per year. This is comprised of activities such as the automation and autonomous adjustment of computing power to current demand, real-time sharing and allocation of computing power, more efficient cooling and heat recovery from cooling equipment in server rooms, and powering data centres with clean energy, for example from large wind farms or high-efficiency solar power plants.

Incremental manufacturing

Incremental manufacturing represents a development in the world of design, testing, manufacturing, etc., such as 3D printing. It is the concept of true and effective, fast connectivity between the customer, data and production; it is changing the way products, and their separate parts, are manufactured. With rapid prototyping, the robust manufacturing of any mould and 3D printing itself, additive manufacturing is changing processes, planning, design ideas, the ability to create and rapidly reducing costs across the production line. The capabilities of additive manufacturing continue to expand.

Augmented Reality

Augmented reality creates a bridge between virtual reality and data that has been collected via methods of physical analysis. It facilitates a new approach to the design and repair of components and entire products. By creating the right digital toolkit, designers, engineers or technicians can improve their problem-solving capabilities and greatly expand their options for optimising products and processes. Augmented reality also helps to connect customers more effectively with their desired products, thanks to the ability to see the possibilities with all the necessary technical specifications.

Big Data and analytics

Media and scientists repeatedly stress that data is the engine of the century, a commodity more valuable than gold. With the increased ability to collect massive amounts of data, and moreover analyse it in a faster and smarter way, Big Data and analytics are paving the way to the transformation of our understanding, production, sales etc. Now, more than just historical data, real-time physical data such as vibration, noise levels and pressure are being used in factories, as well as predictive data for similar processes and various off-site innovations.

Blockchain

Blockchain is a distributed record of data, stored in a way that makes it impossible to manipulate. Blockchain allows for the transmission and storage of information pertaining to online transactions. Importantly, in the context of sustainable development, blockchain makes it possible for a product to be tracked and recorded at all stages, in a transparent and reliable manner.

Blockchain can be used to track the carbon footprint of products, allowing it to be monitored from the manufacturer to the point of sale. It also helps to prevent unethical practices, such as "green washing" (providing incorrect information), making supply chains more transparent. Information on a product's history is often unavailable and difficult to verify. A product passes through many hands

before it reaches the customer. Blockchain helps to prevent the dissemination of false information about a product – how it is made, what materials and chemicals are used, what item is recycled. Customers gain the ability to make more environmentally friendly choices.

The Internet of Things

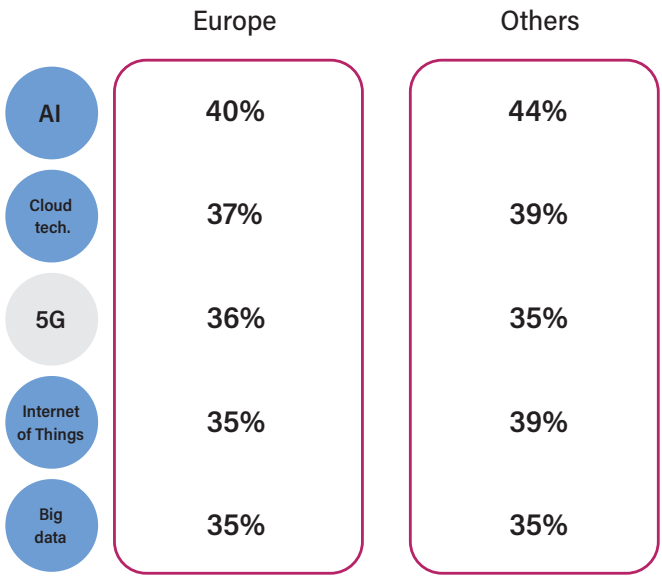
The Internet of Things (IoT) is a system of interconnected devices that are equipped with sensors, which have data processing capabilities and exchange information with other devices, e.g. via the Internet.

5G

5G is the new mobile communications technology standard – the successor to 4G. The parameters it is expected to meet will offer the possibility of data transmission with minimal delay and much higher throughput compared to current mobile technologies.

5G networks can make a real contribution to reducing carbon emissions for operators in several ways. They achieve a high level of energy efficiency as the amount of data that can be transmitted per unit of energy is increased. On average, approximately 90% of the energy spent on sending one bit of data will be able to be saved compared to 4G. With the possibility of future use of millimetre wave transmission (mmWave), this figure could rise to as much as 98%. The use of 5G networks could save up to 0.5 billion tonnes of CO_2 worldwide by 2030, while around 50% of this result can be attributed to effects not directly related to 5G. It should be stressed that the profits from the implementation of 5G technology exceed the outlays many times over, and the sectors that will benefit most will be industry and energy. PKN ORLEN is testing fifth-generation wireless connectivity on the premises of its production plant in Płock and the adjacent service station. The scope of the project includes the launch of a private industrial 5G network, tests and measurements of the 5G network, tests of critical communications, and tests and measurements of the quality of services using 5G technology. Tests include mass transmission of IIoT sensor data, and connectivity parameters for critical applications for real-time video and data transmission. For example, resistance to interference generated by refinery installations, the impact of industrial infrastructure on transmission delays or the level of attenuation by water vapour is analysed.

European companies are planning large investments in new technologies, % of Europe and non-European respondents



Source: Accenture.

There is significant synergy between the principles and objectives of sustainable development and Industry 4.0; perhaps this combination will become the foundation of the fifth industrial revolution. Although today Industry 5.0 is defined as networking between man and machine, sustainability is a broader concept. In addition to the social aspect, the climate and the environment are very important issues. Assuming that the world still has three decades to fight climate change in its quest for carbon neutrality, it is difficult to imagine managing corporate sustainability without Industry 4.0 technologies.

Digital technologies accomplish the task of decarbonisation in three ways:

1. Increased process knowledge through data monitoring and tracking – analysing data on the extent to which raw materials and energy are consumed results in increased awareness of the environmental impact being made. Enables the tracking and reporting of one's carbon footprint.
2. Optimisation and automation – increasing production efficiency through the more effective use of resources used in production processes. Energy and raw materials are thus saved, which leads to both improved economic performance and reduced greenhouse gas emissions. Better use is made of the resources required for production, which improves energy efficiency.
3. Predicting and preventing adverse events – predicting failures minimises the risk of machine downtime and the waste of raw materials and energy. It

also reduces the risk of leaks and spills, prevents water, air and soil contamination, and improves human safety.

On the other hand, the technology-driven nature combined with the relatively early stages of the 4.0 technology life cycle implies and gives rise to certain risks. In their article "Industry 4.0 and Sustainability", Krzysztof Ejsmont, Bartłomiej Gładysz and Aldona Kluczek identify three types of risks: economic (especially cost-intensity and difficulty in estimating the full financial benefits and economic efficiency, e.g. computer simulation modelling); environmental (e.g. an increase in electro-waste, an increase in energy consumption and, despite appearances, carbon footprints); and social (e.g. human-robot interaction issues, unemployment risks, privacy issues).

The authors of the report Digital with Purpose: Delivering a SMARTer2030 highlight the fact that the dynamic development of digital technologies worldwide is associated with a dramatic increase in the widespread use of devices and machines. Consequently, they also foresee three risks: an increase in electricity consumption and more electro-waste; it is estimated that the impact of ICT energy use on greenhouse gas emissions could increase by 11% by 2030; and a third adverse effect could be the polarisation of societies as a result of uneven digital development in different regions of the world.

The development of digital technologies generates greenhouse gas emissions in itself, but their use is an even more effective lever by means of which to counteract negative environmental impacts. For digital tools to serve sustainable goals, they must themselves be used sustainably and the energy they use should come from renewable sources. These are the two most important conditions. Digital solutions responsibly deployed and effectively used are a prerequisite for achieving most of the goals formulated in the 2030 Agenda and the Paris Agreement, and their potential to reduce greenhouse gas emissions could be as high as 35%.

Conclusion

It is clear that Industry 4.0 is not only an opportunity to achieve sustainable development goals, but also requires careful consideration of these risks. From the above analyses, there are undeniable benefits from the synergy of Industry 4.0 and sustainable development, i.e. the combination of artificial intelligence, robotics and other advanced technologies used in many sectors of the economy, e.g. supply chain, distribution channels, and manufacturing – all of which has a significant environmental impact, leading to reduced pollution, lower greenhouse gas emissions, lower energy consumption at the same time and increased profits. Dual Transformation opens up the possibility of combining technology with resources and skills in terms of sustainability benefits. Digitisation can reduce the environmental impact of a product, process or service based on the availability of footprint data and traceable

analysis. Additionally, it helps to achieve more efficient functions, such as reduced resource consumption. Therefore, digital transformation should be seen in the category of sustainability opportunities in developing digital sustainable operations to achieve both the UN 2030 Sustainable Development Goals, the European Green Deal and the Paris Agreement.

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The management system of a company operating on the liquid and gaseous helium distribution market – a case study

Abstract: The liquid and gaseous helium distribution market is highly specific and unique due to the extraordinariness of the raw material, the properties, applications and rarity thereof, and the topic encompasses a great deal of interdisciplinary research. This paper focuses on the assessment of the enterprise management system operating on the Polish and international liquid and gaseous helium distribution markets. The research focused on a detailed market, strategic, personnel, financial and process analysis. A triangulation method was used, including: 1) individual interviews with the owner and employees; 2) direct observation of the processes taking place in the organisation, and 3) a critical-cognitive analysis of the available primary materials (derived from the company) and secondary materials (literature review and information from electronic databases). The data on the activity of the enterprise under study was obtained from the Polish Central Register and Information on Economic Activity. Information on the administrative, strategic and technical processes related to helium obtained from a quality manual, instructions and safety data sheets for liquid and gaseous helium. The financial analysis of the company's operations included data from reports on the national public tenders. The results of the study showed the many strengths of the company. All subsystems (market-driven, strategic, personnel, financial and process) had a favourable effect, which resulted in a positive final evaluation of the entire management system of the enterprise. The effectiveness of the management system of a company operating on the helium distribution market is influenced by the following factors: 1) high competitiveness of the enterprise, associated with a very good reputation among market participants (suppliers, recipients, cooperators); 2) a high level of customer satisfaction manifested in a constantly growing group of both new and returning customers from all over the world; 3) high work efficiency resulting from a properly developed action strategy

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covering every smallest aspect of the company's operation, including a highly motivating personnel policy; 4) continuous improvement and development of each activity and process carried out in the company, including the skills and knowledge of all employees; 5) constant adaptation of the strategy to the changes in the environment.

Keywords: management system, liquid and gaseous (compressed) helium, marketing and distribution of helium

Introduction

The aim of the study is to evaluate the management system of a company operating on the Polish and international liquid and gaseous helium distribution market. The research focused on a detailed market, strategic, personnel, financial and process analysis. The choice of the enterprise to be examined resulted mainly from the fact that the company has a well-developed management system, which additionally focuses on continuous improvement. It consists of smaller subsystems, the task of which is, inter alia, building, streamlining, modernising and developing individual departments of the organisational structure and sectors of activity in terms of the processes taking place therein.

In the context of market analysis, the scope of the research included the determination of the groups of recipients of the company's services and suppliers of liquid helium, as well as domestic and foreign competitors. The strategic analysis included the analysis of risks and opportunities as well as the definition of the company's mission, vision, strategy and quality policy. An important part of the research was the diagnosis of the personnel management methods, which were the determinant of the effectiveness of the entire enterprise. In terms of financial analysis, the annual financial results within the period of 2010–2018 were examined. The scope of the last segment concerned the analysis of internal processes in the company, including the management and control policy.

The hypothesis verified in this paper is the statement that the correct and effective functioning of an enterprise management system on the liquid and gaseous helium distribution market is determined by a number of parameters, including the company's competitiveness on the market, the optimal value of financial indicators, the level of customer satisfaction, the effectiveness of the work performed, continuous improvement of all activities and processes in the organisation and continuous adaptation to the changes taking place in the environment.

In order to analyse the enterprise management system, triangulation was used (Stańczyk, 2011) consisting of collecting theoretical and empirical information gathered from various research methods, comparing and generalising the final results. In this context, the following methods were used: an individual interview (Czarniawska,

2002; Stachak, 2006) with the owner and employees of individual departments of the company; a direct observation (Kostera, 2003) of the processes taking place in the organisation; and a critical-cognitive analysis of the available primary materials (derived from the company) and secondary materials (from the literature review and electronic databases). The set of formal data on the activity of the surveyed enterprise was obtained from the Polish Central Register and Information on Economic Activity (CEIDG, 2021). Part of the information on the administrative, strategic and technical processes related to helium was obtained from the quality manual, instructions, safety data sheets for liquid and gaseous helium and the official website of the company. The scope of the financial analysis of the company's operations included data from the annual reports from national public tenders conducted in the period of 2010–2017.

Literature review on systems theory and company management analysis

Systems theory is a comprehensive theory that applies to every system in nature, in society and in many fields of science where phenomena are considered holistically (Mele et al., 2010). The systemic approach, initiated by Ludwig von Bertalanffy (1968) and Norbert Wiener (1948), the creator of cybernetics, became popular in the 1950s. Its essence is to treat enterprises as open systems, composed of sets of elements that make up a distinctive whole in the environment (Ng, Maull and Yip, 2009; Gadomska, 2008). One of the most popular definitions considers the system to be a set of elements (things, objects, components) with properties (attributes), and these elements are interrelated (Kast and Rosenzweig, 1972). Systems theory is therefore based on a shift in attention from the part to the whole (Jackson, 2003; Weinberg, 2001) and implies a dialogue between holism and reductionism.

When perceiving an organisation as a system, four elements can be distinguished: 1) inputs – in the form of material, human, financial and information resources taken by the organisation from the environment (Katz and Kahn, 1978; Burns and Stalker, 1961); 2) transformation processes – covering technical and managerial processes, thanks to which inputs are transformed into results (Emery and Trist, 1960); 3) results – i.e. products and services, profits or losses, information and staff behaviour (Clark, 1993); 4) feedback – obtaining information about the state of the environment, including potential disturbances, allowing for changes in the transformation processes (Beer, 1972; Griffin, 2004).

According to H.J. Leavitt (1965), the organisation is an ordered system composed of four subsystems, including: 1) goals and tasks performed in the organisation; 2) people with their individual and collective aspirations and patterns of behaviour; 3) material and technological equipment and specific rules of use thereof; 4) formal structure, i.e. the adopted rules for the division of tasks and responsibilities (Sokołowska, 2009).

Taking into account the viable system approach, Golinelli (2005) and Barile (2008) suggested two consolidated organisational and managerial models: 1) sub-system – focusing on the analysis of relationships among the internal components of a company; and 2) supra-system – paying attention to connections between enterprises and other entities in their context.

J.W. Gościński (1968) and A.K. Koźmiński (1979), in defining the role of the management system in the organisation, stated that it has a superior function over other subsystems and is responsible for their operation. Self-regulation of the management system is manifested in the concentration of management on prospective issues, creating and redesigning subsystems (Beer, 1975). The basic forms of external operation of the management system are the emission, collection and processing of information, among others. In particular, the implementation of the entire complex of managerial activities, consisting of making planning and organisational decisions, as well as motivating and controlling the course and results thereof, should be emphasised (Dźwigoł, 2013).

The process of self-regulation aimed at maintaining the state of equilibrium in the system is called the process of homeostasis (Hannan and Freeman, 1977). Homeostasis can be defined as maintaining one or more variables at the same level despite changes in the environment. It allows enterprises to remain in a state of dynamic equilibrium (Jajuga, 1993).

The key factors in shaping an organisation are at the same time fundamental determinants of its management system. They include the dynamics and level of competitiveness of markets and products, the size of the enterprise, the expectations and power of key stakeholders (Christopher, 2007), the potential of the members of the organisation, the advancement and prevalence of key technologies, cultural conditions of the organisation and the environment (Brownlie, 1994; Bełz and Skalik, 2011). Entrepreneurs have to plan and implement structural adjustments to guarantee the survival of the company's management system, formulating new business scenarios, including positioning, transformation and redefinition of the organisational structure, in order to provide sustainable development of the company from a long-term perspective (Vicari, 1992; Mele et al., 2010).

Fundamental issues related to helium and its application

Helium is the second most abundant chemical element in the universe after hydrogen, although it is present on Earth only in trace amounts (Wheeler, 2015). It is a colourless, odourless, tasteless, non-toxic inert gas that belongs to the group of noble gases (Niechciał, 2013).

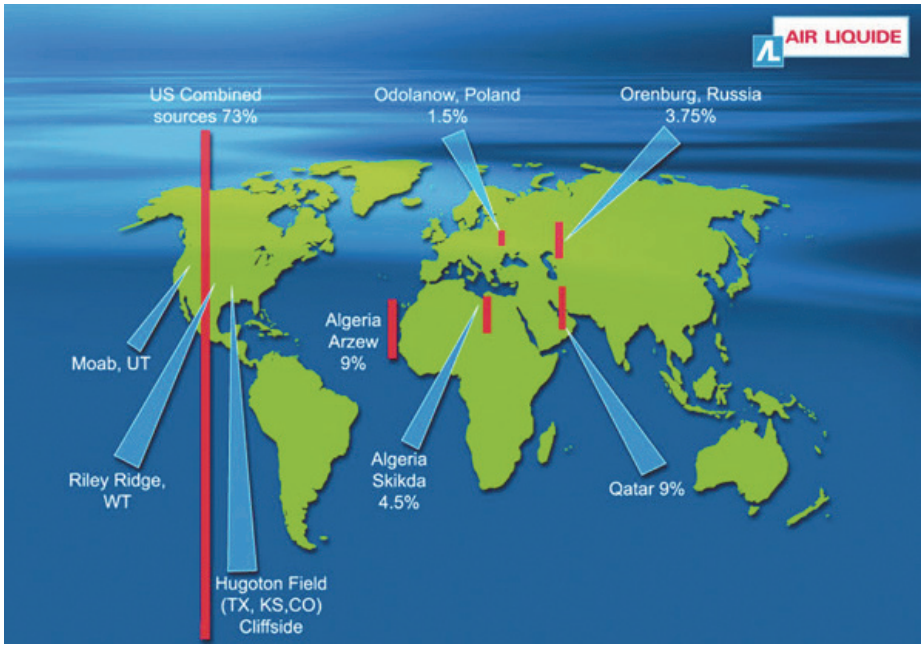
In 1868, Pierre Janssen discovered helium in the spectrum of the sun while observing an eclipse by spectroscopy. In 1895, the Scottish chemist William Ramsay was the first to discover helium on Earth during experiments with a

mineral containing uranium. After the examination of the samples by spectroscopy by Jenssen and Lockyer, helium which was identical to that found in the sun was identified (Heather, 2007). In 1903, helium was first found in natural gas deposits at a mine in Kansas in the USA (McKinney, 2019).

Global extraction of helium takes place in only a few countries. This is due to, inter alia, limited access to sources with a sufficient percentage of the element and the profitability of its extraction. This often involves the use of an expensive low-temperature condensation process, which separates the raw helium gas stream from a liquid consisting of hydrocarbons, and then purifies it in cryogenic installations or using the PSA (pressure swing adsorption) method (Szwast et al., 2014).

Helium is obtained mainly in five countries (Fig. 1), of which the leader (approximately 73% of global gas production) is the United States, where the annual production of helium is 75 million cubic meters. The largest area of these sources is in the states of Kansas, Oklahoma and Texas, where the element concentration is 0.3 – 2.7% (www.blm.gov).

Fig. 1. Helium mining sites



Source: www.airliquide.com (access: May 15, 2021).

Algeria is also at the forefront of global helium production with a 13.5% share (extraction of 40 million cubic meters per year), while Qatar has a 9% share in production (15 million cubic meters per year). Fourth on the list is the city of Orenburg

in the western part of Russia, where up to 8.8 million cubic meters of helium is produced annually (www.blm.gov).

In terms of Europe, the only country that obtains helium from natural gas is Poland, which has a 1.5% share in the global production with an annual extraction of 3 million cubic meters. This process takes place at the Polish Oil and Gas Mining Plant (PGNiG S.A.) located in Odolanów (Perez, 2017). The national resources of deposits contain about 0.1–0.4% of the element, most of which is found in Kościan (www.parkiet.com).

In addition to the abovementioned areas of global helium extraction, more helium-containing deposits are being discovered over time. One of the most famous discoveries in recent years is in the Rift Valley in Tanzania, the size of which has been estimated at over 1.5 billion cubic meters, which is the largest discovery of this type in the world (www.pcsa.org.pl). Each obtained amount of helium and each newly discovered source of helium is of great importance on the global market, both in terms of price creation and wide possibilities for application.

Due to its remarkable properties, helium is widely used in a variety of fields, ranging from commercial industries to scientific research. The beginnings of the helium industry date back to the interwar period, when helium was of interest to the US armed forces due to its lightness and inertia (Nuttall et al., 2012a). At present, this element is mainly used in seven areas, namely cryogenics (30%), lifting gas (17%), semiconductors, superconductors, optical fibres (14%), welding (9%), engineering and science (8%), detection leakage (6%), and gas chromatography (6%).

It is worth paying attention to the use of helium in international defence systems, including observation units, science balloons, testing rocket engines and air-to-air missile guidance systems. Moreover, this gas is used in space programs by major agencies, including NASA and Arianespace, which are leading users of helium for the compression of hydrogen fuels, as well as the production and use of rockets, machines and spacecraft (Nuttall et al., 2012b).

Liquid and gaseous helium distribution market

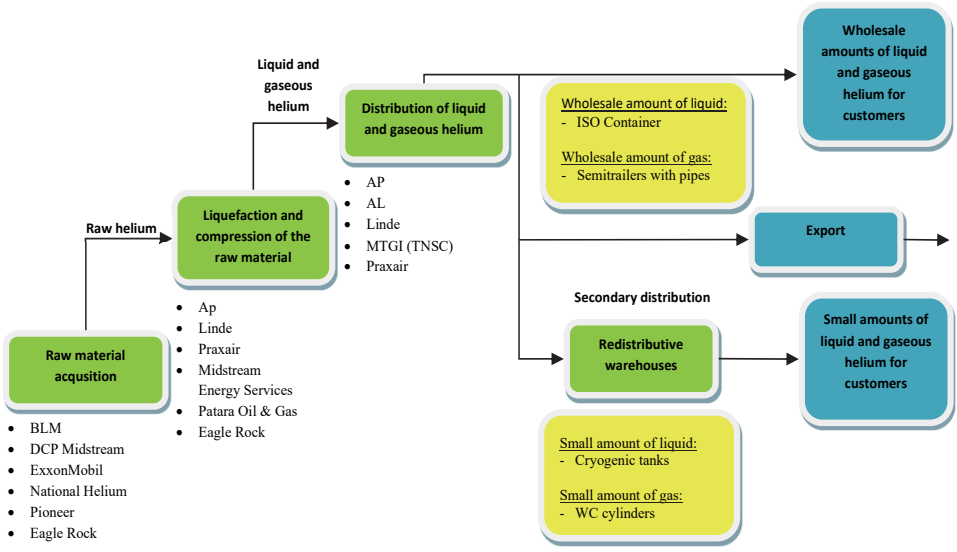
The helium trading market is highly specific, as it is not a commodity that is sold and bought on public stock exchanges. Its prices fluctuate much more than oil prices. For this reason, entrepreneurs distributing helium should be characterised by high levels of management flexibility in the event of unexpected changes.

The key issue regarding the characteristics of the liquid and gaseous helium distribution market is the analysis of the factors that drive it. Taking into account the specific characteristics of mineral resources, four factors are distinguished that affect the supply, demand and price of helium. These include geological uncertainty, volume of demand, helium producers and suppliers, and the natural gas production market (National Research Council, 2000).

Geological uncertainty is a factor on which humans have no significant influence. This is due to the fact that helium is a non-renewable resource with limited sources on Earth. The US Scientific and Research Agency and the US Department of Internal Affairs jointly estimated global helium reserves at 51.9 billion cubic meters in 2019. Assuming current demand at a constant level, the Earth's helium reserves will last for about 230 years (Danabalan, 2017). The demand for helium, which increases every year, may contribute to a critical drop in its supply even within several dozen years. This factor means that sudden changes in prices and the limited availability of helium may occur at any time. Interrupted deliveries are extremely harmful in selected industries and in medicine, where in many aspects there are no substitutes for helium (Stokes, 2013). Managing inventory and distribution becomes a significant challenge for enterprises. The ability of companies to adapt to unpredictable market situations is the key to their maintenance and development.

The second factor influencing the helium distribution market is the size of demand. The greater the demand, the more dynamically developing the market. The demand for helium, as with most other raw materials, is primarily derived therefrom. This means that many helium consumers do not use helium as an end product, but as an input to the production of other goods and services. An example is helium for cooling magnetic resonance systems or optical fibre bundles in telecommunications.

Fig. 2. Supply chain of liquid and gaseous helium



Source: own elaboration based on Campbell (2013).

There is some potential for consolidation among international helium suppliers and producers to ensure internal industry cohesion. The distribution market has many stages, ranging from the extraction and storage of raw helium to refining, to liquefaction and compression, to transportation and final use. These processes require the work of many companies, enabling effective communication between the various phases of the market. A diagram of the distribution process based on the example of the United States is presented in Fig. 2.

The supply chain begins with the extraction of raw helium from natural gas deposits. Examples of agencies and enterprises in the USA dealing with this stage are BLM, Pioneer, and Eagle Rock, among others. Raw helium undergoes a further stage of purification, liquefaction or compression. It is then shipped to large customers, export terminals and secondary redistribution warehouses for repackaging and delivery to small and medium-sized customers.

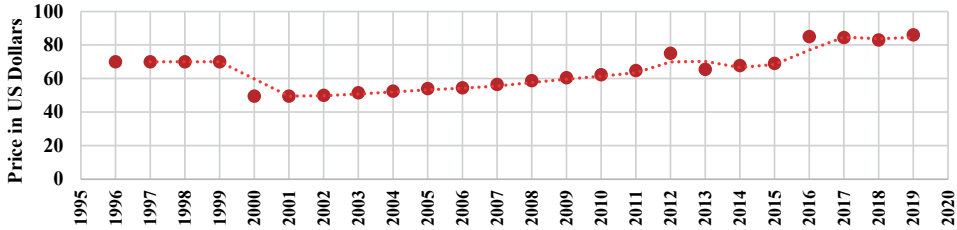
The fourth factor influencing the liquid and gaseous helium distribution market is the natural gas production market, from which raw helium is directly obtained. This is due to the fact that the process of extracting this element from selected sources of energy raw material is the first stage of shaping its initial prices. This issue is closely related to the costs of specially designed and extremely expensive installations (the cost of membrane installations is approximately PLN 50 million), refining the obtained gas and storing supplies (National Research Council, 2000).

Helium prices and their forecasts, 1996–2019

The helium distribution market consists of global competition from private companies dominated by as many as six powerful leaders: Air Products of Pennsylvania, Air Liquide of Paris, Linde Group and Messer of Germany, Praxair of Connecticut and Matheson of New Jersey. An additional market participant whose task is, inter alia, controlling the global price level is the government of the United States. The intervention of the federal Bureau of Land Management creates uncertainty for all those companies that have to respond to any changes and trends in natural gas extraction. Moreover, it suppresses the inflated helium prices after market crisis situations (Nuttall et al., 2012b).

The data shown in Figures 3 and 4 show significant differences in the prices set by private helium sellers and the US government. The quoted prices in dollars ($) are for a specific quantity of 1000 cu ft. In terms of Figure 3, helium prices for the first four years of monitoring remained at the level of $70, which could then result from having the world's largest reserves of resources and, at the same time, weaker competition on the market. In 2000, they dropped suddenly to $50, and then slowly increased with each passing year. Since 2016, prices have stabilised again, albeit at around $85, the highest price set by the US government to date.

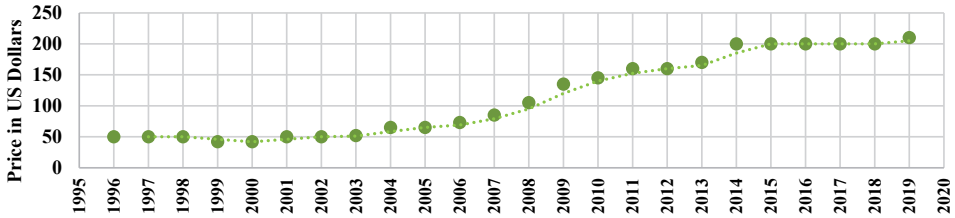
Fig. 3. Government prices of helium per 1000 cu ft



Source: own study based on (www.usgs.gov).

In Figure 4, which shows the average helium prices set by private production and distribution companies, the data from 1996 to 2019 show a clear upward trend. The first stage of their rise from $50 to $60 per 1000 cu ft came in 2004 during a temporary period of supply volatility. Current helium prices are over $200, which is as much as 400% of the original 1996 helium price. Moreover, when one compares the prices set by the government and private companies, it is possible to observe that each year the differences in their levels increase significantly. It is much more expensive to purchase helium through private sellers, where the current helium prices exceed the government prices by almost 150%.

Fig. 4. Prices of private sales of helium per 1000 cu ft



Source: own study based on www.usgs.gov.

Characteristics of the activity of the examined enterprise

The investigated enterprise began operating in 2003 in the town of Odolanów (in the Greater Poland Voivodeship) in Poland. The company belongs to the group of suppliers of liquid and compressed helium on the Polish and foreign markets. In 2004, the first significant investments were made, in the form of the purchase of a delivery vehicle and expensive specialised tanks for the transport of liquid helium. Taking into account the dynamic development of the company, including the constant acquisition of new employees, customers, suppliers, equipment and tanks, the decision was made to move the company's headquarters to the town of Czarnylas in the Ostrów district. Czarnylas is located 45 km from the Wrocław bypass, as well

as 10 km from the trunk road no. 11 connecting Poznań and Bytom. Another advantage is the airport in Wrocław, 90 km away. The area of activity is on the route where magnetic resonance imaging (MRI) machines are most often transported, which requires helium to be replenished during transport.

Currently, the company is engaged in the wholesale of chemical products and related services. The company specialises in the supply of liquid and gaseous helium throughout Europe and to various parts of the world. It offers helium refilling services in imaging diagnostics (MRI) equipment located in Poland, and additionally enables the storage and servicing of magnetic resonances at the company's premises.

Liquid helium is the most frequently sold product; therefore, the management of its stocks and distribution is one of the most important tasks undertaken by the company. To meet the expectations of customers, the company offers three types of tanks with capacities of 100, 250 and 500 litres, respectively. Taking into account the different width of the entrances to the rooms, the working width of the tanks was modified so that they could fit into any location (image 3 and 4). Each of the tanks is designed as a dewar vessel, which is the only way to store and transport liquid helium (Van Sciver, 2012).

Photo 1. Company headquarters

Source: own study.

Photo 2. A delivery truck with a tank for the transport of liquid helium

Source: Company archives.

Photo 3. A set of cryogenic tanks for the transport of liquid helium

Source: Company archives.

Photo 4. Types of cryogenic tanks

Source: Company archives.

Photo 5. Gas cylinders for the storage and transport of compressed helium

Source: Company archives.

Photo 6. The process of replenishing helium levels in an MRI machine

Source: Company archives.

Another service offered by the company is the filling of magnetic resonance systems used in private health care facilities and public hospitals (photo 6). Thanks to highly qualified personnel, the company achieves a high level of efficiency of helium filling in both long-term devices and in the latest models of well-known MRI equipment manufacturers.

The last item on the list of services offered is the possibility of storing magnetic resonances on the premises of the company, along with the servicing thereof. Since 2010, the company has stored more than 70 MRIs, mainly brands from leading companies in the industry such as Siemens and Philips. The company has excellent technological facilities, including devices and parts for all MRI brands. The company guarantees the high quality of all products and services offered. Every year, the experience gained, acquired knowledge and specialised technical facilities allow the company to build strong cooperation with customers and maintain a leading position on the market.

Mission, vision and strategy of the organisation

Mission, vision and strategy are the three pillars of any business that should not be lacking in any successful enterprise. The surveyed company precisely specifies the course of action and the most important short- and long-term goals. The company's activity regarding internal processes and the environment is based on detailed plans, adapted to the current market situation. These plans, transformed into the concept of the company's mission and vision, are an expression of the aspirations of

the management board and the team of employees. Taking into account the development of the company and the fulfilment of customer expectations, the surveyed company defined the mission of its activity: "We are a professional supplier of liquid and gaseous helium and a trusted provider of MRI magnetic resonance storage. We are for you – everywhere".

The content of the company's mission is based on three main messages, including professionalism in business, trust and dedication to the customer. Sales and service specialists provide help and advice in every situation, are never indifferent to the problems of recipients, and consider each case and request individually.

The surveyed company also created a vision of its future, which was clearly communicated and embraced by the entire community of the organisation. It is a picture of the future, which includes the stability of a company enjoying broadly understood respect and trust in the industry and a successively increasing number of returning customers. In addition, this idea is developed by the development of the company in the form of hiring new employees, expanding the technology park, means of transport and expanding a specialised research laboratory. This vision is associated with an optimistic attitude towards success, the achievement of which is both real and credible.

Based on the purpose of the company's existence and its meticulously created future, an action strategy has been developed and implemented, which is an answer to the question of how to most effectively implement the company's vision and mission. For this purpose, a number of factors determining the effectiveness of strategy building have been analysed. An analysis and assessment of the company's environment was carried out, including all the elements that may affect the functioning of the company. They concerned changes which have taken place on the market in the last few years and growing customer expectations. Another key issue was a thorough qualitative and quantitative analysis of the potential of the organisation.

In order to complete the plan to construct an accurate and effective strategy, the company identified its strengths and weaknesses, which include:

1. Strengths – a small family business; a high level of involvement of the owner and the entire management in all activities and processes; highly trained staff; the rapid flow of information between the various levels in the hierarchy of the organisational structure; high flexibility, mobility and openness to various customer needs; readiness to operate seven days a week, 24 hours a day; a global range of products and services offered; ideal locations both in Poland and in Europe; constant cooperation with numerous clients from Poland and Europe; a cheerful and friendly atmosphere amongst all employees; high mobilisation related to competition in the

form of large corporations; legal form of the enterprise – limited liability company; well-developed technological base; own means of transport.

2. Weaknesses – periodical shortages of raw materials on the local market; difficulties in finding appropriately qualified staff on the market; devices that are difficult to find on the market (liquid helium tanks); differences in the price of the raw material depending on its supply.

The company's operating strategy includes the development and improvement of all branches of activity. In order to meet the increasing expectations of customers, the decision was made to create a production organisation that would ensure the uninterrupted possession of liquid and gaseous helium and a flexible and modern supply system. This goal is achieved every day by constantly learning about the needs and expectations of customers; adjusting and planning deliveries in terms of individual customer needs; the proper implementation of all services in terms of timeliness, quantity of helium delivered, speed and quality of service; the analysis of the availability of raw material on the global market and rational production planning, including storage reserves; minimising losses in technological processes by using modern machines and devices; improving the staff by means of regular training in the fields of management systems, language learning, first aid, etc.; improving the quality management system by conducting internal and external audits and updating the quality manual; and the systematic analysis and evaluation of the effectiveness of the management system.

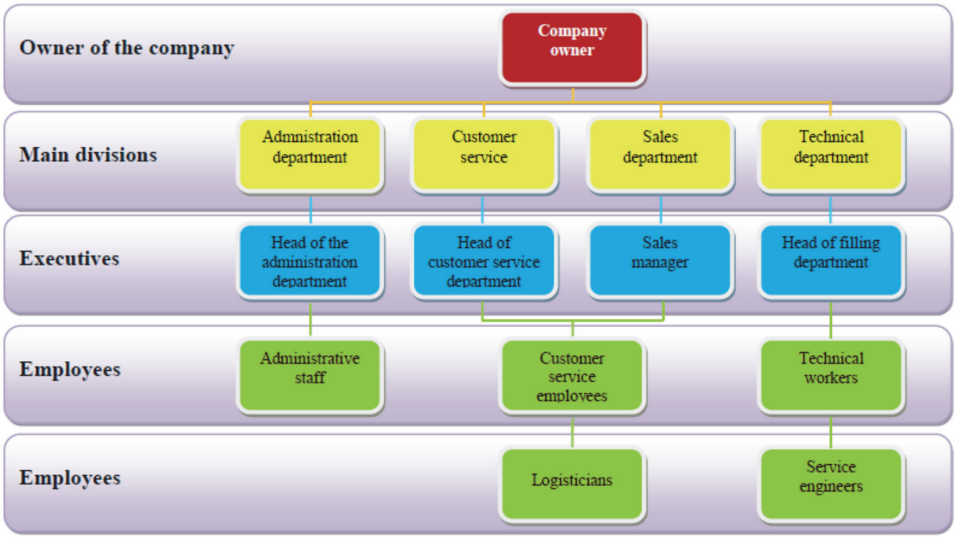
Organisational structure and personnel management

For the first few years, the company operated as a sole proprietorship. The owner was obliged to perform all works related to administration, service and delivery of liquid helium. Over time, the increasing number of orders resulted in the need to hire additional employees responsible for transport, technical matters and order fulfilment. In 2019, 50 people worked at the company. The organisational structure consists of four departments:

1. The administrative department, which deals with running the office, reporting, solving current affairs, invoicing, accounting and maintaining the human resources and payroll book. This department is also responsible for the functioning of the quality management system.
2. The customer service department and 3) the sales department are responsible for developing and updating the sales strategy, calculating the prices offered, analysing the market situation, monitoring the activities of the competition and entering frequent negotiations with customers and suppliers of liquid helium.
3. The technical department supplies the company with an appropriate amount of helium stocks in warehouses, prepares the product for customers,

fills cylinders and cryogenic tanks with compressed and liquid helium, and supervises the technical condition and service of magnetic resonances entrusted to the company by the principals.

Fig. 5. Organisational structure of the researched company



Source: own study based on the company's quality book.

The personnel management methods used in the enterprise are based on a specific process, the stages of which begin with the planning of human resources and end with remuneration for the work performed. Human resources management begins with the selection of employees, i.e. their recruitment and selection. The detailed process of hiring new people for the company includes: 1) job analysis in terms of demand, 2) recruitment decision, 3) recruitment, 4) selection of application documents, 5) a recruitment interview followed by the candidate's withdrawal or 6) preparation of a job offer, and then 7) hiring and onboarding the employee.

In terms of employee improvement, which is another stage in the personnel management process, systematic training has been introduced in the company, divided into internal and external training. Internal training is aimed at creating a better organisation of work processes, including the improvement thereof, so that the employee feels more comfortable and confident. Among the large number of employee training courses, the following should be distinguished: ISO 9001:2016 requirements – quality management system; effective management of the employee team; personal and team time management; change management; team communication; charismatic leadership; fire safety and first aid.

The main goal of external training is to raise and develop professional qualifications. Technical employees participate in courses on energy, welding, forklift and crane service, among others. There are also training sessions for service engineers and liquid helium suppliers, including ADR transport and various magnetic resonance systems, the construction thereof, and the filling process.

The most important competitors

The surveyed company operates on the market in an industry that is strictly focused on specific areas of science and life. Customers who are interested in the activities of the organisation constitute specific groups of consumers focused mainly on the specific application of the service or product offered. The company's most frequently sold product – liquid helium – is not a commodity that can be found in ordinary stores. Its offer requires specialised companies that are guided by specific types of demand in their activities.

In both Poland and abroad, few companies offering liquid and gaseous helium can be found, which is due to the uniqueness of this industry, and which is rare in comparison to other areas of economic activity. Taking into account the range of services offered, the following companies are among the most important competitors of the surveyed company:

1. Polskie Górnictwo Naftowe i Gazownictwo S.A. (PGNiG) is the largest company in the country that deals with the extraction of crude oil and natural gas. It commenced operations as far back as 1982, and now operates on a large scale in Poland (with seven branches) and abroad. The PGNiG branch in Odolanów is the only place in Europe where helium is separated from natural gas with appropriate properties. For this reason, PGNiG has a very strong position on the European market. Having direct access to the only source of resources on the continent, this company has the ability to create prices on its own (https://pgnig.pl/).
2. Linde Gaz Polska is the Polish branch of the German concern Linde Group, established in 1993. The Polish head office is located in Kraków, along with seven plants in other Polish towns. The company's offer includes, among others, compressed medical and technical gases, mixtures of these gases, dry ice and refrigerants. It operates on a large scale in Europe (www.linde-gaz.pl).
3. Air Products is a producer and international supplier of technical gases, based in Pennsylvania in the USA since 1940. It operates in 50 countries, including in Warsaw, the capital city of Poland. In its offer, in addition to the extensive sector of services, inspections and equipment sold, the company distributes a number of gases, from oxygen, argon and helium to welding gases (www.airproducts.com.pl).

4. Air Liquide is a French chemical company founded in 1902. The company's headquarters are located in Paris, and individual branches are located in many countries around the world, including Poland. Its offer includes, among others, technical, food and special gases (www.airliquide.com).

Fig. 6. Logo of PGNiG

Source: https://pgnig.pl/

Fig. 7. Logo of the Linde Group

Source: https://www.linde-gaz.pl

Fig. 8. Logo of Air Products

Source: www.airproducts.com.pl

Fig. 9. Logo of Air Liquide

Source: https://www.airliquide.com/

When analysing the market of the company's largest competitors, it can be noticed that these are mainly large international concerns that have been operating in the industry for decades. The surveyed company, although offering its services in all continents, is relatively small. Such strong competition motivates employees

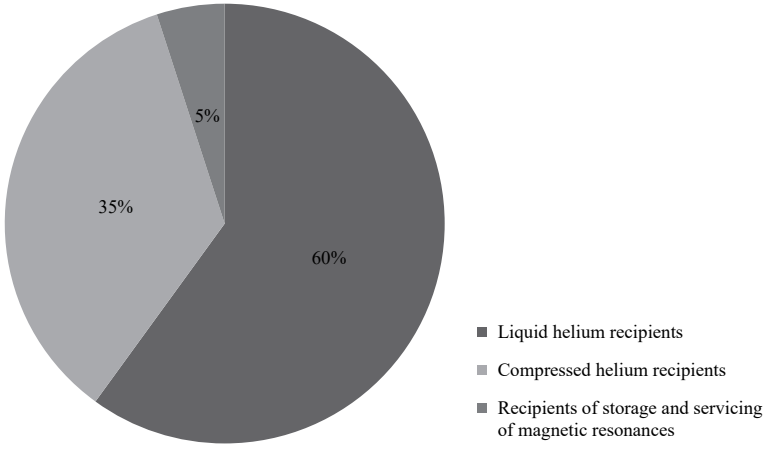
to strive for the continuous development and improvement of the services offered. The company is often chosen by customers who do not need wholesale quantities of products offered by large corporations at one time. It often wins out thanks to the acquired reputation, loyalty and trust of regular customers. By means of a flexible organisation, individualised approach, comprehensiveness and the high quality of services provided, the surveyed company serves clients who appreciate the activities of small and medium-sized enterprises.

Customers

All customers interested in the company's offer of services and products can be divided into three groups, which include: 1) customers buying helium in liquid form – the largest such group (generating 60% of the company's revenues); 2) recipients of compressed gas helium, whose share constitutes approximately 35% of total sales of products and services; and 3) customers interested in MRI storage and service at the company's premises (5% share in sales of goods and services).

In the period of 2003–2018, the number of Polish and foreign customers of the surveyed company grew consistently. From 2003 to 2007, Polish customers constituted the majority, while in the period of 2008–2012, the number of foreign customers interested in buying liquid helium began to rise. Subsequently, over the next two years, the balance again tilted in favour of Polish clients, which resulted from the establishment of greater contacts with Polish companies and hospitals. From 2015 to 2018, the number of foreign customers again exceeded the number of domestic contractors.

Fig. 10. The percentage distribution of sales of goods and services of the company divided according to the share of three groups of customers interested in the company's offer



Source: own study based on the company's commercial books.

The group of recipients of liquid helium is most often associated with the fields of medicine and disciplines involving the exact sciences. The offer of a comprehensive service of supplying and filling liquid helium is most often addressed to private health care facilities and public hospitals, which have magnetic resonances in which the helium level should be systematically refilled. Therefore, the main regular Polish customers purchasing liquid helium include medical and scientific institutions, which: 1) conduct research using magnetic resonance imaging and computed tomography examinations; 2) use helium in thermodynamic, electrical and magnetic laboratories; 3) are involved in chromatographic analysis and cryogenic research at low temperatures.

The most important foreign recipients of liquid helium include distributors of medical equipment in the field of magnetic imaging dedicated to hospitals and private medical clinics located in Central and Eastern Europe.

In terms of compressed gas trading, the main customers include companies operating in the balloon industry in several Western European countries.

The vast majority of customers who store magnetic resonances in the enterprise's facilities are foreign clients (from Germany, Denmark, Austria and France).

In addition to the European range of services offered, deliveries of products to such distant countries as the United States, Israel, Armenia, Kenya, Ethiopia, Nairobi or the Ivory Coast also take place. This is testament to the international renown and business confidence in the industry which the surveyed enterprise has earned.

Business processes

One of the foundations of an effective enterprise management system is the proper management of all processes taking place within the framework of the conducted activity. Thanks to the logical and modern approach to procedure management, it is much easier to carry out specific tasks, monitor their course and adapt the strategies of operation to the changes taking place.

The main and most important processes, the full characteristics of which can be found in the quality manual available to employees, include: 1) the sales and customer service process; 2) the raw material purchasing process; 3) the filling process for liquid helium tanks; 4) the LHe liquid helium delivery process; 5) the process of MRI magnetic resonance storage; 6) the compressed helium GHe production process; 7) the resource management process; 8) the data analysis and improvement process.

Within the framework of the processes taking place in the enterprise, they can be divided into main, management and auxiliary processes. The appropriate categorisation thereof is necessary to achieve the set goals and organise individual activities. The identification of processes enables, first of all, the standardisation of the procedures, the implementation of separate systems for monitoring and

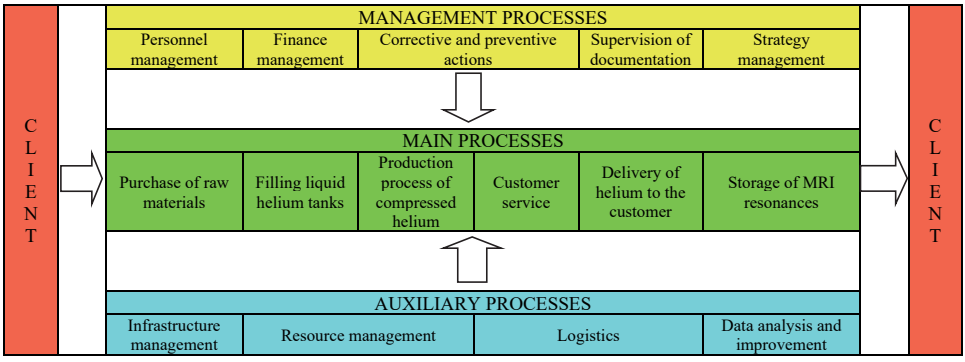
management, as well as the identification of certain areas in which there are discrepancies that require improvement.

In terms of the main processes, the scope covers all activities directly related to the nature and type of business of the company. These are the processes that are mainly the basic activities contributing to the achievement of financial results. They result directly from the purpose of the company's existence and create so-called added value.

Auxiliary processes are all activities intended to support the implementation and functioning of all major processes. Their role is based on the development and achievement of a high level of quality of activities carried out by the enterprise.

The processes classified as belonging to the management group relate mainly to the management of the main and auxiliary processes. They have a one-way effect, and their scope includes control and measurement of the optimisation of individual activities, determination of compliance with specific requirements and goals, as well as detailed verification of the status of implementation of corrective or preventive procedures in the event of non-compliance. These processes are related to the company's goals, its mission and strategy, as well as its position on the market.

Fig. 11. Map of the most important processes of the enterprise



Source: own study.

Taking into account the analysis of the available materials and the observation of the management of the processes taking place in the enterprise, it was found that the surveyed company applies a very good policy towards them. The management team takes care of every detail related to the company's operations; therefore, they meticulously deal with the organisation of all activities carried out at various workplaces. For this purpose, detailed rules of conduct, instructions and all relevant information useful for the implementation of the company's processes have been developed. They were divided into appropriate groups, which made it possible to standardise procedures, implement separate systems for the monitoring thereof, or

extend the branches of specific improvement to individual operations. The company has well-organised process management, which is reflected in the effective functioning of the company at every organisational level.

Sales results

The analysis of the enterprise management system is complemented by the examination of the sales results of the products and services offered by the company. The information obtained on the volume of sales and related income came from public procurement data.

In terms of public procurement processes in which the enterprise participated in the years 2010–2017, the company won seven tenders, which were most often carried out in the Podkarpackie Province. The total number of organisations awarding tenders amounted to five, while the institution that most frequently ordered the products or services of the enterprise was a public university (www.przetargi.egospodarka.pl).

The estimated value of all public contracts awarded by the surveyed company indicates that the advertisers of the highest value contracts are scientific entities conducting research with the use of liquid helium in the field of experimental physics.

The tenders most frequently won by the surveyed company concerned the supply of liquid and compressed helium (i.e. 43.4% of revenues). However, it was services related mainly to filling the research equipment with the appropriate level of helium that contributed most to the total revenues from public procurement (i.e. 56.6% of revenues).

Public procurement carried out by the enterprise in 2010–2017 was only a small fraction of the revenues obtained from the products and services offered. The main segment of the market, generating the highest revenues, is the market for private procurement from companies and state institutions that contact the surveyed organisation in order to commence cooperation. Due to data protection, the results have not been presented in this sales analysis. However, in order to be able to reliably make a final assessment, the information on sales data from private orders obtained during the interviews was taken into account.

The sales analysis carried out regarding the products and services offered by the company as part of tender processes made it possible to obtain a general overview of the revenues achieved in the years subject to analysis. The sales results obtained from the tenders themselves prove the great interest of potential recipients in the products and services offered by the company. Taking into account also the fact that it is a small percentage of other revenues that come from private orders, it can be concluded that, despite the existence of strong competitors in the industrial gases sector, the company operates effectively on the market.

Summary

Effective company management is an extremely complex process. In the case of the liquid and gaseous helium distribution market, this issue results mainly from the fact that in addition to the indispensability of having skills, experience and extensive knowledge in the field of broadly understood company management, excellent knowledge related to helium and the high specificity of the helium distribution market is also a key requirement.

The company which was the subject of the analysis herein, operating on the Polish and foreign market of liquid and gaseous helium distribution, is an example of a company which is strongly focused on the development and needs of both customers and employees. The results of research focusing on market, strategic, personnel, financial and process analysis showed many strengths of the company that determine its dynamic development. Each of the five subsystems achieved a favourable effect, which resulted in a positive final evaluation of the entire management system of the examined enterprise. According to the verified hypothesis, the effectiveness of the company management system on the helium market is influenced by the following factors:

1. the high level of competitiveness of the enterprise, which results from gaining a very good reputation and business trust among market participants (suppliers, recipients, cooperators, etc.),
2. the high level of customer satisfaction, as evidenced by the constantly growing group of both new and returning customers from all over the world,
3. the high level of work efficiency resulting from a properly developed action strategy covering every aspect of the company's operation, including a highly motivating personnel policy,
4. the continuous improvement and development of each activity and process carried out in the company, including the skills and knowledge of all employees,
5. the constant adaptation of the strategy to the changes taking place in the environment.

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The impact of digital money on the financial system

Abstract: Cryptocurrencies in the financial market perform only part of the functions assigned to money in economic theory. According to the European Central Bank, a cryptocurrency is a "digital token" that can be used to make payments over the internet and has no physical form. The creation of bitcoin, like other cryptocurrencies, and the recording of its circulation is not done by an office or official government organisation, but by a network of computers using complex mathematical formulae. According to the ECB, cryptocurrencies cannot be described as currencies because they are not issued by a central public authority and are not a widely accepted means of payment.
Many studies and data suggest that most users of cryptocurrencies treat the acquisition of cryptocurrencies as an investment. The purpose of the study is to show the origins and economic, technical and social conditions of the emergence of bitcoin and to analyse its functioning in the financial market. The study also considers the impact of investment risks in cryptocurrencies and discusses the factors influencing the level of cryptocurrency quotations.

Keywords: investment risk, financial market, cryptocurrencies, bitcoin

Introduction

The work deals with the many positive aspects and possible scenarios of the development of cryptocurrencies, as well as the risks and dangers that are present at every step. The current voices of experts talking about the currency's bright future are as strong as the opinions of sceptics who believe that bitcoin will become the Esperanto of the financial world. However, if the past 12 years have been such a tumultuous history, both in terms of the exchange rate and the events surrounding bitcoin, each successive month could bring huge changes that tip the scales towards victory or defeat for the cryptocurrency. One can speculate that perhaps this work, written with bitcoin's double seniority, would have covered its hard road to success.

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Among bitcoin (BTC) users, there are four types: idealists, BTC fanatics, the so-called grey market and speculators. The first group sees the cryptocurrency as a symbol of independence from state systems, treasuries and central banks. The second group is made up of people who are fascinated by bitcoin technology and its potential, and who will be fascinated by any news related to it. The so-called grey market will use it for illicit purposes. The fourth are the speculators who own bitcoin in the hope of making large profits. Each of these groups of users of the virtual currency reports demand for it independently. The demand reported by all these groups is mainly speculative. The popularity of bitcoin attracts many new users because of its speculative nature. Users do not treat it as a modern means of payment, but acquire it to make a quick profit. Thus, transactional and speculative demand are the only components of demand for this virtual money.

Cryptocurrency concept and overview

Over the centuries, money has adapted its form to the changing needs of people and the economy. The development of the Internet in recent years has created the right environment for the emergence of virtual currencies and their special form, cryptocurrencies. Beginning with an analysis of the name – cryptocurrency, it can be noted that this instrument is a form of currency of an intangible nature, the functioning of which on the Internet is based on cryptography. Cryptocurrency is completely decentralised and has no physical counterpart in the form of coins or banknotes. Thanks to its complete decentralisation, the transfer of funds takes place directly between users and is not controlled by intermediary institutions in the payment processes, which at the same time makes it possible to minimise or even eliminate transaction commissions.

The term virtual money is undoubtedly linked to the development and use of virtual currencies, of which there are three types. There are three forms of virtual currencies, which is the main reason for the inaccuracy of their precise definition. Each of them performs different functions, but they are referred to by the same terms. The term cryptocurrencies definitely refers to only one of these 3 categories of virtual money, so it should be used in a narrower sense than the term virtual currencies.

The European Central Bank makes this distinction:

- Non-convertible currencies that only function in the virtual world, i.e. virtual currencies that are not cryptocurrencies,
- Unilaterally convertible currencies, which are not cryptocurrencies,
- Mutually convertible currencies based on cryptography, called cryptocurrencies.

Characterising the first type of currency, it should be noted that it has its origins in the development of the world of digital games. In these games, participants were paid virtual money for completing certain tasks. It was never possible to buy this in-game currency with real money or to exchange it for real money.

One-way convertible currencies, on the other hand, are used in most games on the internet today. This is a type of currency that any player can buy with real money, but there is no way to withdraw it from the game or use it to buy other goods outside the game. Most often, users purchase these virtual currencies to speed up the game process or to upgrade certain elements of characters, buildings, etc.

Mutually convertible virtual currencies based on cryptography are cryptocurrencies. They can be bought and sold with real money (in various real currencies), and the money invested can be recouped.

To get the right definition of a cryptocurrency, consider how the European Central Bank defines the most popular one – bitcoin. According to them, a cryptocurrency is a "digital token" that can be used to make payments over the internet and has no physical form. Like other cryptocurrencies, bitcoin is created and its circulation registered not by an official government agency or organisation, but by a network of computers using complex mathematical formulae. According to the ECB, cryptocurrencies cannot be described as currencies because:

- They are not issued by a central public authority. For example, holders of banknotes in a particular currency, such as the euro, have the right to pay with them anywhere in the eurozone – the ECB is the guarantor of this right. By contrast, no one guarantees the right to pay with bitcoin. Nor is there any guarantee of the stability of its value;
- They are not a widely accepted means of payment. If cryptocurrencies were a viable currency, one would expect to be able to pay with them everywhere;
- No one protects cryptocurrency users;
- A currency should be a reliable means of storing value – providing confidence that the same money can buy roughly the same amount of goods or services at any given time as it can today. The value of a cryptocurrency such as bitcoin, for example, can rise sharply and fall just as sharply in a matter of days.

According to the ECB, bitcoin is a "speculative instrument". In other words, you can invest in it for profit, but there is always a risk of loss.

The creation of bitcoin in 2009 opened a new chapter in economic history, and an obvious consequence of its existence was the emergence of altcoins (alternative cryptocurrencies or literally "coins"). For a long time, bitcoin was the only cryptocurrency that mattered, and its market capitalisation accounted for almost 100% of the cryptocurrency market. Other projects failed to break through in the media and accounted for a tiny fraction of bitcoin's value. Many of the cryptocurrencies created in the early years of the cryptocurrency revolution were not successful at all and disappeared into the depths of the internet after a short period of operation. Others, such as litecoin, rose alongside bitcoin and are now widely recognised. Today, the cryptocurrency market is much more diversified. Bitcoin's share of the

cryptocurrency market was 63% in January 2021. New cryptocurrencies and tokens are being created practically every day, and it is difficult to even count them accurately. The coinmarketcap.com website only takes into account those projects that have already achieved a minimum level of success and are at least listed on smaller, niche exchanges. There are currently 8327 cryptocurrencies listed. Which of these projects will succeed, and how many of them will still be around in a few years' time? It's a difficult question to answer, but it's worth keeping an eye on those cryptocurrencies that have already managed to capture a significant portion of the market, and those that are bringing a new quality to this ever-evolving segment of business and technology. One of these is **Ethereum (ETH)** – the second most popular cryptocurrency after bitcoin. Ethereum is an IT and economic platform created from scratch, based on its own blockchain network, and does not use the technology of bitcoin. Part of this system is a token called ether which, in addition to payments, allows the creation of decentralised applications for purposes such as crowdfunding. Nowadays it is often used for ICO (Initial Coin Offering), which is a modern method of crowdfunding. In an ICO, start-ups issue tokens and sell them to fund their ideas. ETH has a market capitalisation of nearly $209 billion, making it the second largest cryptocurrency after bitcion. The supply of Ethereum is unlimited, with more than 122 million ETH currently in circulation and blocks being mined every 15 seconds or so.

Another of the more popular cryptocurrencies is **Litecoin (LTC)**, also known as "digital silver". It was launched in 2011. It currently has a market capitalisation of more than $11 billion, ranking 7th on CoinMarketCap. Litecoin creator Charlie Lee reports that it was designed with microtransactions in mind, as its transaction confirmation time is shorter (2.5 minutes) than bitcoin's (10 minutes). Each LTC is divisible into 100,000,000 smaller units to 8 decimal places. As of this moment, more than 71 million LTC (84.68%) have been mined, and the total supply is 84,000,000 LTC. Litecoins can be stored on various wallets.

Ripple (XRP), on the other hand, is a service created mainly for the banking sector, based on the idea of fast international money transfers. It can be a link between banks, companies and exchanges in terms of global transfers. The project was launched in 2012. Its main mission is to support financial institutions around the world in fast and low-cost money transfers in the international market. It features fast transfers, much higher transaction throughput than bitcoin, and allows integration with current systems in banks. The transaction speed is about 4 seconds, and the possible number of transactions per second is about 1,500 – by comparison, bitcoin can do 3–7 of them, and ethereum about 14. One of the developers' goals is to be able to transfer money regardless of the currency and country of destination. XRP is currently being used by a number of major financial institutions, including Santander, Credit Agricole, American Express and MoneyGram.

The National Bank of Egypt also started using the altcoin in 2020. The market capitalisation of the Ripple project is over $17 billion. Currently, about 50% of XRP has been mined out of the 100 billion issued.

Polkadot (DOT) is a cryptocurrency that can be linked to multiple blockchain networks, both private and public, making it more versatile than others.

compared to others. It is a project of the Swiss Web3 Foundation. Polkadot's token is the DOT, through which the platform is managed, and each DOT holder has the ability to influence the development of the network. The current market capitalisation is close to $9 billion. Polkadot has an unlimited supply, more than 111,502,539 DOTs have been mined.

Tether (USDT) is the most popular cryptocurrency that belongs to the group of stable coins, which means that it is pegged 1:1 to specific assets – in this case, the U.S. dollar, to the exchange rate of the US dollar (USD), always aiming for an exact value of $1. Tether is built on top of bitcoin through the Omni Layer platform. The company issuing USDT declares that its supply is fully backed by US dollars, so it is only limited by the amount of money deposited into the company's Tether Limited account. With a market capitalisation of $67 billion, USDT is the third largest cryptocurrency on CoinMarketCap. The supply of this cryptocurrency in circulation is 67 billion.

Bitcoin Cash (BCH or BCC) is based on the same idea as Bitcoin, which is to act as electronic cash. It was created as a result of a fork in the Bitcoin database. The event occurred due to a split in the group of developers who felt that the introduction of a larger block as well as an increase in network speed was necessary, but not all members of the community shared this opinion. The main difference is the size of the block, from 1MB (Bitcoin) to 8MB. A new type of transaction signature was introduced – SigHash, which increases security. A new block is mined every 10 minutes or so, just like bitcoin. The reward for mining Bitcoin Cash is currently 12.5 BCH and will decrease as with Bitcoin. The market capitalisation is over $2.5 billion. 19.1 million BCH have now been mined, which is 91% of the total supply, which is 21 million just like bitcoin.

Binance Coin (BNB) is a token created by the developers of one of the largest exchanges in the world by volume – Binance. Binance coin is a utility token that, among other things, allows users to pay lower fees when trading on the Binance exchange. The time between blocks is 15 seconds, similar to Ethereum. By using Binance coin, users will receive the following discounts on fees associated with trading:

- In the first year of operation of the exchange, 50% (07.2017–07.2018),
- 25% in the second year,
- 12.5% in the third year,
- 6.75% in the fourth year,
- No discount in the fifth year and beyond.

In addition, every quarter, the owners of the exchange will allocate 20% of the income from operations to the repurchase of BNB, and the repurchased tokens will be destroyed. Therefore, the total supply of Binance coins will decrease over time. This will continue until 50% of all BNBs (100 million) have been repurchased and burned. The total supply was 200,000,000 BNB, at the moment there are exactly 161,337,261 BNB in circulation. Market capitalisation is over $48 billion[2].

Stellar (XLM) is a cryptocurrency created to transfer funds in different currencies at low cost. It can be used to convert both fiat currencies and cryptocurrencies. The low cost of the transaction (around 0.00001 XLM) is encouraging. The speed of Stellar is surprising – the network can handle 1,000 transactions per second. There are anchors in the network that issue "credits". Stellar's market capitalisation is over $2 billion. There are currently more than 25 billion XLMs, out of a total of more than 50 billion. In 2014, when the Stellar network was launched, the supply was limited to 100 billion XLMs, and the current total is due to annual inflation of 1%[3].

Economic and legal conditions of cryptocurrencies on the financial market in Poland and worldwide

There is still no clear position on the legal status of bitcoin. Since 2009, most countries have not clarified their position on the rules for trading in virtual currency. This leads to arbitrary use and transfer, which is in fact a lack of regulation and control. State authorities are making efforts to clarify their stance on cryptocurrencies, but these attempts are often clumsy and contradict generally accepted rules. Ignorance often leads to outright bans on trading, but on the other hand, there are still few countries that allow full freedom to use cryptocurrencies.

One of the first steps towards unifying bitcoin's legal status was the position taken by the European Central Bank. It issued a statement saying that "legal rules for the traditional financial sector do not apply to bitcoin, i.e. that it cannot be defined as a standard currency". Following this decision, the vast majority of regulations issued by state authorities were primarily tax-related.

Another, and one of the more significant, decisions affecting the legal aspects of bitcoin was a ruling by the Court of First Instance of the European Union. According to this, the exchange of virtual currencies within the European Union is exempt from tax. The decision was published in October 2015, based on regulations that speak about transactions with currencies, banknotes and coins that are

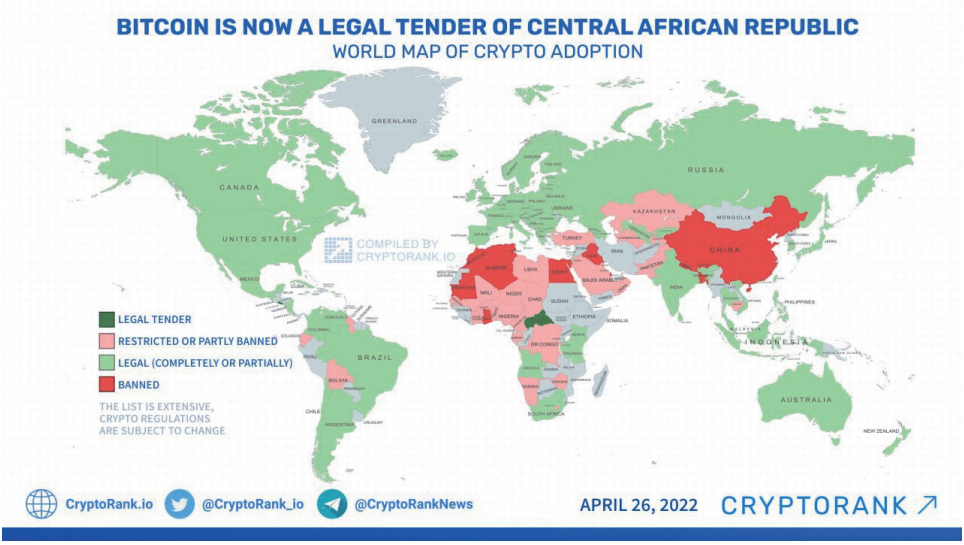
2 S. Barta, R.P. Murphy, *Zrozumieć Bitcoina. Techniczny i ekonomiczny przewodnik po kryptowalutach*, Fijorr Publishing, 2018, p. 46.

3 S. Barta, R.P. Murphy, *Zrozumieć Bitcoina. Techniczny i ekonomiczny przewodnik po kryptowalutach*, Fijorr Publishing, 2018, p.47.

used as legal tender. In summary, according to this decision, bitcoin and its tax alternatives should be treated like traditional money.

The Polish Ministry of Finance believes that bitcoin mining and trading do not violate the law in any way, but the ministry denies bitcoin's status as a currency or other financial instrument. According to this ruling, bitcoin is currently unable to take the form of a money market instrument, a security or even an electronic payment instrument under the Law on Trading in Financial Instruments and the Law on Electronic Payment Instruments. The legal status of bitcoin in the world is illustrated in Figure 1.

Figure 1. Legal status of bitcoin in the world (end of April 2022).



Source: https://bithub.pl/wiadomosci/kraje-w-ktorych-bitcoin-btc-jest-legalny/, [accessed 11/06/2022].

In the US, the federal government has not imposed any restrictions on cryptocurrencies. For the US IRS, cryptocurrencies are a "commodity" for US federal tax purposes. The US is ahead of most other countries in regulating bitcoin trading in the derivatives market. The CFTC (Commodity Futures Trading Commission), the independent US agency that oversees the regulation of the derivatives market, has officially approved bitcoin futures trading. Cryptocurrencies are not legal tender in the US. The SEC (United States Securities and Exchange Commission) treats digital currencies as securities.

China was the first to state that it wants full control over cryptocurrency issuance. As of early 2018. China bans ICOs[4]. Most of the world's largest mining pools (cryptocurrency mines) were and are located in China, as the profitability of mining (cryptocurrency digging) in the US and Europe has declined due to rising electricity prices. In the "Catalogue of Guidelines for Adjusting the Industry Structure", released in early November 2019. "Catalogue of Guidelines for Adjusting the Industry Structure", which came into effect on 1 January 2020, mining and the "bitcoin production process" were missing from the list of activities that the Chinese economy had earmarked for elimination. The People's Bank of China has also announced the launch of the world's first national digital currency, cryptocurrency[5].

The Japanese authorities have been gradually introducing regulations on virtual currencies. However, the Japanese government's support for bitcoin has greatly increased the country's trading volume. Almost half of bitcoin's global exchange volume was in Japan. The Financial Services Agency (FSA) recognised bitcoin as legal tender as early as April 2017. The Japanese government has also introduced an innovative tax system in which cryptocurrency trading is tax-neutral. Many companies handle bitcoin-related transactions as a service, and some even pay their employees' salaries in BTC[6].

Switzerland is optimistic about the emergence of cryptocurrencies. Swiss regulators have drafted a "blockchain law" that will allow the market to develop without restricting innovation. Switzerland has also created the world's first canon of good practices for conducting ICOs. It was created in cooperation with companies from the so-called Cryptocurrency Valley. Among others, non-profit foundations that manage leading blockchain platforms such as Ethereum, Cardano and Tezos have their headquarters in Falcon Valley. Well-known cryptocurrency banks Seba and Sygnum also operate there. Falcon Group has also added a service to manage bitcoin holdings directly from a bank account[7].

The Russian government, in turn, outlines its position on digital currencies in detail in the Federal Law on Digital Financial Assets and Digital Currency, which came into force in its current form on 1 January 2021. The law defines digital currency as a set of electronic data contained in an information system that is offered and/or can be accepted as a means of payment and is not a monetary unit of the Russian Federation, a monetary unit of a foreign country and/or an international monetary or clearing unit. The law defines certain restrictions on circulation and introduces the concept of qualified investors, who must meet certain conditions in

4 R. Turrin, *Cashless: China's Digital Currency Revolution,* Authority Publishing 2021, p. 19.

5 R. Turrin, *Cashless: China's Digital Currency Revolution,* Authority Publishing 2021, p. 21.

6 Blockchain & Cryptocurrency Laws and Regulations 2023 – Japan, Global Legal Insights, 2023.

7 A.E. Brunner, Crypto Nation: Die Schweiz im Blockchain-Fieber, Stämpfli Verlag AG, 2019.

order to acquire assets. Digital currencies are supervised by the Central Bank of the Russian Federation. However, the restrictions and regulations are not onerous, which allows us to conclude that the adaptation of cryptocurrencies in the Russian Federation has been successful[8].

German law recognises the existence of private currencies. They can be used for mutual settlements between parties to a transaction, but cannot be used, for example, to pay taxes to the state. According to German income tax regulations, income from the difference between the purchase and sale price of bitcoin is exempt from income tax after a holding period of more than 1 year. The tax rate is 25%. On 2 March 2020, the German Financial Supervisory Authority published a clarification on the status of cryptocurrencies, stating that cryptocurrencies are financial instruments. They are defined as a digital representation of value that:

- has not been issued or guaranteed by a central bank or public authority;
- does not have the legal status of currency;
- can be used by individuals and legal entities as a medium of exchange or payment; and
- is for investment purposes;
- can be transferred, stored and exchanged electronically.

The first legal regulation on the issue of cryptocurrencies in Poland appeared in the Act of 1 March 2018 on the prevention of money laundering and terrorist financing[9]. The law cited gives a definition of virtual currency as a digital representation of value that does not exist:

- By bill of exchange or cheque,
- legal tender issued by the NBP, foreign central banks
- central banks or other public administrations
- an international unit of account established by an international organisation and accepted by individual countries belonging to or cooperating with that organisation,
- electronic money within the meaning of the Payment Services Act of 19 August 2011,
- a financial instrument within the meaning of the Law of 29 July 2005 on trading in financial instruments,
- is exchangeable for legal tender in commercial transactions,
- and accepted as a medium of exchange, and can be stored or transferred electronically or traded electronically.

8 https://www.cms-lawnow.com/ealerts/2020/12/legislation-on-circulation-of-digital-financial-assets-and-digital-currency-to-come-into-force, [date of access:13.06.2022].

9 Law of March 1, 2018 on the prevention of money laundering and financing of terrorism (Journal of Laws of 2018, item 723, as amended).

According to the latest amendments to the Income Tax Act of 26 July 1991, income from cryptocurrency trading is not combined with other income from monetary capital. This means that a loss from trading in virtual currencies cannot be deducted from the taxpayer's other income, such as from the sale of shares or from business activities, regardless of whether the taxpayer was engaged in business activities or not. A taxpayer may not include in his or her annual tax return the amount of losses incurred as a result of trading in virtual currency. Income from monetary capital includes, in absolute terms, income from the sale of virtual currency on a stock exchange, in a bureau de change or on the open market. The sale of cryptocurrencies is equal to the payment with cryptocurrencies for goods, services or property rights that are not virtual currency, as well as the payment of other obligations with virtual currency[10].

Whether a taxpayer exchanges one cryptocurrency for another cryptocurrency on an exchange or individually, the transaction will be indifferent to income tax. The tax will be calculated on income, which means that the taxpayer will be able to take into account the costs associated with trading cryptocurrencies.

All costs incurred in a given tax year in relation to cryptocurrency trading will have to be declared by the taxpayer in their annual return, regardless of whether they made a profit or loss in the tax year. If the costs exceed the income in a given tax year, the excess will increase the tax liability in the following tax year.

Virtual currency acquisition costs incurred in a given tax year, but only directly related to the purchase and sale of virtual currency, are considered capital costs. For example, the costs of loans and credits taken out to finance the purchase of cryptocurrencies are not deductible.

According to the Law on Personal Income Tax, the tax will be calculated using the principle of "self-settlement" of the tax without the intermediation of a payer. Settlement will take place in the annual tax return, and taxpayers will not be required to make advance payments of income tax during the tax year[11].

In December 2020. The Office of the Financial Supervisor published the "Position of the Office of the Financial Supervisor on the issuance and trading of crypto-assets". According to the statement, the document was created because the authority "perceives a lack of standardisation and legal certainty in the approach to the use of crypto-assets in the Polish financial market".

The document defines the tokens available for trading and includes the legal regulations and the UKNF's stance on them. In the document, the office repeatedly emphasises the explicitly unregulated legal status of cryptocurrencies and thus the fact that trading in them may involve various risks. In particular, these include the risk of

10 Law of July 26, 1991 on personal income tax (Journal of Laws of 1991, No. 80, item 350, as amended) – Article 17.

11 Law of July 26, 1991 on personal income tax (Journal of Laws of 1991, No. 80, item 350, as amended) – Article 22.

not being able to enforce claims related to the acquisition of a particular cryptocurrency, the risk of losing access to it, or a significant decrease in its value, regardless of the assessment of such activity within the scope of supervision by the Commission[12].

Bitcoin as the most far-reaching cryptocurrency in the financial marketplace

Nicknamed "digital gold", bitcoin is the world's most recognised cryptocurrency. It is mistakenly considered by many to be synonymous with blockchain technology, although it only uses one of its possible applications. A blockchain is a chain of blocks that records all transactions made since the inception of bitcoin[13]. In 2008, blockchain (also known as a distributed ledger) came to the world in the form of the first successfully working implementation of the technology behind the bitcoin cryptocurrency[14].

A distributed registry is essentially a distributed, decentralised, multi-copy, shared database. It operates simultaneously and on an equal basis between all participants in a given system (individuals, companies, countries or institutions). It is not subject to central monitoring or control.

The medium for data exchange in the registry is an Internet network, which provides connectivity between the nodes of the system based on the principle of equality of users. A classic feature of any distributed registry will be mechanisms that constantly check the integrity of the data in it, based on cryptography[15].

One of the key features of the bitcoin cryptocurrency is its pre-determined limited supply. The maximum supply of BTC, or the amount of currency in circulation, was set by the creator at 21,000,000 units. At the end of August 2022, there are more than 19,148,600 BTC in circulation. The total market capitalisation of cryptocurrencies is $1,065,979,682,062128, of which the total value of bitcoin on the market is $423,384,488,276.

The amount of currency in circulation is always determined by the market, as it is created by network servers based on reported demand. As a result of the Bitcoin creators' introduction of a special key into the program that creates digital currency, the value of each new currency issue gradually and steadily decreases as computers with increasingly complex computing power are required to create it. This solution acts as an "inflation brake". It has been built into the system to counter the risk of

12 https://www.knf.gov.pl/knf/pl/komponenty/img/Stanowisko_UKNF_ws_wydawania_i_obrotu_kryptoaktywami_71794.pdf, [date of access:13.06.2022].

13 K. Kopańko, M. Kozłowski, *Bitcoin. Gold of the 21st century*, Helion Publishing House, Gliwice 2014, p. 24.

14 M. Grzybkowski, *Cryptocurrencies: why one bitcoin will be worth a million dollars*, Crypto-logic Publishing House, Poznań 2018, p. 24.

15 Ibid, p. 25.

a rapid increase in issuance and to prevent a situation of oversupply in the Bitcoin market.

Currently, one BTC is "mined" every 10 minutes, which means that the rate of growth of the bitcoin supply will steadily decrease until 2040, when there will be 21,000,000 BTC in circulation, i.e. the size of the supply will be at the upper limit programmed into the currency's algorithm. Fixing the maximum supply of bitcoin in advance makes it impossible to "add" money, as in the case of real money. In the organisation of the bitcoin system, there is no central banking institution, nor is there a main server that could be accessed, shut down, destroyed or fail by administrative decision of the state.

The history of bitcoin has been shrouded in mystery since its inception, and to this day no one has been able to explain it. In October 2008, a so-called white paper was published by a programmer or group of programmers using the pseudonym Satoshi Nakamoto. The first block was mined on 9 January 2009. The anonymous creator of the currency probably left the project in the second half of 2010. Management of the cryptocurrency passed into the hands of a group of the most committed members of the bitcoin community, including Gavin Andresen and Jeff Garzik[16].

The first bitcoins mined were used in a transaction on 22 May 2010 by Laszlo Hanyecz, who bought two pizzas from an online forum friend – Jeremy "Jercos" Sturdivant – for approximately 10,000 BTC. Had Laszlo chosen to pay in cash, their value in 2021 would have been almost $453,500,000. Since this transaction, bitcoin has gained a strong foothold in the market and enjoys unwavering popularity. Since its inception, not only has interest in the cryptocurrency grown, but various measures have been taken to promote it and consolidate its status. Exchanges were created: Mt. Gox in 2010, Polish Bitomat in 2011, and Bitcoin Slush's pool "mine" was also established. These steps made it easier to carry out transactions in this currency and made it popular all over the world. After a few years, Germany recognised BTC as a full-fledged means of payment, and the University of Cyprus allowed payments using it. This was followed by Denmark, which exempted bitcoin trading from tax[17].

The main idea of the creators of bitcoin was to create a payment system through which value could be transferred without the involvement of a so-called trusted third party, such as a financial institution, which plays the role of an intermediary in traditional payment systems. Typically, this intermediary acts as a guarantor of the transaction, confirming its authenticity and preventing double spending. To remove the third party from the transaction, the intermediary's activities need to be

16 L. Markiewicz, P. Nowak, *Bitcoin: the future of investing*, PWN Scientific Publishers, Warsaw 2015, p. 11.

17 P. Lis Markiewicz, Sz. Nowak, *Bitcoin, the future of...*, p. 22.

replaced by another solution – the introduction of an innovative cryptographic and blockchain mechanism[18].

The main reason for the drive to remove financial institutions from payment systems was to reduce the cost of transfers as much as possible, i.e. to introduce a low-cost micropayment tool. This, in turn, stemmed from a growing resentment of the banking system, which had been compromised by the global financial and economic crisis[19]. Transactions on the Bitcoin network are:

- Transparent, due to the openness of its ledger,
- irrevocable, which can be a disadvantage or an advantage, depending on your point of view,
- anonymous, entirely within the network, similar to the stock market, where the time and value of transactions are known, but there is no information about their parties.

Principles of Bitcoin

Most operations on the Bitcoin network are based on cryptography. Encryption algorithms are the foundation of BTC operations. Cryptography has not been used for payments since bitcoin's inception, but it does provide security for payment card transactions, among other things. Despite the fact that most information, i.e. transaction history, is public, encryption plays a key role in securing bitcoin transactions. Public key cryptography and cryptographic hash functions are primarily used to secure BTC.

A fixed length hash is the result of a hash function. It is a function that is a computer algorithm performed on certain input data[20]. Hashing functions are mainly used to ensure the integrity of the block chain and to calculate checksums of transaction blocks.

Asymmetric (public key) cryptography uses two mathematically related keys: private and public. The private key is a value that the owner should only have for their own information. The public key, as the name suggests, can be made available to a wide range of people. There is no risk of data manipulation. The mathematical relationship between these keys is such that a transaction encrypted with one key can only be decrypted with the other. The private and public keys are closely associated with a single bitcoin account. The keys are used to digitally sign transactions and to verify digital signatures. Each bitcoin transaction is signed with the sender's private key, and anyone on the BTC network can verify the transaction with the sender's public key.

18 W. Michalczyk, *Barriers to the development of Bitcoin as a new form of international money*, Economics XXI Century 1(17)2018, Publisher of the University of Economics in Wroclaw, Wroclaw 2018, p. 43.

19 Ibid, p. 44.

20 M. Szymankiewicz, *Bitcoin. The virtual currency of the Internet*, Helion Publishing House, Gliwice 2014, p. 34.

Bitcoin technology uses the peer-to-peer network communication model familiar to Internet users from file sharing[21]. In this network model, every user is an equal and connects directly to other computers on the network. There is no clear hierarchy or division of roles between the machine requesting resources and the machine providing resources, as there is in a client-server architecture[22].

Currently, the most popular use of the P2P (peer-to-peer) model is for file-sharing programs on the Internet, such as BitTorrent, where each computer on the network plays the role of server, accepting connections from other users, and client, simultaneously uploading and/or downloading files directly from other computers operating on the same P2P network.

The peer-to-peer network mechanism provides users with a decentralised market and a form of security. Thanks to this technology, the Bitcoin network is not dependent on a specific server, the probable failure of which would cause problems such as BTC holders being unable to access their accumulated capital. In addition, the decentralised network makes bitcoin independent of centralised management systems, but also makes it difficult for any kind of manipulation and monitoring of the transactions taking place in it. The entire network is based on user participation. Therefore, there is no way to quickly shut down the entire network if, for example, bitcoin is banned in a country[23].

Each new BTC in circulation, out of the 21 million available, appears on the network as a reward for the computing power provided by users in a process called mining. Mining is the solution of a computationally complex mathematical puzzle required to solve a block. Transactions are accumulated in each block. Solving a block means verifying it and adding it to the publicly available blockchain, which has been systematically created since the project's inception[24]. In bitcoin technology, the verification process is called mining. Each user who verifies a block of transactions is rewarded by the system with a certain number of BTCs. All Bitcoins in circulation have been created in this way[25].

The first bitcoin block was dissolved by Satoshi Nakamoto on 3 January 2009, for which he received an initial reward of 50 BTC. Each subsequent 50 BTC hit the network about every 10 minutes until 28 November 2012, when block number 210,000 was dissolved, halving the mining reward to 25 BTC according to the

21 R. Kurek, *Bitcoin and the economic functions of money*, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu nr 395.2015, Wrocław 2015, p. 220.

22 M. Szymankiewicz, *Bitcoin. Virtual...*, p. 38.

23 M. Szymankiewicz: *Bitcoin. Virtual...*, p. 38.

24 S. Bala, T. Kopyściański, W. Srokosz, *Cryptocurrencies as electronic payment instruments without an issuer. Informational, economic and legal aspects*, University of Wroclaw Publishing House, Wroclaw 2016, p. 44.

25 D. Homa, *Secrets of Bitcoin and other cryptocurrencies. How to turn virtual money into real profits*, Helion, Gliwice, 2015, p. 36.

protocol specifications. Around 2016 it was reduced to 12.5 BTC. The process of halving the reward will continue until it reaches zero, at which point all bitcoins will be released into circulation. The end of mining is announced for 2140[26].

In parallel with the emergence of new technologies and the development of the Bitcoin network, the computing power of mining machines is also increasing. In order to adapt to an increasingly powerful network, the difficulty of mining increases in such a way that, with increasing performance, the next block solution takes place in a maximum time of almost 10 minutes. Increasing the difficulty of bitcoin allows it to maintain a constant speed of block solving while controlling the appearance of mining rewards in circulation. So, whether bitcoin is mined by a few personal computers or a hundred supercomputers, the difficulty of its mining will be adjusted so that the average time between solving successive blocks is as close to 10 minutes as possible[27].

Bitcoin issuance, pricing and secondary trading

The price of BTC is a market equilibrium price set by the market mechanism, entirely dictated by the market, shaped by the laws of supply and demand. As demand for Bitcoin increases, its price rises, and as interest decreases, its value decreases. It can also be considered highly volatile. It is well known that there are a limited number of Bitcoins in circulation, and the current generation of more Bitcoins has a decreasing amount, which is predictable. Demand should grow proportionally to maintain the price. However, it is important to remember that demand is not the only factor affecting the price. A major factor affecting the price is market volatility.

BTCs are divisible to eight decimal places. There are different names to describe each part of the virtual currency:

- 1 Satoshi = 0.00000001 BTC,
- 1 microBitcoin/ubit (μBTC) = 0.000001 BTC,
- 1 milliBitcoin/mbit (mBTC) = 0.001 BTC,
- 1 centBitcoin/bitcent (cBTC) = 0.01 BTC.

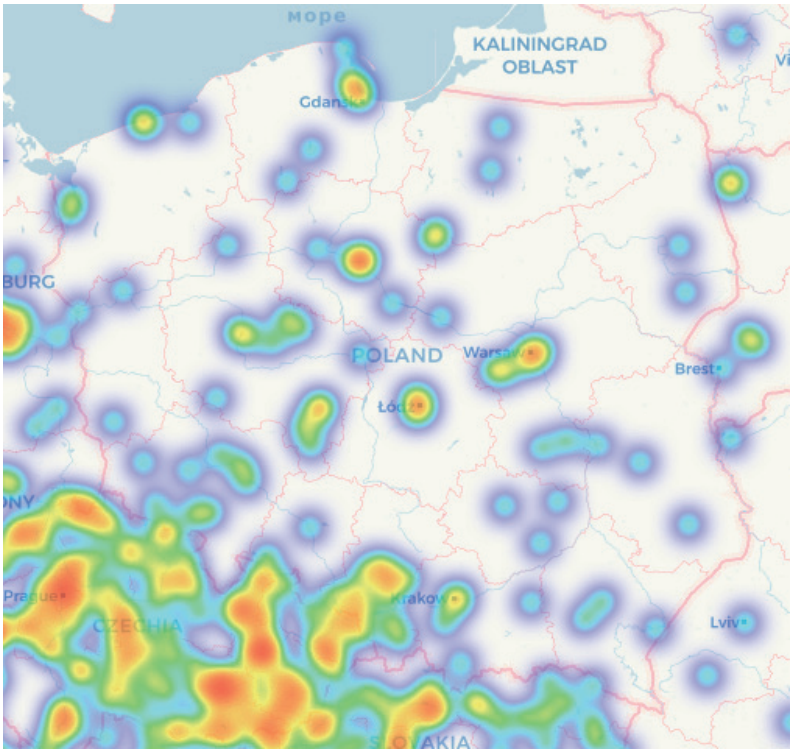
Bitcoin payments are becoming more widely accepted in Poland. The exact number of merchants is not known, but in Poland's larger cities you can find cafes, restaurants, hotels and bars that accept payment in BTC, among other currencies. The cryptocurrency payment process involves scanning a QR code with a smartphone that contains the address of the owner of the goods or services to be paid for, entering the amount and accepting the transaction. If the seller has an application that allows him to manage a virtual wallet on his phone, the time

26 M. Grzybkowski, *Cryptocurrencies...*, p. 40.

27 M. Szymankiewicz, *Bitcoin. Virtual...*, p. 40.

taken to confirm the transaction is around 2–3 seconds. On the other hand, there are tens of thousands of businesses of various sizes on the Internet that accept payments in bitcoin.

Figure 2. Locations accepting BTC payments in Poland



Source: https://coinmap.org/view/#/map/52.23193280/21.01839066/16, [date of access: 13.06.2022].

As can be seen in Figure 2, there are relatively few entities that accept cryptocurrency payments in Poland, and they are mainly located in large cities. It is worth noting that the entities accepting cryptocurrency payments are mainly small companies that manage their own policies. There are still not many "networkers".

Strengths and weaknesses of the bitcoin cryptocurrency

A summary of the strengths and weaknesses of the cryptocurrency provides an objective look at how and why bitcoin works. To further enhance the positive image of the cryptocurrency, its advantages will be discussed next. Starting to analyse the weaknesses of the cryptocurrency, it can be said that the most important one is the lack of a link to real value. Unfortunately, while in theory bitcoin can be used by anyone, in practice it is a currency used mainly by tech-savvy internet users, so

it only appeals to a certain group of people. Unfortunately, it is also common for cryptocurrencies to be used on the black market by criminals, arms or drug dealers, or other organisations outside the law. The main reason these people use cryptocurrencies is that they want to remain anonymous, so they cannot use bank accounts to transfer illegal funds. Therefore, bitcoin is a good tool for these purposes and can serve as a means for money laundering and terrorist financing[28].

The problem of legal and economic regulation is another weakness that limits the development of cryptocurrencies and their everyday practical use. Polish authorities originally considered bitcoin to be a commodity, and the transaction (payment) made with it is an exchange of goods for goods, or barter. Until 22.10.2015, the sale of BTC was taxed. Following the EU CJ ruling, it is considered that bitcoin is an alternative means of payment and should be exempt from VAT.

Cryptocurrencies are undoubtedly an easy target for speculators, as the capitalisation of bitcoin, for example, is much lower than that of the stock or bond markets. At the same time, virtual currencies are not among those with a stable market position. Nor can bitcoin be protected from hackers (cash can be kept in a safe) or insured in any way.

The biggest advantage of bitcoin is its low susceptibility to inflation due to the limited supply of 21,000,000 BTC. As a result, there is no legitimate high risk of the coin going bad. Independence from central banks and financial institutions is the main advantage of bitcoin, according to critics of countries' monetary policies, while the fact that it only exists online allows it to be used in all countries. This also allows costs such as international transfer fees to be reduced.

The obvious strength of bitcoin is the anonymity of transactions. In a way, it has similar advantages to cash. Paying with cash is an anonymous and irreversible transaction. However, cash transactions have some limitations. They require a face-to-face meeting with the other party to the transaction, in addition to the fact that cash in a particular currency is accepted in certain locations, and payment outside the currency's acceptance limits requires an exchange. On the other hand, the transaction in BTC is completely anonymous and the seller and buyer do not need to meet face-to-face[29]. Bitcoin's economic advantages outweigh its disadvantages. As a result, the virtual currency is gaining popularity and is being used by an increasing number of internet users.

Risks of investing in cryptocurrencies

Cryptocurrencies are widely recognised as one of the riskiest forms of investment. Investing in the cryptocurrency market – as in other markets – is never a guaranteed

28 W. Michalczyk, *Barriers to Bitcoin's development...*, p. 46.

29 M. Szymankiewicz, *Bitcoin. Virtual...*, p. 92.

return. Risks may arise from unresolved regulatory issues. The issuance of digital currencies is not decided by central banks. Companies issuing their own tokens on the market do not go through a complicated verification process. The lack of regulation is an advantage for some, but on the other hand it determines the high risk of investing in cryptocurrencies[30]. Cryptocurrencies carry a high level of purely speculative risk. The funds invested are in no way protected by the guarantees of the Bank Guarantee Fund, the Financial Ombudsman or the Financial Supervisory Authority – none of these institutions provide protection over the digital currency market. The entire history of the BTC exchange rate shows its instability, resulting in a risk of loss.

Another high risk is the fact that it is difficult to predict which cryptocurrency project will last long in the market. If you invest in little-known cryptocurrencies with low capitalisation, you can expect to make money, but they may one day reach a very low value or be withdrawn from major exchanges. Using cryptocurrency exchanges with dubious reputations is also very risky. This is because they are prone to collapse, or worse, become insolvent. Even the largest and most well-known exchanges can fail. In order not to expose yourself to unnecessary risks, it is recommended to use those sites that are proven and highly trusted by users around the world.

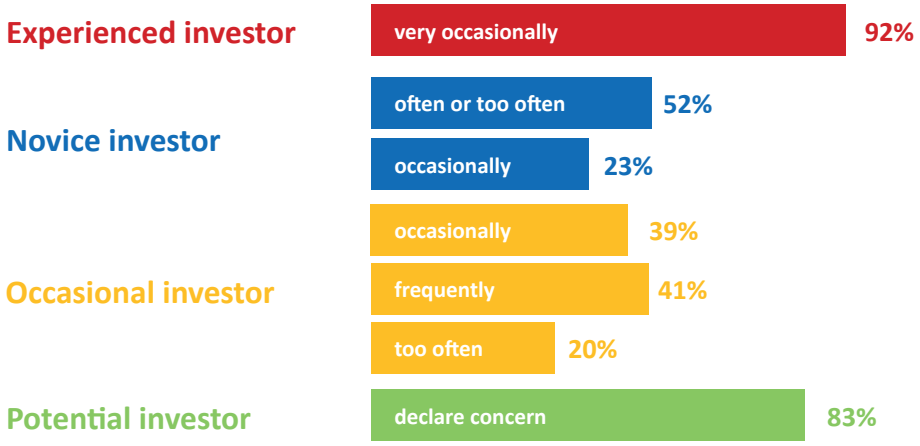
Another element of risk is vulnerability to hacking. Cryptocurrencies are described as instruments that are safe to use. When dealing with such funds, users are generally not at risk of losing their holdings if they ensure that individual transactions are carried out in a secure manner – on secure platforms, with verified network users. However, some people do store cryptocurrencies in an inappropriate location, which is often vulnerable to hacking. There is also no shortage of users who use shady cryptocurrency exchanges that lack proper security features. Users also often forget basic rules, such as setting a very strong password to access the account where the accumulated cryptocurrency is stored, or setting an email notification when making further transactions. It is also common to see the installation of third-party applications that are advertised as tools that give away cryptocurrency for free. The use of this type of software is known as a scam or fraud, and can result in the loss of accumulated capital[31]. In the environment, there are significant differences in the perception of investment risk among different investor segments. Based on the report of a national bitcoin market survey conducted for the Polish Bitcoin Association in 2018, it is known that all groups, except potential investors, describe the level of investment in bitcoin as subjectively high. Experienced investors describe it as 70%, beginners 94%, occasional investors 51%. The level of awareness of the investment risk, on the other hand, varies widely. When asked

30 https://finansowy360.pl/kryprowaluty,ac292/z-czego-wynika-ryzyko-inwestowania-w-kryptowaluty,11719, [date of access:13.06.2022].

31 https://magazynfakty.pl/ryzyko-inwestowania-w-kryptowaluty/, [date of access:13.06.2022].

"How often do you incur losses as a result of your transactions" (Figure 3), experienced investors almost unanimously answered "very rarely" (92%). 52% of respondents in the novice segment said that they often or too often suffered losses, and only 23% of them said that they very rarely suffered losses. 39% of respondents in the occasional investor group answered 'very rarely', 41% answered 'too often' and 20% answered 'often'.

Figure 3. Response statistics to the question "How often do you suffer losses as a result of your trading?"



Source: https://bithub.pl/wp-content/uploads/2018/07/raport.pdf, [date of access:13.06.2022].

83% of respondents in the potential investor segment cited fear of loss as a significant barrier to entering the market. Despite this, the number of transactions does not fall sharply. It can be seen that the graph of the number of transactions is dependent on the graph of prices. They move in a similar way.

Conclusion

The analysis shows that bitcoin is not easy to value. It will take a long time for bitcoin to gain the confidence of the public, to convince governments and to gain a larger user base, since it is the increasing number of users that creates stability in the exchange rate and reduces the impact of non-economic events on the rate of return. Arguably, the development of virtual currencies would thwart plans to seal the tax system of countries and would be a convenience for transferring large amounts of money without the possibility of detection. It should be recognised that investing in cryptocurrencies carries a lot of risk due to their characteristics. Cryptocurrencies cannot be equated with money or currency because they do not fulfil the conditions formulated by economic and financial theory, which talks about the functions of money and the status of an official means of payment. bitcoin, like other

cryptocurrencies, is certainly not a means characterised by widespread acceptance, which makes it an instrument with a high exchange rate volatility. In practice, this prevents them from performing the basic functions of money, such as a measure of value and a means of payment, and makes them risky payment instruments.

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Angelika Kabiesz[1]

Opportunities for academic careers offices to support students' career development

Abstract: With the dynamic changes in the labour market situation, both the offer of activities of these offices and the needs of students and employers are changing, so the problem of support of students' professional development by academic career offices is an important issue from the point of view of shaping the career opportunities of university graduates. In order to analyse and evaluate the support of students' professional development by academic career offices, the author conducted interviews with representatives of selected universities and carried out qualitative research with a sample of 30 students who use the services of career offices. The research was conducted between February and March 2022. The results of the research made it possible to capture the current range of opportunities offered to students by academic career offices, as well as students' expectations in relation to obtaining career support. Positive and negative aspects of the activities of Academic Career Services from the perspective of students' career development were also presented.

Keywords: academic career offices, career, employment, professional development, universities and colleges

Introduction

The first Academic Career Office in Poland was established in 1993 at the Nicolaus Copernicus University in Torun, and the model of its activities was based on the British University of Hull[2]. In the last thirty years, with the development of higher education in Poland, the network of academic career offices, which operate in different forms at individual universities, has definitely developed.

The mission of the Academic Career Services is to provide information, advice and assistance to students and graduates in their effective search for employment. This mission applies to all active academic career offices in Poland.

1 WSB University, Dąbrowa Górnicza.

2 M. Żurek, *Z działalności biur karier za granicą – Wielka Brytania,* „Edukacja Ustawiczna Dorosłych" nr. 3, 2013, s. 97.

The Act of 20 April 2004 on Employment Promotion and Labour Market Institutions (Journal of Laws of 2017, item 1065, as amended) defines the rules of academic career offices. These organisations are defined as units working for the professional activation of students and graduates of higher education institutions, run by higher education institutions or student organisations. The tasks carried out by these organisations are, in particular

- Providing students and graduates with information on the labour market and opportunities to improve their professional skills,
- Collecting, classifying and making available job, internship and training opportunities,
- Maintaining a database of students and graduates interested in finding a job,
- Assisting employers in finding suitable candidates for vacancies and placements, – Assisting students in active job search,
- Assisting in active job search[3].

Career services therefore provide comprehensive support for students' career development. The support they provide enables not only dynamic career development, but also the improvement of skills and the acquisition of new competences.

Many young people plan their careers at a very early stage. They are inspired by successful people. By observing social life, they adopt certain career patterns. They are usually already associated with certain companies or positions. Choosing a career is one of the most important decisions a person makes. Reality is changing at a dynamic pace, which requires a person to be able to adapt smoothly to changes in the labour market or, for example, to be able to retrain.

C. Bühler was the first to seek a coherent theory of career development in the 1930s. She not only promoted this idea, but also promoted the idea that a person's Life is a whole, from childhood to death[4]. That is why it is believed that a person's career lasts all his life, until the moment of rest.

Career development depends on a number of factors. Many authors fit the factors into different approaches to career development, constructing individual grouping schemes for the factors presented. D.E. Super, who conducted research on professional development, states that human development is influenced by three factors, and these are:

- Role factor,
- Personal factors,

3 *Ustawa z dnia 20 kwietnia 2004r. o promocji zatrudnienia i instytucjach rynku pracy* (tekst jednolity Dz. U. z 2008 Nr 69, poz. 415 z późn. zm.).

4 D. Becker-Pestka, J. Kołodziej, K. Pujer, (red.): *Rozwój osobisty i zawodowy. Wybrane problemy teorii i praktyki.* (red.), Wydawnictwo EXANTE, Wrocław 2017, s.10.

– situational factors[5].

These factors are interdependent with the stages of a person's career. The role factor is related to the construction of a career path as a result of identification with and imitation of those in the immediate environment. Situational factors are the socio-economic functions of the parents, as well as their world view, views on religion, the environment, interpersonal relations and approach to the child, and the choice of the child's educational course. Personal factors include passions, talents, beliefs and values[6].

The importance of a career in a person's life can be seen in the growing popularity of fields and areas with topics related to career analysis, such as:

– Career Counselling,
– Career Guidance,
– Human Resource Management,
– industrial psychology
– Organisational psychology,
– coaching
– entoring[7].

Career development can also be initiated by the employer. If the employer sees the potential for career development in the employee, he or she can offer the employee support and even promotion. This is a very important aspect of the employer's recognition of the employee's efficiency and skills. In this way, the employee can climb the career ladder by also ensuring further career development.

Career services, on the other hand, have the task of helping students and supporting them in their careers. Undoubtedly, an important aspect of academic career services is the university environment. Career services closely monitor the current labour market situation in order to provide students with access to not only the latest, but also the best opportunities. The role of academic career services is to collaborate not only with the university environment but also with the socio-economic environment in order to adapt the study concept to the current requirements of the job search[8].

5 C. Plewka, Człowiek w całożyciowym rozwoju zawodowym. [w.] C.Plewka, Zarys monograficzny wzbogacony ilustracją własnych badań empirycznych, Wydawnictwo Uczelniane Politechniki Koszalińskiej, Koszalin 2016, s. 76–77.

6 M. Szumiec, Czynniki determinujące kierunek kariery zawodowej w świetle wybranych teorii rozwoju zawodowego oraz ich znaczenie dla poczucia bezpieczeństwa jednostki, „Studia de Securitate" Annales Universitatis Paedagogicae Cracoviensis, Folia 280, Wydawnictwo Naukowe UP, Kraków 2019, s. 51.

7 L. Myszka-Strychalska, *Znaczenie kariery zawodowej dla człowieka [The significance of career for individuals],* Kultura – Społeczeństwo – Edukacja nr 1(11) 2017, Poznań 2017, s. 264.

8 Regulamin biura karier https://www.wsz.pl/wp-content/uploads/2019/10/Regulamin-Biuro-Karier-WSZ.pdf z dnia 31.10.2021 r.

The usefulness of Academic Career Services for students, especially in the light of changing labour market conditions, is an interesting research issue that can be explored both from the point of view of institutional development of higher education institutions as well as from the the needs and expectations of students. In this study, the author has addressed the latter issue. The purpose of the paper is to analyse and evaluate the support of students' career development by academic career services. In the paper, the author posed the following research questions

1. What do academic career services offer?
2. What are the strengths and weaknesses of the current activities of academic career services?
3. What do students expect from the activities of academic career services?

In order to obtain answers to the above research questions, the author conducted interviews with representatives of three academic career offices operating at universities in the Silesian province. The author also conducted quantitative research on a sample of 30 students who used the services of these career offices. The research was conducted using the CAWI survey technique, and the respondents' data for the study were obtained using the indirect measurement method.

The study was conducted between February and March 2022.

Determinants of career development

Career development is the preparation of a person to function in the world of work[9]. Its aim is to obtain better and better jobs through the continuous improvement of professional skills, taking into account the development of the whole person as a means to an end[10]. Career development, understood in terms of career planning, is continuous and serves to discover different aspects of the world of work and aims to make wise choices about life and work, and therefore concerns both the professional and personal spheres. Career should be understood as the achievement of multiple goals set throughout life and not, as in the past, only during the period of working life. Career is also defined as a sequence of professional roles and positions that an individual occupies at different stages of his or her life cycle, or as a set of jobs that an employee occupies in an organisational structure[11], which form a picture of his or her career in a particular organisation or over the course of his or her working life. Career is not only related to promotion, but includes the process of all changes in organisational and professional roles, including those that imply horizontal or

9 Porzak, Robert, Jacek Łukasiewicz, and Ewelina Pękalska. „Innowacyjne Biuro Karier WSEI jako nowoczesny model profilowania ścieżki kariery." *Zeszyty Naukowe WSEI seria: EKONOMIA* 9.2 (2014).

10 Bańka, A. (2005). Zawodoznawstwo, doradztwo zawodowe, pośrednictwo pracy. Psychologiczne metody i strategie pomocy bezrobotnym. Kraków: Wydawnictwo Print-B.

11 Rokicka E.: Wzory karier kierowniczych w gospodarce państwowej. Z badań nad ludnością dużego miasta. Uniwersytet Łódzki, Łódź 1995, s. 23.

downward shifts in the organisational structure. Career also includes the development of talent, professional skills and experience, and is closely related to career development as mentioned above. It undoubtedly influences the course of a career and, in particular, the frequency and value of professional success. Nevertheless, it happens that well-educated and talented people do not develop their careers adequately according to their real potential. This is because career development is influenced by various factors: personality, socio-cultural, political, etc. Career development, and therefore a future career, should be consciously planned, with specific goals, priorities and how and when to achieve them. Career development is influenced not only by the employee, but also by the employing organisation, superiors and even by chance. The second important career factor seems to be the degree of stability of the place or type of work. Some employees prefer the same type of work, in the same company and in the same sector. There are also employees who like change or see it as a necessary condition for a successful career. Career development depends to a large extent on one's attitude to it. An analysis of the literature suggests that it is possible to distinguish a number of different factors that influence careers. These may include access to education or the education received, personal interests, personality traits, a person's personal motivations or a young person's conscious and professional orientation towards a particular future career direction, which can be provided by career guidance and counselling from primary school to university. The aim of guidance is the harmonious development of a person's personal and professional competences through the recognition of emerging opportunities and challenges. Many young people do not begin to take a serious interest in their future careers until they are at university, which is why they are encouraged to make use of the guidance services offered by universities. Studying allows for the development of skills, broadening of experience and broadening of interests, but in addition to theoretical knowledge, practical professional competences play an increasingly important role. It is precisely these competences that more and more students want to acquire during their studies, among other things in order to be able to compare the knowledge acquired at university with the reality of its use in the labour market. Another motivation for gaining work experience while studying is the desire to enrich one's curriculum vitae and strengthen one's chances when applying for future jobs. Another motivation is the desire to earn a living while studying and to improve one's living conditions. Academic Career Services can play a special role in this process of students' career development.

Activities of Academic Career Services

The vast majority of universities have an academic careers service. They deal with job search advice and provide the necessary support not only to students who are starting their careers in the labour market, but also to students who already have some work experience.

In addition, the offices deal with assistance related to supporting students' professional achievements, but above all, they strengthen students' chances of developing their professional competences during their studies and teach students how to present their potential well on the labour market.

Career development is seen as a cycle that runs through most of a person's life. It usually begins immediately after leaving school or university. In addition, each time it combines features such as the expansion of existing abilities, skills and knowledge. It is well known that in order to stay in the labour market one needs to be very flexible and able to adapt to change. It is also necessary to have an appropriate range of competences to be able to retrain flexibly, for example to change industry or profession.

Work-based learning allows for the development of skills, the extension of previous experience and the broadening of young people's interests. It is worth noting that while attending college, young people are able to strengthen their competences while ensuring that they continue to develop their vocational competences.

The dynamic changes in the labour market mean that careers are becoming increasingly important today. Continuous development not only shapes a person's character, but also provides satisfaction from the successes achieved. This results in a growing motivation to multiply one's competences.

For young people with little work experience, their studies or interests play an important role. The specificity of the professional competences that M. Suchar has developed is based on the fact that young people attach great importance to competences and skills. As time goes by, what is important for these people is what they have learnt and their skills in a particular field[12]. Often young people are modern, so acquiring competence is very important to them. Continual development is a path to success in professional life, and this in turn is the reason for climbing higher and higher up the career ladder.

The cooperation of the Academic Career Office with the university environment carries out all of the following tasks

- Development of competences and skills (workshops, paid internships or courses),
- Analysing and shaping the profile of the graduate (student recommendations on the skills or qualifications acquired),
- Participation in the recruitment process (current vacancies, fairs or exchanges and competitions)[13].

12 M. Suchar, *Kariera i rozwój zawodowy,* Wydawnictwo: Ośrodek Doradztwa i Doskonalenia Kadr, Gdańsk 2003, s. 15.

13 Współpraca biura karier z otoczeniem uczelni https://portal.uw.edu.pl/web/biuro-karier/wspolpraca-z-otoczeniem z dnia 31.10.2021 r.

Career offices carry out many activities to help students on their career path. Active job search methods are among those tasks that are carried out for students with the utmost care.

Success in finding a job depends on the student's activities. The more different ways he uses, the more likely he is to find a job. At the very beginning, it is advisable to draw up a plan of action, which should include the following:

- Identifying the job the student would like to do,
- Identifying the student's knowledge and skills,

Preparing application documents[14].

Academic careers services, which support students in active job search methods, provide assistance with activities such as:

- Responding to job advertisements posted on the Internet,
- Submitting applications in person to companies,
- Posting their own job advertisements on special online portals in the "Wanted" sections,
- Participating in internships or apprenticeships,
- getting help from organisations such as temporary employment agencies or recruitment agencies,
- seeking help from employment services (at the district, city or provincial)
- attend job fairs (often organised by career offices)[15],
- create a professional profile on special portals that deal with job placement[16].

It can be noted that Career Services carry out a lot of activities related to supporting students who want to take advantage of active job search methods. The organisations help those interested as much as possible to find a job as soon as possible.

In order to assess the offer of academic career offices in terms of supporting students' professional development, the author conducted interviews with employees of three academic career offices operating at universities in the Silesian province. On the basis of the information obtained in the interviews, as well as after analysing the websites of these offices, the author formulated the current offer of services provided by academic career offices.

In particular, career offices collect and disseminate offers of jobs, internships and apprenticeships, as well as organising:

- individual or group counselling (both remote and on-site) on: career counselling, preparation of application documents, preparation for interviews,

14 https://www.kul.pl/art_1997.html dated 28/08/2022.

15 Ibid.

16 Source: https://kpu.krosno.pl/bk/testowy/ dated 28/08/2022.

information on methods of active job search, drawing up a balance sheet of professional competences and planning an informed career path,
- Training and courses,
- Programmes, projects and events such as World Entrepreneurship Week, Job Fair
- Meetings with the employer,
- Interviews in a university environment,
- Planning and organising study visits,

In addition, these organisations also run:
- Websites with up-to-date information on organised events, etc,
- creating platforms to facilitate access for students and employers to jobs, internships, etc,
- guides on labour market issues, career development.

In order to verify the interest of students in the services offered by academic careers offices, the author conducted a survey among students who use the services of these offices. The detailed results are presented in Table 1.

Table 1. Types of academic career office services and frequency of use by respondents

Types of services	Frequency of use of academic career offices in numbers and percentages			
	0 times	1–3 times	4–10 times	11 and up.
Individual consultations on drafting application documents	3 (10%)	24 (80%)	3 (10%)	0 (0%)
Group consultation on job assistance	0 (0%)	19 (63%)	5 (17%)	1 (3%)
Group consultation on further professional development	4 (13%)	16 (53%)	8 (27%)	2 (7%)
Participation in workshops, trainings, courses, job fairs	2 (7%)	16 (53%)	10 (33%)	2 (7%)
Participate in meetings with potential employers	5 (17%)	17 (57%)	7 (23%)	1 (3%)
Participation in study visits	10 (33%)	14 (47%)	5 (17%)	1 (3%)
Meeting with the employer	8 (27%)	17 (57%)	2 (7%)	3 (10%)
Organizing professional practice	6 (20%)	16 (53%)	8 (27%)	0 (0%)
Participation in specialized language courses	7 (23%)	17 (57%)	6 (20%)	0 (0%)

Source: own elaboration.

The results clearly show the variation in students' use of the different services offered by academic careers services. Most students use the services between one and three times. Very rarely (or hardly ever) do students use selected services eleven or more times. The most popular services offered by the Careers Advisory Service are individual advice on preparing application documents, group advice on job search assistance and meetings with employers. Students also benefit from recommendations from academic careers services when it comes to placements.

In Table 1, there are several elements that suggest changes that students would like to see in the activities of careers services. This is because, among other things, respondents were asked to evaluate the elements of the academic careers service in terms of student demand. As many as 30% of respondents felt that meetings with employers did not provide them with the support they expected, while 27% of respondents felt that participation in specialised language courses did not provide them with support either. According to the author of the paper, changes should be made to improve the quality of these services so that they provide the support that respondents expect. The survey also gave respondents the opportunity to comment on the changes they would expect to see in the services provided by the offices. From the responses, it is clear that forms of guidance are outdated. Students feel that many things can now be done online and that some careers services only keep paper records, which respondents see as a barrier to using the services of the organisation. The online form is definitely easier and more transparent. Unfortunately, signing documents in paper form only is cumbersome, as you have to go to the office in person. This opinion is also shared by the representatives of the Career Offices, with whom the author of the paper conducted short interviews. One of the interviewees emphasised that he had experienced a bad attitude of the organisation's staff towards the student. The careers officer was unfriendly and unwilling to answer questions. Of the 30 students interviewed, only one had experienced this situation. In the author's opinion, the change needed in the office formula is undoubtedly the modernisation of the way services are provided and the elimination of unnecessary formalities. The change would involve abandoning the current methods of doing business in favour of more modern ones. Each of these measures requires careful analysis in order to modernise the structure of the running of an academic careers service as far as possible and to improve its efficiency. Presumably, the situation in which those interested in getting help from the office did not receive support was a one-off, similar to the inadequate approach to students. Nevertheless, even minor shortcomings may indicate the need to improve the level of service in order to better meet students' expectations.

All the Careers Offices surveyed offer similar services to students, but their services are differentiated by, among other things, tasks carried out in the context of projects subsidised, inter alia, by European funds or other sources. Each office has

its own vision of activities and specificities resulting from the profile of its parent university. For example, one office is more specialised in organising training, courses or paid internships, while another pays more attention to the development of a student's career by focusing on career counselling or different types of research (such as the balance of professional competences).

Each careers service specialises in a particular range of services. The first career office states that its strengths are training and career counselling. The second career office specialises in conducting surveys using tools to test competences and personality traits. The organisation has access to special questionnaires that help to conduct surveys. The third office specialises in providing the latest and most valuable job opportunities. Each of these organisations tries to reach students and graduates in the best possible way.

According to the author, the range of services offered by these offices makes it possible to meet the very different needs of students. As the employees of the offices confirm, although the labour market is constantly changing and the low level of unemployment means a higher availability of jobs, the activities of such offices are still very useful. They help both students and graduates. Their help extends not only to those with work experience, but also to those without. Starting a career is not easy, so it is worth using the help of academic careers services to increase your chances of finding a good employer.

Attention should also be paid to the issue of cooperation between academic career offices and entrepreneurs offering employment. Not only students can use and benefit from the activities of the Career Service, but also employers. These organisations help employing companies to actively search for the right candidates for the right vacancies. This is an important issue, if only for the fact that both parties, employers and employees, benefit.

Positive and negative aspects of the activities of academic careers services from the perspective of students' career development

As a result of the literature analysis, the author analysed some views on the professional support of students by academic career offices. E. Moskalewicz-Ziółkowska claims that academic career offices should be counted among the sources of information about employers' demand for specific qualifications and competences of university graduates[17]. B. Banaszak, on the other hand, believes that the essential field of activity for a smooth transition from the university

17 E. Moskalewicz-Ziółkowska, „*Kwalifikacje i kompetencje absolwentów szkół wyższych Mazowsza – opinie uczelnianych biur karier.*" Nauka i Szkolnictwo Wyższe 1 (39), Poznań, 2012, s.16.

environment directly to the labour market is the professional activation of students, which should enable them to start working even during their studies. This should be done through "support systems, including career guidance, facilitating contacts with potential employers, support for setting up a business, etc[18]". This is what academic career services do. And M. Smogula believes that the main task of "academic career offices is to cooperate with companies in order to increase the competitiveness of students and graduates on the labour market". In view of the above, these organisations have a coordinating role that shapes the links between the academic community (university authorities, academic staff, students, graduates) and employers[19].

In order to gain a deeper understanding of the positive and negative aspects of academic careers services, the author interviewed students who use their services. The results are presented in Tables 2 and 3.

Table 2. Positive aspects of the activities of academic career offices

Positive aspects of academic career offices according to respondents	Number and percentage of responses
Support during high unemployment in the labor market	16 (12%)
Advertising of academic career offices in the employer community	16 (12%)
Attractive offers for students available at the university	17 (13%)
Free advice for students	22 (17%)
Recommendations from friends to use these offices	11 (8%)
Loss of job and willingness to seek support	11 (8%)
Lack of employment and willingness to seek support	7 (5%)
Willing to change jobs and able to review offers	7 (5%)
Assistance offered by specialists and career counselors	16 (12%)
Opportunity for continuous improvement	11 (8%)

Source: own elaboration.

18 B. Banaszak, Akademickie Biura Karier w Polsce – bieżąca działalność i możliwości rozwoju. Warszawa, 2014, s.5.

19 M. Smoguła, *„Akademickie biura karier a przedsiębiorczość."* Zeszyty Naukowe Uniwersytetu Szczecińskiego. Ekonomiczne Problemy Usług 109 Przedsiębiorczość – droga do innowacyjnej gospodarki, Szczecin 2013, s. 236.

Table 3. Negative aspects of academic career offices

Negative aspects of academic career offices according to respondents	Number and percentage of responses
Lack of time	19 (24%)
Lots of complicated procedures	13 (17%)
Outdated forms of office management	10 (13%)
Bad reviews	11 (14%)
Unfavorable offer	10 (13%)
Staff shortages among employees of academic career offices	8 (9%)
Failure to update data on websites	7 (9%)

Source: own elaboration.

In conclusion, the students' opinions varied widely, but the disadvantages outweighed the advantages. According to the students, the biggest advantages are the free advice and the attractive offer of the offices. The lack of time to make use of the services offered by these offices is seen by students as the main disadvantage. They are also bothered by a lot of complicated procedures and bad evaluations of the offices.

The results of the interviews with representatives of academic careers services reveal many positive aspects of their activities from the perspective of students' professional development. These include

- Bringing students and graduates closer to where they can get support,
- Support along the career development pathway,
- Support in finding employment,
- Increasing students' self-awareness by developing their professional competence and aptitude,
- Mutual benefits of cooperation between the academic careers service and employers and students (access to the labour force/securing employment),
- Dissemination of the profile of students and graduates on the labour market.

The negative aspects of the activities of academic career offices at universities from the point of view of students' professional development are much fewer. The main disadvantage seems to be the lack of knowledge of students about the activities of these offices. Some students do not even know that such organisations exist at their universities. According to the author, it is worth considering better promotion of the offer of the Career Bureau, not only at the university, but also in other places where both students and graduates meet, for example in student clubs or even in district employment offices.

Another negative aspect of the bureaus can be the unfavourable opinions of their users. People who have failed to find a job, even with the help of a careers service, are often the authors of such opinions. Steps should be taken to clarify what the support of careers services is all about, and to explain what can be achieved for the student with their involvement and what is entirely up to the student. Careers advice may also be extended to some students, or other measures taken to change students' attitudes to the work of the careers service.

During the pandemic period, a negative aspect of academic career offices was that activities, including counselling, were exclusively online. The pandemic period caused many changes in the lives of students and employers and affected the labour market. As a result, the demand for support from career offices increased, while not everything can be done online, so it was a good solution to return to the stationary form of these offices' activities. Such activities again increased students' interest in using career offices.

In summary, it is worth noting both the positive and negative aspects of the operation of academic careers services and the support they provide to students. The advantages outweigh the disadvantages. Taking into account the benefits of the activities of academic career services, it should be emphasised that it is worthwhile for students to use the services of these organisations in order to ensure an attractive start in the labour market.

Students' Expectations of the Activities of Academic Career Services at Universities

A. Bańka argues that the young generation, which is faced with the choice of the type of vocational school or field of study, is sceptical about the monitoring of available jobs and thus may find themselves in very difficult and unpleasant circumstances. He also points to the transformation of the labour market, which has undoubtedly led to an increase in the demand for vocational support services[20].

Today's labour market is a challenging area for young people in terms of education and support for their professional future. The problem of finding a job affects not only the younger generation, but also graduates with higher education. Such a society has been described as a "lost generation[21]". As a result, both undergraduate and graduate students are a collective that can benefit from professional development support and various activities organised by academic careers offices[22].

20 A. Bańka, *Vocational science, career counseling, job placement. Psychological methods and strategies for helping the unemployed,* Print B Publishing House, Poznań 1995, p. 36.

21 K. Szafraniec, *Młodzi 2011,* Kancelaria Prezesów Rady Ministrów, Warsaw 2011, p.135.

22 A. Nymś-Górna, A. Sobczak, *Academic career offices and their role in career guidance for students,* „Zeszyty Naukowe Państwowej Wyższej Szkoły Zawodowej im. Witelona w Legnicy", no. 26, 2018, p. 111.

There is no doubt that the planning and implementation of an individual's career development requires adequate support. The maxim of the functioning of academic career offices is the concept of continuous training. The mobility of students on the labour market is of great importance (among other things, graduates who have recently returned from abroad go to academic career offices for advice and support). In order to provide them with adequate support, Career Services cooperate with various associations, institutions, universities, offices or workplaces, which also cover the international scope, in order to be able to provide them with assistance in finding a job[23].

Student surveys also served to identify students' expectations of the offerings of academic career offices. The results of the survey are presented in Table 4.

Table 4. Students' expectations of the activities of academic career offices

Students' expectations of the activities of academic career offices	Number and percentage of responses
Assistance in finding an employer	23 (17%)
Preparing to apply for a job	23 (17%)
Indication of attractive professions	19 (14%)
Assistance in acquiring additional certificates or credentials	20 (15%)
Facilitating the use of training or courses	15 (11%)
Research on the fate of graduates	6 (5%)
Assistance in finding apprenticeships	15 (11%)
Assistance in starting your own business	12 (9%)
Other	0 (0%)

Source: own elaboration.

The vast majority of respondents believe that academic careers services should help students find employers as much as possible. Career services should also prepare students to apply for jobs. Twenty respondents (15%) ticked the option of helping students to obtain additional certificates or qualifications. According to the respondents' expectations, careers services should help interested parties to identify attractive careers and to take advantage of courses and training. Students also expect careers advice services to help them find work placements, with fifteen respondents (11%) choosing this option. On the other hand, twelve respondents

23 M. Szumigraj, *Career counseling: systems and networks,* Oficyna Wydawnicza ŁośGraf, Warsaw 2012, p.184.

(9%) believe that the organisation should also help them to start their own business. Career services, according to several respondents, should study the fate of graduates.

In interviews with representatives of academic career services, the author of the paper asked, among other things, which services students use most and least, what could be added/changed/improved and what could be left out. In the first Careers Advisory Service interviewed, a Careers Adviser told the paper that students were most likely to use help in finding an employer, organised training, job fairs and meetings with the company, while they were definitely least likely to use the current events portal. When asked what could be added/changed/improved and what could be omitted, the representative of the office replied that it would certainly be possible to subsidise the organisation's activities and omit unnecessary paperwork, which is often an obstacle for students. After the interview, it can be concluded that students have the highest expectations of the services they use most. On the other hand, it is worth thinking about changes in the services that students use less frequently, perhaps this will translate into greater interest in these services in the future.

A representative of the second career office interviewed informed the author that the services most frequently used by students are assistance in finding an employer, group career counselling, advice on career planning, preparation of application documents and preparation for interviews. There is also great interest among students in career potential analysis and assistance in finding internships, apprenticeships or jobs. Meetings with a practitioner organised by careers services are used by the smallest number of students. A representative of the organisation surveyed mentioned that promotional activities could be added to encourage students to participate in interesting events, training, follow-up of job, internship and apprenticeship offers, meetings with employers. It would also be worthwhile to increase the time devoted to face-to-face meetings with students. As for the omission, it is undoubtedly the bureaucracy associated with various types of projects. This is the second career office where there is a problem with unnecessary formalities. It is worth working on this area so that it does not hinder cooperation between students and careers services.

In the third Career Service interviewed, the representative of the organisation reported that students most often ask for advice on application documents, help in finding a place for a work placement and are keen to participate in training courses where they can acquire new competences, preferably those that are certified. Students are least likely to make use of vocational aptitude tests and mock interviews. However, they are by far the least likely to use the events portal. In terms of change, the Careers Service could certainly organise more practical activities and promote its services more effectively. One member of the organisation said that

since the pandemic there have been a lot of free webinars, so it is definitely difficult for students to choose the most valuable events, so it is worth thinking about changes in this regard.

It can be seen that the results of the interviews are reflected in the results of the surveys carried out. Most students expect careers services to help them find an employer. The results of the interviews confirm this information. Most students make use of this service. The preparation of job applications is a service of the Career Service that is frequently used by the students, which is confirmed by the staff of the organisation in the interviews. There is certainly a need to change the way the office operates, as problems with paperwork and bureaucracy definitely hinder the contact between the office staff and the students. It would be necessary to take into account the expectations mentioned by the students and the staff of the organisation, so that the services offered by the careers offices provide sufficient support to meet the demand.

Opportunities and evaluation of support for students' career development through the activities of academic career offices at universities

The research shows that academic career offices play an important role in the life of the university, especially when it comes to strengthening the chances of students and graduates in the labour market. In general, it can be said that they provide students with support in the following areas

- Finding a job,
- creating their own career path
- continuous development,
- Improving skills and competences.

The purpose of the study was to analyse and evaluate the support of students' career development by academic career services. In order to achieve the purpose of the study, a literature review was conducted on the topics of student career development and university support through academic career services. A critical analysis of the literature included online publications and the subjects' own materials. An empirical study was carried out using student questionnaires, in-depth interviews with representatives of academic career services, and a case study of three academic career services.

Based on the purpose of the study, three research questions were formulated. The first question concerned the design of the services provided by academic career offices. Through the analysis of three case studies, a student survey and interviews with representatives of academic career offices, it was possible to observe the development of the services offered by the analysed organisations. On the basis of the

research, the author found that the organisations offer a similar range of services, but differ slightly in the various ideas they use to differentiate themselves from other organisations (competence testing with special tools, organisation of top-level training, etc.). Rather, each of the organisations surveyed has an individual course of action on the basis of which it implements current activities and supports students in their career paths. The results of the survey clearly show that the range of services provided by the organisations is satisfactory for the students. According to the author of the paper, the organisations in question offer a wide range of services, which makes it possible to meet the needs of many students. In conclusion, the case studies analysed have a wide range of services that students can access when they need help.

The second research question related to the strengths and weaknesses of the current activities of academic career services at universities from the perspective of students' career development. As a result of the research, it is concluded that the organisations in question have many positive features from the perspective of students' career development. One of the most important advantages is the support they give to students in their career development. The same goes for the help they give to those who have difficulties in finding a job. The cooperation between the Academic Career Service and employers as well as students brings many benefits, which is, of course, an undeniable advantage of the organisation's activities. Shortening the distance between students and Career Service staff ensures the professionalism of the latter. Thanks to the activities of the academic career offices, each student is also guaranteed the development of his or her competences and professional predispositions in his or her future career. Raising students' self-awareness is not only the task of the Career Service, but also one of the strengths of the activities of these organisations.

The weaknesses of the activities of academic career offices at universities from the point of view of students' professional development are much less. The biggest disadvantage of these organisations is the limited knowledge of students about the existence of these offices. Unfortunately, many students are not aware of the existence of such offices at their university. The author of the paper believes that promotional activities are needed to ensure that they reach a larger group of students. It is worth considering not only promoting the office within the walls of the university, but also extending these activities a little further to reach alumni. These could be places that are often visited by people who are actively looking for work, such as county employment offices. One of the next weaknesses of the organisation could be user feedback. The authors of unfriendly opinions are usually people who have not managed to find a job even with the help of career offices. The author of the paper suggests clarification measures so that people who use the services of these organisations can learn what the support of career services

is about, what their capabilities are and what can be expected from them, while involving students. New services may also be introduced, or existing services expanded, in order to change the negative attitudes of those who are dissatisfied with the services provided by the careers service. The provision of online-only guidance is also a negative aspect of careers services. The period of the pandemic brought about a switch from desktop to online mode, which many careers offices are still doing today. The pandemic brought a lot of changes that also took place in the labour market. The author of the paper believes that a return to the bricks and mortar way of working would increase students' interest in using the services of careers services.

In the survey, students were asked to indicate what encouraged and discouraged them from using the services of the organisation. The respondents were divided. However, from the point of view of students' career development, free counselling is the most important factor that encourages them to use the services of the office. Such services offered by professional guidance companies are generally very expensive and not everyone can afford to use them. Therefore, using the free services of the office is a great advantage for the organisation. Next, the respondents decided that an attractive offer is a big advantage of using the help of a careers service. Similarly, advantages such as high unemployment and assistance from specialists and career counsellors were mentioned. What prevents students from using the services of the organisation from the point of view of their professional development is mainly lack of time. As many as 24% of respondents gave this answer. A lot of complicated procedures is a definite disadvantage of using the services of the Office, seventeen per cent of respondents think so. Bad reviews, outdated forms of office management and unfavourable offers are the most frequently marked answers by students.

Summing up the positive and negative aspects of the activities of the Academic Career Offices at universities, it is possible to consider many advantages that encourage students to use the services of the organisation. The disadvantages are fewer, but they are worth working on in order to meet the needs of the most demanding students in the future.

The third research question related to students' expectations of the activities of academic careers services. Such a question appeared in the survey for respondents. Respondents were divided on these expectations. Similarly, the provision of assistance in finding an employer and preparing for an interview was selected by students at the same level (17%). This means that the above-mentioned services are the most important ones for the students and that they go to the Careers Advisory Service in order to use these services. Students also expect career guidance services to help them obtain additional certificates or qualifications and to provide information about attractive careers. The organisations should also, according to the

students, make it easier for them to take part in training or courses and help them to find apprenticeships. Several respondents think that careers services should help students to set up their own business. The lowest expectations that students have of the activities of university careers services are in relation to postgraduate research. None of the respondents gave an answer other than the above. According to the author of the paper, students struggle most with the problem of finding a job and the associated stress of an interview. The surveys carried out confirm this. Most people who are faced with the problem of being unemployed or who express the wish to change their job are referred to the Careers Advisory Service only, as this is the most popular service. The same applies to individual counselling to prepare for a job interview. Although the range of services offered by these organisations is wide, students tend to use only some of them.

Summary

The issue of supporting students' career development is a very broad one, and therefore all the activities carried out by the Academic Career Services are aimed at enhancing the professional potential of students and graduates.

The study carried out focused on the possibilities for academic career services to support the professional development of students. The main objective of the study was to examine the issue of students' career development and the possibilities of supporting it through the activities of academic career offices at universities.

The support provided by academic career offices to students is a whole range of services offered by these organisations. These range from individual counselling on how to find a job, to organising internships, training, courses and various events, to organising interviews in the university environment. The opportunities for support are many, and the range of services offered by academic careers offices is wide. Every student has the right and access to free support to help them start their career.

Academic Career Services, which operate at universities, are obliged to constantly monitor the labour market. As a result, they are able to respond to changes by adapting to current trends. By coordinating these activities, Academic Career Services can continuously adapt their services to students, providing them with, among other things, access to current job opportunities or to current programmes, projects and events. Ongoing training of the staff responsible for running the Careers Advisory Service enables them to meet the needs of students in terms of professional support. People who are looking for their career path or who want to develop themselves professionally or otherwise can find support thanks to these organisations.

The current labour market situation requires an increased involvement of academic career services. The range of services offered by the organisations should be adapted to the needs reported by students. Through such practices, Academic

Career Services can offer interested individuals a wide range of services that meet students' expectations.

The main objective of this study was based on the possibilities for academic career offices to support students' professional development. The purpose of the work was realised.

The research shows that there are many opportunities for academic career services to support students. These organisations contribute significantly to providing adequate support to students who need the organisation's support. The analysis of the ways in which the academic careers services support students shows that the courses organised, the training provided or the job opportunities found by the organisations not only open up prospects for students to develop and strive for professional success, but that the support provided by the organisations also gives students the opportunity to develop their career paths.

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