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DEVELOPMENT AND ADMINISTRATION OF BORDER AREAS OF THE CZECH REPUBLIC AND POLAND

SUPPORT FOR SUSTAINABLE DEVELOPMENT

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DEVELOPMENT AND ADMINISTRATION OF BORDER AREAS OF THE CZECH REPUBLIC AND POLAND

SUPPORT FOR SUSTAINABLE DEVELOPMENT

Conference Proceedings of RASPO 2024

Editor

Eva Ardielli
Jiří Bečica
Roman Vavrek

Conference Proceedings of the 6th International Scientific Conference
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DEVELOPMENT AND ADMINISTRATION OF BORDER AREAS OF THE CZECH REPUBLIC AND POLAND - SUPPORT FOR SUSTAINABLE DEVELOPMENT

Conference Proceedings of RASPO 2024

The conference was organized within the framework of the sustainability of the project No. CZ.11.3.119/0.0/0.0/16_013/0003093 „Zvýšení znalostí a dovedností vysokoškolských studentů v oblasti implementace veřejných politik v České republice a Polsku a zlepšení jejich uplatnitelnosti na trhu práce“ (Increasing the knowledge and skills of university students in the field of implementation of public policies in the Czech Republic and Poland and improving their applicability in the labor market) and the project No. CZ.11.3.119/0.0/0.0/16_013/0001981 „Rozvoj kompetencí a zlepšení uplatnitelnosti vysokoškolských studentů na trhu práce v oblasti služeb veřejného sektoru“ (Development of competences and improvement of employability of university students in the field of public sector services) of the Interreg V-A Program Czech Republic-Poland.

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DEVELOPMENT AND ADMINISTRATION OF BORDER AREAS OF THE CZECH REPUBLIC AND POLAND - SUPPORT FOR SUSTAINABLE DEVELOPMENT

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The conference traditionally focuses on theoretical and practical issues of the development of the Czech-Polish border region. Emphasis is placed primarily on issues of public economics and administration, business economics and management, and sustainable development.

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Prologue

Dear readers,

you are holding a collection of papers presented at the 6th International Scientific Conference "Development and Administration of Border Areas of the Czech Republic and Poland - Support for Sustainable Development" (RASPO), organized by the Department of Management at the Faculty of Economics, VSB – Technical University of Ostrava.

The RASPO scientific conference took place on November 11, 2024. The conference was conducted within the framework of the sustainability of the project titled "Increasing the knowledge and skills of university students in the field of implementation of public policies in the Czech Republic and Poland and improving their applicability in the labor market" (Reg. No. CZ.11.3.119/0.0/0.0/16_013/0003093), and the project titled "Development of competences and improvement of employability of university students in the field of public sector services" (Reg. No. CZ.11.3.119/0.0/0.0/16_013/0001981) co-financed by the European Regional Development Fund under the INTERREG V-A Czech Republic – Poland Program through the 2014–2020 Microprojects Fund in the Euroregion Silesia.

The RASPO conference traditionally addresses pressing issues faced by economies, particularly in border regions. Emphasis is placed on discussions encompassing multidisciplinary, practically oriented, and innovative insights.

This RASPO 2024 conference proceedings volume contains peer-reviewed contributions that successfully underwent the review process and were approved for publication by the Scientific Committee.

Ostrava, December 2024

doc. Ing. Iveta Vrabková, Ph.D.
Scientific Guarantee of the Conference
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Prologue in Czech

Vážení čtenáři,

máte v rukou sborník příspěvků, které byly prezentovány na 6. mezinárodní vědecké konferenci „Rozvoj a správa příhraničních oblastí České republiky a Polska – podpora udržitelného rozvoje“ (RASPO) pořádané Katedrou managementu, Ekonomické fakulty, Vysoké školy báňské – Technické univerzity Ostrava.

Vědecká konference RASPO se konala 11. listopadu 2024. Konference RASPO byla realizována v rámci udržitelnosti projektu „Zvýšení znalostí a dovedností vysokoškolských studentů v oblasti implementace veřejných politik v České republice a Polsku a zlepšení jejich uplatnitelnosti na trhu práce“ reg. č. CZ.11.3.119/0.0/0.0/16_013/0003093 a projektu „Rozvoj kompetencí a zlepšení uplatnitelnosti vysokoškolských studentů na trhu práce v oblasti služeb veřejného sektoru“ reg. č. CZ.11.3.119/0.0/0.0/16_013/0001981, které byly spolufinancovány z prostředků Evropského fondu pro regionální rozvoj z Programu INTERREG V-A Česká republika – Polsko prostřednictvím Fondu mikroprojektů 2014-2020 v Euroregionu Silesia.

Konference RASPO se tradičně věnuje aktuálním otázkám, kterým čelí ekonomiky a speciálně příhraniční regiony. Důraz je kladen na diskusi, která zahrnuje multidisciplinární, prakticky orientované a inovativní poznatky.

Také tento sborník konference RASPO 2024 obsahuje recenzované příspěvky, které uspěly v recenzním řízení a byly vědeckou komisí schváleny k publikaci.

Ostrava, prosinec 2024

doc. Ing. Iveta Vrabková, Ph.D.
Odborný garant konfernce
Katadra managementu
Ekonomická fakulta
VŠB-TUO

Prologue in Polish

Szanowni Czytelnicy,

Trzymają Państwo zbiór referatów przedstawionych na VI Międzynarodowej Konferencji Naukowej „Rozwój i administracja obszarów przygranicznych Republiki Czeskiej i Polski – wspieranie zrównoważonego rozwoju" (RASPO) zorganizowanej przez Katedrę Zarządzania, Wydziału Ekonomicznego, VŠB -TUO w Ostrawie.

Konferencja naukowa RASPO odbyła się 11 listopada 2024 r. Konferencja RASPO została zrealizowana w ramach trwałości projektu „Podnoszenie wiedzy i umiejętności studentów wyższych uczelni w zakresie realizacji polityk publicznych w Czechach i Polsce oraz poprawy ich stosowalności na rynku pracy" nr CZ.11.3.119/0.0/0.0/16_013/0003093, oraz projektu „Rozwój kompetencji i poprawa szans na zatrudnienie studentów uczelni w dziedzinie usługi sektora publicznego", nr CZ.11.3.119/0.0/0.0/16_013/0001981 które były współfinansowany ze środków Europejskiego Funduszu Rozwoju Regionalnego w ramach Programu INTERREG V-A Republika Czeska - Polska w ramach Funduszu Mikroprojektów 2014-2020 w Euroregionie Silesia.

Konferencja RASPO tradycyjnie koncentruje się na bieżących problemach stojących przed gospodarkami, zwłaszcza regionów przygranicznych. Nacisk położony jest na dyskusję obejmującą multidyscyplinarne, praktyczne i innowacyjne spostrzeżenia.

Materiały konferencyjne RASPO 2024 zawierają również recenzowane artykuły, które przeszły proces recenzji i zostały zatwierdzone do publikacji przez komitet naukowy.

Ostrawa, grudzień 2024

doc. Ing. Iveta Vrabková, Ph.D.
Gwarant naukowy konferencji
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Content

Ethics and Self-Development in Business

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Abstract

The article examines the relationship between ethics and self-development in business. The authors emphasize that ethical principles are a crucial foundation for the personal and professional growth of employees and leaders. Special attention is paid to questions: How ethics influence decision making the development of corporate culture, and the enhancement of a company's reputation. The article also discusses the roles of self-improvement and awareness in shaping ethical behavior, which contributes to successful management and business sustainability.

Keywords: *Business Ethics, Corporate Culture, Personal Growth, Professional Development, Self-Development*

JEL Classification: *CO2, M12, M14*

1 Introduction

Ethics and self-development in business play a central role in building successful and sustainable companies (COLLINS, 2019). In the context of globalization and rapidly changing economic realities, businesses are increasingly faced with the necessity of considering not only financial metrics but also the aspects towards organizational culture, managerial behavior and awareness of organizational mission. These aspects settled not newest but newly discovered disciplines as ethics and more philosophy of management. The disciplines which traditionally belonged into the areas of theoretical philosophy now become an important part of applied studies. Moral, social and environmental aspects of organizational operations is necessary to describes and normatively shaped. Ethics becomes an essential subject of that operations which can help organizations establish good organizational culture, self-improvement of the workers and relationships between TMT (Top Management Team) with employees, clients, and other stakeholders based on trust, respect, and responsibility. As Linda Treviño mentioned in her distinguished book Managing Business Ethics (TREVIÑO and NELSON, 2011. p. 322) ethics in business build better culture of the organization.

Considered that theoretical thoughts, it is essentially significant that ethical environment inside the organizations support behavior of each employee. There are many positive aspects of the ethical environment inside the organization; between them is self-development of employees. Ethical management has the potential to create that kind of environment where the employee could find the possibility for personal growth. In addition, to become more human through the work which human being provides (ROBSON and OTTESON, 2024). In terminology of management, it is described by the term of self-development.

Self-development, in turn, is an integral part of the personal and professional growth of every team member, from entry-level employees to top management. Leaders who strive for continuous improvement of their skills and conscious development not only enhance their own performance but also inspire those around them to act

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responsibly and ethically. This creates a foundation for forming a corporate culture that encourages both personal achievements and adherence to high moral standards.

The application of ethical principles in business aids in addressing complex moral dilemmas and avoiding situations that could undermine trust in the company among its stakeholders. Furthermore, companies that uphold high ethical standards tend to have more loyal customers, attract better talent, and navigate external challenges more successfully.

Thus, introducing the topic of ethics and self-development in business emphasizes their significance in building long-term success, sustainability, and the reputation of an organization. The theory of the management described it theoretically, but this theory is very difficult to proof in praxis.

1.1 Theory

Very little attention has been paid in the past to the issue of the person in management, let alone economics. And if at all, then as consumers. Expressed through ethical discourse, the person was viewed to other ends rather than an end in itself. Even though it is man who is the creator of values, general as well as economic values. The classic economic lesson that expresses the production process as inputs-processes-outputs is not false, only reductive. Inputs would never be inputs in themselves if the entire process was not preceded by a person who plans, divides, controls and finally closes the entire process. It is evident that the two important lessons we have in economics simply diverge here. The economic lesson and the management lesson are somehow not mutually coherent. Especially in relation to the current development of technology and the absolute dominance of knowledge management, in which human capital and knowledge fundamentally determine which organizations and businesses survive and which, on the contrary, disappear. The organization can no longer be seen as a structure that transforms inputs into outputs and competes with them in the market, which according to the classic lesson is completely autonomous, expressed in the classic way, is controlled by the invisible hand of the market. The organization is currently a dynamic environment into which a person enters not as a finished product of education, but as an individual who will continue to be shaped.

This is the reason why it is extremely important to ask anew the question, who or what is a person in relation to the organizations in which he will work? (NORTHAUSE, 2022). However, since this is a very general question, so general that the whole of anthropology as a science could fall into it, it is necessary to define this issue in a more precise way. The question that we will deal with in the article is the personal development of a person as a person in an organization. More precisely, how does the quality of the ethical environment of an organization affect the self-development of a person as a person?

1.2 Theory of Person in Business Ethics

There are many definitions of a person in anthropology. An anthropological approach defined personalities as a concept of enculturation. Kottak defined personality in the way of psychological anthropology: "(…) personality is a more or less enduring organization of forces within the individual associated with a complex of fairly consistent attitudes, values, and modes of perception which account in part for the individual's consistency of behavior." (KOTTAK, 1987. p. 290). This is a very strong foundation for management, but for our research more fundamental theory is needed. The kind of foundation which included the ethical aspect is needed.

One of the classical definitions formulated Immanuel Kant. A classic definition, which, however, never had the chance to be fulfilled in the past, is the definition of a person is an end in himself (KANT, 1788. p. 68). This definition was created by Immanuel Kant and published in the The Critique of Practical Reason in 1788 (KANT, 1788). As well as Immanuel Kant wrote same idea and explained in his book Foundation of the Metaphysics of Morals from the year 1785: *"So I say that man, and every rational being in general, exists as an end in itself, not only as a means that this or that will could use at will, but must always be considered as an end* ***in all his actions directed both to himself****, so also on other rational beings (...). " (*KANT, 1785, BA 64). This is very based foundation where person is defined as a purpose of being, not an instrument of existence. That is mean that every human beings are not the instrument of morality but rather the goal of morality itself. Kant's seminal work, 'Groundwork for the Metaphysics of Morals,' provides a foundational framework for understanding the human person. Within this framework, Kant elucidates the defining characteristics of a person, namely:

- **Rationality:** The capacity for logical thought and reasoned action.

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- **Conscience:** An internal moral compass that guides judgment and behavior.
- **Autonomy of Will:** The ability to act independently and self-direct one's actions based on reason and internal moral principles.
- **Freedom:** The capacity for free choice and the ability to act in accordance with one's own will

These attributes show that a person is able to rationally formulate himself in relation to the surrounding world and other human beings, he is able to formulate the consequences of his actions towards himself, other people and also the nature he is surrounded by. He can want to realize his intentions and is also aware of the fact that he is determined by everything that surrounds him. At the same time, it can define the limit of what is possible and thus also the limit of freedom of what can be achieved. Kant's definition is very impressive, because it ethically defines human action and thus says why man can de facto direct his actions unlike animals.

However, one aspect of this definition is very important for management. And that aspect of focusing one's own actions on oneself. This aspect points to a person's responsibility towards himself. On the obligation of what a person is now, but also what a person should be in the future. In other words, to the possibility of self-actualization. Arno Anzenbacher comments on this fact as follows: “But why is the human person not a thing, but an end in itself? Precisely because in it pure reason can become practical reason. In this "fact of reason" the person manifests himself as a rational being who can determine himself by giving himself a law of action (moral law)." (ANZENBACHER, 1994. p. 56). Anzenbacher notes the same aspect of Kant's definition of the person. Man's obligation to himself, i.e. obligation to develop and become someone else. This aspect points to the importance of personal self-development. A person is not a finished being, or rather a being that we could consider to be completely finished in terms of both physical and mental as well as spiritual aspects. At any age, a person can learn about himself and can benefit from this knowledge by trying to develop himself further. It is no different in the working life of an individual. Work is a potential means of human self-development.

It is not at all easy to connect personal growth with the culture of the organization, and above all with one of the basic articles of the organizational culture, i.e. ethics. Many studies that are built on management theory do not take this aspect into account at all. Moreover, the personal development of the intern is closely connected with the organizational culture and strategy of every organization that wants to develop. Such organizations consider knowledge management in their strategy, invest considerable resources in the development of human capital and build a talent pool for strategically important positions in the organization's management. These investments are related to the organization's environment, its culture, which is dependent on the level of self-awareness of each individual who works for the organization. In the model of organizational culture according to Edgar Schein, this is the level of Deeper Cultural Assumptions, which include: Nature of human relationship, appropriate human activities, Human natures, Time, Space and finally the most important question What is the truth? (SCHEIN, 2017).

Among these categories is the category of human nature. It is one of the most complex theories in Schein's model. Human nature can be examined from the positions of many disciplines, including ethics. This is a very specific problem, because a person considers his actions also from the standpoint of morality. Especially in interpersonal relationships, man is manifested as an ethical being. And an organization with an organizational structure and organizational culture is an example of this. A relatively large group of people meet and cooperate in a closed social environment.

Workplaces are a social environment where people meet, live and cooperate. This very specific social environment brings together diverse mix of individual personalities (MULLINS, 2019. P. 151). Differences between people in one specific workplace are called diversity. Laurie Mullins defines diversity *“Diversity focuses on the multiplicity of differences among people – on the variety people as heterogeneous groupings”* (MULLINS, 2019. p. 151). In ethical sense this variety of difference not to negate and not to exclude the dignity of the person as a human being. The organizational structure and also the organizational culture can become just such an environment in which a person will continue to grow and develop his own abilities. But for this, ethical values and thus also an ethical environment must be created. In category of philosophy human being is not an agent for other, neither his-self or her-self. Human being is purpose in itself. This is Immanuel Kant’s definition of human being as an ethical being. This article will follow this Kan’s idea of human being as a person as purpose in itself.

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1.3 Organizational Environment and Self-Development

The HRM department is watching over itself-development or should be watching. It is responsible for a whole range of HR activities in the organization and one of the responsible functions of HRM is employee development. Human Resource Management (HRM) is supposed to fulfill three basic tasks: selection and acceptance of new employees, adaptation and development, dismissal. If all three tasks are set in the right way and HRM also does its job well, the organization gains an advantage in the sustainable development of its human resources. One HRM task seems to outshine the others in its relevance. That task is the adaptation and development of employees. At the same time, it seems that in addition to HRM, the environment, i.e. the organizational culture of the organization in which people work and should continue to develop, has a great stimulating effect on the personal development of employees. This article focuses on this aspect, which is the environment and its influence on the further development of employees. Before we justify this influence of the environment on the development of an employee, let's determine what we mean by development at all.

As Martin N. Davidson (DAVIDSON, 2005, p. 234) writes, personal development can be conceived in two ways, as a training program or developmental programs. Training programs are focused on the performance of a specific activity, or on a specific type of expertise. It involves training employees in certain areas related to their current and/or future work.

Personal development is completely different in nature, it is focused on individual employees and is long-term. "Developmental programs are increasingly shaped to take into account the unique competencies and weaknesses of an employee and help that employee improve through a more personalized educational approach. (DAVIDSON, 2005, p. 234). Development is focused on individual employees and is more personalized to the needs of the individual. It therefore considers the personal needs of employees in relation to their work, but also in relation to their personal assumptions. Unlike training, it is long-term, which means that the development plan is also based on the needs of the organization, which plans to fulfill the strategy and long-term goals of the organization in the development of employees. Davidson describes this fact as follows: "Development programs often include developmental relationships as core elements of the learning process. Whereas training may tend to be more short-term and may not even heavily use human instructors, developmental programs are often framed as long-term learning opportunities requiring the input of more senior individuals who can mentor the employee." (DAVIDSON, 2005. p. 234). Development programs are based on the idea of comprehensive personal development of employees. This emphasis, which is placed on the adjective personal development, points to a very important ethical aspect. Organizations that understand employee development in this way approach the employee as a person. In this aspect, the role of ethics in the organization is already very clearly evident. Other ethical aspects include improving workplace relationships that ensure long-term sustainable cooperation between workers.

1.4 Definition of Self-Development in Business

Drucker emphasizes that self-development is a key factor for leaders, as adapting to changes in a rapidly evolving business environment requires continuous learning and skill enhancement (DRUCKER, 2017, p. 123). This, in turn, affects strategic management and the overall effectiveness of the organization. Thus, constant self-development becomes a necessary condition for successful leadership. In "Who Moved My Cheese?", Blanchard and Johnson explore the necessity of flexibility and adaptation to change. Self-development helps employees and leaders cope with transitions, enhancing the overall resilience and competitiveness of the company (BLANCHARD & JOHNSON, 2002, p. 45). This confirms the importance of adaptability in the face of change. Stephen Covey, in "The 7 Habits of Highly Effective People," outlines principles of personal effectiveness, emphasizing the significance of self-development for achieving both personal and professional goals (COVEY, 2020, p. 37). By developing these skills, employees become more productive and capable of making meaningful contributions to business growth. Therefore, personal effectiveness is a key element of successful self-development. Daniel Pink, in "Drive: The Surprising Truth About What Motivates Us," asserts that motivation and job satisfaction are directly linked to personal development (PINK, 2011, p. 78). Companies that support the self-development of their employees can witness increased productivity and improved workplace atmosphere, ultimately leading to higher outcomes. This highlights the importance of motivation in the self-development process. Richard Branson, in "Like a Virgin: Secrets They Won't Teach You at Business School," shares his experiences, emphasizing that successful companies thrive when their employees invest in their personal development (BRANSON, 2013, p. 102). This fosters a culture of learning and innovation, which is critical for business success. Thus, cultivating a culture of self-development becomes essential for achieving corporate

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goals. Michael Hyatt, in "Platform: Get Noticed in a Noisy World," focuses on the formation of habits that facilitate self-development (HYATT, 2012, p. 54). This enables not only individuals but also teams as a whole to reach their objectives and improve the company's performance. Consequently, habits play a significant role in the self-development process. Tony Robbins, in "Awaken the Giant Within," examines how personal transformation and self-development can lead to improved quality of life and work (ROBBINS, 2012, p. 64). He emphasizes that companies benefit when their employees actively engage in their own development, enhancing their engagement and effectiveness. This indicates that employee involvement in self-development is critically important for business success.

London and Smither argue that self-development is a critically important process in which an individual consciously and actively participates in their own learning and skill development. This involves not only setting goals, but also evaluating one's own progress and correcting behavior based on feedback and analysis. In their opinion, successful self-development requires striving for constant learning, flexibility and adaptation to new knowledge and experience. "Self-development-oriented individuals are constantly striving to improve their competencies and expand their opportunities, using both formal and informal sources of learning" (LONDON & SMITHER, 1999). The article by L. Ritchie and B. G. Dale "Self-assessment using the business excellence model: A study of practice and process" analyzes self-assessment practices in organizations based on the Business excellence model (EFQM) (RITCHIE & DALE, 2000). The authors explore how the self-assessment process, considered using the example of ten organizations, can influence strategic planning and identify areas for improvement. However, as noted in the article, the potential of self-assessment is often underestimated by managers, which indicates existing gaps in understanding its impact on business. Thus, self-development in business needs further research to better understand its significance and impact on organizational effectiveness.

These authors underscore that self-development in business is an integral part of organizational success, enabling them to adapt, grow, and effectively achieve their goals.

The relationship between self-development and equality in business is essential for cultivating an inclusive workplace culture. In "The Equality of Opportunity," Chetty argues that equitable access to resources, including professional development, is crucial for enabling individuals from diverse backgrounds to succeed (CHETTY, 2018, p. 45). This perspective aligns with insights from "Dare to Lead," where Brown emphasizes the importance of vulnerability and courage in leadership, advocating for environments where all employees feel safe to express themselves and pursue growth (BROWN, 2018, p. 102). Furthermore, Duhigg highlights in "The Power of Habit" how establishing productive habits through self-development can lead to improved performance and greater equality among team members, as everyone learns to contribute effectively (DUHIGG, 2012, p. 154). Page argues in "The Diversity Bonus" that diverse teams prioritizing self-development outperform homogeneous teams, as varied perspectives lead to better problem-solving (PAGE, 2017, p. 78). In "Mindset: The New Psychology of Success," Dweck discusses the concept of a growth mindset, emphasizing that believing in the capacity for development can help individuals break through barriers and achieve their potential, contributing to a more equitable work environment (DWECK, 2006, p. 39). Overall, fostering self-development initiatives not only empowers individuals but also enhances collaboration, creativity, and equality within organizations, making them more adaptable and successful in a competitive landscape.

As Immanuel Kant wrote in «The Fundamentals of the Metaphysics of Morals», a person should be perceived as an end, not a means (KANT, 1875, p. 64); this principle emphasizes the importance of respecting and supporting the self-development of each employee in an ethical organizational culture.

1.4.1 Premises of Work

P1: Human being is not a finished being.

P2: Work is a potential means of a person's self-development.

P3: A high-quality ethical environment of the organization motivates a person's self-development.

P1: Human beings exhibit inherent potential for growth and development throughout their lifespan.

This premise emphasizes the ongoing nature of human development, moving away from the static notion of a "finished being."

It aligns with fields like developmental psychology and humanism, which acknowledge the continuous process of learning, adaptation, and personal evolution.

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P2: Engaging in meaningful work activities can serve as a catalyst for individual self-actualization.

This premise focuses on the instrumental value of work for personal growth, shifting from a general statement about "self-development" to a more specific concept like "self-actualization" (a term from humanistic psychology).

It suggests that work can provide opportunities for skill acquisition, challenge, creativity, and the realization of one's full potential.

P3: A positive and ethical organizational culture fosters intrinsic motivation and facilitates individual self-development.

This premise introduces the concept of "organizational culture" and its impact on individual motivation.

It emphasizes the importance of factors like ethical leadership, fair treatment, employee autonomy, and a supportive work environment in promoting personal growth.

This connects to research in organizational behavior and positive psychology, which explore the influence of organizational factors on employee well-being and performance.

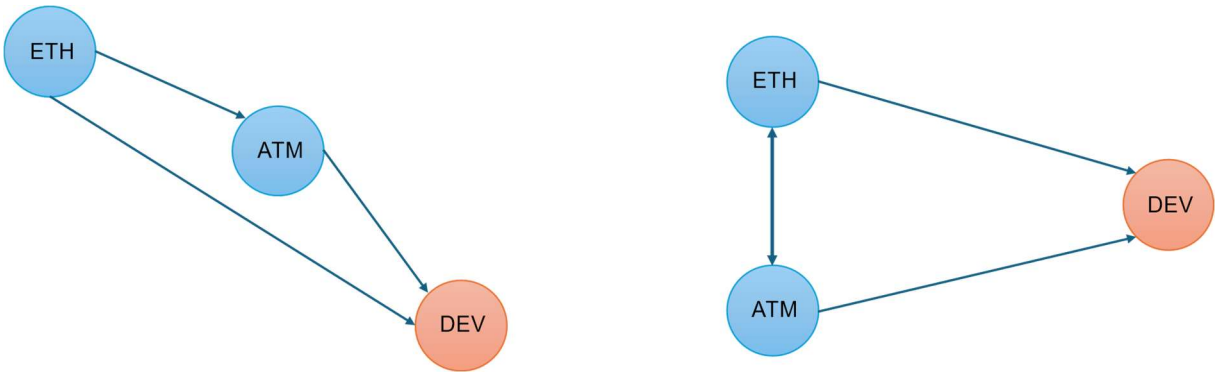
There are many issues that relate to these premises that can be quantified using two structural models in which three variables are involved:

- independent variables (predictors) – atmosphere in the organization (ATM) and ethics (ETH);
- dependent variable – self-development (DEV).

In the first model there is a regression relationship between the predictors (ETH → ATM), in the second there is a correlation relationship between the two predictors (ETH ↔ ATM). The first model is related to Schein's theory of organizational culture, where ethics influences the whole organizational culture; the second model is close to Trevino's idea that culture and ethics influence both.

Both models can be expressed using structural diagrams (Figure 1):

Figure 1 – Structural diagrams



Model I Model II

Source: own elaboration

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Three hypotheses were developed to test these models:

H0: The self-development is dependent on ethics and atmosphere in organization.

H1: Atmosphere is depended on ethics in organizational culture.

H2: Ethics and atmosphere are mutually corelated.

These hypotheses will be tested in the next analytical section of this essay.

2 Model and Data

The influence of corporate ethics on the professional development of employees is manifested in the formation of an environment where moral values and respect for the individual contribute to their self-development. According to the study, organizations that create and maintain an ethical atmosphere promote mutual trust and encourage employees to learn and master new skills. Correlation analysis confirms that in companies with a high level of trust and compliance with ethical standards, staff demonstrate a greater desire for professional growth and personal development.

Ethical principles help employees see their tasks not only as part of the job, but also as an opportunity for personal growth. Codes of ethics and moral standards, clearly established by management, also give employees confidence that their rights and interests are protected, and their efforts will be fairly evaluated. This aspect is especially important for creating a stable corporate culture where employees see opportunities for self-realization and a long-term professional career.

Thus, the ethical environment in the company is not just aimed at observing moral norms; it creates conditions for unlocking the potential of each employee, contributing to sustainable growth both on a personal and professional level.

2.1 Data for Model Analysis

The analysis used selected questions from the standardized MAELQ questionnaire (Multidimensional Analysis of Ethical Leadership Questionnaire), which examines corporate values in the organization. The questionnaire helps to create a better view of the analyzed company, which in turn allows to improve the working conditions in the company, to find out what are the company's strengths and to support targeted development of areas that represent weaknesses.

The questionnaire under consideration is composed of 24 attitudinal questions, which are divided into four areas (factors) representing the dimensions of corporate values as follows: individual values, social values, consumer values and societal values. The responses to all questions are designed on a four-point Likert-type scale (1 = definitely yes, 2 = rather yes, 3 = rather no, 4 = definitely no). It is important to note that the scale does not include a mean neutral value, which forces respondents to take a positive or negative attitude towards each issue assessed.

For the analysis, a representative sample (N=259) with responses from randomly selected workers in the energy-intensive industry typical for the Moravian-Silesian region was used. All quantitative data obtained from the questionnaire were subsequently analyzed first in Excel and then in IBM SPSS Statistics.

For the purpose of this study, three questions from the MAELQ questionnaire were selected to represent each of the variables in the model – ETH, ATM and DEV.

Table 1 – Question Q3

Q3. Is it important for you personally to have the opportunity for further professional development and training (for example, acquiring new skills, advanced training certificates, etc.)?
1. Yes
2. Yes, but I would welcome additional opportunities to improve my professional qualifications.
3. No, I only undergo mandatory training (for example, on labor protection, etc.).
4. No

Source: own elaboration

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The third question of the questionnaire focuses on the importance of professional development and training, indicating the desire of employees to improve their skills in the presence of appropriate conditions and opportunities. This commitment is largely determined by the prevailing atmosphere within the company, with trust and openness being of central significance. This question is thus considered the dependent variable of the model – personal self-development (DEV).

Table 2 – Question Q13

Q13. Is there an atmosphere of trust and openness in the company?
1. Yes
2. Yes, the atmosphere is friendly, but only between employees of the same organizational level.
3. There is a lack of communication
4. No, the working climate is disrupted, an atmosphere of mistrust and even fear reigns

Source: own elaboration

In question 13 of the MAELQ questionnaire, it is asserted that the presence of an atmosphere of trust and openness within the company is conducive to the active participation of employees in training and their involvement in work processes. Such interaction is only possible on the condition that the organization adheres to the standards and rules set out in the code of ethics. This question is related to the predictor Atmosphere (ATM) in the models.

Table 3 – Question Q24

Q24. About the company's code of ethics:
1. I know that there are rules of ethical conduct and that I and my colleagues (and superiors) abide by this document.
2. I know that there are rules of ethical behavior and I follow this document.
3. I know that there is a code of ethics, but I do not know exactly what this document contains.
4. I don't know if the company has a code of ethics.

Source: own elaboration

Question 24 of the questionnaire posits that awareness of and compliance with the code of ethics serve to fortify the bond between employees and management, thereby exerting a favorable influence on the evolution of organizational culture and the motivation of employees to pursue professional advancement. This question represents the predictor Ethics (ETH) in the models.

2.1.1 Methods

Given that the variables present within the models are ordinal in nature, the examination of the relationships between these variables was undertaken through the utilization of ordinal correlations, with particular reference to Kendall's tau correlation. A relationship map and mosaic chart were employed to facilitate the visualization of the relationships between ordinal variables.

Linear regression models with ordinal predictors were employed to construct both models of dependence. These models were created in IBM SPSS Statistics using the Automatic Linear Modelling tool. In addition to calculating the model itself, this tool also performs input optimization of the ordinal variables (merge categories to maximize association with target, i.e. output variable) using forward stepwise optimization.

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3 Results and Discussion

Table 4 – Correlation table

Correlations

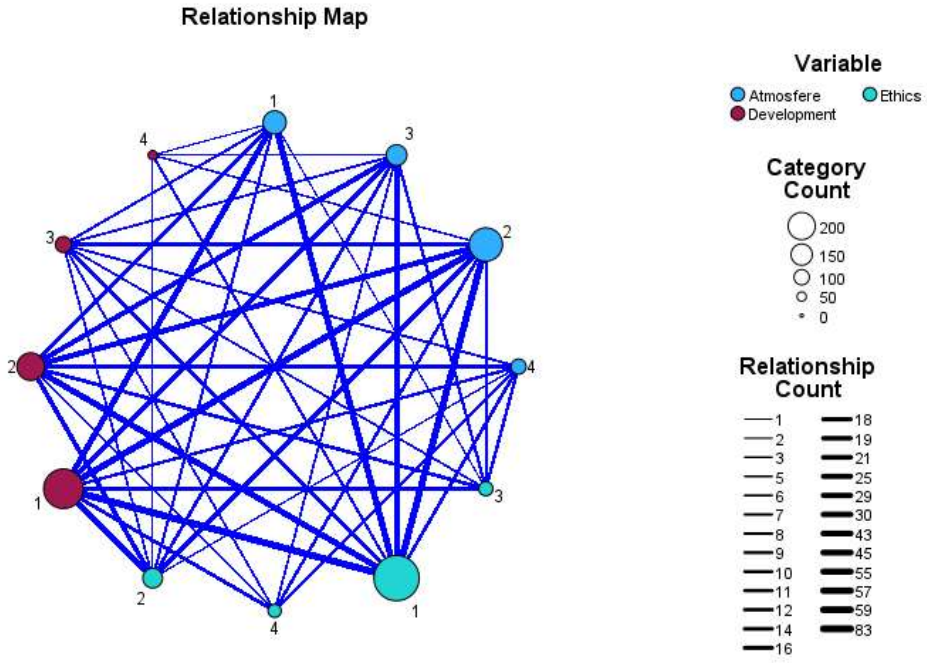
			Development	Atmosfere
Kendall's tau_b	Atmosfere	Correlation Coefficient	,174**	
		Sig. (2-tailed)	,001	
	Ethics	Correlation Coefficient	,063	,313**
		Sig. (2-tailed)	,254	<,001

**. Correlation is significant at the 0.01 level (2-tailed).

Source: own elaboration

It is evident that at the 0.01 significance level there are statistically significant relationships (ordinal correlations) between the pairs of variables ATM and DEV and ATM and ETH. In contrast, there is no significant correlation between the variables ETH and DEV.

Figure 2 – Relationship map



Source: own elaboration

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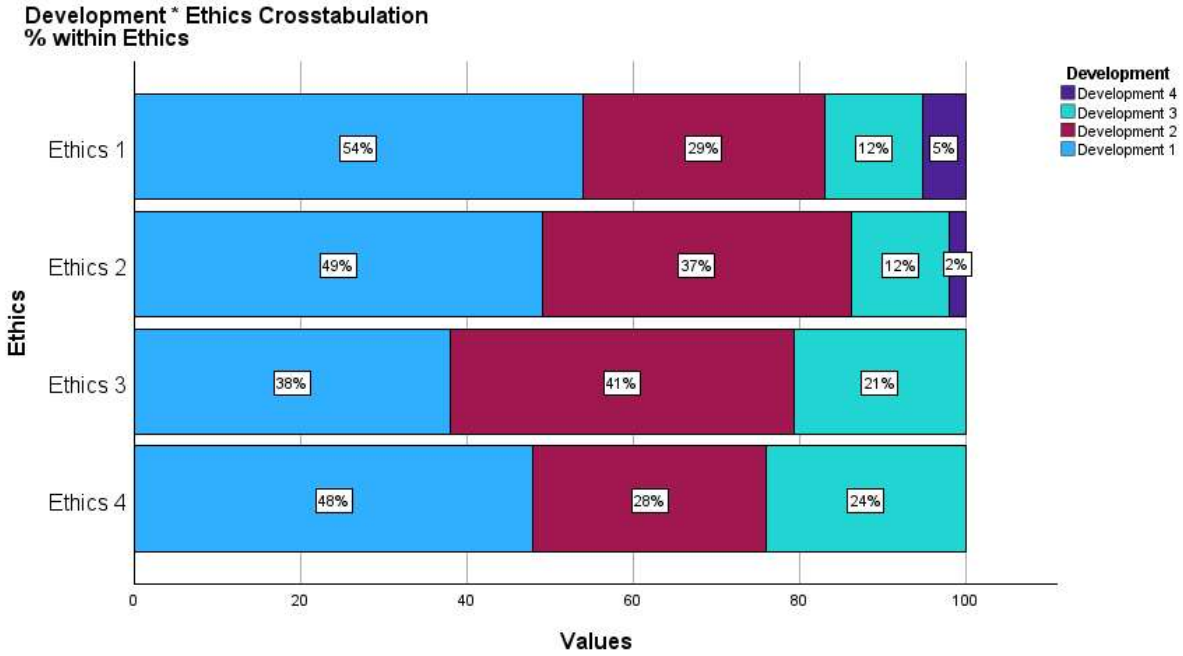
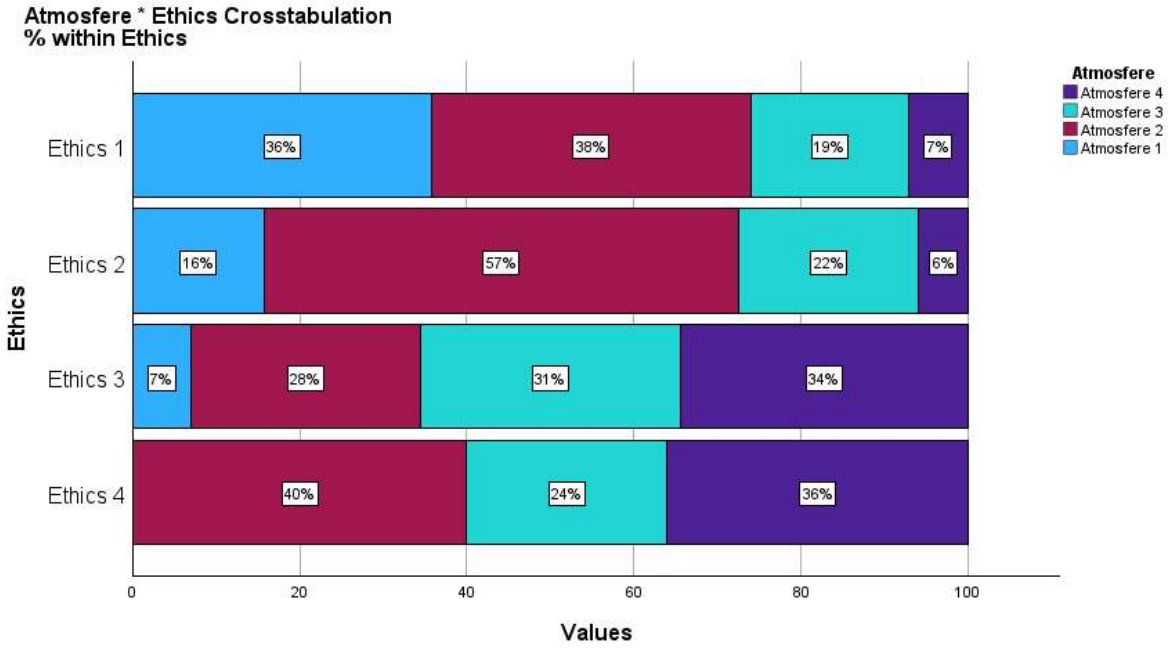
Figure 3 – Mosaic plot between the ETH and DEV variables



Source: own elaboration

The mosaic plot between the ETH and DEV variables shows that there is indeed no obvious dependence between these variables. The distribution of the representation of the individual values of the DEV variable is very similar in all 4 bars representing the values of the ETH variable.

Figure 4 – Mosaic plot between the ETH and ATM variables



Source: own elaboration

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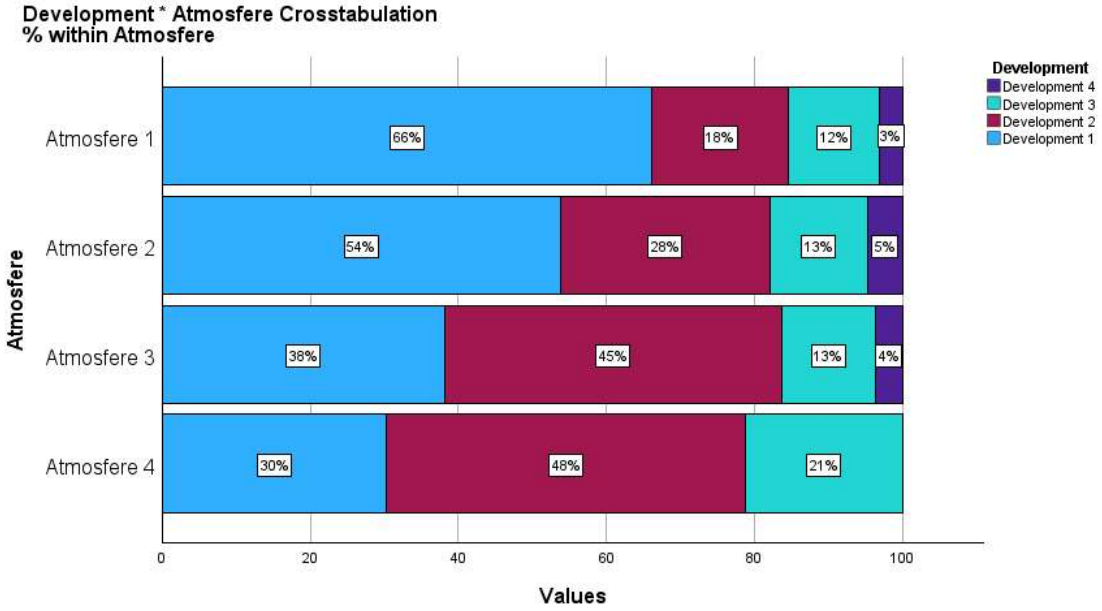
In contrast, the mosaic plot between the ETH and ATM variables shows that there is a positive relationship between these variables. As the values of the ETH variable increase in each of the 4 bars of the graph, the representation of higher values of the ATM variable also increases. Thus, it is clear that the existence of ethical standards has a positive effect on the atmosphere in the organization.

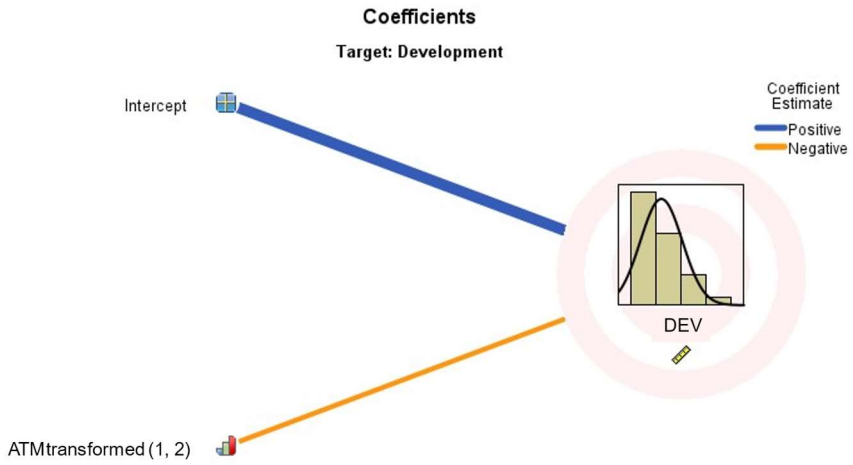
Figure 5 – Mosaic plot between the ATM and DEV variables



Source: own elaboration

Similarly, the mosaic plot between the ATM and DEV variables shows a positive relationship. As the values of the ATM variable increase in each bar of the graph, the proportions of higher values of the DEV variable also increase. Thus, it is clear that the atmosphere in the firm has a significant impact on the willingness of employees to self-develop.

Figure 6 – Optimized regression model



Source: own elaboration

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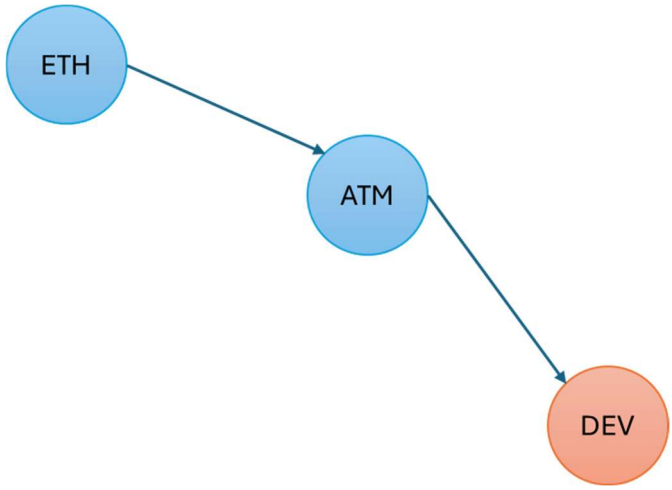
The optimized regression model with ordinal predictors shows that only the variable ATM has an effect on the output variable DEV, and only the values 1 and 2 representing a positive atmosphere. Thus, it is clear that the atmosphere in the company acts as a motivator (positive atmosphere strengthens employees' efforts to develop themselves, negative atmosphere does not affect self-development). The variable ETH has no direct effect on the variable DEV, but because it has a positive effect on the atmosphere in the company, it has an indirect effect on self-development.

The resulting model (after removing statically insignificant relationships) looks like:

Figure 7 – Resulting model



Source: own elaboration

What is the evaluation of hypotheses H0 to H2?

H0: The self-development is dependent on ethics and atmosphere in organization.

This hypothesis was partially supported. As the resulting model shows, self-development is directly dependent on atmosphere and indirectly dependent on ethics (ethics affects atmosphere and therefore affects self-development through atmosphere).

H1: Atmosphere is depended on ethics in organizational culture.

This hypothesis is confirmed. Atmosphere in a company is statistically significantly dependent on ethics, i.e. on the existence of functional ethical norms,

H2: Ethics and atmosphere are mutually correlated.

This hypothesis was not confirmed. There is a strong statistically significant correlation between the variables ETH and ATM, but it is not a reciprocal relationship, but a unidirectional (regression) one. Ethics has a positive effect on the atmosphere in the company.

The resulting model is therefore closer to the first of the two originally proposed models. It can therefore be said that the results of the analysis confirm the Schein's theory of organizational culture, that ethics influences the whole organizational culture.

4 Conclusion

This study highlights the critical importance of corporate ethics and the atmosphere in an organization to promote professional growth and self-development of employees. The results partially confirm the hypotheses: the atmosphere in an organization directly affects self-development, which, in turn, is determined by ethical standards. Although there was no direct link between corporate ethics and self-development, an indirect link was

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established through the atmosphere in the organization. In addition, the atmosphere in an organization is highly dependent on the availability and observance of ethical standards, which underscores the importance of a functional code of ethics for creating a positive work environment. However, the hypothesis suggesting a mutual correlation between ethics and the atmosphere was not confirmed, since the relationship turned out to be unidirectional, and ethics had a positive effect on the atmosphere.

These results confirm Edgar Schein's theory of organizational culture, according to which ethics has a significant impact on the overall organizational environment. Workplace culture, based on clear moral standards, mutual trust and open communication, contributes to creating an atmosphere in which employees feel safe, using their opportunities for development and training. The majority of respondents emphasized the importance of continuous professional training, strengthening the link between corporate ethics and employees' willingness to improve themselves.

In the long term, organizations that prioritize ethics and support the personal and professional growth of their employees gain a competitive advantage in the market by attracting and retaining talented professionals. The integration of ethics into the corporate culture not only strengthens the internal dynamics of the organization, but also promotes sustainable growth and reputation. Thus, adherence to ethical principles and a culture of development is a key factor in strategic success, allowing companies to thrive in an ever-changing business environment.

Acknowledgements

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Digital Transformation of Public Sector Services in the Context of an International Comparison of EU Countries` Progress: Case of Czechia and Poland

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Abstract

Digital transformation is one of the political priorities of the European Union, which is also significantly reflected in the policies of the EU countries. Digital technologies are perceived as an important aspect, representing a huge growth potential for EU countries and which have a significant impact on the development of the public sector and public services. Increasing the digital literacy of EU citizens, enhancing the digital skills of employees and promoting the digitalization of public services are important areas of digital transformation in the EU countries. The aim of this paper is to evaluate the digital transformation of public sector services in EU countries in the period 2019-2023 with the great emphasis on the performance of Czechia and Poland. The result of the research is the comparison of EU countries in the determined dimensions of digitalization of public services with regard to the results of the Czech Republic and Poland and pointing out shortcomings and possible areas of improvement.

Keywords: *Digitalization, eServices, Public Administration, Transformation*

JEL Classification: *O34, O52, J24, H87, C44*

1 Introduction

Digitalization is an important research topic and a key issue in the European Union and its member countries. A number of studies have been created that deal with the topic of digitalization and digital transformation of the economy and their importance for the future at the international and national level, see Senna et al (2023), OECD 2023, Małkowska, Urbaniec and Kosała (2021), Kraus et al., (2021) or OECD (2019). In the Czech and Polish environment, it is primarily research of Gancarczyk et al. (2023), Kucharska and Rostek (2023), Ivanova et al. (2019), Pisár et al. (2022) or Ardielli (2024).

Nowadays, digitalisation refers to the process of introducing the use of digital technologies in various areas of production and social life. Digitalization is the process of applying digital technology and capabilities in

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processes, and services that drive improved outcomes. This process involves the automation, digitization, and computerization of activities and operations, see MPSV (2020). Digitalization is the foundation for digital transformation. It is viewed as a new source of growth, efficiency, or relevance in an increasingly digital world. According to OPSI (2024) digital transformation refers to a process of adoption of digital tools and methods by an organisation, typically those that have either not been including the digital factor as part of their core activities or have not kept up with the pace of change in digital technologies. The umbrella of digital transformation encompasses a wide variety of technologies, including applications and software, networking capabilities, AI, machine learning, augmented and virtual reality, the Internet of Things (IoT), sensing technology, video-based analytics, the cloud, and beyond (Oracle, 2024) or (Mergel, Edelman and Haug, 2019). In the context of modern society and the economy, digitalization is of crucial importance in various aspects, including efficiency and productivity (ECB, 2023), (Szalavetz, 2019), innovation (Oracle, 2024), access to information and services (OECD, 2021), transformation of the labor market (ILO, 2022), (Artyukhina et. al., 2018) and globalization (OECD, 2023).

Digital transformation in private sector organizations is primarily driven by tangible factors such as efficiency, market share, and profit, leading to more immediate outcomes (Dang-Pham et al., 2022). In contrast, digital transformation within government entities must also address public purposes, encompassing factors such as the ownership and persistence of public data (especially identity), data security and privacy, accessibility of digital services, and public digital literacy as important parts of well-functioning eGovernment in national economy. European Commission (2024) is defining eGovernment as the integration of Information and Communication Technologies (ICTs) to government functions and procedures with the purpose of increasing efficiency, transparency, accountability and citizen participation, i.e. to various government processes, operations, and structures. Governments, having transitioned through eGovernment and digitization of paper-based processes, are now increasingly adopting a comprehensive organizational approach to digital transformation (Crusoe, Magnusson and Eklund, 2024) or (Escobar, Almeida and Varajão, 2023). The implementation of eGovernment usually aims to reduce costs and to increase efficiency in public administration European Commission (2024).

The paper is focused on the issue of digital transformation in the public sector. The intention is to compare and evaluate the digitization of public administration services in the international context of EU countries over the last 5 years (period 2019-2023). In order to achieve the research objective, research questions RQ1 – RQ7 were formulated:

- RQ1: Has the willingness of EU citizens to use online public services increased in the period 2019-2023?
- RQ2: Has the willingness of Czech and Polish citizens to use online public services increased in the period 2019-2023?
- RQ3: Has the offer and quality of online services for citizens and business increased in the period 2019-2023?
- RQ4: Has the offer and quality of online services for citizens and business in Czechia and Poland increased in the period 2019-2023?
- RQ5: Has the transparency and support for easy and safe usage of online public services by EU citizens and business increased in the period 2019-2023?
- RQ6: Has the transparency and support for easy and safe usage of online public services by Czech and Polish citizens and business increased in the period 2019-2023?
- RQ7: What is the performance of Czechia and Poland in the implementation of online public services in comparison with other EU countries in the period 2019-2024?

1.1 Policy Supporting Digitalization at the European Union level and national level of Czechia and Poland

The digitisation of the economy and digital transformation is being addressed by a number of supranational and international institutions and organisations. The European Union, the OECD and the United Nations play the most important roles in terms of European perspective. These organisations issue a series of documents, strategies and recommendations to their member countries to promote digitisation, shape national policies and analyse results in this area. The European Union seeks to support the digital transformation of the EU public

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sector and accelerate the deployment of secure cross-border data exchange and sharing solutions needed to deliver digital services across EU countries. The guide for Europe's digital transformation is the political program A Digital Decade for Europe, which is based on the Europe 2030 Strategy - Digital Compass: Europe´s vision for the Digital Decade adopted in 2021. This strategy contains specific tasks and goals for the period until 2030, which pursue the European Union's digitalisation. It focuses in general on four areas (European Commission, 2024): digital skills, digital transformation of businesses, secure and sustainable digital infrastructure and digitization of public services.

Public sector such as state administration, local government, transport, health, education or culture are also significantly affected by digital transformation. The digitisation of public administration is therefore included among the key objectives of the Digital Compass. In the field of digitization of public services, the strategy has set such milestones, the result of which will be that till 2030: all key public services will be available online; all citizens will have access to their electronic health records and 80% of citizens will be able to use a digital identity (European Commission, 2024), (ECB, 2023).

A monitoring system based on the Digital Economy and Society Index (DESI) is used to measure progress in meeting these goals. The Europe's performance across the four dimensions of the Digital Decade policy programme is summarising a dashboard of indicators – DESI 2023 dashboard for the Digital Decade (DESI, 2024). Digital Public Administration factsheets are published for EU countries, focusing on all the matters related to digital public administration. According to European Commission (2024) or Pisár et al. (2022) in 2023, the Czech Republic made significant progress in improving digital skills. 69.1% of the population has at least a basic level of digital skills, which is well above the EU average (55.6%). Czech students benefit from the introduction of digital subjects into the curriculum of primary and secondary schools and from the availability of digital tools in schools. On the contrary, small and medium-sized enterprises must advance in the implementation of digitization. 49.3% of SMEs have at least a basic level of digital intensity, which is below the EU average (57.7%). On the contrary, Poland in 2023 made significant progress in the area of gigabit connectivity. However, challenges remain in the acquisition of basic digital skills by the general population. Although Polish businesses need to make progress in implementing advanced technologies such as artificial intelligence and data analysis, Poland has made significant progress in the digitization of SMEs over the past year (Kucharska and Rostek, 2024), (European Commission, 2024) or (Statista, 2024).

1.2 Digital Transformation of the Public Sector in Czechia and Poland

A prerequisite for effective communication between public administration and communication partners is the digitization of internal public administration activities (digitization of agendas and automation of routine activities) and the internal connectivity of state offices, but above all the digitization of external activities in the form of a sufficient offer of online eGovernment services, for their possible use by entrepreneurs , citizens, non-profit organizations and other entities (Veber et al., 2018). In doing so, the emphasis is on making public services available to all entities online, without the need for, or at least minimizing, visits to the office. The use of ICTs aims to optimize the activities of public administration and thus offer citizens and companies more professional, faster and more comprehensible service. A significant increase in the use of ICTs over the past few years, has had a great impact on different aspects of society and economic activities by making everyday procedures easier and more efficient.

The COVID-19 pandemic accelerated the expansion of digital services in Poland and Czech Republic, significantly increasing public reliance on e-services. In recent years, Poland and Czech Republic has made notable strides in eGovernment, allowing citizens to access services such as electronic tax filings, e-prescriptions, and online medical consultations (Ardielli 2021). By 2023, over 16 million citizens used Poland's Trusted Profile (Profil Zaufany eGO) for public administration services and over 5 million Czechs used the National eID system (Národní identifikační systém) to securely access various public administration services (Statista, 2024). While the Poland ranks 37th in the 2024 UN e-Government Development Index, higher than Czech Republic (54th out of 193), there remains room for advancement (United Nations, 2024). Despite high internet access (over 93%), Poland ranks low in digital competencies within Europe, with just 43% of the population demonstrating basic skills and 21% possessing advanced digital competencies, below EU averages. Addressing these skill gaps is crucial to prevent digital exclusion and support economic growth, with reforms in education and EU funding seen as potential solutions.

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2 Material and Methods

The aim of this paper is to evaluate the digital transformation of public sector services in EU countries. The observation is corresponding to the period 2019-2023. To support the research objective, 7 research questions RQ1 – RQ7 were formulated. The evaluation is performed based on 3 dimensions and 7 criteria (DESI, 2024) selected from the EU dataset (C1-C7).

Dimension 1 includes the possibility and willingness of citizens to use online services. This dimension is based on the evaluation of the criteria C1:

- eGovernment users (C1): Percentage of individuals aged 16-74 who used Internet within the last 12 months for interaction with public authorities on websites or on mobile applications.

Dimension 2 evaluates the offer and quality of online public services for citizens and business. This dimension is based on the criteria C2, C3 and C4:

- Digital public services for citizens (C2): The share of administrative steps that can be done online for major life events (birth of a child, new residence, etc.) for citizens (score 0 – 100).
- Digital public services for businesses (C3): The indicator broadly reflects the share of public services needed for starting a business and conducting regular business operations that are available online for domestic as well as foreign users. Services provided through a portal receive a higher score, services which provide only information (but have to be completed offline) receive a more limited score (score 0 – 100).
- Pre-filled Forms (C4): Amount of data that is pre-filled in public service online forms for life events included in the scope - Regular business operations and Business Start-up, Moving, Owning and driving a car, Starting a small claims procedure, Family, Career and Studying (score 0 – 100).

Dimension 3 is based on the evaluation of transparency and support for easy and safe usage of online public services by citizens and business (criteria C5, C6, C7):

- Transparency of service delivery, design and personal data (C5): The extent to which service processes are transparent, services are designed with user involvement and users can manage their personal data. The following life events are included in the scope: Regular business operations and Business Start-up, Moving, Owning and driving a car, Starting a small claims procedure, Family, Career and Studying (score 0 - 100).
- User support (C6): The extent to which online support, help features, and feedback mechanisms are available incl. cross-border (score 0 - 100).
- Mobile friendliness (C7): The extent to which eGovernment services are provided through a mobile-friendly interface, an interface that is responsive to the mobile device. The following life events are included in the scope: Regular business operations and Business Start-up, Moving, Owning and driving a car, Starting a small claims procedure, Family, Career and Studying (score 0 - 100).

All the criteria (C1 - C7) are of maximizing type. To determine the importance of individual criteria, the method of equal weights was chosen. The appropriateness of the method was confirmed by the test of non-dominance of variants. For the purpose to reach the set objectives and to answer given research questions RQ1-RQ7 was chosen the application of MCDM method of MAPPAC (Multicriterion Analysis of Preferences by means of Pairwise Actions and Criterion comparisons). MAPPAC is one of operations research methods that is used for multi-criteria decision-making and is widely used for the evaluations in wide scope of economic areas (Saeidi and Rezapour, 2015), in business and management (Jafari, 2013) or spatial planning (Sabokbar, 2014).

MAPPAC method is based on the preference relation and was chosen because, apart from the information from the multi-criteria matrix and the vector of weights, it does not need any additional information, such as threshold values or the choice of generalized criteria.

2.1 MAPPAC

The MAPPAC method is described by (Matarazzo, 1991) and is composed of three phases including definition of input data (variants, criteria), pairwise comparison of variants for each pair of criteria resulting in the definition of indifference and preference relations and aggregation of preferences constructing the final ranking (Martel & Matarazzo, 2005). The MAPPAC method is based on the criterion matrix and weights of the criteria.

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The method splits the variants into several preferential classes. MAPPAC method uses a normalized multi-criteria matrix $C = (c_{ij})$, where r-th row corresponds to variant a_r and s-th row corresponds to alternative a_s.

First the paired comparison of alternatives is processed. Than the basic preferential index $\pi_{ij}(a_r, a_s)$ of variants a_r, a_s is calculated, according to the pairs of criteria f_i and f_j. After the preferential indexes calculation is performed, the basic preferential indexes are arranged into the matrix π_{ij}. Following is the calculation of the aggregate matrix according to the formula (1), see Matarazzo (1986):

$$\pi(a_r, a_s) = \sum_{i=1}^{k-1} \sum_{j=i+1}^{k} \pi_{ij}(a_r, a_s) \frac{v_i + v_j}{k-1} \quad (1)$$

where $r = 1,2, ...,p$, $s = 1,2, ...,p$.

In the last step preferences are aggregated, resulting in a final order. The row totals of the aggregated matrix π are calculated according to the equation (2):

$$\sigma^l(a_i) = \sum_{j=1}^{p} \pi(a_i, a_j),\ i \in J^l \quad (2)$$

where $i = 1,2, ...,p$.

Variants with the highest σ^l values are placed on the first place in the arrangement. The set of variants is reduced from these alternatives, new set of alternatives A^l is created, the set of indexes of alternatives from A^l are marked as J^l. The procedure is repeated for m steps where m is the number of preferential classes by the arrangement from top.

Than the value of $\tau^1, \tau^2, \ldots, \tau^n$, is reached where n is the number of preferential classes in the arrangement from bottom, by usage of equation (3):

$$\tau^t(a_i) = \sum_{j \in J^t} \pi(a_j, a_i),\ i \in J^t \quad (3)$$

where $t = 1, 2, \ldots n$.

The output is the arrangement of variants into the preferential classes. The overall arrangement of alternatives is reached by averaging of the serial numbers of variants by the arrangement from top and from bottom. The best evaluated variant has the lowest overall serial number. Some variants can be ranked in the same place, although they were ranked differently from top and from bottom, because their average serial numbers are the same.

3 Results and Discussion

The aim of this paper is to evaluate the digital transformation of public sector services in EU countries with emphasis on Czechia and Poland. The observation is corresponding to the period 2019-2023. The research was performed in accordance with the set objectives and research questions. Three dimensions were selected for evaluation and 7 research questions RQ1 – RQ7 were formulated. The comparison will be made primarily on average values for the period 2019-2023 in order to limit annual fluctuations in values.

The first dimension was connected with the RQ1 and RQ2. According to the comparison (Table 1), the willingness of EU citizens to use the online public services increased from 61.13 % to 75.01 % in the period 2019-2023. The best results were achieved by Denmark (95.32 %), Finland (93.80 %), Sweden (92.28 %), Netherlands (91.77 %) and Estonia (90.88 %). The lowest values were reached by Romania (19.08%), Bulgaria (34.69 %), Italy (50.29 %), Poland (56.49 %) and Germany (60.79 %). The greatest growth was reached by Croatia (47.21 p.p.) in the period 2019-2024. The biggest negative growth was reached by Latvia (-1.39 p.p.). In Poland increased the value from 2019 to 2023 by 17.15 p.p. but in comparison with Czech values the level of citizen willingness remains lower. While the Czech Republic has above-average values within EU countries, Poland's values are below average in this indicator. However, both countries recorded growth between 2019-2023 higher than the EU average.

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Table 1 - Evaluation of dimension 1 in EU countries (2019-2023)

eGovernment users (C1)	**2019**	**2020**	**2021**	**2022**	**2023**	**2019-2023**	**Difference (p. p.)**
EU - average	61.13	64.21	64.84	74.19	75.01	67.88	13.88
Czechia	61.45	63.76	75.87	86.02	76.68	72.76	15.23
Poland	49.29	49.45	54.67	62.62	66.44	56.49	17.15

Source: European Commission (2024), own processing

The second dimension was connected with the RQ3 and RQ4. In case of digital public services for citizens the offer and quality in EU countries increased from 76.9 % to 79.44 % in the period 2019-2023. But in case of digital public services for businesses the offer and quality in EU countries decreased from 87.72 % to 85.42 %. The offer and quality of pre-filled forms in EU countries increased from 60.88 % to 70.82 % in the same period, see Table 2. The development of the offer and quality of online public services for citizens and business in the Czechia and Poland was different. Nevertheless, for all selected indicators, the Czech Republic and Poland have lower values than the EU average, which points to a lower level of development in this dimension. The only exception is the C4 indicator for Poland, which between 2019-2023 achieved growth of 22.08 p.p. and was thus above the average of EU countries.

Table 2 - Evaluation of dimension 2 in EU countries (2019-2023)

	2019	**2020**	**2021**	**2022**	**2023**	**2019-2023**	**Difference (p. p.)**
Digital public services for citizens (C2)							
EU - average	76.90	74.93	74.63	77.03	79.44	76.59	2.54
Czechia	72.19	70.60	75.37	76.17	76.33	74.13	4.14
Poland	65.49	64.98	57.30	59.92	63.73	62.28	-1.76
Digital public services for businesses (C3)							
EU - average	87.72	84.40	81.71	83.73	85.42	84.60	-2.29
Czechia	81.50	75.75	80.75	83.75	83.75	81.10	2.25
Poland	77.94	66.56	69.62	72.74	72.88	71.95	-5.05
Pre-filled Forms (C4)							
EU - average	60.88	63.93	64.70	67.56	70.82	65.58	9.94
Czechia	52.29	45.50	40.99	41.94	45.09	45.16	-7.20
Poland	57.87	65.40	73.83	78.30	79.95	71.07	22.08

Source: European Commission (2024), own processing

The third dimension was connected with the RQ5 and RQ6 (Table 3). According to the results the transparency of service delivery, design and personal data protection decreased in the EU countries in the monitored period from 69.23 % to 66.98 %. On the other hand, the user support increased from 82.52 % to 86.44 % and the mobile friendliness also increased from 76.93 % even to 95.34 % (more than 18 p.p.) during the period 2019-2023. As with dimension 2, the Czech Republic and Poland achieve below-average values for EU countries in all the listed indicators for the monitored period, the only exception being indicator C7 in the case of Poland, where an above-average value is reported for the period 2019-2023.

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Table 3 - Evaluation of dimension 3 in EU countries (2019-2023)

	2019	**2020**	**2021**	**2022**	**2023**	**2019-2023**	**Difference (p. p.)**
Transparency of service delivery, design and personal data (C5)							
EU - average	69.23	67.75	62.82	64.73	66.98	66.30	-2.25
Czechia	64.07	60.61	54.40	57.31	61.94	59.67	-2.12
Poland	55.54	49.13	42.21	56.83	65.09	53.76	9.55
User support (C6)							
EU - average	82.52	81.57	81.57	83.59	86.44	83.14	3.92
Czechia	73.51	70.24	67.20	67.99	75.40	70.87	1.88
Poland	65.07	63.39	60.32	69.84	74.07	66.54	9.00
Mobile friendliness (C7)							
EU - average	76.93	89.12	92.03	93.27	95.34	89.34	18.41
Czechia	63.98	85.04	81.14	80.05	93.71	80.79	29.73
Poland	79.24	89.03	93.69	93.02	93.14	89.63	13.90

Source: European Commission (2024), own processing

In the presented research also, the research question RQ7 was investigated. A comparison of EU countries was made using MAPPAC method applications. $C_1 - C_7$ are the selected criteria, the variants are the 27 EU member countries. According to the comparison, the performance of EU countries in the implementation of online public services in the period 2019-2024 was detected. The output of MAPPAC method is the arrangement according to preferential classes. In Table 4, it is possible to see the variants in the order according to the average serial numbers and rankings from the top and bottom. In some case two variants are placed in the same preferential class. Average serial numbers of these variants are the same (for example Ireland and Latvia).

Table 4 - Results of MAPPAC method (2019-2023)

Class	Variant	Rank from top	Rank from bottom	Average serial number	Final arrangement
1	Malta	1	1	1	1.
2	Estonia	2	2	2	2.
3	Finland	3	3	3	3.
4	Netherlands	5	4	4.5	4.
5	Denmark	4	6	5	5.
6	Luxembourg	6	5	5.5	6.
7	Sweden	7	7	7	7.
8	Ireland	9	8	8.5	8./9.
8	Latvia	8	9	8.5	8./9.
9	Austria	10	11	10.5	10.
10	Lithuania	13	10	11.5	11./12.
10	Spain	11	12	11.5	11./12.
11	Belgium	12	13	12.5	13.
12	Portugal	14	14	14	14.
13	France	16	15	15.5	15./16.
13	Slovenia	15	16	15.5	15./16.
14	Germany	17	17	17	17.
15	Italy	18	19	18.5	18.
16	Czechia	19	21	20	19.
17	Poland	21	20	20.5	20.

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18	Croatia	20	22	21	21.
19	Cyprus	25	18	21.5	22.
20	Bulgaria	22	23	22.5	23.
21	Greece	23	25	24	24.
22	Hungary	26	24	25	25./26.
22	Slovakia	24	26	25	25./26.
23	Romania	27	27	27	27.

Source: European Commission (2024), own processing

By usage of MAPPAC method, it was investigated the performance of EU countries in the implementation of online public services in the period 2019-2024 according to RQ7: How performed the EU countries in the implementation of online public services in the period 2019-2024? When evaluated by MAPPAC method, the first five positions were occupied by Malta, Estonia, Finland, Netherlands and Denmark. The last positions were occupied by Bulgaria, Greece, Hungary, Slovakia and Romania. The Czech Republic placed on the 19. position in comparison with other EU countries, Poland on the 20. position. It means that the level of performance in online public sector services implementation is in both countries quite similar. It is comparable to Italy and Croatia (18. and 21. position). The limitations of this research could be seen in the implementation of multicriterial method. By application of different MCDM method or different weights of variants the results can differ.

4 Conclusion

Public administration, using the possibilities of ICTs as well as artificial intelligence, contributes to more effective communication between the state, citizens and businesses. The intention of the digitization of public administration is therefore to limit the need for personal visits to offices and paperwork and to increase the availability and efficiency of public administration services, while accessibility and user friendliness are also an important element of appropriately implemented solutions. The paper was focusing on the evaluation of digital transformation of public sector services in EU countries with the emphasis on the performance of Czechia and Poland.

As supporting of the research objective, four research questions RQ1 – RQ7 were formulated. According to the research done it can be summarized, that the RQ1 and RQ2 were confirmed. According to the indicator C1 the willingness of EU citizens to use online public services increased in the period 2019-2023. This is very important prerequisite for implementation of more specialized public services. The RQ3, and RQ5 were confirmed only for indicators C2, C4, C6 and C7. Some shortcomings were detected in the area of digital public services for businesses (C3) and transparency of service delivery, design and personal data protection (C5). The RQ4 and RQ6 were confirmed only for indicators C2, C3, C6 and C7 in Czechia and C4, C5, C6 and C7 in Poland. Efforts of EU countries as well of Czechia and Poland should be increased in the areas where the results are under averaged, as these are necessary requirements for the functional implementation of digital transformation. In this way, public administration becomes more modern, responsive and better adapted to the needs of citizens and businesses. According to the comparison based on RQ7 the the performance of EU countries was measured. Countries that achieve promising results have been identified and they should focus on raising the level within individual eGovernment indicators. The performance of the Czech Republic and Poland is comparable, however, both countries achieve below-average values compared to the average of EU countries (with the exception of C4 and C7 for Poland and C1 for the Czech Republic). In other indicators, the Czech Republic achieves better average values for the monitored period than Poland. The evaluation showed that the Czech Republic should focus significantly on improving the C4 indicator and both countries should work more significantly on deepening the digitization of public sector services.

Despite the above-mentioned trend of digital transformation in the field of public administration, it is always necessary to think about public administration services being available to all groups of the population, and therefore to preserve the possibility of personal contact of the citizen with the office for disadvantaged groups without sufficient digital literacy, through contact points public administration.

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Public Services at Local Level in France

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Abstract

The contribution deals with selected aspects of public services at local level in France. The attention is primarily paid on the management methods of local governments. The aim of the contribution is to present, analyze and explain selected types of local government management in France. For this purpose, the author of the paper uses mainly the method of description, the method of analysis and synthesis. Among the results of the contribution is the statement that the way local governments are managed in France is diametrically different from the concept used in Czech Republic, or in other Central Europe countries. The conclusions that can be drawn from the scientific knowledge of this area can help to cultivate the Czech administrative theory in the area of territorial self-governing units and, above all, these conclusions can serve as inspiration for legal practice, or rather legislation *de lege ferenda*.

Keywords: *France, Local Authorities, Public Administration, Public Services*

JEL Classification: *K10, K23, K29*

1 Introduction

A public service is an activity carried out directly by the public authority (state, territorial or local authority) or under its control, with the aim of satisfying a need of general interest. (Galabov, Rouet, 2015) By extension, public service also refers to the body responsible for providing this service. It may be an administration, a local authority, a public institution or a private law company that has been entrusted with a public service mission. In the latter case, the public service mission may take various forms: concession, license, franchise, specifications, tariff setting, investment control, etc. Some of these activities are linked to the sovereignty of the state (so-called sovereign activities such as justice, police, national defence, public finances, etc.), others fall within the commercial sector, particularly when the prices and the level of quality of the services would not be those expected by the political power if they were entrusted to the private sector.

The basis of the concept of public service is that certain social activities considered essential and strategic must be managed according to specific criteria to allow access to all and contribute to solidarity and social, cultural and economic cohesion in society. These activities must therefore escape the logic of the market and the search for profit. This is the case, in particular, when it is necessary:

- heavy investments that are not profitable in the short term,
- long-term management,
- safeguarding a rare and precious asset,
- managing a space. (Fournier, 2013)

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In other words, public services represent the content of public administration activities (not only) in France. In order to fulfil this content, the public administration uses different management methods as well as different types of public property. "*In France, the public property of public entities differs from private property of public entities by subjecting them to a highly protected legal regime which is based on the following aspects - the inalienability and the imprescriptibility*" (Bartes, 2018)

In this contribution, the attention is paid on management methods of local governments in France. The aim of the contribution is to present, analyze and explain selected types of local government management in France.

2 Material and Methods

In order to achieve the set goal, the author uses in the contribution analytical and descriptive methods. Together with the method of analysis, the method of synthesis is also used. Among the materials used to prepare the contribution, the author included French specialist literature, French legislation and scientific contributions dealing with French public administration in the broadest sense of the word.

Within the framework of French professional literature, it is possible to proceed from publications devoted to the French administrative law and public administration. The main French authors in the field of administrative law include, for example, Hafida Belrhali or Jacqueline Morand-Deviller. These authors specialize in issues of public services, public administration and local authorities. Among Czech authors, one can find, for example, Petr Havlan, who focuses on the issue of public property according to the French administrative theory. Another Czech academic focusing on the French theory is Petra Hrubá-Smržová, who, however, focuses more on the area of French public finances and makes various foreign comparative financial law studies. On the other hand, Michel Bouvier is one of the most respected experts in the field of French public finances.

"*Both an administrative law and a financial law belong to the public law*. *Although the administrative law and the financial law are two separate and independent branches of law, these branches of law have a common basis and roots.*" (Bartes, 2023) For that reason, it is possible to draw information from both the literature of administrative law and the literature of financial law in the contribution. Moreover, financial law is closer to economic disciplines than any other legal branch. That is why "*economy, (financial) law or public finance – several individual disciplines that have the intersection.*" (Bartes, 2019)

As far as the French legislation is concerned, the area of territorial self-governing units is perfectly codified in the General Code of Local Authorities (i.e. in French *Code générale des collectivités territoriales*) – issues of administrative law are regulated here, but also issues related to public finance law (i.e. budgetary law and tax law). This main code of the French territorial self-governing units is naturally supplemented by a number of ordinary acts and decrees. Apart from the French legislation, the decision-making activity of the Council of State (i.e. in French *Conseil d'État*) is also a useful source, which helps to understand legislation.

3 Results and Discussion

In France, local authorities are entitled to choose the legal regime of how to manage their public services. This right to choose the management method results from the constitutional principle of free administration of territorial self-governing units. Local authorities can choose a direct service management model (which is described in the subsection 3.1) or indirect service management model - i.e. entrusting management to a third party through a public service concession (discussed in the subsection 3.2). Exceptionally, however, the law may impose a special method of management, as is the case, for example, with departmental fire brigades or social and health-social facilities. Similarly, the decision no. 340 609 of the *Conseil d'État* of 7 October 1986 identified certain missions, which could not be delegated to a private individual, namely:

- public service missions carried out by local authorities in the name and on behalf of the State, such as civil status, elections, military obligation,
- public service missions which fall within the very execution of the sovereign power of local authorities such as police, security and hygiene powers,
- the exercise of the power of regulation or internal organization of local authorities.

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3.1 Direct Management

Direct management means a management method by which the local authority directly manages the service. This is achieved by using a management system. Decree No. 2001-184 of 23 February 2001 relating to the authorities responsible for operating a public service has profoundly modified the provisions applicable to authorities. According to this decree, within a direct management local authorities have the possibility to create only two categories of management:

- a management with exclusive financial autonomy,
- a management with legal personality and financial autonomy.

All the provisions applying to the administration of local authorities are codified in the General Code of Local Authorities in articles L. 1412-1, L. 2221-1 et seq. (for legislative texts) and R. 2221-1 et seq. (for regulatory texts).

It is possible to observe several identical aspects, but also important differences between the management with exclusive financial autonomy and the management with legal personality and financial autonomy. There is no difference when it comes to creating these kinds of management. The creation is decided by deliberation of the municipal council. However, the difference is in determining the volume of the municipality's funds. In case of the management with legal personality and financial autonomy, the deliberation establishes the statutes and sets the amount of the initial allocation of the management (consequently, the amount of funds may be adjusted). But in case of the management with exclusive financial autonomy, the deliberation establishes the statutes and determines all available resources to the management. The essential difference lies in the governing bodies. Whereas the management with legal personality and financial autonomy is administered by a board of directors, its president and a director appointed by the municipal council on the proposal of the mayor (article L. 2221-10 of the General Code of Local Authorities) and the elected members of the municipal council hold the majority, the management with exclusive financial autonomy is administered by an operating board and a director who are under the authority of the mayor and the municipal council. The members of the operating board are appointed by the municipal council. The director is appointed by the mayor under the conditions provided for in Article L. 2221-14 of the General Code of Local Authorities on the advice of the operating board. Related to this is the question of who deliberates issues related to the course of management and economic activities. The board of directors deliberates on all questions concerning the operation of the management (i.e. model of the management with legal personality and financial autonomy). In the management with exclusive financial autonomy, a deliberation of all questions concerning the operation of the management is entrusted to the municipal council, after consulting the operating council and under the conditions provided for in the internal regulations.

An important instrument in the management is the budget. In both types of management, the budget consists of two sections – one for operational transactions and the other for investment transactions. In the same way, the budget is prepared by the director in both types of management. In case of the management with legal personality and financial autonomy, the president of the board is an alternative to the preparation of the budget in addition to the director. However, the difference lies in the authority that approves the budget. The board of directors votes the budget in the management with legal personality and financial autonomy, but the municipal council votes the budget in the management with exclusive financial autonomy. In that case, this budget is attached to the municipal budget. (Bouvier, 2022)

Another French specificity is the introduction of so-called public accounting, which is also reflected in these types of management. "*The public accounting is intended for the further management of public funds by the relevant persons. It is a system that is presented across the entire French public sector, and which naturally reflects the decentralized organization of French public administration starting at the state level, continuing through French territorial self-governing units (i.e. regions, departments, municipalities) and ending with French public institutions (including e.g. public hospitals). A specific feature of the French concept of the public accounting is the fact that is it essentially taken over from the private sphere*". (Bartes, 2022) In case of the management with legal personality and financial autonomy, the accounting functions are entrusted either to a treasury accountant or to an accounting officer. He is appointed by the prefect, on the proposal of the board of directors and after advice from the general treasurer-payer. In the management with exclusive financial autonomy, the legal construction is simpler – the accounting officer is the accounting officer of the municipality. In the case of both types of management, economic activities end by a resolution of the municipal council.

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3.2 Indirect (Delegated) Management

This management method allows the municipality to entrust a private company or a public person with the execution of the public service while retaining control over it. The company is then responsible for the execution of the service. The company or public person provides it with its own staff according to private management methods and at its own risk. In return, the municipality grants it a monopoly on operating the service.

One of the essential characteristics of delegated management methods concerns the financial risk linked to the operation of the service: it does not fall on the municipality but on the company, which is remunerated, in whole or in part, by the price paid by the users of the service. This particularity also finds its counterpart in the freedom offered to the municipality to call upon the company of its choice, within the framework of a procedure ensuring the transparency of the choice.

The municipality nevertheless retains control of the service to the extent that the company is required to account for its management on technical and financial levels. In addition, the municipality has the legal means necessary to ensure the operation of the service or to modify its organization (power to impose sanctions on the company, to unilaterally modify the contract or even to terminate it for reasons relating to the organization of the service or drawn from the general interest).

This type of management is of interest to both industrial and commercial public services (drinking water distribution, sanitation, car parks, funeral directors, slaughterhouses, gas or electricity distribution, etc.) and administrative public services (school canteens, leisure centers, cultural centers, etc.). Services that have a public service character can also be subject to delegation, because the municipality has replaced the lack of private initiative.

There are three types of management in the area of delegation of public services: (1) concession, (2) leasing, and (3) participating management.

Ad 1) The concession is a management method by which the municipality instructs its co-contractor to carry out initial establishment work and to operate the service at its own expense for a fixed period by collecting fees directly from users of the public service. The concessionaire's remuneration is ensured by the users – the risk rests with the concessionaire.

The delegation agreement must take into account, in determining its duration, the nature of the services requested from the delegate and must not exceed the depreciation period of the installations implemented. According to the article L. 1411-2 of the General Code of Local Authorities, in the area of household waste and other waste, drinking water and sanitation, public service delegations may not last more than twenty years, except after prior examination by the departmental director of public finances.

The municipality monitors the proper functioning of the service, particularly in light of the annual technical and financial reports. Depending on the case, the municipality has the power to set and approve the service. Upon expiry of the delegation agreement, all investments and assets of the service become the property of the municipality.

Ad 2) Leasing differs from concession essentially in that the devices necessary for operating the service are handed over to the tenant by the municipality which, as a general rule, has provided the financing. The tenant is responsible for the maintenance of these devices or, in certain cases, their modernization or extension.

As in the concession system, the tenant is paid by the users, but he pays the municipality a fee intended to contribute to the depreciation of the investments it has made. The risk lies with the tenant. The duration of leasing contracts is generally quite short – around three to five years.

Depending on the nature of the investments to be made by the delegate, the boundary between concession and leasing is sometimes difficult to draw. This is why case jurisprudence has recognized the possibility of combining the two management methods in the same contract. However, the community must ensure that the economy of the contract is not disrupted and that its initial purpose is not too altered.

Ad 3) The participating management is a form of management in which the local authority enters into a contract with a professional to operate a public service. The municipality pays the “involved manager” with a fee consisting of a fixed fee and a percentage of the operating results "an involvement". The municipality is responsible for managing this service but can give a certain amount of management autonomy to the manager.

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Depending on the level of risk covered by the delegate, it is a public service delegation or a contract (see the article R. 2222-5 of the General Code of Local Authorities).

The various methods of contractual execution of the public service (concession, leasing, participating management, and other types of delegated management subject to nominated or inominated contracts) must comply with the provisions of the Act no. 93-122 of 29 January 1993 (articles 38 to 47), as codified in articles L. 1411-1 to L. 1411-18 of the General Code of Local Authorities.

These provisions subject a whole area of public authority management to reinforced rules of publicity and transparency. If the free choice by the competent authority of its delegate is confirmed, it can only take place at the end of a procedure guaranteeing the transparency of this choice and during which the respective merits of different offers have been compared. The procedural rules were specified by the aforementioned Act of 29 January 1993 and Decree no. 93-471 of 24 March 1993. The public call for competition constitutes the major innovation.

The transfer of a public service delegation involves several stages: the choice of delegated management, the advertising and pre-selection of candidates, the selection of offers, the negotiation and approval of the draft agreement and finally the signing of the agreement (see articles L. 1411-1, L. 1411-5, L. 1411-7, L. 1411-9 and L. 1411-18 of the General Code of Local Authorities).

This procedure does not apply to agreements that are necessarily entered into with a specific delegate in application of a monopoly set by law for a company. This procedure does not concern acts by which a public authority entrusts a public institution with a public service mission, provided that it appears in the statutes of this institution exclusively (see Article L. 1411-12 of the General Code of Local Authorities).

A simplified procedure is used, when the amount of the sums owed to the delegate for the entire duration of the agreement does not exceed €106,000 or when the agreement covers a period of less than three years and concerns an amount not exceeding €68,000 per year. Splitting the amount of the sums to place it below these thresholds constitutes a misuse of power that may be sanctioned by the administrative judge (see article L. 1411-12 of the General Code of Local Authorities).

4 The Consequences of the Application of the Major Principles of Public Service

Public administration not only in the Czech Republic, but also in France is governed by several crucial principles that enable effective implementation of public administration. These principles of public administration help to create the rules governing the operation of public services in France. Below in the contribution, there are three main rules:

1) The rule of continuity implies that public services must operate regardless of the circumstances – some of them permanently (firefighting, etc.), others in a continuous, punctual and regular manner (civil status). Except in cases of force majeure, the user must be able to access them permanently.
2) The rule of constant adaptation (mutability) assumes that the public service must follow the evolution of needs and adapt with a view to ensuring flawless efficiency. These imperatives may lead, for example, the municipal council to modify current administrative contracts. The modifications very often have financial consequences. The delegate is required to accept the consequences arising from the rule of constant adaptation.
3) The rule of equality does not allow any discrimination in access to public service and in its operation.

The pricing of services whose financing is ensured by fees proportional to the service provided (water, sanitation, etc.) cannot, for example, be adjusted according to considerations unrelated to the nature of the service provided.

However, the council may take into account the differences in situation between categories of users and adjust the rates provided that the breaches of equality are justified by needs arising from the general interest in relation to the conditions of operation. The criterion of the importance of users' resources may only be taken into account for services with a social purpose (school canteens, day-care centres, etc.).

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Case law has established the principle of freedom to conclude amendments, which is subjected to the judge's control on the merits and which is aimed in particular at ensuring compliance with the Community principles of public procurement in matters of advertising and competition.

To the extent that the conclusion of the initial contract is subject to rules, the freedom to conclude amendments must not constitute a means of circumventing the award procedures, in particular the obligations of publicity and competition. According to the ruling No. 143438 of *Conseil d'Etat*, therefore, "amendments" which are in reality new contracts are illegal.

In order to avoid abusive appeals, the judge set out a number of principles for governing the signing of amendments. Taking up the principles arising from case law, the *Conseil d'Etat*, in its opinion no. 371234 issued on 19 April 2005, had the opportunity to specify the conditions of legality of an amendment to a public service delegation contract:

- the amendment must not modify the purpose of the delegation;
- the amendment must not substantially modify an essential element of the agreement, such as the duration of the agreement, the volume of investments, the nature of the services, the operating risk;
- the amendment must not have as its object the realization of investments which are normally the responsibility of the delegate.

In addition, Article L. 1411-2 of the General Code of Local Authorities allows the signing of amendments having the effect of extending the duration of the contract, under certain conditions:

For reasons of general interest (ensuring the continuity of public service, for example); in this case, the duration of the extension cannot exceed one year.

When the delegate is forced, at the request of the delegator, to make material investments not provided for in the initial contract which are likely to modify the general economy of the delegation; in this case, the material investments must be justified either by:

- the proper execution of the public service;
- the extension of the geographical scope of the delegation;
- the new or increased use of renewable or recovered energies;
- the carrying out of a pilot operation for the injection and storage of carbon dioxide.

In any case, the exceptions to the principle of limiting the duration of public service delegation agreements do not allow the delegating authorities to proceed, by successive amendments, to a repeated extension of the duration of their delegations without reopening the competition, and thus to evade the principles of public procurement enshrined in both European Union law and national law.

Thus, the *Conseil d'Etat* specified in its opinion No. 271737, that the methods for setting the durations of agreements or their amendments must "guarantee, through periodic re-tendering, freedom of access for economic operators to public service delegation contracts and transparency of award procedures.

5 Conclusion

The presented contribution was dealing with issue of public services at local level in France. Specifically, the contribution presented the situation and methods of local government management in France. In this regard, the paper not only presented, but also analysed and explained selected types of local government management in France, which was also the aim of the paper.

The attention was paid on two main ways of public administration management – direct and indirect (delegated) management. These methods of management were described and the author presented relevant French legislative regulating these methods. In the case of direct management, a distinction is made in France between management with exclusive financial autonomy and management with legal personality and financial autonomy. The author drew attention to their different features, but also to identical elements, including budgetary aspects. On the other hand, in the case of indirect (delegated) management the author drew attention to possible entities to which the authority to perform public service can be delegated and to the very essence of the performance of

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public service by an entity different from the territorial self-governing unit. The delegated management sector employs 1.3 million employees and represents an annual turnover of 130 billion euros, or 6% of GDP. (Banque des territoires, 2022)

Within the framework of the contribution's theoretical framework, the author also recalled the basic principles of public administration, or rather the rules according to which public services operate in France. These main rules include the rule of continuity, the rule of constant adaptation, and the rule of equality. Rules help to interpret the purpose of the legislation when the legislation does not contain detailed regulation. These rules thus fill a potential legislative vacuum.

Another auxiliary legal instrument is the case law, or rather jurisprudence. In France, rulings are the Council of State. In legal practice, it is therefore possible that jurisprudence will be connected with the area of legal principles and a new legal principle will emerge. This is the case of the principle of freedom to conclude an amendment to a contract for the provision of public services, which was created according to French case law. These amendments must not to be a way how to circumvent provisions of law (it means to circumvent the award procedures, in particular the obligations of publicity and competition).

It is possible to state that these methods of public administration management are different compared to the model used in the Czech Republic. For that reason, the French model can serve as a theoretical model of inspiration for the Czech legislator. However, the question is whether the Czech legislator should adopt the French model as a whole or rather be inspired by only partial parts of the French model. The functioning of the French public administration and public services is considerably different from the Czech concept, which is rather closer to the German model. Therefore, it may seem appropriate to draw rather individual fragments from the French model, which could be appropriately added to the Czech legislation.

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Resolution of the Company's Financial Crisis Through Restructuring in Slovakia, Poland and the Czech Republic

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Abstract

This study analyses approved restructurings in Slovakia and Poland and reorganisations in the Czech Republic between 2019 and 2023. The aim is to compare the implementation of the EU Directive in the national legislation of the selected countries and to compare approved reorganisations and restructurings between 2019 and 2023. The data was obtained from publicly available sources and includes the number of approved reorganisations and restructurings in Slovakia, Poland and the Czech Republic. The ANOVA test performed showed that there is no statistically significant difference between the number of insolvency proceedings in each country. The study also describes successful and unsuccessful cases and shows that the legislative framework in each country significantly influences the course and outcomes of these processes. The results show that Poland has the highest number of restructurings, which may indicate a greater need for or effectiveness of these processes. Slovakia shows a stable growth, while the Czech Republic has a fluctuating trend with lower overall numbers. These differences may be due to various factors, including economic conditions, legislative frameworks and the business environment. The study also describes specific cases of restructurings and reorganisations irrespective of the outcome of insolvency proceedings. The analysis shows that the legislative framework and the implementation of EU directives have a major impact on the success of these processes. The study highlights the importance of an effective legislative framework and its impact on the business environment in each country.

Keywords: *Reorganization, Restructuring, Financial Crisis, Insolvency, Bankruptcy, Rehabilitation*

JEL Classification: *G34, G30, G011*

1 Introduction

Within the life cycle of a company, a financial crisis is a phase that is not common. The resolution of a company's crisis through the institution of insolvency proceedings has been dealt with separately in the various national legislations. The establishment of the European Union is an effort by the European Council to unify the legislation of the Member States and the implementation of directives. The insolvency directive has become particularly useful in connection with the global crisis of 2008 and also in connection with the global panic of Covid-19 and the subsequent crisis. However, the medium- and long-term consequences of the pandemic are still

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unclear. Experts currently predict that it will lead to financial crises for small and medium-sized enterprises in the future, as reported by Mayr (2022).

In the event of bankruptcy, the business will cease to exist without compensation. It is therefore a liquidation method. In the case of reorganisation, the business is not wound up, but continues to operate and uses the proceeds to pay secured claims. This is the rehabilitation method. Failure to comply with the reorganisation plan results in the company going into bankruptcy. Debt relief applies mainly to individuals and spouses.

In the event of bankruptcy, the company ceases to exist without compensation. The company shall cease its operations. The assets are sold and the proceeds are then paid out to the registered creditors on a pro rata basis. The employment relationships of the employees are also terminated. In the event of a reorganisation, the company is not wound up, but continues to operate and uses the proceeds to pay secured claims. The activities of the company are monitored by the insolvency administrator and a progress report on the implementation of the reorganisation plan is submitted to the court. Separation mainly concerns natural persons and spouses.

Business bankruptcy is a sensitive issue in the financial world (Tung and Phung, 2019) because it concerns the financial health and stability of subjects. The ability to anticipate the financial insolvency of a firm is essential for its development and sustainability (Isaac-Roque and Caicedo-Carrero, 2023).

1.1 Literature Review

A crisis of a company is a situation that arises as a result of negative, unpredictable or hardly predictable development of internal and external factors and thus threatens the prosperity, stability, and future existence of the company (Truneček 2000). A company that has fallen into bankruptcy proceedings has several legally supported options to deal with this situation and repay creditors. (Poláček 2017)

The principle of reorganisation is the gradual satisfaction of creditor claims while maintaining the operation of the debtor's business, secured by measures to rehabilitate the business in accordance with a court-approved reorganisation plan, with ongoing control of its implementation by creditors. (Maršíková 2018). However, most real restructurings assume that there will be 'sacrifices' on the part of both creditors and owners, i.e. a development that can be summarised as a 'loss'. The aim of the process is to minimise this loss and make it lower than what would occur in a reorganisation or bankruptcy (Schönfeld 2018).

Recent crises, such as the economic crisis of 2008 and the COVID-19 pandemic, emphasised the increasing importance of business reorganization for companies facing insolvency (Dinu & Bunea, 2022; Vrabcová et al., 2022) and also affected, to a greater extent, companies´ competitiveness (Pech et al., 2020). Countries all over the world have improved their specific regulations regarding insolvency procedures as part of their globalization strategy, a process that also requires the removal of inefficient companies from the competitive business environment (Petkovski et al., 2022). Recently, through Directive 2019/1023, the European Union (E.U.) has drawn attention to the need for early warning signals to highlight expensive insolvency procedures with high material and social costs and low success rates. (Stroie et al., 2023).

The insolvency procedure provides an opportunity for restructuring when appropriate; this is closely related to competitiveness (Ključnikov et al., 2017). To successfully complete a reorganisation procedure, a company should improve its competitiveness in an economic environment (Routledge, 2021). The EU Restructuring Directive (2019/1023) requires Member States to provide a preventive restructuring framework for financially distressed entities that remain viable or are likely to readily restore economic viability.

To analyse corporate restructuring in a competitive environment, the literature highlights useful quantitative and qualitative factors (e.g., solvability, liquidity, company size, industry, specific capital structure, profitability, and so on) (Laitinen, 2011b; Routledge, 2021; Kuttner et al., 2022). Most studies are based on predicting the state and stages of bankruptcy (Bartłomiej, 2021).

1.2 Implementation of the EU Directive into National Legislation

The reorganisation is governed by Directive (EU) 2019/1023 of the European Parliament and of the Council of 20 June 2019 on preventive restructuring frameworks, insolvency and bans and measures to improve the effectiveness of restructuring, insolvency and resolution procedures and amending Directive (EU) 2017/1132 (the Restructuring and Insolvency Directive).

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In the Czech Republic, Act No. 182/2006 Coll., on bankruptcy and its resolution methods (Insolvency Act), as amended (hereinafter referred to as the Insolvency Act), sets out the types of bankruptcy of debtors, respectively legal and natural persons.

In Slovakia, Act No 7/2005 Coll. on Bankruptcy and Restructuring, as amended (hereinafter referred to as the 'Bankruptcy and Restructuring Act'), which sets out the conditions for bankruptcy, restructuring and debt relief.

In Poland, the Act Dz.U.2022.2309, i.e. the Restructuring Law of 14 November 2022, which focuses on the restructuring of companies that are insolvent or threatened with insolvency. The main objective is to prevent the debtor's bankruptcy by allowing it to enter into an agreement with creditors and carry out rehabilitation.

Regulation 2015/848 of the European Parliament and of the Council of 20 May 2015 on insolvency proceedings has been implemented in all the above mentioned laws. The implementation of the Regulation in national legislation is particularly important with regard to cross-border transactions and companies. Under the Regulation, the Union has set itself the objective of creating an area of freedom, security and justice.

1.3 Reorganisation and Restructuring Definition

In the Czech Republic, the bankruptcy of a company was first dealt with by Act No. 328/1991 Coll., on Bankruptcy and Settlement. However, this Act did not provide for the reorganisation of the company. The concept of reorganisation was first introduced by Act No 182/2006 Coll., on bankruptcy and methods of its resolution (Insolvency Act), which came into force on 1 January 2008. Prior to the entry into force of this Act, which did not address reorganisation, it was possible to apply certain European Union (EU) regulations and directives that addressed this issue. For example, Regulation EC No. 1346/2000 and Regulation EC No. 603/2005 could be used as a basis. The advantage of these regulations is that they are directly applicable to EU law and do not need to be implemented in EU law. Moreover, they take precedence over the national legislation of individual EU countries. In this context, there is maximum harmonisation of the insolvency rules in the individual EU countries and therefore it is no longer necessary for individual countries to participate in the implementation of the directives. Insolvency law is also dealt with in Directive 2001/17/EC or Directive 2001/24/EC. However, these Directives are no longer directly applicable in the country concerned and national legislation, which must not conflict with the Directives, takes precedence. A significant change to the Insolvency Act was made by the Revision Amendment effective as of 1 January 2014.

In the current Insolvency Act, the method of resolving insolvency of companies is contained in the second part, i.e. in the provisions from § 244 to § 418:

- Title I defines bankruptcy by the provisions of § 244 to § 315.
- Title II defines reorganisation by provisions 316 to 364
- Title III defines special provisions for the exclusion of the effects of the Act § 365 - § 366
- Title IV defines the bankruptcy of financial institutions in §§ 367 - 388
- Title V defines insolvency in §§ 389 to 418

The reorganisation of a company is a rehabilitation method of resolving an impending bankruptcy which may result in the bankruptcy of the company. It is defined in the Insolvency Act in Title II. The seven parts describe the reorganisation process from the petition for authorisation of the reorganisation to the end of the reorganisation. Section 316(4) sets out the precise conditions under which reorganisation is permitted. These conditions are either a limit of the debtor's annual aggregate net turnover for the last financial year preceding the insolvency petition of EUR 50 million or a limit of the debtor's net turnover for the last financial year preceding the insolvency petition of EUR 50 million. CZK or the employment of at least 50 employees in the employment relationship.

The Insolvency Act defines in Section 5 four basic principles applied in insolvency proceedings:

1. the insolvency proceedings must be conducted in such a way that none of the parties is unfairly prejudiced or unduly disadvantaged and that a prompt, economical and maximum satisfaction of creditors is achieved,

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2. creditors who are in principle of the same or similar status under this Act shall have equal opportunities in insolvency proceedings,
3. unless otherwise provided for in this Act, the rights of a creditor acquired in good faith before the commencement of insolvency proceedings may not be restricted by a decision of the insolvency court or by the insolvency administrator's procedure,
4. creditors are obliged to refrain from any action aimed at satisfying their claims outside the insolvency proceedings, unless permitted by law.

From these principles, the entire course of insolvency proceedings can be deduced in its individual phases

- the petition phase - filing the petition for insolvency proceedings,
- the discovery phase,
- the phase of deciding how to resolve the insolvency,
- the insolvency implementation phase,
- the closing phase of the insolvency proceedings.

In Slovakia, Act No. 7/2005 Coll. on Bankruptcy and Restructuring as amended (hereinafter referred to as the Bankruptcy and Restructuring Act) defines restructuring and the conditions for authorisation of restructuring in the third part of the Act in Sections 108-165. First of all, an opinion has to be drawn up. The court will entrust the administrator with the preparation and preparation of the report. The court will evaluate the report and on the basis of it may grant the application for authorisation of the restructuring. Then the restructuring itself and the implementation of the restructuring plan begins. Once the restructuring plan has been implemented, the restructuring is completed. If the conditions of the restructuring plan are not met, the restructuring is converted into bankruptcy.

According to the Bankruptcy and Restructuring Act, "if the debtor is threatened with bankruptcy or is bankrupt, the trustee may commission a restructuring opinion for the purpose of determining whether there are common prerequisites for its restructuring. This is without prejudice to the debtor's obligation to file a timely bankruptcy petition." According to the law, the report must contain the following elements:

- the exact identification of the debtor,
- a detailed description of the debtor's business activities,
- a determination of whether the debtor is threatened with bankruptcy or is bankrupt and when bankruptcy occurred, together with a statement of the reasons why bankruptcy is threatened or has occurred,
- a detailed description of the measures taken by the debtor to prevent insolvency,
- a detailed description of the debtor's financial situation and business situation,
- a detailed description of the legal acts of the debtor which are likely to be capable of being opposed with professional diligence,
- the recommendation or non-recommendation of a restructuring of the debtor, together with a detailed explanation of why the restructuring was recommended or not recommended,
- the date of the opinion.

Any opinion in which the trustee has recommended reorganisation must, under the Act, contain the following:

- an assessment of the debtor's creditors in terms of their rights and economic interests,
- a detailed analysis of the assumptions on which the debtor's business, or a substantial part of it, can be maintained, a detailed analysis of the measures needed to meet those assumptions and the circumstances justifying the feasibility of meeting those measures,

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- a detailed analysis of the possible restructuring methods and the conditions for the feasibility of one or more variants of restructuring methods, together with a justification as to why it is justified to assume a greater extent of satisfaction of the debtor's creditors in the event of authorisation of restructuring than in the event of a declaration of bankruptcy,
- the identification of the creditors of the debtor's legal transactions which are to be subject to the administrator's approval after the debtor's restructuring has been authorised.

Act 2022_2309 applies in Poland. The whole Act deals only with reorganisation. The aim of the Act is to prevent the debtor's bankruptcy by means of an agreement with creditors and by carrying out a reorganisation. For this purpose, the Act defines 4 main types of restructuring proceedings:

1. Proceedings for approval of the agreement,
2. Expedited conciliation procedure,
3. Conciliation procedure,
4. Remediation.

Each of these procedures is designed to protect the rights of creditors while allowing the debtor to continue in business

In summary, both reorganisation and restructuring are intended to have a positive effect and the satisfaction of creditors is higher than in bankruptcy. A comparison of the above-mentioned laws shows that reorganisation is approached slightly differently in each country, but in the end it is mainly an attempt to continue the business, which ensures a higher satisfaction of creditors than in the case of bankruptcy.

The content of the petition in the Czech Republic is precisely defined in the Insolvency Act. Section 319 summarises the conditions for both the debtor's and the creditor's petition.

In Slovakia, there are conditions for the preparation of the report, which must be prepared by a trustee who is registered in the list of trustees. According to the Slovak law, both the debtor and the creditor may draw up a restructuring plan. The court approves the plan. Once the plan has been completed, the court terminates the restructuring by order.

In Poland, the Act defines the Dz.U.2022.2309, known as the Restructuring Law, focuses on the restructuring of companies that are insolvent or threatened with insolvency. The main objective is to prevent the debtor from going bankrupt by allowing it to enter into an agreement with creditors and carry out rehabilitation. In Poland, the Restructuring Act entered into force at the beginning of January 2016, introducing new types of restructuring proceedings aimed at protecting against bankruptcy by restoring the debtor's ability to meet its obligations and providing protection against enforcement. Since the economic transformation until 2016, the only solution for an insolvent debtor was to settle with its creditors within the framework of bankruptcy proceedings. On the one hand, the new legislation has led to an increase in the share of restructuring proceedings in relation to liquidation bankruptcies. On the other hand, however, it turned out that many of the initiated restructuring proceedings do not end even with the conclusion of an agreement between the debtor and the creditors (Prusak, 2023).

Comparing the laws, it can be concluded that they share common basic characteristics. In the Czech Republic, the law defines court proceedings relating to bankruptcy or threatened bankruptcy. The law in Slovakia defines bankruptcy as insolvency or over-indebtedness. The law in force in Poland is similar to the above countries, but with an emphasis on the protection of employees and social security.

2 Material and Methods

Descriptive analysis was performed on the data and the results were compared using ANOVA test. Among the approved reorganisations, the most well-known reorganisations in Slovakia, Poland and the Czech Republic were described. The reorganisations were analysed irrespective of the outcome of the insolvency proceedings.

2.1 Model and Data

Data from 2019 to 2023 were obtained in Slovakia from the Register of Bankrupts, in Poland from the Ministry of Justice website and in the Czech Republic from the Insolvency Register. The individual authorised

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reorganisations were processed into a database for subsequent processing. All databases are publicly available. Data on approved reorganisations were obtained. In the period under review, 115 restructurings were approved in Slovakia, 79 reorganisations were approved in the Czech Republic and 968 restructurings were approved in Poland. The course of reorganisation or restructuring was described for regionally known companies.

The companies were analysed by comparative analysis. Subsequently, the data were analysed using the ANOVA test. The following hypotheses were established:

H0: There is no statistically significant pattern between the average number of restructurings in the selected countries.

H1: There is a statistically significant pattern between the average numbers of restructurings in the selected countries.

2.2 Slovak Companies in Restructuring

The list of bankrupts in the Slovak Republic is kept in the Register of Bankrupts. The register is administered by the Ministry of Justice of the Slovak Republic. All data are publicly available.

Some of the best known restructurings in the Slovak Republic include SVET ORECHOV s.r.o., Arca Capital Slovakia, a.s., Arca Investments, a.s. and Dedoles, s.r.o.

SVET ORECHOV s.r.o. sells goods, specifically not only nuts by name, but also dried fruits, confectionery and health food. The offered assortment is sold only electronically via e-shop. The company has no brick-and-mortar store. The company has successfully completed the reorganization on 9 July 2020 and continues to do business.

Arca Capital Slovakia, a.s. is engaged in the construction of real estate in Bratislava and its surroundings. It has branches in Slovakia, the Czech Republic, Austria and Hungary. Restructuring was granted on 13.4.2021 and completed on 16.6.2022. The company continues its business activities.

Arca Capital Slovakia, a.s. is followed by Arca Investments, a.s., which belongs to the Arca Capital Group. The Slovak-based company explains the filing of the reorganisation petition in the Czech Republic on the grounds that it has its registered office in the Czech Republic, that the company's centre of main interests is located there and that most of its creditors have their registered office or domicile there. The restructuring was resolved by the contribution of assets to the newly established company Noah. The restructuring was authorised on 3 February 2021 and completed on 27 April 2023. Interestingly, Arca Investment, a.s. owns shares in Františkovy Lázně SAVOY a.s. worth CZK 70 million. CZK. The company continues its business activities.

Dedoles, s. r. o. is engaged in the sale of socks and underwear. During its existence since 2012, the company has expanded into several countries of the European Union. The restructuring was authorized on 4 August 2022 and terminated on 10 March 2023. The company continues its business activities.

The above restructurings have been completed with positive closure and the Company continues to carry on its business. Compared to the Czech Republic, they also have a shorter duration.

2.3 Polish Companies in Restructuring

In Poland, research was conducted between 2016 and 2021 by Prusak (2023). Prusak (2023) studied "companies operating in Poland for which the restructuring procedures engaged in between 2016 and 2021 resulted in the approval of a settlement and the settlement was ongoing or fully implemented." 648 companies were analysed. The analysis showed a positive relationship between company longevity and management success. Entities that have been on the market longer are more likely to enter into a settlement with creditors.

LOT Polish Airlines (Polskie Linie Lotnicze LOT) underwent significant restructuring in 2012 and 2013 due to financial problems. The Polish government owns 70% of the company. For this reason, the government granted PLN 527 million in state aid to the company. The restructuring was due to the 2008 crisis, which was not addressed by the company's management, and to obsolete aircraft that required costly repairs. At the same time, the cost side of the business was not addressed. The restructuring was successful and the company returned to profitability and started to expand into new markets.

PKP Group (Polskie Koleje Państwowe) underwent a restructuring between 2012 and 2015. The company, by way of restructure, made major changes in optimising the number of railway lines, streamlining loss time and

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more thorough supervision of loan disbursement. As a result of the successful restructuring, the operations were made more efficient and the company was able to obtain an investment in the modernisation of the rail network.

Stocznia Gdańsk was reorganised between 2013 and 2015 and received state support of EUR 150 million. As part of the restructuring, the company sold unneeded land and revitalised the development of the shipbuilding industry.

2.4 Czech Companies in Reorganization

A list of insolvency practitioners in the Czech Republic is kept in the Insolvency Register. The Insolvency Register is administered by the Ministry of Justice of the Czech Republic. Before the Insolvency Act came into force, i.e. before 2008, debtors were listed in the Register of Insolvent Debtors. All data is publicly available. The research was carried out

The best known reorganisations in the Czech Republic include ZOOT a.s., Františkovy Lázně SAVOY a.s., BLAŽEK PRAHA a.s. and KARA Trutnov, a.s.

The company ZOOT a.s. is engaged in the sale of clothing. This company was dissolved on 1 October 2021 by merger as of 1 January 2021. The successor company is Digital People, a.s. The authorized reorganization was completed on April 30, 2020. Even though the reorganization was successful, the merger was completed to strengthen the market and continue the ZOOT branded stores on the internet.

Františkovy Lázně SAVOY a.s. offered accommodation and services related to spa stays to spa guests. The company has an approved reorganization date of 10.12.2020. The reorganization plan was not fulfilled and the reorganization was converted to bankruptcy as of 5.4.2022. On 10.5.2022 the properties were sold with the consent of the insolvency administrator to the new owner Česká hotelová, a.s.

The company BLAŽEK PRAHA a.s. has an approved reorganization plan on January 12, 2021. The last report on the implementation of the reorganization plan is dated September 14, 2023. The conditions of the reorganization plan are fulfilled and the company continues to operate its establishments, but with a lower number of employees. It currently operates 20 stores throughout the Czech Republic and 7 stores in Slovakia.

The company KARA Trutnov, a.s. is a company that offers fur and leather fashions. It currently operates 26 stores in the Czech Republic and 7 stores in Slovakia. On 8 November 2021, the company's reorganization plan was approved. On April 1, 2022, the conditions of the reorganization plan were met and the company continues its business activities.

From the overview of the reorganizations of the companies listed above, it can be seen that solving insolvency in the form of a reorganization plan was a good solution.

3 Results and Discussion

For a comparative analysis of reorganizations in the Czech Republic and restructurings in Slovakia and Poland, the data was entered in table no. 1 for an overview comparison.

Table 1 – Overview of restructurings in Slovakia, Poland and reorganizations in the Czech Republic

Year	SK	PL	CZ
2019	16	0	16
2020	22	0	9
2021	23	6	11
2022	26	621	24
2023	28	341	19
Total	115	968	79

Source: own elaboration

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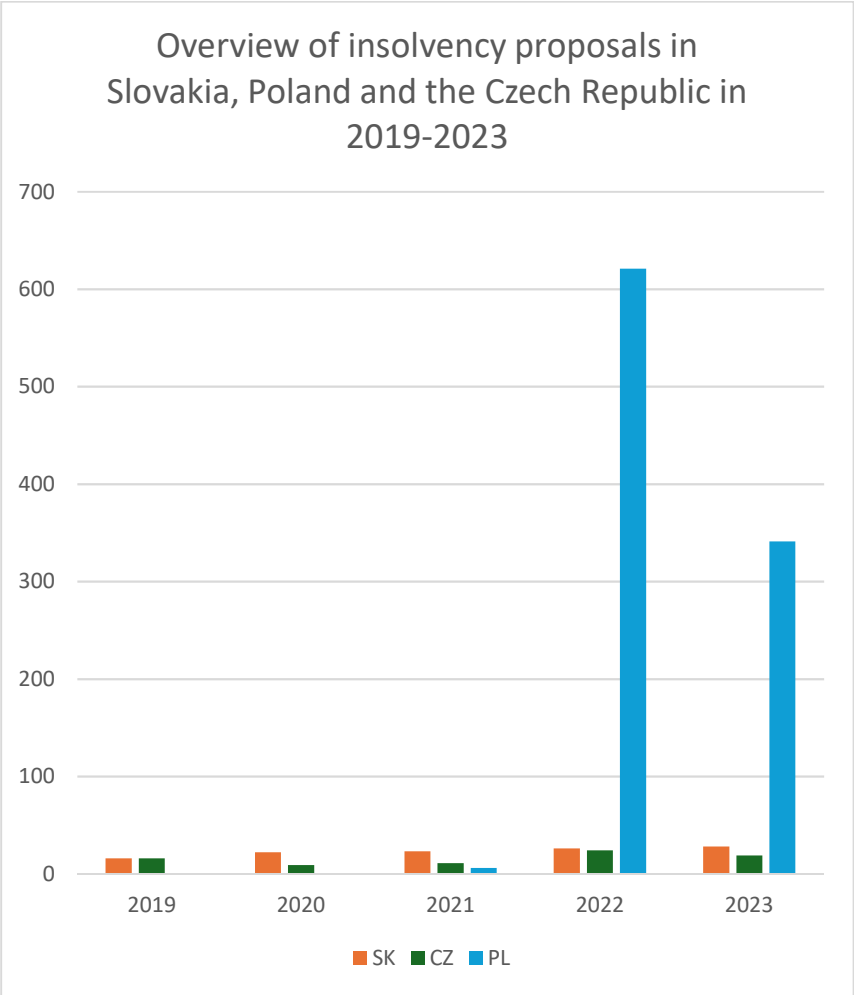
The data show that Poland has the highest number of restructurings, which may indicate a greater need or effectiveness of these processes. Slovakia shows steady growth, while the Czech Republic has a fluctuating trend with lower overall numbers. These differences can be caused by various factors, including economic conditions, legislative frameworks and the business environment. The data from the table can also be clearly processed graphically for the following analysis. The processed data is in Figure No. 1.

Figure 1 - Overview of restructurings in Slovakia, Poland and reorganizations in the Czech Republic



Source: own elaboration

The graph shows that reorganizations are used in smaller numbers in the Czech Republic and Slovakia compared to the use of restructurings in Poland. These numbers are mainly influenced by the use of the implemented EU directive.

Furthermore, a descriptive analysis was carried out from the data in Table No. 1. The results show that the number of restructurings in Slovakia ranged from 16 to 28 with an average of 23 and a standard deviation of 4.58. In the Czech Republic, the reorganization ranged from 9 to 24 with an average of 15.8 and a standard deviation of 6.06. In Poland, the number of restructurings ranged from 0 to 621 with a mean of 193.6 and a standard deviation of 280.43.

Subsequently, we performed an ANOVA test. We analyzed the data at a significance level of 95%. The p-value (0.1875) is higher than the usual level of significance. This means that we cannot reject the null hypothesis, which states that there is no statistically significant difference between the average numbers of restructurings and reorganizations in individual countries (Slovakia, Czech Republic, Poland). This means that, based on the available data, we do not have sufficient evidence to say that the average numbers of restructurings and

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reorganizations differ significantly between the three countries. However, it is important to note that the results may be affected by the high variability of the data, especially in the case of Poland, where there was a significant increase in the number of restructurings in 2022.

4 Conclusion

Restructurings in Slovakia are used more compared to the Czech Republic and also have a shorter time course. According to the law, only the insolvency administrator has the authority to draw up a restructuring plan.

Restructurings in Poland are used the most. The law is more focused on preventing corporate bankruptcy by allowing debtors to enter into agreements with creditors and carry out rehabilitation.

Permitted reorganizations in the Czech Republic are not affected by seasonality. Reorganization is advantageous for the company only under certain circumstances and conditions. The reorganization plan can also be drawn up by the debtor himself, but it is more convenient and faster to use an insolvency administrator. Not every reorganization plan that is approved by the court is successful either. Some reorganizations are subsequently converted into bankruptcy.

In connection with the implementation of the Regulation of the European Parliament and the Council into national regulations, it is documented that restructuring is used more in Slovakia than reorganization in the Czech Republic. From the analysis of the years 2019 to 2023, the impact of the global pandemic on the filing of an insolvency proposal cannot be deduced.

Reorganization and restructuring are beneficial for both parties, both the debtor and the creditor. The debtor has room to raise funds to pay creditors, and creditors can get more funds than if the debtor filed for bankruptcy. The research was limited to the selected period 2019-2023.

This study provided a comprehensive analysis of restructurings in Slovakia and Poland and reorganizations in the Czech Republic in 2019-2023. The results show that the legislative framework and the implementation of EU directives have a major influence on the success of these processes. Poland shows the highest number of restructurings, which may indicate a greater need or effectiveness of these processes compared to Slovakia and the Czech Republic. Slovakia shows steady growth in the number of restructurings, while the Czech Republic has a fluctuating trend with lower overall numbers. These differences can be caused by various factors, including economic conditions, legislative frameworks and the business environment.

The study also examined specific cases of restructuring and reorganization, such as SVET ORECHOV, Arca Capital Slovakia, LOT Polish Airlines and ZOOT. The analysis shows that the legislative framework and the implementation of EU directives have a fundamental influence on the success of these processes. Reorganization and restructuring are key to keeping businesses afloat and maximizing creditor satisfaction. The study emphasizes the importance of an effective legislative framework and its impact on the business environment in individual countries.

Furthermore, it was found that reorganization and restructuring have a positive effect on the financial stability of companies and their ability to repay obligations. The implementation of EU directives into national legislation contributed to the harmonization of procedures and increased efficiency of insolvency proceedings. However, differences in the legislative frameworks of individual countries still influence the course and results of these processes.

The ANOVA test, which was performed on data from 2019-2023, showed that there is no statistically significant difference between the average number of restructurings and reorganizations in individual countries (Slovakia, Czech Republic, Poland). The p-value (0.1875) is higher than the chosen significance level of 5%, which means that we cannot reject the null hypothesis that there is no statistically significant difference between the average numbers of restructuring and reorganization in individual countries. This result suggests that despite differences in the absolute numbers of restructuring and reorganizations between countries, the mean values are not sufficiently different to be considered statistically significant.

The study also showed that the success of restructuring and reorganization depends on many factors, including economic conditions, the size of the company and its financial situation. In the future, further research could examine the impact of specific legislative changes on the success of restructuring and reorganization. Overall, it

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can be said that restructuring and reorganization are necessary tools for solving financial crises of enterprises, and their effective implementation can significantly contribute to their success.

The limitations of the research are mainly represented by the size of the sample and the limited sources of public information on approved reorganisations and restructurings. This deficiency is an important denominator of all relevant research papers dealing with this issue. The sample size could be expanded in future studies.

Further research could focus on the analysis of the duration of restructuring processes and their impact on the financial stability and operational performance of enterprises. Examining the time frame of restructuring could reveal how the speed of implementation affects the success of these processes and their ability to restore the financial health of the business. Furthermore, it would be useful to analyze how various factors such as firm size, industry and economic conditions affect the duration of restructuring. This research could provide valuable insights into the creation of more effective legislative frameworks and strategies for managing restructuring processes, which could lead to better outcomes for businesses and creditors.

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The Role of Real Estate Tax in the Budget Revenue of Statutory Cities of the Czech Republic

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Abstract

The paper evaluates the role of the real estate tax in the budgets of statutory cities in the Czech Republic for the period 2012-2022. The aim of the paper is to evaluate the role of the real estate tax in the tax and total revenues in the budgets of statutory cities. The paper evaluates all statutory cities in the Czech Republic, as defined by the Municipalities Act. In the paper, the statutory cities are divided into four size groups according to the total population at the end of 2022. The statutory cities are divided into evaluation groups according to quartiles in order to achieve a similar population within each group of statutory cities. In this way, it is possible to ensure a better comparison of the observed values with each other. The role of the property tax is identified both in terms of tax and total revenue in the budget of the respective calendar year. The results show that the role of the property tax decreases over time for both total revenue (on average from 4.45% to 3.30%) and tax revenue (on average from 6.80% to 4.61%) for all statutory cities in the Czech Republic. The amount of property tax revenue is not affected by the fact that a statutory city is divided into city districts or municipal districts in terms of its administration. The impact of the role of the property tax is highest in percentage terms in the fourth group evaluated, i.e. in the budgets of those statutory cities with the smallest population. Among the evaluated sample of statutory cities, the role of property tax is higher in the cities of Liberec and Olomouc in the first group. In the second group of cities, Hradec Kralove, Pardubice and Ústí nad Labem stand out positively. In the third group of statutory cities, the cities of Most, Opava and Karlovy Vary are the most significant. Within the fourth group, higher % of real estate tax values were found in the cities Mladá Boleslav and Chomutov.

Keywords: *Czech Republic, Real Estate Tax, Statutory City, Tax Revenue, Total Revenue,*

JEL Classification: *E62, H71, H72, P25, P35*

1 Introduction

The division of territorial units in terms of the exercise of state administration and self-government in the Czech Republic is very diverse and relatively fragmented. Municipalities with larger populations in the Czech Republic include municipalities with extended powers, district cities or regional cities. Some other cities in the Czech Republic, which have been granted the status of statutory cities by government decision, also have a specific status.

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Statutory cities represent a special type of municipalities in the Czech Republic, as they can be further divided into urban districts or urban parts based on the Act on Municipalities and the own decision of the elected bodies within the framework of the internal regulation, the so-called statute. In practice, there is thus the possibility of a two-level system of management of the given territory, which, according to Finzgar and Oplotnik (2013), should have its own financial resources and a positive influence on the effectiveness and efficiency of management in the given territory, which was already noted as important by Tiebout (1956) or Oates (1972). According to Vavrek (2015) or Daňková, Čepelová, Koreňová (2017), limited options when deciding on the use of financial resources are the result of an insufficient or non-existent effectiveness evaluation system. Vavrek and Bečica (2020a, 2020b, 2022) further add to this that if public administration entities want to survive and prosper in a globalized and competitive world, they must change their thinking system and try to make their management more efficient. Mokrá et al. (2023) or Horváthová et al. (2024) state that management can be made more efficient in both the private and public sector in different ways and with different techniques. Mazllami, Osmani (2014) stated in their work that many endogenous and exogenous factors determine the success of fiscal reforms at the local and central level. Neubauerová (2003) states that the application of fiscal decentralization in each country depends on many assumptions, such as the size of the country, the number of levels of government, historical, legislative, social or economic aspects.

Due to their size, statutory cities are the centres of social, economic and cultural life in the Czech Republic alongside regional cities. Within the Czech Republic, we distinguish a total of 26 cities with this statute and the capital city of Prague, which, based on Act No. 131/2000 Coll. legally independent anchorage, however, its management and administration system is very similar to other territorially divided statutory cities in the Czech Republic. Expenditure from the budget of individual statutory cities is largely influenced by their income side, i.e. total revenues. One of the few revenues that the elected bodies of cities can influence is, in addition to other revenues, which are given by Act No. 243/2000 Coll. on the budgetary determination of taxes, also revenues from the tax on immovable property, for which the elected council is empowered by law to increase or decrease the basis given by law. Governatori and Yim (2012) state that it is ideal to finance a large part of expenses in the territory on the basis of own revenues, especially from the funds collected from taxes and fees. Sedmihradská and Bakoš (2016), Tománek (2017, 2022), Vavrek et al. also agree with this opinion regarding financing in the territory. (2020), Opera et al. (2022) or Vartasová and Červená (2023). Tax on immovable property is therefore not only for statutory cities one of the important sources of revenues through which public services can be provided to citizens in the city.

The aim of the paper is to evaluate the role of the real estate tax and its influence in the total and tax revenues in the budget of all statutory cities in the Czech Republic in the period 2012-2022.

2 Literature Review

The status and competence of local self-government in the Czech Republic is enshrined in Constitutional Act No. 1/1993 Coll., the Constitution of the Czech Republic, specifically in Title Seven, which deals with local self-government. The functioning of municipalities in the Czech Republic is governed mainly by Act No. 128/2000 Coll., on Municipalities, and their management is further regulated by a number of legal regulations. Among the important ones are Act No. 250/2000 Coll., on budgetary rules for territorial budgets, Act No. 320/2001 Coll., on financial control in public administration and on amendments to certain acts, and Act No. 420/2004 Coll., on the review of the management of territorial self-government units and voluntary associations of municipalities. From the point of view of local government revenue, Act No 243/2000 Coll. on the budgetary determination of taxes is particularly important.

Vančurová et al. (2020, 2022) state in general terms that: tax is a mandatory, legally imposed payment that flows into the public budget. It is non-refundable, non-equivalent and usually non-expenditure. Radvan (2020) argues that all taxes within the tax system should primarily fulfil a fiscal function, i.e. that they are able, together with other taxes collected, to cover expenditure from the respective public budget, where the proceeds of each tax are directed. The purpose of taxation is also to fulfil a redistributive function in which taxation is seen as a means of reducing inequalities between people. Široký (2016) states that some taxes also serve to prevent cyclical fluctuations in the economy, which can include the real estate tax, which all its proceeds go to the budget of the municipality in whose territory the taxed property (land, building) is located.

From the point of view of the yield of individual taxes, these are redistributed to municipalities in the Czech Republic on the basis of Act No.243/2000 Coll., on the Budgetary Determination of Taxes, which distinguishes

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several criteria that are applied only to shared taxes. However, the real estate tax is not subject to these criteria, as it is an entrusted tax and its revenue is fully entrusted to the budget of the municipality in whose cadastral territory the taxed real estate (land, building) is located. For this reason, the shared taxes are not discussed or described further in this paper, since the municipality cannot influence their amount in the municipal budget in any significant way.

The current Act on Municipalities allows some municipalities in the Czech Republic to have a specific status, including statutory cities and the capital city of Prague, which is governed by a separate act (Act No. 131/2000 Coll. on the Capital City of Prague). Statutory cities are municipalities that were designated by municipal law after 1848 in the historical countries of Austria-Hungary and had their own legal regulations, called Statutes, which regulated the status and activities within the city's territory. In 1850, these towns included the cities of Opava, Olomouc, Brno and Prague from the present territory of the Czech Republic. However, the number of statutory cities increased rapidly over time and in 1918, when the independent Czechoslovak state was established, they included Liberec, Jihlava, Znojmo, Uherské Hradiště, Kroměříž and Frýdek.

Exner (2004) states that during the course of time, statutory cities in the territory of today's Czech Republic have been established and disappeared in various ways. The extinction of all statutory cities occurred in 1949. Until that year, there were seven statutory cities in the territory of the present-day Czech Republic, namely Prague, Pilsen, Liberec, Brno, Ostrava, Olomouc and Opava. In the period of socialist establishment after 1950, only the capital city of Prague had a privileged position among the cities. In 1969, the cities of Brno, Pilsen and Ostrava joined Prague, but the term statutory city was not officially used.

The concept of a statutory city was not returned to the municipal system until 1990 by Act No. 367/1990 Coll., of the Czech National Council on Municipalities. The first Act on Municipalities in force after 1990 regulated statutory cities in Section 3 and stipulated that the cities of České Budějovice, Plzeň, Karlovy Vary, Ústní nad Labem, Liberec, Hradec Králové, Pardubice, Brno, Zlín, Olomouc, Ostrava, Opava and Havířov were cities with a special status. The 1990 Act also made it possible to expand the number of statutory cities by stating that a statutory city includes any other city designated by the Bureau of the Czech National Council on the proposal of the Government or on the proposal of such a city, after the Government has expressed its opinion.

According to Svoboda et al. (2017), a specific feature of the territory of statutory cities is the possibility of dividing the city into urban districts or urban parts, which effectively implies a two-tier system of city administration. However, the subdivision of a city is not its obligation. Koudelka et al. (2019) state that the legislation of the Czech Republic considers statutory cities to be of special importance, as the status of a statutory city cannot be acquired by a municipality in any other way than by law, while none of the existing laws of the Czech Republic provides for precise criteria by which the prerequisites for obtaining the status of a statutory city can be assessed. Hendrych et al. (2014) state that the specific powers of statutory cities are only within the scope of autonomous competence, where it is, for example, the provision of those activities that are associated with their own budget and the satisfaction of housing needs, the protection and development of health, transport, communications, the protection of public order, education, etc.

After 1990, the number of cities that have the right to use the term statutory city has been expanded several times, e.g. in 2000 by the cities of Jihlava, Kladno and Most; in 2003 by the cities of Karviná, Mladá Boleslav and Teplice. In 2006, the cities of Děčín, Frýdek-Místek, Chomutov and Přerov were added, and in 2012 Jablonec nad Nisou and Prostějov. The youngest statutory city in the current Czech Republic is Třinec, which was added to the list of statutory cities in 2018 and as of 2022 is also the smallest statutory city, according to the permanent number of inhabitants living in the city. As of 31.12.2022, a total of 26 statutory cities in the Czech Republic are granted a specific status in the Municipalities Act, and in fact also the capital city of Prague on the basis of a separate law.

3 Material and Methods

Territorial self-government operates within the Czech Republic on the principle of uniformity of revenues and expenditures. In this context, the Ministry of Finance of the Czech Republic issues rules (valid not only for territorial self-government) to ensure uniformity and transparency in the form of a binding budget composition, thanks to which it is possible to compare individual territorial budgets from different perspectives and analyse their revenues and expenditures over time.

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The aim of the paper is to evaluate the role of property tax in the budgets of statutory cities. The level of property tax revenues is evaluated in the context of the level of total city revenues as well as the city's tax revenues in the base sample, which is all cities that can use the statutory city designation.

The paper tests two research questions as follows:

VO1: The role of the property tax in the budgets of statutory cities a) as a share of total revenues and b) as a share of tax revenues is decreasing over the period 2012-2022 of the evaluated years.

VO2: Property tax revenue is similar in statutory cities of comparable size.

As a similar value is taken the value found within specific groups of statutory cities of the Czech Republic, which for the purposes of this paper were divided into 4 categories so that each of the groups of statutory cities formed one quartile of the evaluated sample of the total number of all statutory cities, which for the purposes of the evaluation were ranked in descending order of the total number of permanent residents in the city as of 2022. Cities within each group are thus similar in size (in terms of the number of permanent residents) and have similar characteristics and needs. Dividing cities into four groups also allows for more homogeneous data sets to be worked with. The breakdown of cities into a total of four groups by population is shown in Table One.

Table 1 - Distribution of statutory cities in the Czech Republic into evaluated groups according to the number of population

1 st group		**2 nd group**		**3 rd group**		**4 th group**	
City	Population	City	Population	City	Population	City	Population
Praha (57 částí)	1 286 120	Hradec Králové	93 506	Most	63 856	Děčín	47 180
Brno (29 částí)	379 466	České Budějovice	93 426	Opava (8 částí)	55 512	Chomutov	46 940
Ostrava (23 obvodů)	283 504	Pardubice (8 obvodů)	92 149	Frýdek-Místek	54 188	Jablonec nad Nisou	45 830
Plzeň (10 obvodů)	168 733	Ústí nad Labem (4 obvody)	91 963	Jihlava	52 548	Mladá Boleslav	45 000
Liberec (1 obvod)	107 389	Zlín	74 191	Teplice	50 843	Prostějov	43 551
Olomouc	101 825	Havířov	70 245	Karviná	50 172	Přerov	41 634
		Kladno	68 436	Karlovy Vary	49 043	Třinec	34 306

Source: Own processing

Table one shows that the cities in the first group are represented by statutory cities with a population of over 100,000 inhabitants, all of which are also regional cities. The only city in this group that is not divided into urban districts or urban parts is the statutory city of Olomouc. The second group consists of cities in the range of 68-94 thousand inhabitants and, with the exception of the statutory city of Kladno and Havířov, are again represented by regional cities. Only the Statutory City of Pardubice and Ústí nad Labem are divided into urban districts. An interesting feature of this group is the statutory town of Havířov, which was historically founded only in 1951 and has never been a district town, which is geographically close to the statutory city of Karviná. The third group of statutory cities consists of cities with a population of 49-64 thousand inhabitants. In this group, only Jihlava and Karlovy Vary are regional cities. Only the statutory city of Opava is divided into urban parts. The fourth group of cities is made up of cities with a population of 34-47 thousand inhabitants and are thus the most homogeneous sample in terms of population. None of the cities in the fourth group is a regional city and none of the cities in the fourth group is divided into urban districts or urban parts.

The cities were classified into groups according to the actual number of permanent population at the end of the year 2022. As of that year 2022, the most recent data in terms of the management of each statutory city, i.e. data on the revenues and expenditures of the evaluated cities, were also available at the time of data collection for the practical part of the paper. The obtained data on the economy come from the publicly available database IISSP-

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Monitor, which is maintained by the Ministry of Finance of the Czech Republic and are subjected to processing through selected mathematical and statistical methods. The data are also transformed from absolute values to relative values due to the different size of the cities (measured by population); year-on-year changes are expressed through indexes. The evaluation period is eleven consecutive years within the 2012-2022 reference period.

The role of property tax is assessed for the 27 largest cities in the Czech Republic. All of the cities evaluated are statutory cities by law and have a population of more than 34 thousand inhabitants at the end of 2022. Of these statutory cities, a total of eight cities, the number of which is shown in Table 1, take advantage of the possibility to subdivide into urban districts or urban parts by statute. These are Prague, Brno, Ostrava, Plzeň, Liberec, Ústí nad Labem, Pardubice and Opava. Secondarily, the paper will thus examine whether the division of the statutory cities in terms of administration into urban districts or urban parts is reflected in the budget and the amount of real estate tax collection in relation to the tax and total revenues of these statutory cities.

To achieve the stated aim, the paper employs time series analysis methods using basic descriptive statistics such as arithmetic mean, standard deviation, minimum and maximum.

Arithmetic mean is one of the most common indicators of mean in descriptive statistics. The arithmetic mean provides an idea of the "typical" value in a dataset and is often used to express the mean or average value in a dataset. The arithmetic mean ($\bar{x}$) can be calculated using the following formula:

$$\bar{x} = \frac{\sum_{i=1}^{n} \boldsymbol{xi}}{n} \tag{1}$$

where:

- $\bar{x}$ is the arithmetic mean,
- xi are individual values in the dataset,
- n is the number of values in the dataset.

The standard deviation (σ) is a statistical indicator of the variability of data in a dataset. It is defined as the square root of the variance and measures how much the values in the dataset are spread out around the arithmetic mean. The following formula can be used to calculate the standard deviation:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}} \tag{2}$$

where:

- σ is the standard deviation,
- xi are individual values in the dataset,
- $\bar{x}$ is the arithmetic mean,
- n is the number of values in the dataset.

The minimum and maximum in descriptive statistics indicate the smallest and largest value in a given data set. It is a value that is lower or higher than all other values in the set. Both minimum and maximum are one of the indicators of data position and provide information about what is the lowest and highest value in a given dataset.

4 Results

The results are divided into two separate sections. First, the shares of property tax to the total revenue of the assessed statutory cities and to the average for a given size group of statutory cities are presented. Next, the role of the property tax is evaluated in each group to tax revenues only, as total revenues for individual cities may be affected by other revenue categories that may be volatile over time. Examples include one-off revenues from the sale of property or one-off increased subsidy revenues from higher levels of government. The classification of statutory cities into groups and their framework characteristics were described in the previous chapter.

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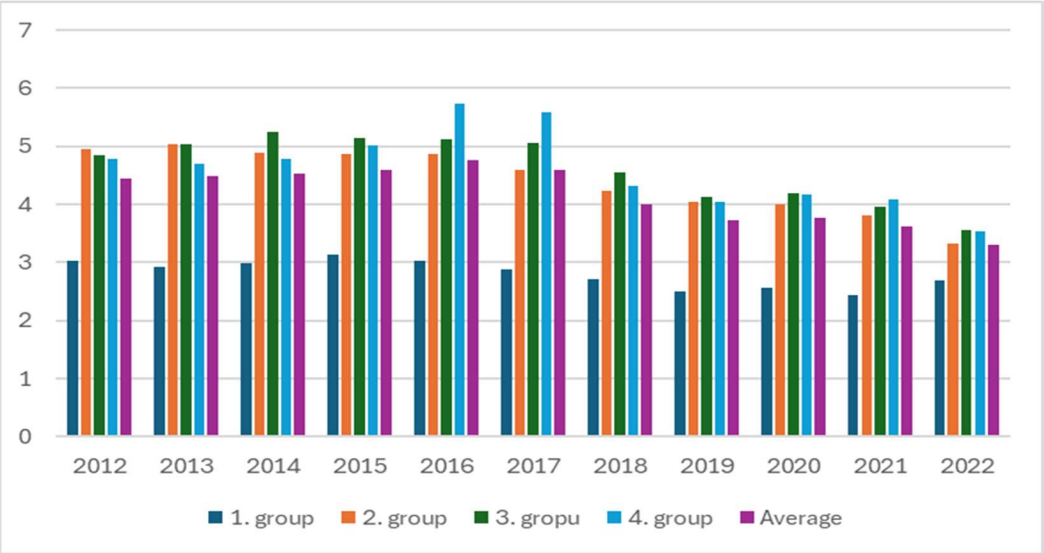
4.1 Results of Property Tax on Total Revenue of Statutory Cities

The average share of property tax in the total revenue of statutory cities as a percentage of the summarised revenue for each of the evaluated groups of statutory cities is shown in Figure 1.

Figure 1 - % share of real estate tax in total revenues of individual groups of statutory cities in the Czech Republic in 2012-2022



Source: Own processing

Figure one shows that the share of property tax in the total revenue of statutory cities was initially stable or only slightly increasing between 2012 and 2017, averaging 4.16% over the entire 2012-2022 period. An absolute minimum was recorded in 2019 for the capital city of Prague with a value of 0.9% and an absolute maximum of 14.57% in 2016 for the statutory city of Mladá Boleslav. The observed average value of all statutory cities in the Czech Republic in 2012 with a value of 4.45% increased only slightly year on year to 4.75% by 2016. Between 2017 and 2018, there was a sharp drop of more than half a percentage point and in the following years the observed value continued to decline until the minimum observed in 2022 with a value of 3.30% of the share of total revenue of all statutory cities.

In terms of the individual evaluated groups of statutory cities, the values of the first evaluated group of the largest statutory cities over 100,000 inhabitants, whose share ranges from 2.19 to 3.62%, stand out compared to the other groups. For the other three groups of statutory cities, which have populations between 34 and 94 thousand inhabitants, the shares are higher, ranging from 3.30 to 6.09 % of total revenue. However, for all the evaluated groups of statutory cities, there is a decrease in the observed values in the period 2012-2022, so the research question VO1a), "The role of property tax in the budgets of statutory cities as a share of total revenue is decreasing in the period 2012-2022", can be confirmed.

The answer to research question VO2: "Property tax revenue is similar in statutory cities of comparable size" is presented in Figure 2.

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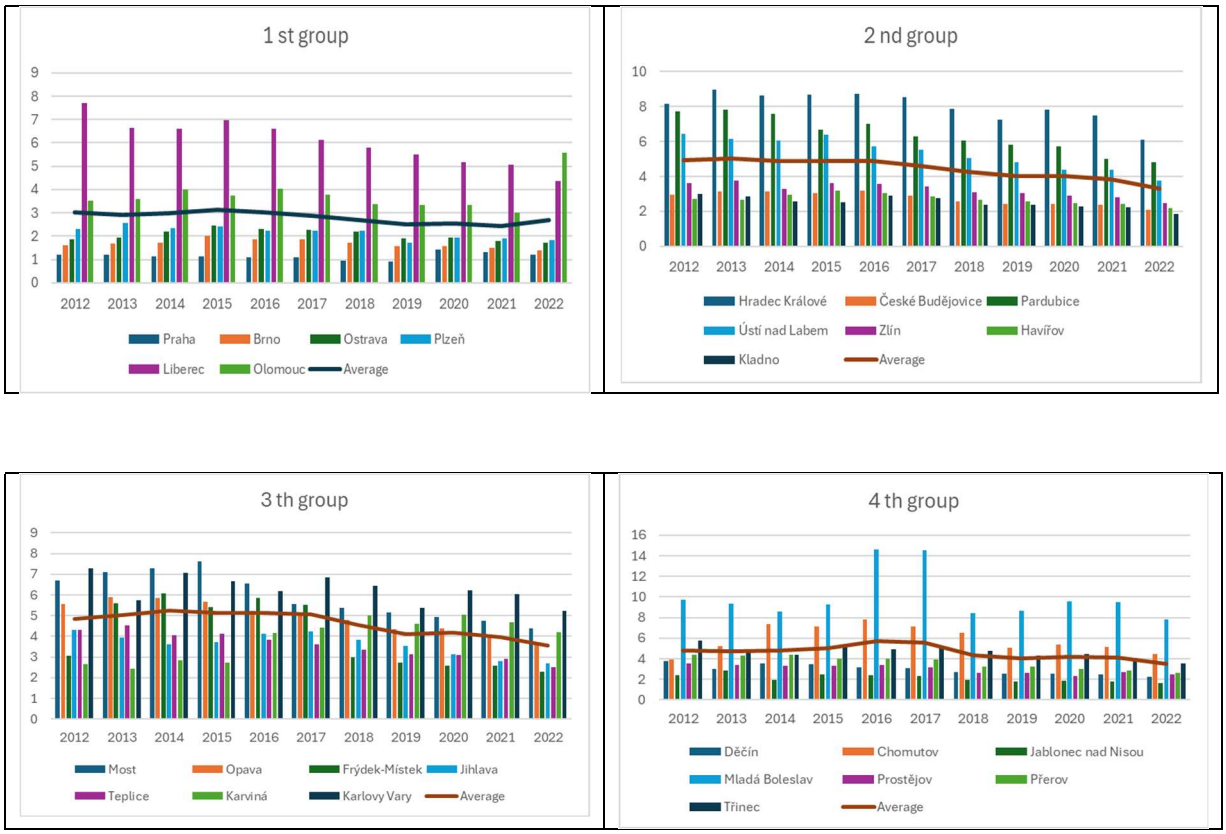
Figure 2 - % share of property tax to total revenue in a similar size group of statutory cities



Source: Own processing

Figure two shows that research question number two can be rejected for all evaluated groups of statutory cities, given that in each evaluated group of statutory cities there is at least one, but usually two or three statutory cities that stand out from the observed average of similarly sized statutory cities. In the first size group, it is the Statutory City of Liberec for the whole period under review, which is joined by the Statutory City of Olomouc towards the end of the period under review. For the second size group of statutory cities, the statutory cities of Hradec Králové, Pardubice and Ústí nad Labem stand out from the average of the size group throughout the period under review. In the third size group, where the results are the most even, the statutory cities of Most, Opava and Karlovy Vary slightly stand out with their results. In the fourth size group, the Statutory City of Mladá Boleslav stands out from the observed average in all years evaluated, and even three times in 2016 and 2017, and in 2014-2018 also the Statutory City of Chomutov.

4.2 Immovable Property Tax Results to Tax Revenues of Statutory Cities

The average share of property tax in the tax revenue of statutory cities as a percentage of the summarised tax revenue for each of the evaluated groups of statutory cities is shown in Figure 3.

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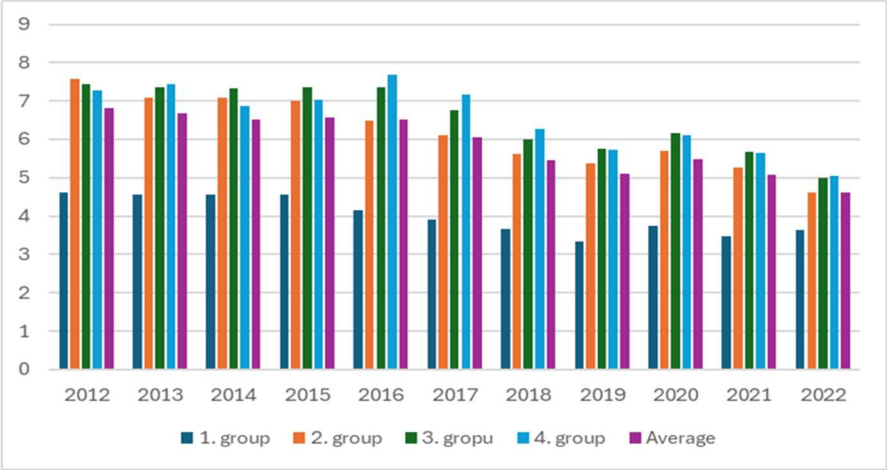
Figure 3 - % share of property tax in tax revenues of individual groups of statutory cities in the Czech Republic in 2012-2022



Source: Own processing

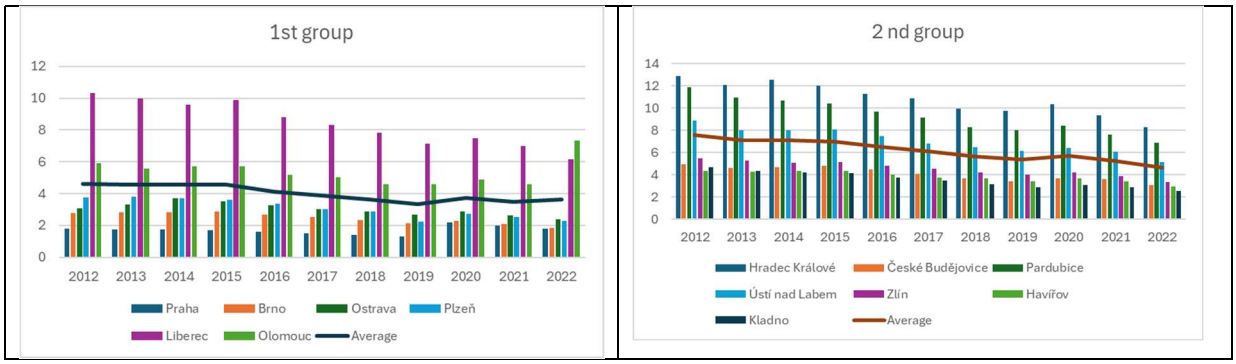
Figure three shows that the share of property tax in tax revenues has increased in all evaluated groups of statutory cities compared to total revenues. The averages ranged from 1.29% to 18.13%. The lowest value was found in 2019 for the capital city of Prague and the highest value of 18.13% for the statutory city of Mladá Boleslav in 2016.

The average value of real estate tax to tax revenues of all statutory cities in the Czech Republic was found to be 5.9%. The maximum value across all statutory cities was found in 2012 with a value of 6.80%. In all subsequent years, there has been a gradual decline in the percentage to a value of 4.61% in the last year assessed, 2022.

In terms of the individual evaluated groups of statutory cities, the values of the first evaluated group of the largest statutory cities over 100,000 inhabitants, whose average share ranges from 3.08 to 5.04%, stand out compared to the other groups. For the other three groups of statutory cities, which have populations between 34 and 94 thousand inhabitants, the shares are higher, ranging from 4.62 to 8.51 % of tax revenue. However, for all the assessed groups of statutory cities, the observed values are decreasing in the period 2012-2022, so the research question VO1b) "The role of property tax in the budgets of statutory cities as a share of tax revenues is decreasing in the period 2012-2022" can be answered positively.

The answer to research question VO2: "Property tax revenue is similar in statutory cities of comparable size" is presented in Figure 4.

Figure 4 - % share of property tax to tax revenue in a comparable size group of statutory cities



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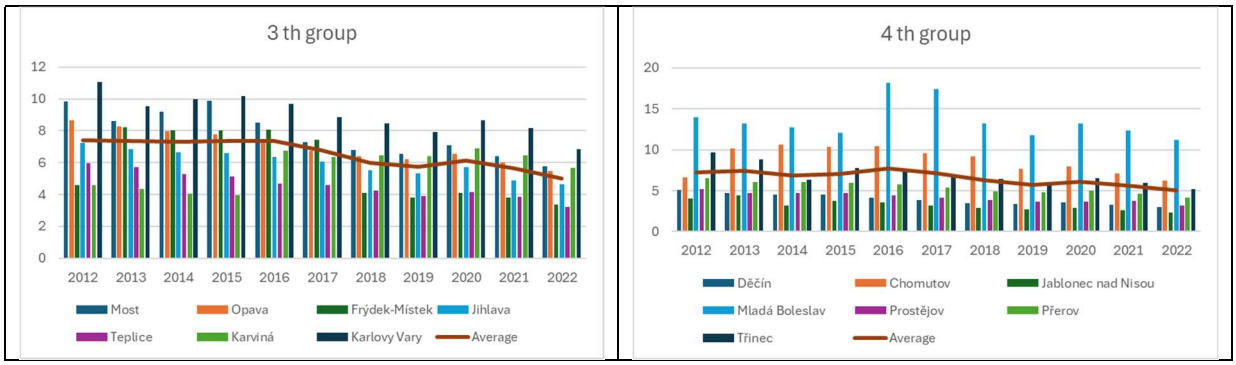

Source: Own processing.

Figure four shows that research question number two can be rejected for all evaluated groups of statutory cities, given that in each evaluated group of statutory cities there is at least one, but usually two or three statutory cities that stand out from the observed average of similarly sized statutory cities. In the first size group, it is the Statutory City of Liberec for the whole period under review, which is joined by the Statutory City of Olomouc towards the end of the period under review. For the second size group of statutory cities, the statutory cities of Hradec Králové, Pardubice and Ústí nad Labem stand out from the average of the size group throughout the period under review. In the third size group, the statutory cities of Most, Opava and Karlovy Vary and in the fourth size group the statutory cities of Mladá Boleslav and Chomutov.

The results do not suggest that the role of the property tax for statutory cities that are subdivided into urban districts or urban parts differs significantly from that of other non-subdivided statutory cities, either in terms of total or tax revenue. Rather, there are noticeable differences within the different groups of statutory cities evaluated.

5 Discussion and Conclusion

The tax system of the Czech Republic is based on several principles, such as legal efficiency, tax fairness and tax effectiveness, which aim to ensure fair and equitable taxation while minimising the negative impact on taxpayers and ensuring the fiscal function for public budgets. The tax system in the Czech Republic also includes the real estate tax, which is one of the forms of direct taxes that is fully entrusted to the budgets of local self-government units at the local level. The results obtained in this paper show that despite partial changes in tax and total revenues, the real estate tax retains its importance for the local budgets of statutory cities, even though it is decreasing in the period 2012-2022. The information presented in the paper shows that the share of property tax in total and tax revenues of statutory cities has been decreasing over time. This trend can be observed in all groups of statutory cities, thus answering the first research question.

The second research question was to evaluate the similarity in the amount of property tax revenue within each of the four groups of statutory cities, which were determined by the number of permanent population living in the territory of each statutory city at the end of 2022. By dividing the cities into these groups, the individual statutory cities became more comparable to each other. However, given the results, this research question has to be rejected, as in each of the evaluated groups of statutory cities, there are one to three cities that outperform the other statutory cities in a given group with respect to the reported values. These are Liberec and Olomouc in the first group of statutory cities. In the second group are the statutory cities of Hradec Králové, Pardubice and Ústí nad Labem. In the third group are the cities of Most, Opava and Karlovy Vary, and in the fourth group the cities of Mladá Boleslav and Chomutov stand out.

Secondarily, the paper examined whether the division of a statutory city into urban districts or urban parts has an effect on the amount of tax on immovable property, which was not confirmed due to the results found within the individual assessed groups of statutory cities. From a geographical point of view, however, it was found that the distribution of cities within the regions of the Czech Republic is not proportional. The largest number of statutory cities is located in the Moravian-Silesian Region (Ostrava, Havířov, Opava, Frýdek-Místek, Karviná and Třinec) and the Ústí Region (Ústí nad Labem, Most, Chomutov, Teplice and Děčín). More than one statutory cities is located in the region of MiddleBohemia (Kladno and Mladá Boleslav), Liberec (Liberec and Jablonec nad Nisou) and Olomouc (Olomouc, Přerov and Prostějov) region. There is only one statutory city in the

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remaining eight regions of the Czech Republic, which is the city that is also the seat of the given region (Brno, Zlín, Jihlava, České Budějovice, Plzeň, Karlovy Vary, Pardubice and Hradec Králové).

The most populous territorially undivided statutory city in the Czech Republic is the city of Olomouc with more than one hundred thousand inhabitants, which, with its values of real estate tax, deviated from the group of the largest statutory cities of the Czech Republic together with the territorially divided statutory city of Liberec. On the other hand, within the third size group of statutory cities, the statutory city of Opava stood out, which is the smallest territorially divided statutory city in the Czech Republic, in terms of population and area and at the end of 2022 had approximately fifty-seven thousand inhabitants and an area of 9,057 ha. Among the non-territorially divided statutory cities that deviated from the average in this group were the statutory cities of Most and Karlovy Vary. Within the second largest group of statutory cities, the city of Hradec Králové stood out, which is not territorially divided, and the statutory cities of Pardubice and Ústí nad Labem, which are territorially divided. In the last evaluated group of statutory cities, the city of Mladá Boleslav and Chomutov stand out, which, in terms of the administration of their territory, like other statutory cities in the given size group, are not divided. It can be stated that the division of statutory cities into urban districts or urban parts in terms of administration does not depend on the size of the city's territory, nor on the number of permanent residents in the city's territory and does not affect the amount of real estate tax. In terms of the population represented in the Czech Republic, the selected sample of all statutory cities constituted 35.8% of all residents of the Czech Republic.

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Apendix 1 - The share of real estate tax in the total income of the 1st group of statutory cities in %

Statutory city	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	x̄	σ	min	max
Praha	1,19	1,19	1,13	1,13	1,11	1,08	0,96	**0,90**	**1,41**	1,33	1,20	1,15	0,14	0,90	1,41
Brno	1,61	1,68	1,71	**2,03**	1,86	1,86	1,70	1,58	1,58	1,48	**1,39**	1,68	0,17	1,39	2,03
Ostrava	1,87	1,93	2,20	**2,44**	2,32	2,27	2,18	1,91	1,93	1,80	**1,73**	2,05	0,23	1,73	2,44
Plzeň	2,30	**2,56**	2,33	2,41	2,23	2,22	2,24	**1,72**	1,93	1,90	1,83	2,15	0,25	1,72	2,56
Liberec	**7,70**	6,63	6,60	6,99	6,61	6,13	5,79	5,51	5,16	5,06	**4,38**	6,05	0,93	4,38	7,70
Olomouc	3,53	3,58	3,98	3,75	4,04	3,77	3,39	3,35	3,33	**3,00**	**5,59**	3,76	0,65	3,00	5,59
x̄	3,03	2,93	2,99	3,13	3,03	2,89	2,71	2,50	2,56	2,43	2,69	**2,81**	**0,40**	**2,19**	**3,62**
σ	2,05	1,68	1,70	1,75	1,69	1,53	1,44	1,42	1,22	1,20	1,55	**1,53**	**0,27**	**1,08**	**2,09**
min	1,19	1,19	1,13	1,13	1,11	1,08	0,96	0,90	1,41	1,33	1,20	**1,15**	**0,14**	**0,90**	**1,41**
max	7,70	6,63	6,60	6,99	6,61	6,13	5,79	5,51	5,16	5,06	5,59	**6,05**	**0,93**	**4,38**	**7,70**

Source: Own processing

Apendix 2 - The share of real estate tax in the total income of the 2 nd group of statutory cities in %

Statutory city	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	x̄	σ	min	max
Hradec Králové	8,15	**8,94**	8,64	8,67	8,71	8,52	7,87	7,24	7,83	7,50	**6,08**	8,01	0,80	6,08	8,94
České Budějovice	2,93	3,14	3,16	3,03	**3,19**	2,89	2,55	2,41	2,41	2,40	**2,10**	2,75	0,36	2,10	3,19
Pardubice	7,72	**7,79**	7,56	6,69	6,99	6,28	6,06	5,81	5,71	4,99	**4,80**	6,40	1,00	4,80	7,79
Ústí nad Labem	**6,45**	6,16	6,07	6,37	5,70	5,50	5,07	4,82	4,40	4,37	**3,77**	5,34	0,87	3,77	6,45
Zlín	3,63	**3,77**	3,29	3,61	3,56	3,42	3,09	3,04	2,89	2,81	**2,48**	3,24	0,39	2,48	3,77
Havířov	2,69	2,66	2,93	**3,20**	3,05	2,83	2,67	2,58	2,48	2,43	**2,18**	2,70	0,28	2,18	3,20
Kladno	**3,02**	2,85	2,57	2,54	2,90	2,75	2,36	2,37	2,29	2,25	**1,83**	2,52	0,33	1,83	3,02
x̄	4,94	5,04	4,89	4,87	4,87	4,60	4,24	4,04	4,00	3,82	3,32	**4,42**	**0,58**	**3,32**	**5,19**

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σ	2,09	2,23	2,16	2,04	1,99	1,93	1,85	1,68	1,83	1,68	1,40	**1,88**	**0,26**	**1,40**	**2,15**
min	2,69	2,66	2,57	2,54	2,90	2,75	2,36	2,37	2,29	2,25	1,83	**2,52**	**0,28**	**1,83**	**3,02**
max	8,15	8,94	8,64	8,67	8,71	8,52	7,87	7,24	7,83	7,50	6,08	**8,01**	**1,00**	**6,08**	**8,94**

Source: Own processing

Apendix 3 - The share of real estate tax in the total income of the 3 rd group of statutory cities in %

Statutory city	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**x̄**	**σ**	**min**	**max**
Most	6,69	7,10	7,27	**7,62**	6,55	5,55	5,36	5,16	4,94	4,75	**4,37**	5,94	1,08	4,37	7,62
Opava	5,55	5,89	**5,86**	5,66	5,22	5,16	4,80	4,35	4,37	3,99	**3,57**	4,95	0,75	3,57	5,89
Frýdek-Místek	3,07	5,61	**6,07**	5,42	5,84	5,51	3,00	2,74	2,60	2,57	**2,28**	4,06	1,50	2,28	6,07
Jihlava	**4,30**	3,95	3,60	3,74	4,11	4,23	3,82	3,54	3,13	2,82	**2,71**	3,63	0,52	2,71	4,30
Teplice	4,32	**4,52**	4,04	4,14	3,82	3,63	3,36	3,12	3,10	2,92	**2,51**	3,59	0,61	2,51	4,52
Karviná	2,64	**2,42**	2,83	2,72	4,17	4,41	5,01	4,61	**5,03**	4,69	4,21	3,89	0,97	2,42	5,03
Karlovy Vary	**7,30**	5,74	7,07	6,67	6,20	6,86	6,46	5,36	6,22	6,04	**5,23**	6,29	0,64	5,23	7,30
x̄	4,84	5,03	5,25	5,14	5,13	5,05	4,54	4,13	4,20	3,97	3,55	**4,62**	**0,87**	**3,30**	**5,82**
σ	1,52	1,33	1,52	1,49	0,96	0,93	1,06	0,88	1,13	1,11	0,96	**0,97**	**0,30**	**0,98**	**1,12**
Min	2,64	2,42	2,83	2,72	3,82	3,63	3,00	2,74	2,60	2,57	2,28	**3,59**	**0,52**	**2,28**	**4,30**
max	7,30	7,10	7,27	7,62	6,55	6,86	6,46	5,36	6,22	6,04	5,23	**6,29**	**1,50**	**5,23**	**7,62**

Source: Own processing

Apendix 4 - The share of real estate tax in the total income of the 4 th group of statutory cities in %

Statutory city	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**x̄**	**σ**	**min**	**max**
Děčín	**3,78**	2,98	3,56	3,50	3,18	3,07	2,67	2,59	2,54	2,47	**2,22**	2,96	0,48	2,22	3,78
Chomutov	**3,94**	5,26	7,33	7,15	**7,79**	7,13	6,53	5,05	5,39	5,17	4,48	5,93	1,24	3,94	7,79
Jablonec nad Nisou	2,40	**2,88**	1,94	2,49	2,40	2,33	1,93	1,80	1,87	1,76	**1,63**	2,13	0,37	1,63	2,88
Mladá Boleslav	9,71	9,33	8,57	9,24	**14,57**	14,51	8,43	8,62	9,58	9,51	**7,83**	9,99	2,21	7,83	14,57
Prostějov	**3,52**	3,41	3,29	3,35	3,37	3,14	2,66	2,62	**2,32**	2,72	2,48	2,99	0,41	2,32	3,52
Přerov	4,36	4,29	**4,38**	3,99	4,00	3,92	3,27	3,24	3,04	2,86	**2,61**	3,63	0,61	2,61	4,38
Třinec	**5,73**	4,71	4,41	5,40	4,88	4,96	4,73	4,33	4,43	4,08	**3,56**	4,66	0,57	3,56	5,73
x̄	4,78	4,69	4,78	5,02	5,74	5,58	4,32	4,04	4,17	4,08	3,54	**4,61**	**0,84**	**3,44**	**6,09**
σ	2,07	1,93	2,03	2,09	3,70	3,68	2,07	2,00	2,33	2,29	1,83	**2,32**	**0,58**	**1,81**	**3,54**
Min	2,4	2,88	1,94	2,49	2,4	2,33	1,93	1,8	1,87	1,76	1,63	**2,13**	**0,37**	**1,63**	**2,88**
max	9,71	9,33	8,57	9,24	14,57	14,51	8,43	8,62	9,58	9,51	7,83	**9,99**	**2,21**	**7,83**	**14,57**

Source: Own processing

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Factors Influencing the Frequency of Use of Digital Tools in Human Resource Management

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Abstract

The present era is known as the "digital age", and digital transformation has evolved into a worldwide phenomenon. This progression influences individuals, organisations, and society as a whole. Human resource management also embraces digitalisation, offering numerous opportunities ranging from recruitment and more efficient planning of selection interviews to productivity measurement, psychodiagnostic tests, onboarding of new employees, and other areas.

As part of our study, we developed a questionnaire to determine (i) the extent to which digitisation is implemented in organisations in the Czech Republic, (ii) which specific elements of digitisation are utilised, (iii) what effects organisations notice in this regard, and (iv) whether there are any barriers to the introduction and application of digitalisation related to the age of employees. Following this, statistical analysis methods are used to determine whether the frequency of use of digital tools varies based on selected factors, namely the economic sector, the size of the organisation, and the age structure of the organisation's employees. It can be concluded that both the economic sector and the size of the organisation influence the frequency of using digital tools in HR, while the age structure of the employees appears to be statistically insignificant.

Keywords: *Digitalisation, Frequency of Use of Digital Tools, Human Resources Management*

JEL Classification: *M10, M12, O33*

1 Introduction

Digital transformation has emerged as a worldwide phenomenon, impacting organisations across all levels and compelling them to adjust to a rapidly changing world and the advent of digital technologies (Varadaj and Al Wadi, 2021). Embracing digitalisation has become crucial in the business realm, with organisations needing to adopt it to stay competitive (Kontić & Vidicki, 2018).

Digitalisation influences all aspects of the management of an organisation, including human resource management. Beyond standard administrative tasks like attendance tracking, it can be used for recruitment, employee onboarding, training, and career development, among other activities. As noted by Iwu (2016), digitalisation in human resource management (HRM) improves employee performance and positively impacts employee development, talent management, and job performance. It is clear that digitising HRM processes

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eliminates many routine tasks, reduces the risk of human error, and allows professionals to focus on significant issues, thus enabling them to use their knowledge and skills more effectively to address HRM challenges.

The digital maturity of Czech companies is growing, and they are systematically approaching their digital transformation. They are aware that without it they will hardly maintain their current market position (Confederation of Industry of the Czech Republic, 2022). The aim of this article is to find out what factors can influence the frequency of using digital tools in human resource management. In particular, the research focused on three areas that could influence this frequency of use: the age structure of the employees of a given organisation, the economic sector, and the number of employees.

The structure of the article is as follows: it begins with an introduction, followed by the theoretical background and a description of the methodology. The third chapter presents the results, while the fourth chapter provides a discussion and summary. The last chapter is the conclusion.

1.1 Digitalisation in Human Resource Management

Human resource management plays a crucial role within an organisation, and digitalisation has also become prevalent in this field. There are numerous applications of digitalisation, such as in the recruitment process for handling job advertisements or matching available CVs to job roles. It can also be used for planning and conducting selection interviews, including video interviews, virtual reality interviews, diagnostics, productivity measurements, psychodiagnostics tests, and more (Zhang and Chen, 2023). In the realm of new employee onboarding, various "onboarding applications" are available, and virtual reality can be used for virtual office tours. An AI-based buddy can be extremely helpful in helping new employees by continuously answering their questions, along with the use of e-learning (Benáková, 2017). This approach can also be extended to other HR activities.

Businesses that focus on digitalising their human resource management activities tend to manage these functions more efficiently (Stacho et al., 2023). The digital transformation of HRM is essential because, in challenging situations like the COVID-19 pandemic, companies with higher levels of digitalisation in HRM gain significant advantages over others (Zavyalova et al., 2022). Organisations that had a higher degree of digitalisation in their HRM functions before the COVID-19 pandemic were better equipped to handle their work environment and related activities. Additionally, those who prioritised technology in their HRM operations managed to recover from the effects of the COVID-19 pandemic more quickly than others (Skryl et al., 2023; Nguyen et al., 2022).

Companies that adopt digital technologies in HRM and empower their managers and employees to use them report higher satisfaction levels compared to those that rely solely on manual resources (Bilon and Litwin, 2023). Digitalisation has revolutionised HRM, substantially boosting business performance by offering daily digital tools that assist employees (Truant et al., 2021; Ribeiro-Navarrete et al., 2021). Additionally, organisations that implement digital technology in their HRM tend to attract more talented employees and effectively manage the employee lifecycle, talent acquisition, training, and assessment processes better than those that do not employ digital methods (Dutta et al., 2023).

In light of the prevalent role of technology today, organisations are raising their use of digital tools to new heights. They are progressively incorporating advanced technologies like virtual reality, artificial intelligence, and augmented reality into their HRM departments. As industries face numerous challenges, focusing on AI-based programs and digitalisation within their departments is essential to address these issues (Fang et al., 2023). Artificial intelligence is essential in the digitalisation of HRM, enhancing the capabilities, adaptability and well-being of employees (Murugesan et al., 2023).

In summary, organisations recognise numerous benefits from digitalisation, such as cost savings, time efficiency, improved financial performance, improved overall organisational effectiveness, and gaining a competitive edge. Additionally, digitalisation minimises the risk of workplace accidents – such as those in the construction industry – by providing advanced training through digital software. As digital transformation becomes increasingly vital across all industries, organisations must adapt to stay competitive and optimise their performance. The objective of our research is to explore the current state of digitalisation within organisations in the Czech Republic, identify factors that positively influence its adoption, and highlight potential barriers. This paper will present a segment of research that examines the factors affecting the frequency of utilising digitalisation tools in the domain of HRM within organisations.

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2 Methods

To achieve the objective of the article, identifying factors that can influence the use of digital tools in human resource management, a questionnaire survey was used as the primary method. The questionnaire included questions not only on factors affecting the use of digital tools in HRM, but also on related issues such as challenges in implementing digitalisation and future plans in this area. For the purposes of this article, only the responses related to the three aforementioned factors were used.

The research was carried out using the CAWI method through a questionnaire created in MS Forms. The questionnaire included a total of 24 questions, comprising both open and closed formats, with some allowing multiple choices, as well as a set of Likert scale questions. Additionally, organisations were asked to provide information about their economic sector, the number of employees, the time on the market, and the age structure of their workforce. Czech organisations from all sectors were contacted. From a purchased database (Czech Companies Database, 2019) containing 6,500 organisations, 2,000 were randomly selected and contacted, 245 of them completing the questionnaire. These organisations were chosen regardless of size or economic sector, as these characteristics were not known beforehand. The response rate for the questionnaire was 12.25%.

The evaluation of the responses of the respondents was carried out using descriptive statistics, while Fisher's exact test was used to test the hypotheses. In addition, methods such as the analysis of published information, synthesis, induction, and deduction were used.

3 Evaluation of the Questionnaire Survey Digitalisation in the Field of Human Resources Management – Dependencies

Based on the above objective, three research questions were formulated:

(1) Does the age structure of the employees of an organisation influence how frequently digital tools are used in HRM?

(2) Does the economic sector in which the organisation operates influence the frequency of use of digital tools in HRM?

(3) Does the number of employees in an organisation affect the frequency of use of digital tools in HRM?

3.1 Overall Use of Digital Tools in Human Resource Management

The responses showed that almost a fifth of organisations (18.8%) do not use digital tools in the field of HRM at all – see Table 1.

Table 1 – Use of digital tools in human resource management

use of digital tools	frequency	rel. frequency
not used	46	18.8 %
use	199	81.2 %

Source: own elaboration

From a practical standpoint, the study also explored which organisations use these tools regularly versus those that use them less than once a month, the latter being categorised as irregular usage. For simplicity, these responses were combined with the option that the organisation does not use digital tools in HRM at all. From this perspective, it was found that more than three-quarters of organisations (77.6%) use these tools on a regular basis – daily, weekly or monthly – as illustrated in Table 2.

Table 2 – Frequency of using digital tools in HRM

frequency of using	frequency	rel. frequency
not used or used irregularly	55	22.4 %
used with min. monthly frequency	190	77.6 %

Source: own elaboration

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A detailed analysis of the responses indicated that regular use of digital tools in HRM occurs predominantly on a daily basis, as confirmed by two-thirds of the respondents (66.1%) – see Table 3.

Table 3 – Frequency of using digital tools in HRM

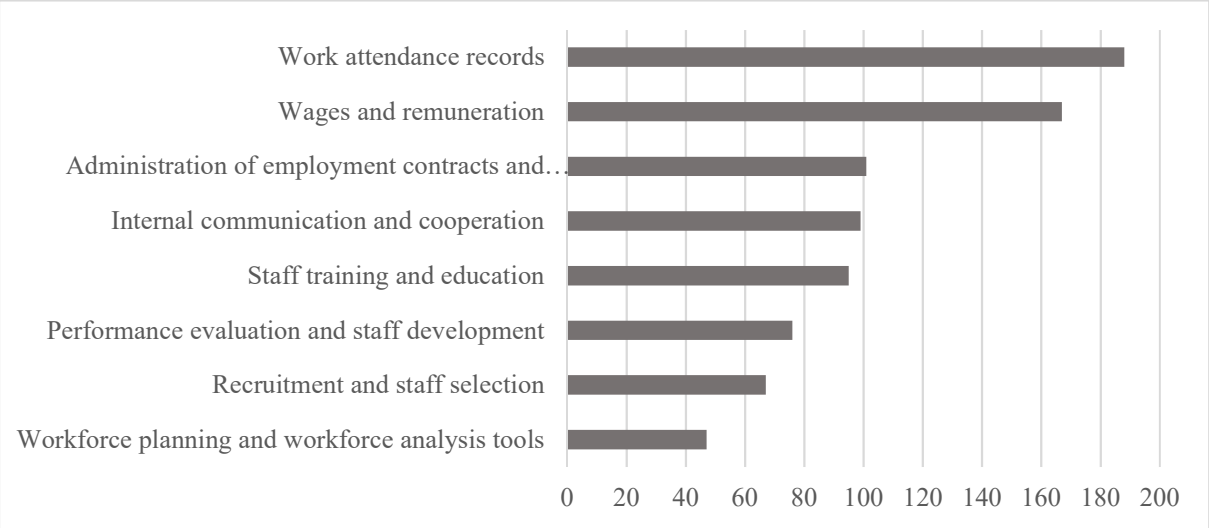
frequency of using	frequency	rel. frequency
Never - everything is just in paper form	46	18.8 %
Less often	9	3.7 %
Monthly	13	5.3 %
Weekly	15	6.1 %
Daily	162	66.1 %

Source: own elaboration

3.2 Digitalisation of Specific Tasks or Processes of Human Resource Management in Organisations

Regarding the specific application of digital tools in human resource management, they are most frequently utilised for recording attendance, followed by payroll and remuneration processes. Conversely, they are the least commonly employed for workforce planning and analysis, as well as for recruitment and selection – see Figure 1.

Figure 1 – The most frequently digitised tasks and processes in HRM



Source: own elaboration

3.3 Impact of the Age Structure of Employees in an Organisation on the Frequency of Use of Digital Tools in Human Resource Management

The following hypotheses were set for the first research question:

H0: The age structure of the employees does not affect the frequency of using digital tools in HRM.

H1: The age structure of the employees has an impact on the frequency of using digital tools in human resource management.

As shown in Table 4, the highest number of respondents came from organisations with a majority of employees aged 31-49 years, while the lowest representation came from organisations with a majority of employees under 30 years of age (only two respondents answered). For all categories, the use of digital tools in the field of human resource management was the most prevalent with a daily frequency, with the highest proportion in relation to the number of responses received from organisations where the age structure is relatively balanced, followed by organisations with a prevalence of employees aged 31-49 years.

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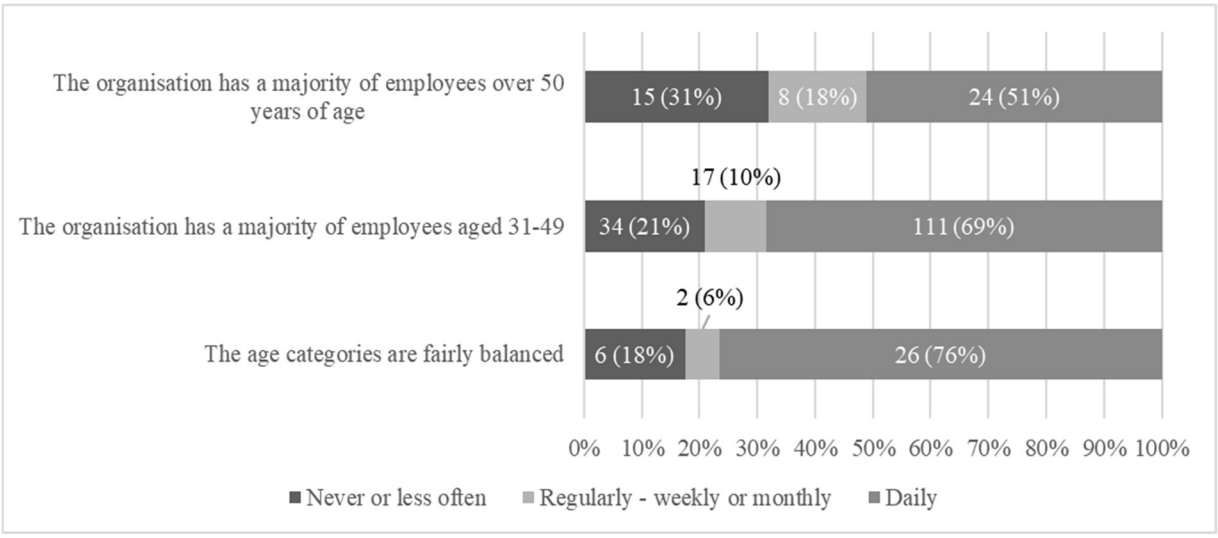
Table 4 – Use of digital tools according to the age structure of the employees

Age categories in the organisation	Never - everything is just in paper form	Less often	Monthly	Weekly	Daily
The age categories are fairly balanced	5 (15 %)	1 (3 %)	1 (3 %)	1 (3 %)	26 (76 %)
The organisation has a majority of employees under 30 years of age	---	---	1 (50 %)	---	1 (50 %)
The organisation has a majority of employees aged 31-49	26 (16 %)	8 (5 %)	7 (4 %)	10 (6 %)	111 (69 %)
The organisation has a majority of employees over 50 years of age	15 (31 %)	---	4 (9 %)	4 (9 %)	24 (51 %)

Source: own elaboration

Due to the number of responses for some categories, for the purpose of graphical representation, the responses were combined into three categories - organisations that do not use digital HRM tools at all or with a frequency of less than monthly, organisations with regular use on a weekly or monthly basis, and organisations that use these tools on a daily basis. The category of organisations with employees under 30 years of age was excluded from the graphical representation (Figure 2) as only two respondents answered here, and this would have distorted the data visualisation.

Figure 2 – Impact of the employee age structure on the use of digital tools in HRM



Source: own elaboration

Fisher's exact test ($p = 0.133$) does not reveal a statistically significant relationship between the age structure of employees and the frequency of use of digital tools in HR. Cramer's V (0.161) suggests that the analysed dependency is weak. Organisations with a majority of employees under 30 years of age were excluded from the analysis due to their very low representation (two respondents).

3.4 Impact of the Economic Sector on the Frequency of Using Digital Tools in Human Resource Management

The following hypotheses were established for the second research question.

H0: The economic sector in which an organisation operates does not affect the frequency of using digital tools in HRM.

H1: The economic sector in which an organisation operates has an impact on the frequency of using digital tools in HRM.

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As shown in Table 5, the secondary sector (manufacturing, processing) was the most represented, with 82% of the respondents indicating that they use digital tools for human resource management daily. In contrast, the primary sector (agriculture, mining), which was the second most represented sector, had the highest proportion of organisations that did not use these tools at all.

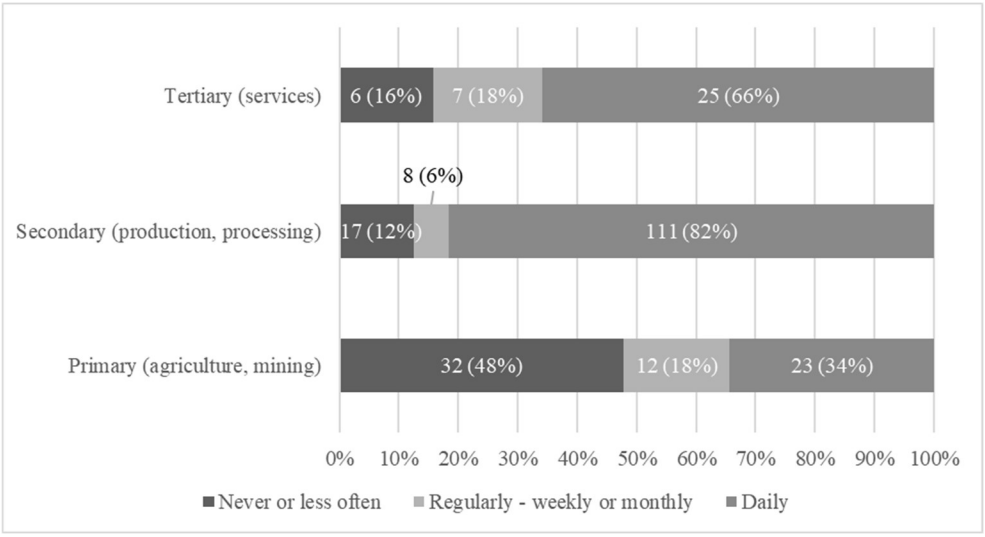
Table 5 – Use of digital tools according to the economic sector in which an organisation operates

Economic sector	Never - everything is just in paper form	Less often	Monthly	Weekly	Daily
Primary (agriculture, mining)	31 (46 %)	1 (2 %)	5 (8 %)	7 (10 %)	23 (34 %)
Secondary (production, processing)	11 (8 %)	6 (4 %)	5 (4 %)	3 (2 %)	111 (82 %)
Tertiary (services)	4 (11 %)	2 (5 %)	2 (5 %)	5 (13 %)	25 (66 %)
Quaternary (knowledge economy)	---	---	1 (25 %)	---	3 (75 %)

Source: own elaboration

Due to the number of responses for some categories, for the purpose of the graphical representation (Figure 3), the responses were combined into three categories: organisations that do not use digital HRM tools at all or with a frequency of less than monthly, organisations with regular use on a weekly or monthly basis, and organisations that use these tools on a daily basis. At the same time, the category "Quaternary (knowledge economy)" was excluded from the graphical representation as only four respondents answered here and this would have distorted the data visualisation.

Figure 3 - Impact of the economic sector on the use of digital tools in HRM



Source: own elaboration

Fisher's exact test ($p < 0.001$) reveals a statistically significant relationship between the economic sector in which an organisation operates and the frequency of use of digital HR tools. Cramer's V (0.359) indicates that this relationship is moderately strong. Due to the very low representation (4), organisations from the quaternary sector (knowledge economy) were excluded from the analysis.

3.5 Impact of the Size of the Organisation by Number of Employees on the Frequency of Use of Digital Tools in Human Resource Management

The following hypotheses were established for the third research question:

H0: The size of the organisation does not affect the frequency of use of digital tools in HRM.

H1: The size of the organisation has an impact on the frequency of use of digital tools in HRM.

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Table 6 illustrates that medium organisations (those with 50–249 employees) had the highest representation among the responses, while large organisations (those with more than 250 employees) had the fewest respondents. Despite this, large organisations showed the highest daily use of digital tools for human resource management. On the contrary, small organisation respondents (those with fewer than 49 employees) were more likely to report not using these tools at all.

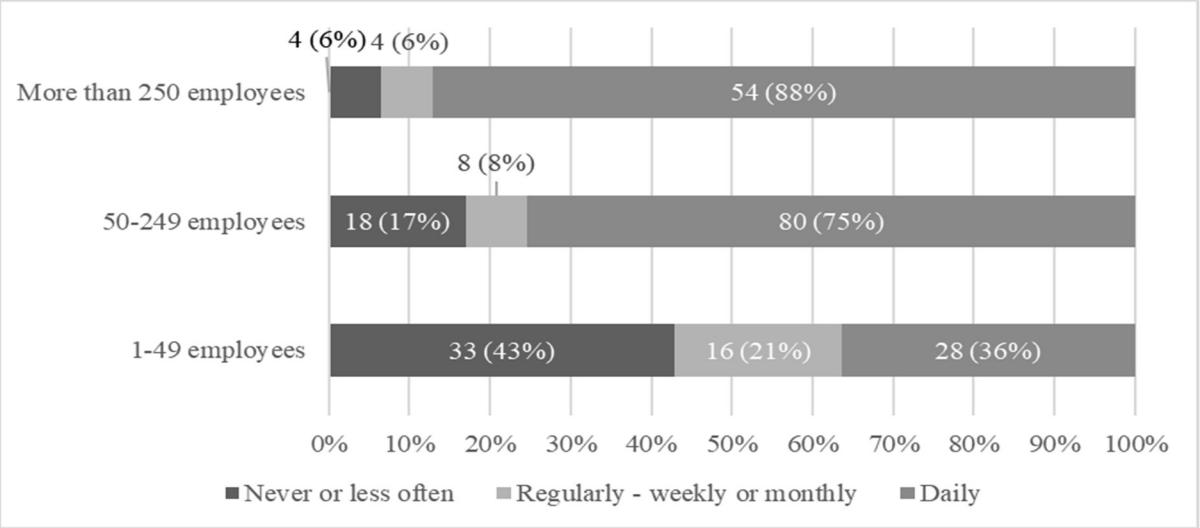
Table 6 – Use of digital tools depending on the size of the organisation by number of employees

Number of employees	Never - everything is just in paper form	Less often	Monthly	Weekly	Daily
1-49 employees	31 (40 %)	2 (3 %)	7 (9 %)	9 (12 %)	28 (36 %)
50-249 employees	14 (13 %)	4 (4 %)	4 (4 %)	4 (4 %)	80 (75 %)
More than 250 employees	1 (2 %)	3 (4 %)	2 (3 %)	2 (3 %)	54 (88 %)

Source: own elaboration

Due to the number of responses for some categories, for the purpose of the graphical representation (Figure 4), the responses have been combined into three categories: organisations that do not use digital HRM tools at all or with a frequency of less than monthly, organisations with regular use weekly or monthly, and organisations that use these tools on a daily basis.

Figure 4 - Impact of the size of the organisation on the use of digital tools in HRM



Source: own elaboration

Fisher's exact test ($p < 0.001$) reveals a statistically significant relationship between the size of the organisation and the frequency of use of digital HR tools. Cramer's V (0.336) suggests that this relationship is moderately strong.

3.6 Summary

The results of the hypothesis testing indicate a statistically significant relationship between the economic sector and the size of the organisation with the frequency of the use of digital tools in HR. Cramer's V assesses both of these dependencies as moderate. On the contrary, the relationship between the structure of age within the organisation and the frequency of using digital HR tools is not statistically significant and is considered weak, according to Cramer's V.

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Future research could focus on the benefits of digitalisation for organisations or explore potential barriers and strategies to overcome them during the implementation of digitalisation. Additionally, comparisons between different countries could be conducted, for instance, by utilising the DESI index or other available studies.

4 Conclusion

Digitalisation is undeniably a means to enhance the performance and competitiveness of organisations, impacting all business areas, including human resource management. The objective was to examine how organisations in the Czech Republic manage digitalisation in HRM and whether the frequency of using digital tools varies based on the economic sector, the size of the organisation and the age structure of the employees. This information can guide organisations in identifying which activities can be effectively digitised and understanding their frequency of usage. It also helps in preparing for potential barriers to digitalisation implementation. Additionally, this information can be utilised at the government level to target support for specific segments and facilitate the adoption and development of digital tools.

Currently, SMEs have access to state support for digitisation and the adoption of new technologies through the Ministry of Industry and Trade's program (2023). Individuals can also receive support to improve their digital skills through a program offered by the Ministry of Labour and Social Affairs (2024); however, registration with the Labour Office is required, which may be restrictive. There are no dedicated incentives for enhancing digital literacy in human resource management or for employee training in this field, which could hinder the development of digital skills in this area.

It is essential to recognise that the degree of digitalisation influences the competitiveness of an organisation, which is vital for its long-term success.

Acknowledgements

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Company Digitalization: Using QR Codes to Decrease Number of Reclamations

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Abstract

The article deals with the advanced application of QR codes in a manufacturing company. It extends the scope of QR codes from the routine monitoring of work-in-progress towards quality control. The aim of the research is to link production and non-production processes, which will lead to increased stability and reliability of individual production steps. The aim of these activities is to reduce poor quality and eliminate the possibility of making mistakes in the process. This method was applied in a medium-sized manufacturing company to reduce the number of customer complaints by 50%. After implementing the activities, the company achieved a 66% reduction in complaints. The improvement was achieved through the introduction of QR codes on the accompanying production documentation. These QR codes were used to document compliance with the required drying time in the painting process and to perform follow-up inspection activities. In order to implement these measures, a database of manufactured articles and their specific quality requirements had to be created. From this database, unique QR codes are derived, which are part of the accompanying documentation.

Keywords: *Digitalization, Production Company, QR Code, Quality Performance*

JEL Classification: *L11, L15, L23, L25, L60*

1 Introduction

A manufacturing enterprise is a dynamic model into which a number of parameters enter. The aim of the management is to try to stabilise all the variables as much as possible and to reduce the variation. This stabilisation and reduction of variation is implemented through standardisation. Individual processes of production operations and non-production support processes are established. These guidelines define exactly what goes into the process - how and with what tools it is processed - what the output will be.

Variation is introduced into the enterprise by the following factors:

- Employees
  - Everyone has a slightly different approach to work.
  - Everyone is subjective. This can be a problem in self-control.
  - People often look for shortcuts. These shortcuts can lead to more work. The reason for shortcuts can be a misunderstanding of the next process steps and its needed input.
  - Employee turnover. A new employee needs to go though an adjustment phase.
- Supplier material

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  - The material may be of different qualities. Typically, several suppliers are used for one commodity for possible failure, so it may happen that the material from company A is slightly different from company B.
  - Material may be supplied without manufacturing documentation. Typically this is a missing attestation, missing declaration of conformity.
  - The material arrives under a different number and is thus stocked as a different item. This creates a mismatch between the information system and the actual stock status.
  - Material arrives late.
- Production machine
  - Unexpected breakdowns make it necessary to reorganise the production plan using other production units
- Customer
  - The customer does not share the order plan in advance. This creates time pressure and uncertainty because the company never knows what order will be produced.
  - The customer sends orders at the last minute with an urgency to process quickly. The customer orders 2,000 different items in small batches.
  - Similar products are a problem because production employees can easily mistake a similar product. Customer orders old product revisions for their service centers. During the processing of the order, it can be easy to forget that the latest revision was not ordered, but a two-year-old revision of the part was ordered that is no longer in production.

This list of factors is far from complete, but it illustrates the need for standardisation of production and non-production processes. One of the tools for standardisation is digitalisation, which will help to manage production so that variations are minimal.

1.1 Literature Review

QR codes are utilized in several areas of the manufacturing sector, including:

1. Inventory Tracking and Management: Research shows that QR codes improve product tracking in the supply chain, enhancing inventory efficiency and minimizing errors (Harrison et al., 2018).

Harrison et al. (2018) explore the implementation of QR codes in supply chain management, focusing on their impact on efficiency and error reduction. Their study provides a detailed analysis of how QR codes streamline inventory tracking and data sharing between supply chain partners. They conclude that the adoption of QR codes enhances visibility, reduces human errors, and optimizes the overall supply chain performance. This research is particularly relevant for European manufacturers looking to improve logistics and reduce costs through technology.

2. Machine Maintenance: Studies focus on how QR codes can facilitate access to maintenance information and technical specifications for machines (Dahl & Rønnquist, 2020).

In their work, Dahl and Rønnquist (2020) investigate the use of QR codes for machine maintenance in European manufacturing environments. They show how QR codes can provide workers with instant access to maintenance records, technical documentation, and real-time system updates. This study emphasizes the role of QR codes in preventing machine downtime and optimizing maintenance schedules, leading to increased productivity. The paper also highlights the importance of training staff in new digital tools to ensure the smooth integration of such systems.

3. Streamlining Manufacturing Processes: The application of QR codes in industrial processes contributes to faster communication among workers and optimizes production lines (Norrmann et al., 2019).

Norrmann et al. (2019) focus on how QR codes can be used to improve efficiency across different stages of the manufacturing process. Their research illustrates various case studies where European companies have adopted QR codes to track materials, coordinate production lines, and communicate critical information between

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workers. The authors argue that the simplicity and cost-effectiveness of QR codes make them an attractive solution for small and medium-sized enterprises (SMEs) in the manufacturing sector.

Usage of QR codes is bringing benefits in several ways:

1. Speed and Efficiency: QR codes enable quick data retrieval using mobile devices, simplifying and speeding up processes (Fuchs & Möller, 2021).

Fuchs and Möller (2021) examine the broader impact of QR codes on operational efficiency within European industries. Their study covers various sectors, with a particular focus on manufacturing, and analyzes how QR codes contribute to faster data access, reduced paperwork, and enhanced coordination among teams. They find that companies using QR codes see a notable reduction in process delays and an increase in overall productivity, as QR codes allow for real-time updates and immediate access to crucial information.

2. Cost Effectiveness: The creation and implementation of QR codes are relatively inexpensive, allowing smaller businesses to leverage this technology without significant investments (Vallée & Morin, 2022).

In their 2022 study, Vallée and Morin explore the cost benefits of QR code implementation, particularly in small and medium-sized enterprises (SMEs) across Europe. They argue that QR codes offer a low-cost, high-impact solution for improving inventory control and product tracking, which can be crucial for smaller businesses with limited resources. Their findings show that QR codes help SMEs enhance operational efficiency without the need for significant financial investments in more complex systems, making the technology accessible to a broader range of companies.

3. Increased Transparency: QR codes can provide customers with transparent information about products, enhancing trust and satisfaction (Johnson et al., 2023).

Johnson et al. (2023) examine the role of QR codes in enhancing transparency and building customer trust, particularly in the European context. The study highlights how QR codes allow customers to access detailed product information, including sourcing, manufacturing processes, and sustainability efforts. This transparency fosters greater trust between businesses and consumers, especially in industries where ethical practices are increasingly valued. The research also discusses the growing demand for traceability and how QR codes provide a simple solution to meet these expectations.

There are several challenges and barriers:

1. Technological Integration: Integrating QR codes into existing systems can be technically challenging and requires employee training (Martinez et al., 2022).

Martinez and colleagues (2022) investigate the barriers that European manufacturers face when integrating QR codes into existing production processes. Their study identifies key challenges, including technical compatibility issues, employee resistance, and the need for infrastructure upgrades. The authors suggest that, while QR codes offer significant benefits, companies must carefully manage the change process, provide adequate training, and ensure that systems are properly aligned to maximize the technology's potential.

2. Data Security: Concerns about data protection and cybersecurity are becoming increasingly important as digital transformation expands (Klein & Schmidt, 2023).

Klein and Schmidt (2023) focus on the data security challenges associated with using QR codes in industrial environments. Their research highlights concerns about potential vulnerabilities, such as QR code manipulation or hacking, that could compromise sensitive data in manufacturing systems. The authors discuss the importance of implementing robust cybersecurity measures and monitoring systems to protect against such threats, especially as QR code usage becomes more widespread in digitally transforming industries across Europe.

3. Lack of Standardization: Currently, there is a lack of standardized procedures for creating and using QR codes, which can lead to compatibility issues (Schneider et al., 2021).

Schneider et al. (2021) explore the lack of standardization in the creation and implementation of QR codes across different industries. Their study emphasizes that, without common standards, companies may face compatibility issues when trying to integrate QR codes into multinational supply chains. The paper calls for greater collaboration among industry bodies to establish standardized practices that ensure QR codes can be universally adopted and work seamlessly across different systems and borders.

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There is ongoing research in application direction:

1. Automation and Robotics: Further research should focus on integrating QR codes with automated systems and robots in manufacturing (Haas et al., 2024).

Haas et al. (2024) discuss the future of QR codes in the context of automation and robotics in manufacturing. They highlight how QR codes can be integrated with automated systems, such as robotic arms and AI-driven processes, to enhance production efficiency. The authors propose several areas for future research, including the development of smart QR codes that can interact with IoT devices and facilitate autonomous decision-making on the production floor.

2. Development of Mobile Applications: Developing mobile applications for the effective use of QR codes in industry can open new opportunities for optimizing manufacturing processes (Fröhlich & Geiger, 2023).

Fröhlich and Geiger (2023) explore the development and implementation of mobile applications that support QR code usage in the manufacturing industry. Their research focuses on how these apps can enhance employee interaction with machines, products, and processes by providing instant access to relevant data via mobile devices. They also discuss the potential for these applications to facilitate remote monitoring and control of industrial processes, contributing to more flexible and efficient manufacturing operations.

3. Augmented Reality (AR): The combination of QR codes with augmented reality technologies could enhance employee training and real-time decision-making support (Lange et al., 2024).

Lange et al. (2024) present an innovative approach to employee training by combining QR codes with augmented reality (AR) technologies. Their study shows how QR codes can trigger AR content that guides employees through complex tasks in real time, improving both training outcomes and operational safety. The authors argue that this combination of technologies can significantly reduce training time and errors, making it a valuable tool for manufacturers looking to upskill their workforce quickly and efficiently.

2 Material and Methods

The aim of the research was to design and implement a solution that would lead to a reduction in the number of complaints. The solution must be designed to be fit for purpose in the long term, but at the same time, not to add costs to its operation. Similarly, the measure must not have a high acquisition cost. Another parameter of the measure is the ease of change management for possible modifications. Based on these parameters, I have used already established processes and only extended their application in a new way. This is by modifying the processes "scanning of production operations" and "accompanying documentation of the production part".

A common use of QR codes is in the accompanying documents that travel with the order throughout the production process. The idea is that after each production step, the worker scans the QR code and this instantly flips the status into the information system. Materials management can then immediately see the status of the work in progress in the system and can assess whether the order will be produced on time.

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Picture 1 – Production sheet using QR code

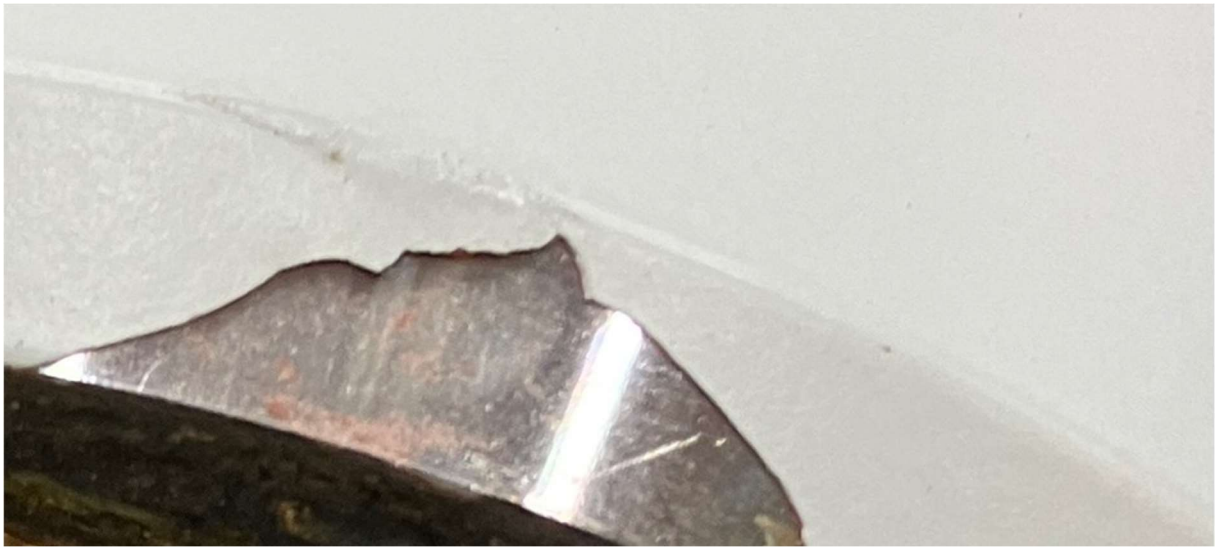
6212-2Z -	**6212-2Z** Kuullaager	PAA 00-00-00-00	TK	4	8	
DIN912-M12X25- -	**DIN912 M12X25 8.8 ZN** Silinderpea sisekuuskantpolt	PAA 01-01-01-00	TK	8	16	
52392585 -	**ECN16-D60-L175** EC/BN16 võll	PAA 00-00-00-00	TK	1	2	
52392576 -	**ECN16-D85_D60-L22** EC/BN16 puks, astmega	PAA 00-00-00-00	TK	2	4	
DIN471-60X3+1 -	**DIN471 60X3** Stopperrõngas võllile	PAA 00-00-00-00	TK	2	4	
52295352 -	**D1801B 63X53** Kummipuhver A	PAA 00-00-00-00	TK	2	4	
52564890 -	**ECN16-H333W153** EB/CN16 otsaplaat ovaal kõrge	PAA 00-00-00-00	TK	2	4	
52564891 -	**ECN16-H333W152** EB/CN16 otsaplaat ümar kõrge	PAA 00-00-00-00	TK	2	4	

Source: own processing

The company that requested the improvement of digital quality management defined the following problems:

Case 1 The paint shop workers did not respect the prescribed drying time of the production after painting. The drying time is set in the regulations at 8 hours. In reality, however, it was reduced to 4-6 hours. The customer is then faced with peeling paint after receiving his order and the part is sent back for complaint.

Picture 2 – Peeled painting from customer claim



Source: own processing

After communicating this problem, an update to the current system was introduced into production. Once the painting is complete, a parking clock will be placed on the pallet with the part where an employee will set the time the part will be ready for shipment. This was to prevent rushing and make it more visible that the required drying time was being met.

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Picture 3 – Corrective action using parking clock

Source: own processing

However, this measure did not work for the reason I mentioned in the first chapter - the human factor and the search for shortcuts.

The solution is digitalisation, which will not be circumvented. A solution has been proposed that extends the application of QR codes:

1. When the painting processes start, the employee scans the QR code from the accompanying document.

2. This will start a timer that will calculate the time: the standard time of the painting process + the prescribed drying time.

3. The following process will not be able to start until the prescribed time from point 2 has elapsed.

For this measure, a database of all production articles and their prescribed drying and painting times have been created.

Case 2 Shipping staff skip the output control process. Typically, dispatch purchases orders ready to be sent to the customer. They wait for the inspector to perform the exit inspection according to the checklist. Sometimes the shipping staff does not wait for the inspector and simply releases the parts themselves. This leads to special customer requirements not being checked, which are easily forgotten. Dispatch is at a point where they do not know which special requirements the customer had. A typical problem is a slightly different shade of paint colour. Another problem is missing accessories for a specific application on the customer's side.

The solution is to set up the inspection process so that it cannot be bypassed. Again, digitization and QR codes are offered. In this case, I suggested that the required inspection be put on the accompanying documentation.

Picture 4 – Production sheet using QR code for quality control

330	TÖÖKESKUS	**PAA-KVAL-I**	**PAA-kvaliteet, Inimesed**	24.05.24	24.05.24
			Kvaliteedikontroll		

Source: own processing

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Again, it was necessary to create a database of all manufactured items and define which parts must be inspected and which must not. No company wants to waste on 100% inspection, it is a non-value adding activity. In the subset of items to be inspected, it is necessary to define what will be inspected.

Picture 5 – Production sheet with automatic generated special quality request

Source: own processing

3 Results and Discussion

Table 1 shows the number of complaints broken down by reason for the complaint. January 23 reads as follows: the company received 6 complaints for paint, one complaint for machining, 4 complaints for missing accessories, 2 complaints for other reasons, for a total of 13 complaints.

Table 1 – Quantity of customer claims based on failure

	painting	holes/machining	missing accessories	others
I-23	6	1	4	2
II-23	4	2	1	2
III-23	6	2	2	2
IV-23	5	1	4	3
V-23	4	4	2	2
VI-23	5	0	1	3
VII-23	6	3	4	2
VIII-23	5	2	2	5
IX-23	5	2	1	2
X-23	4	4	3	4
XI-23	6	3	1	1
XII-23	5	2	3	3

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I-24	0	2	1	1
II-24	0	1	1	2
III-24	0	1	0	1
IV-24	1	1	0	1
V-24	1	1	1	2
VI-24	0	1	0	1
VII-24	1	2	0	1

Source: own processing

Graph 1 – Quantity of customer claims based on failure

Source: own processing

There has been a 92% reduction of complaints with painting problems. From the original 36 complaints to 3. Here we see that the action to monitor the drying time of the paint has worked. Production volume were stable within monitored period.

The total number of complaints was then reduced by 66%. From the original 83 complaints to 28 complaints. Again, the action with the QR inspection codes that cannot be bypassed worked. Unfortunately, this is only a partial success because the inspection activity may protect the customer, but it will not reduce the number of internal non-conformances, repairs, extra work. It is essential to continue to stabilize processes so that inspection activities are not necessary.

4 Conclusion

Through QR codes, a significant reduction in complaints was achieved as requested. This is a solution that also causes no additional costs and no loss of production time. The company where the measure was implemented is considering further extending this methodology to other types of complaints with other types of defects. The

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implementation of the measure was low cost because it uses existing processes (material accompanying documentation, scanning of production operations).

Emphasis was also placed on the simplicity of change management when it was necessary to change the drying time of the paint according to the technological regulation. Or when it is necessary to assign a new ID to a new employee.

Another important parameter of the measure is that it is not possible to skip, and therefore it is assumed that the measure will not degrade over time due to the "search for shortcuts".

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Mapping the Extent of Talent Management Use in Human Resource Management within the Moravian-Silesian Region's Enterprises

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Abstract

If companies want to survive and grow in an environment of great global competition, overtake existing competition, substantially increase added value and realize a competitive advantage, they must attract, cultivate and retain talented employees. The solution to this situation is to apply a talent management system in companies. The aim of the paper is to map the extent of the use of talent management in the management of human resources in enterprises of the Moravian-Silesian Region over a period of 10 years. Research was carried out in 2009 and 2019 in the form of quantitative research based on a questionnaire survey. The return rate of responses was 79% in 2009 (237 out of 300 businesses approached), then 73% in 2019 (220 out of 300 businesses approached). The result of the research is information on the use of talent management within 10 years; in 2009, businesses in the Moravian-Silesian Region used talent management in a very small extent (4% of businesses; 9 out of 237), in 2019 the situation was much more positive (38% of businesses; 83 out of 220). The paper presents different reasons for not using talent management, when in 2009 it was ignorance of this approach, in 2019 it was a lack of resources for its implementation. The paper also considers possible reasons for the improvement in the situation between 2009 and 2019.

Keywords: *Methodology, Reasons for Non-Use, Talent Management, Use*

JEL Classification: *M5, M12, M51*

1 Introduction

In times of global competition, human resources are becoming crucial for businesses. Not financial resources, modern and powerful technique and technology or quality strategy, but people, efficient employees, are the main competitive advantage. Companies that want to survive and grow in these conditions, overtake their existing competition and significantly increase added value, realize a competitive advantage, must attract, cultivate and retain talented employees. Extremely talented if possible. However, because this is a relatively small and finite pool of the most talented potential employees, the efforts of businesses to acquire these individuals are increasing considerably. For companies, it clearly follows that in the interests of their own competitiveness, they must find these limited resources of talented people using the most effective tools, then effectively develop them, use them, and retain them in the company [12].

In the Czech Republic, this problem appears all the more urgent because it is accompanied by two current trends: the outflow of human capital (brain drain) and the aging of the population. Businesses are experiencing the biggest talent shortage in 15 years, according to ManpowerGroup research. Finding and retaining the right talent is becoming more and more challenging [16]. A number of highly educated, qualified and talented people are

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attracted by the openness of opportunities abroad or the offer of the opportunity to work for foreign companies operating on our market.

The solution for businesses is to offer talented employees a real perspective, change their management strategy. To replace the prevailing approach of using more formal talent development programs and focusing especially on career management and succession planning with a talent management system that will enable these talented individuals to develop truly and to identify more deeply with the company. This system will then help businesses to attract and retain highly talented employees, build on their strengths, reward their achievements, provide them with opportunities for advancement and increase their overall effectiveness.

A properly set up and applied talent management system provides a number of benefits [12], which are verified both by its use, especially by foreign practice, and in recent years by its application in companies of the Czech Republic. What was the time development of the use of this approach in our conditions? Unfortunately, there are no exact statistics on the use of talent management in the Czech Republic. Since the authors have been dealing with this issue for a long time, they decided, in this paper, to summarize the use of talent management not in the entire Czech Republic, but at least in the Moravian-Silesian region.

The aim of the contribution is to map the extent of the use of talent management in the management of human resources in enterprises of the Moravian-Silesian region in the form of quantitative research based on a questionnaire survey within a period of 10 years, i.e. in 2009 and then in 2019.

According to the authors and available information, such research has not yet been carried out in the Moravian-Silesian region.

1.1 Basic Concepts of Talent Management

The two basic concepts of the examined issue are talent and talent management. From the point of view of the definition of the concept of talent, it is possible to consider the professional article [10] as a pivotal work in this area, in which the authors, based on the analyzes and comparison of the contents of definitions of talent from more than 170 professional articles from the Scientist Direct, Google Scholar, Emerald and Business databases Source Complete, 9 doctoral theses, 44 monographs, 6 working texts and 20 reports of human resources managers, defined these two conceptions of the concept of talent (1) talent as an object (talent is related to certain characteristics of an individual), (2) talent as a subject (talent is related to people). Within the second concept, two approaches are further distinguished: (1) exclusive (narrower) approach, (2) inclusive (wider) approach.

According to the exclusive (narrower) concept, talent is an individual or a group of employees performing at a high level at present and having high potential for the future. These are capable employees who can have a significant impact on the company's performance [10], [20], [5], [14], [17]. These high-performing employees are the most important force for business performance because they are more efficient, more innovative, work smarter, have confidence, are more imaginative, more proactive, are able to implement change more effectively, work very well in a team, and do high-quality work [21]. From the above, it follows that an individual who has the capacity to achieve extraordinary performance not only in the present, but also in the future is considered a talent in such a way that he/she can successfully handle new tasks.

The inclusive (wider) concept considers all company employees as talents [5]. According to this approach, each employee is considered a talent or has a specific talent and has the potential to bring added value to the company. It can be anyone who can contribute to the achievement of the company's goals. According to this concept, talent management should not be limited to only a few favored individuals [10], [22], [21]. Proponents of this approach argue that in today's knowledge-based society, a business cannot afford to achieve its goals without addressing the talents of the majority of its employees. The question of how the mentioned approach to talent management differs from the overall management of human resources in the company appears to be debatable. Higher human resource management costs can also be a problem [8]. Graphically, the definition of talent is shown in Figure 1.

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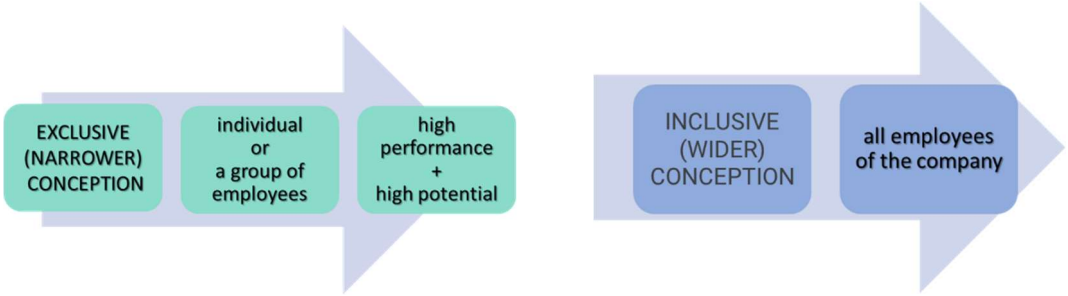
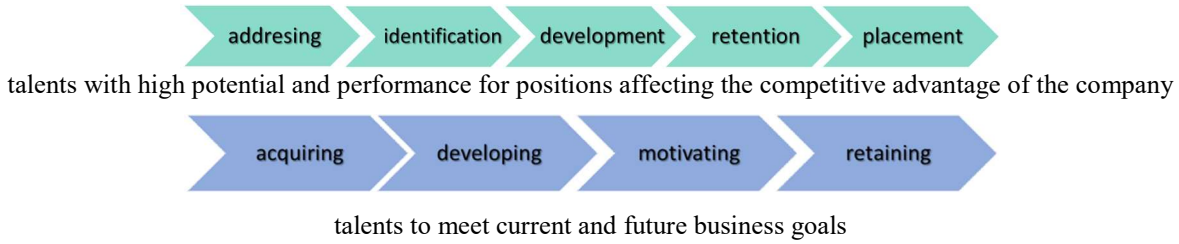
Figure 1 – Definition of talent



Source: Own processing.

The definition of the concept of talent management corresponds to these two concepts of talent. According to the exclusive concept, it is about addressing, identifying, developing, maintaining and deploying talents with high potential and performance to positions affecting the competitive advantage of the company [11], [3]. The inclusive concept understands talent management as acquiring, developing, motivating and maintaining talents for the fulfillment of current and future business goals [2], [3], [23]. Graphically, the definition of talent management is shown in Figure 2.

Figure 2 – Definition of talent management.



Source: Own processing.

In our circumstances, we lean more towards an exclusive (narrower) concept of talent and talent management.

The talent management system consists of several areas and sub-areas, from a number of interconnected sub-activities [12]. Its complex application, i.e., both the introduction of its use and the actual implementation of all its processes in the day-to-day functioning of the company, is relatively time and organizationally demanding. Despite the demonstrable benefits of talent management, this fear of time and organizational demands, in other words a kind of "fear" of not being able to apply the given approach in the company, leads to the fact that talent management, despite the decision to implement this approach, in case of sufficient financial and other resources and fulfillment of other conditions for the introduction and use of talent management, the company ultimately does not apply [12].

1.2 Using Talent Management

Let's date the beginning of talent management to 1998, when a study by *Mckinsey & Co* entitled *The War for Talent* was published [15]. The respondents of the aforementioned study were 77 global companies and almost 6,000 managers and executives. According to this study, the main competitive advantage of organizations will be their ability to find, develop and retain talented employees. In the next 20 years, according to this study, talent will be the most important corporate resource. In the last few decades, the topic of talent management has become the main discipline of human resource management, which is confirmed by a number of surveys. E.g., according to a survey by *Right Management* (part of global career management leader *Manpower*) of more than 450 senior managers from the US, Canada and Latin America, 94% of respondents said that talent management was their top priority for 2010 [13]. According to the *Deloitte Global Human Capital Trends 2019* study, in which almost 10,000 respondents from 119 countries were involved, talent management was among the 5 most important trends in the field of human capital in 2019 [6]. Even today, according to a number of studies, the issue of talent is one of the most important priorities of human resources management. As businesses find it increasingly difficult to successfully recruit external talent (which they focused on in the past), there is now a

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boom in internal talent markets, i.e., the search for talented people especially within the company and among the "hidden workforce" [7], [9], [18].

In the Czech Republic, talent management began to be used later, with a certain delay from the time when, based on the above-mentioned study, this approach begins to be applied in global practice. According to the authors' own experience, the first mentions of talent management in the Czech Republic date back to sometime around 2008. Exact statistics of the extent of use of the given approach, i.e., how many employers in the Czech Republic used or are using talent management at a certain time, were not and are not often directly available as it depends on different definitions and methods of data collection. However, from several surveys and studies, certain conclusions can be drawn about the current situation in the Czech Republic with the use of talent management. For example, *Randstad Employer Brand Research 2022* states that there is a significant proportion of Czech employers who actively try to attract and retain talent through effective talent management and that many companies in the Czech Republic have already integrated talent management into their HR strategies [19]. The *Resourcing and Talent Planning Survey 2022* mentions that most Czech companies are aware of the importance of talent management, especially in the context of recruiting and retaining key employees. The share of companies that implement specific talent management strategies varies between 40-60%, depending on the industry and the size of the organization [4]. And according to the international research called *Global Talent Competitiveness Index 2023*, which examines how individual countries around the world attract and retain talent, the Czech Republic was ranked 23rd globally (out of 136 countries) and is the 17th strongest country in Europe. which is a testament to its ability to attract highly skilled workers, especially from abroad. The study highlights the need for the Czech Republic to increasingly rely on foreign talent to cover the labor shortage [1].

Overall, it can be said that talent management is an increasingly accepted and applied strategy in the Czech Republic, especially among larger and international companies.

2 Material and Methods

Since for the Czech Republic, as mentioned above, no accurate statistics on the use of talent management existed and do not exist, the authors decided already in 2009 to conduct research and map the situation not in the entire Czech Republic, but only in the Moravian-Silesian region. It was not a comprehensive, but at least a partial view of the issue. After 10 years, i.e., in 2019, the research was repeated and the results of both research was compared in two basic questions.

2.1 Quantitative Research Conducted in 2009

At the end of 2009, the first quantitative research on the use of talent management in companies operating in the Moravian-Silesian region was carried out. The aim of the research was to find out in individual companies, among other information related to talent management, whether companies use this system and, if not, what are the reasons for not using it. The hypotheses that were confirmed or refuted by the survey were formulated as follows: Hypothesis A: Talent management is used by less than 10% of businesses in the Moravian-Silesian region; Hypothesis B: The most common cause of non-use of talent management by businesses in the Moravian-Silesian region is ignorance of it.

The method of the survey was electronic questioning through a pre-compiled questionnaire. The questionnaire included a total of 25 questions, of which 20 were devoted to the issue at hand, 5 questions were identification questions. The identification questions were aimed at finding out the predominant activity of the company's branch, the legal form of the company, the duration of the company's operation, the existence of a foreign owner or shareholder of the company and the number of employees. All problem questions were first graded, all identification questions were both first graded and second graded. As part of the processing of the obtained data, testing of dependencies between the use or non-use of talent management and the identified identification information was also carried out.

The following procedure was chosen to create the research set in which the research was carried out. A group of all enterprises (registered units) located in the Moravian-Silesian region was chosen as the basic set. In the next step, a sample set of 300 respondents was created from the basic set using the simple random sampling technique, in which the percentage representation of enterprises according to the predominant activity (sector) corresponded to the percentage representation of enterprises of the given predominant activity (sector) in the base set. The necessary data were obtained from the Statistical Yearbook of the Moravian-Silesian region 2008.

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Based on the implementation of the research, the authors could state that 237 respondents (79%) answered the questions of the questionnaire, 63 respondents (21%) did not. The set of answers from 237 respondents could be considered satisfactory for the formulation of relevant conclusions resulting from the evaluation of the answers to the questionnaire questions.

2.2 Quantitative Research Conducted in 2019

At the end of 2019, second quantitative research on the use of talent management in companies operating in the Moravian-Silesian region was carried out. This time, the aim of the research in individual companies was to find out only two pieces of information - whether companies use talent management and, if not, what are the reasons for not using it.

No hypotheses were formulated; it was comparative research (in two basic questions) with the research carried out in 2009. The research method was again chosen by electronic questioning through a pre-compiled questionnaire, which this time contained only 2 questions related to talent management, there were no identification questions in the questionnaire. The same procedure as in 2009 was chosen to create a research group of 300 respondents. The necessary data were obtained from the 2018 Statistical Yearbook of the Moravian-Silesian region.

Based on the implementation of the research, the authors could state that 220 respondents (73%) answered the questions of the questionnaire, 80 respondents (27%) did not. The set of answers from 220 respondents could be considered satisfactory for the formulation of relevant conclusions resulting from the evaluation of the answers to the questionnaire questions.

3 Results and Discussion

By processing data obtained through quantitative research carried out in 2009, it was found that companies applied talent management to a very small extent - only 9 companies (3.8%) used talent management, 228 companies (96.2%) did not.

Another finding was the main reason for respondents not using talent management. The main reason why businesses did not use this approach was the fact that they were not familiar with it. This reason was given by 118 companies out of those that did not use talent management (52%). Although some companies knew about talent management, they did not use it, due to a lack of the necessary resources, either in terms of personnel (14%) or financial (16%). Twenty-three companies (10%) thought, despite their knowledge of talent management, that this was an organizationally too demanding approach. Ten respondents (4%) said that they are aware of talent management, but that they consider it unsuitable for their company as the reason for not using it. Four companies out of these ten did not state any reason for inappropriateness, three consider their field of activity to be the reason, and three respondents did not know what the reason might be. Eight respondents (4%) gave other reasons for not using talent management. In one case, a short history of the company, in four cases the small size of the company, and three respondents distrust talent management as a new approach.

Both hypotheses were confirmed by testing - i.e., that talent management was used by less than 10% of businesses in the Moravian-Silesian region and that the main reason for its non-use was ignorance of this approach.

Could the authors determine the main factor or the main factors determining the use or non-use of talent management by companies? On the basis of data processing, interpretation of the results of the questionnaire survey and, in particular, testing of dependencies between the use or non-use of talent management and the identified identification information, the authors reached the conclusions below.

Predominant activity (industry) was not a factor in not using talent management, because most of the activities engaged in by companies using talent management could also be found in companies not using talent management. The situation was similar in the case of the legal form of the company, because both among the companies using talent management and among those that did not apply it, the majority of subjects were trading companies. An interesting finding was that neither cooperatives nor state enterprises were found among the companies using talent management, on the contrary, companies of all four legal forms were among the companies not using talent management. Even a longer period of operation of the company had no influence on the use or non-use of talent management, as companies whose operation period was 10 to 15 and more than 15

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years were found in both groups of respondents, as well as those that used talent management (eight out of nine companies) , as well as those that did not apply this approach (206 out of 228 companies) - so it was not the case that the longer the company operated, the more likely it was to use talent management.

The existence of a foreign owner influenced the use or non-use of talent management, because most companies that used talent management (seven out of nine respondents) had a foreign owner/shareholder. This fact could also be confirmed by finding that in most cases companies that did not have a foreign owner/shareholder did not use talent management (215 out of 228 respondents). Another factor that influenced the use or non-use of talent management was the number of employees of the company, its size. Of the nine companies using talent management, three were medium (51 to 250 employees) and six were large (over 250 employees); among the 228 companies that did not use talent management, 19 were medium and 14 were large, the majority, i.e. 195 of these respondents, however, fell into the category of small enterprises (up to 50 employees).

If we summarize the results of the research and the authors' own experience, the main reasons for not using talent management by Czech companies in 2009 were generally low awareness of the approach, its advantages, disadvantages, possibilities of use, influence on the fulfillment of the company's strategy and economic goals and other benefits, etc.; a lower priority given to the management of human resources in the enterprise; generally lower quality of human resource management in the company, inappropriately set standards in this area; possible rejection of management and employees towards the approach as such; concern about the complexity of introducing and using talent management stemming from the unclear division of roles in the company; fear of implementing a more organizationally demanding activity; fear of disrupting the existing business environment, fear of talent management as a change, a novelty; the impossibility of allocating the necessary resources, not only financial, due to the company's current unsatisfactory financial situation; in the case of the current satisfactory financial situation, the reluctance of the responsible persons to release the necessary financial and other resources due to concerns regarding the functioning of the enterprise in the future; lack or insufficient qualification of employees whose competences include human resource management and therefore talent management; the solution would be the possibility of using the services of external specialists (consultants, consulting firms, employees of educational institutions, etc.); reluctance to use the services of external specialists due to fear of "intrusion of someone from the outside" into the enterprise.

The identified main reason for not using talent management, i.e. ignorance of this approach, prompted one of the authors, based on the knowledge and information gained and the development of the issue over time, to develop a comprehensive view of talent management and, in particular, to create a methodology for the introduction and use of talent management in the company that can be used in practice. Both were published by the author in 2011 [12].

At the end of 2019, the authors conducted comparative quantitative research on the use of talent management in enterprises of the Moravian-Silesian Region. The goal of the research was to find out only two pieces of information in individual companies, namely whether companies use this system and, if not, what are the reasons for not using it.

By processing the data obtained from this second quantitative research, it was found that in 2019 the application of talent management in enterprises of the Moravian-Silesian region improved significantly - 83 enterprises (38%) used talent management, 137 (62%) did not. This means that the use of talent management by businesses in the Moravian-Silesian region has increased tenfold in the space of 10 years. Which can certainly be understood as a positive finding.

The main reason for not using this approach in 2019 was the lack of resources (personnel or financial).

Of course, the reasons for improving the use of talent management by companies in the Moravian-Silesian region between 2009 and 2019 are up for discussion. The authors believe that the reasons for this state of affairs can be formulated as follows: (1) Economic transformation and restructuring: The Moravian-Silesian region, which was traditionally an industrial area, was undergoing an economic transformation during this period. Traditional heavy industry and coal mining gradually declined, leading to the need to restructure the economy. Businesses began to look for new ways to adapt to changing conditions, which included investments in human resource development. (2) Increased competitiveness: With increasing globalization and integration into the European market, competition between businesses has increased. Talent management has become a key tool for ensuring that businesses have qualified and motivated employees who can contribute to innovation and improve productivity. (3) Demographic changes: The county has faced demographic challenges such as an aging

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population and an outflow of young people to other regions. Businesses have had to start investing more in attracting, retaining and developing talent to ensure continuity and growth. (4) Support from the public sector and EU funds: In this period, there was increased support from the public sector, including the use of European Union funds, which were aimed at improving the quality of the workforce and supporting innovation. This included the financing of programs focused on talent management. (5) Increasing importance of the knowledge economy: With the transition to the knowledge economy, where innovation, technology and expertise play a vital role, talent management has become key to maintaining a competitive advantage. Businesses in the Moravian-Silesian region have started to invest in developing the skills and knowledge of their employees. (6) Examples of good practice: Once companies have successfully implemented talent management, the sharing of positive experiences has led to the spread of these approaches among other companies. This chain effect has contributed to the overall increase in the use of talent management in the region.

The bold idea of the authors is the opinion that a contribution to the increase in the use of talent management by businesses in the Moravian-Silesian region was also the Czech publication entitled Talent Management, which contains the above-mentioned comprehensive view of the issue, including the methodology for the introduction and use of talent management in the company that can be used in practice. According to the authors' knowledge, this is the only Czech professional publication devoted to the given issue.

4 Conclusion

This paper dealt with one of the areas of human resource management, namely talent management, i.e. a systematic approach to working with talented employees. The theoretical starting points of the problem are based on professional literature, especially foreign literature, as the Czech literature dealing with this area is very limited. That is why it was mainly drawn from foreign sources.

The aim of the paper was to map the extent of the use of talent management in the management of human resources in enterprises of the Moravian-Silesian region in the form of quantitative research based on a questionnaire survey over a period of 10 years, i.e. in 2009 and then in 2019. The research methodology was based on a positivist-objectivist approach, where knowledge was obtained based on research and analysis of available, mostly foreign, literature in the given area. Based on these findings, a questionnaire was created to map the extent of the use of talent management in enterprises of the Moravian-Silesian region using the methods of analysis, synthesis, comparison, analogy, deduction and induction. As part of the processing of the obtained data, in 2009, in addition to the use of descriptive statistics, testing of hypotheses and dependencies between the use or non-use of talent management and the identified identification information was carried out; in 2019 only descriptive statistics were used.

The conclusions of this contribution cannot be generalized for the entire Czech Republic, because the findings are based on a sample of businesses from only one region in two-time horizons, in 2009 and 2019, not in the present. These are the limiting conditions of this paper. The use or non-use of talent management could and may differ in other regions of the Czech Republic. Therefore, the authors see the future direction of research in focusing on the entire Czech Republic and the current time horizon.

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Factors Influencing Borrower Behavior in Debt

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Abstract

The article deals with the issue of household indebtedness and over-indebtedness, focusing on the Czech Republic. It analyses various factors influencing indebtedness, including socio-economic, psychological and institutional aspects. The study examines the decision of debtors between staying in foreclosure and entering insolvency, emphasising that this decision depends mainly on the amount of disposable income. The multicriteria model shows that debt restructuring is generally more advantageous for borrowers than staying in foreclosure for a long time. The authors also suggest improvements in financial literacy and recommend a revision of credit risk management strategies by banks. The study makes an important contribution to the understanding of individuals' debt behaviour and the socio-economic consequences of debt.

Keywords: *Foreclosures, Debt Repayment, Over-Indebtedness, Socio-Economic Factors, Household Indebtedness*

JEL Classification: *D14, D91 K35*

1 Introduction

Indebtedness is an economic concept that refers to the fact that a company uses foreign capital to finance its assets. The use of foreign capital affects the profitability of a company and the level of risk of the business. The definition can be applied to the personal finances of citizens as the fact that foreign capital, i.e. credit, is used to finance a household's expenditures, and there is no doubt that the level of this indebtedness affects households' reserve formation and their standard of living.

Since the turn of the millennium, we can observe increasing household indebtedness, related to the privatisation of banks, the development of financial products, and the simplification of credit. Nowadays, we understand indebtedness not only as an economic problem, but especially as a socio-economic problem. It directly affects many areas of life, such as the unemployment rate, the quality of housing, access to health care or education, crime, recidivism, and others, but at the same time, in many cases, it is the cause of social exclusion of individuals and families, leads to social and health problems, and threatens the basic needs of children. Growing indebtedness and, consequently, over-indebtedness of households has long been perceived as a serious social problem throughout the EU, including in the Czech Republic. Currently, almost 10% of the adult population in the Czech Republic is facing foreclosure, and in total there are more than 4.5 million foreclosure proceedings pending. (Statistics of the Executors' Chamber of the Czech Republic, 2021) The situation is all the more serious as the vast majority of the population faces multiple foreclosures at once.

The solution to the indebtedness or over-indebtedness of the population is not only legislative changes, e.g. in the area of consumer credit, social work, financial literacy, but also more drastic solutions such as personal bankruptcy. Personal bankruptcy or debt settlement as a process that helps over-indebted citizens to settle their

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debts with honour in a managed process that involves creditors and offers a second chance for a reasonable return to economic life.

Socio-economic behaviour can be understood as the borrower's decision-making and behaviour in the context of his or her financial obligations, which is influenced by the broader social environment, cultural norms and economic conditions. Financial literacy plays a key role in borrowers' borrowing, lending and money management decisions, but many people are not sufficiently prepared for the complexity of modern financial products. Other factors influencing credit behaviour include psychological aspects such as risk perception, materialism and the desire for social status, which can lead to overspending and debt.

1.1 Literature Review

Debtors' behaviour is influenced by a complex interplay of psychological and sociological factors. Key psychological aspects include financial literacy, materialism and risk perception, which significantly influence decision-making and management The article "Behavioural factors influencing household over-indebtedness: a systematic review" presents several important conclusions regarding the factors influencing household over-indebtedness. Here are the key findings: Debt. Important factors influencing borrower's decision making is lack of financial knowledge can lead to poor financial decisions, which contributes to over-indebtedness, risk perception this influences borrower's borrowing behaviour. Further, the desire for material possessions, influenced by social pressure can lead to overspending and debt accumulation and finally, emotional factories are important and significantly influence financial decisions, often leading to impulsive spending.(2023, Bianwila, Cizine, Anuradha)

The article "Socioeconomic determinants of credit behavior of the population" emphasizes that consumer and credit behavior is influenced by a complex interplay of sociocultural, psychological, institutional and socioeconomic factors. The factors should be considered together rather than in isolation, providing a more comprehensive understanding of credit behaviour. Among the important factors influencing borrowers' behaviour, he cites the transition to a market economy, the phenomenon of Eastern European countries, the increasing quantity of purchases and qualitative changes in consumer behaviour. As a consequence, irrational consumption is accelerating and contributing to household debt. This is essential for understanding the psychological and social dimensions of credit behaviour. The study highlights the importance of the social environment and group behaviour in shaping consumption habits. It suggests that social influences can significantly alter individual attitudes towards consumption and borrowing, leading to a culture of consumption that may not be consistent with rational financial decision-making (2022, Kudaibergenova et al.).

Debt and personal indebtedness have become a global problem as consumption-driven economies have spread around the world. Today, outstanding consumer debt is a normal feature of many economies and a source of great mental distress for large numbers of people. Understanding personal debt, however, requires an understanding of the complex social systems that produce poverty. Debt can have profound psychological effects on individuals, as highlighted in the article "The Social and Psychological Dimensions of Personal Debt and the Debt Industry". The key psychological impact associated with personal debt is mental distress; it is the most significant psychological effect of debt. Many individuals experience anxiety, stress and depression as a direct result of their financial obligations. The pressure to manage debt can lead to a constant state of worry about financial stability and future prospects. Feelings of shame and guilt are common, with debtors feeling embarrassed about their financial situation, especially if they feel unable to manage their finances responsibly. This can lead to a negative self-image and further exacerbate mental health problems. The burden of debt can lead to social isolation. People may withdraw from social activities due to financial constraints or fear of peer judgement. This isolation can exacerbate feelings of loneliness and contribute to a decline in mental health. Indebtedness can put a strain on personal relationships. Financial stress is a common source of conflict between partners and family members, leading to arguments and breakdowns in communication. This relational strain can further affect an individual's mental well-being. Coping mechanisms include substance abuse or compulsive spending. These behaviours can create a vicious cycle, worsening their financial situation and mental health. The psychological scars left by financial struggles can affect an individual's overall quality of life and future financial decisions (2015, Serdar, M., Degirmencioglu., Carl, Walker)

The paper, entitled "The Role of Social Psychological Capital in Individual Debt Behavior," makes an important contribution to understanding how social psychological factors influence debt behaviour. Here are the key

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contributions: The study provides a comprehensive analysis of different types of debt behaviour, including borrowing, lending, and meeting debt obligations. This categorization helps to understand the nuances of how individuals interact with debt. Findings show that debtors exhibit higher levels of generalized and social trust, as well as stronger global and civic identities compared to non-debtors. This suggests that social-psychological capital, particularly trust and identity, plays a key role in influencing lending behaviour Differences in trust levels between payers and borrowers suggest that those who default on their debt obligations tend to have higher levels of trust in lending institutions. This differentiation provides insight into the psychological factors that may motivate individuals to repay their debts (2022, Gagarina)

The paper, entitled "Indebtedness in the Czech Republic and some selected EU countries", makes an important contribution to the understanding of household debt and its consequences in the Czech Republic and other selected EU countries. It highlights the relationship between household debt and the social market economic model prevailing in the Czech Republic. The paper discusses how this model affects household financial behaviour and the sustainability of public finances. It identifies specific risks associated with rising household debt, especially in the context of rising consumption and declining savings of Czech households. This perspective is crucial for policy makers and economists working on financial stability (2012, Šedová).

2 Material and Methods

The process of recovery involves several steps, starting with collections through court decisions and ending with enforcement proceedings, which burden the debtor on multiple levels, reducing his disposable income and increasing the psychological burden of ostracism. The best solution to the debtor's indebtedness in the Czech Republic is currently insolvency in the form of debt relief, which is a court-ordered form during which the debtor gets rid of all his debts. The price they have to pay in non-financial terms is the time spent in insolvency with a minimum of available funds, this is a high price for many debtors, and they more often choose the option of staying in enforcement proceedings. A borrower's decision whether to stay in foreclosure or go through insolvency is a significant borrower's dilemma. Foreclosure is an involuntary recovery process that is at the end of the chain of recovery, and for the borrower, it means a long-term reduction in income and thus in their standard of living; for many, it is a lifelong or lifetime condition. The way out of this dire situation is through insolvency proceedings, in the form of debt relief, which, once completed, will enable the debtor to return to full economic life. Nevertheless, statistics show that debtors make little use of this form of debt resolution. According to the Chamber of Executors, the total number of persons in execution as of 5 January 2024 is 645,724, while according to Insolcentrum data, 18,970 persons have been granted insolvency, a decrease of 3.5% compared to 2022. The imbalance between the number of debtors in execution and debtors in insolvency makes it clear that entering insolvency is a difficult decision for many debtors. Certainly, many factors influence this decision; for the purposes of this paper, I will only address the basic decision of a borrower to remain in foreclosure or enter bankruptcy from the borrower's perspective. In the experience of debt counsellors, a debtor makes this decision based on the state of his or her wallet, i.e., the net or non-dischargeable income that remains available to the debtor after the foreclosure or bankruptcy deduction. Debt counselling centres would have benefited from a tool that would have supported debtors' decision-making and the transition to debt relief by its calculation.

A tool for a qualified decision of the debtor can be the use of the multi-criteria decision-making method, which I tested as part of a case study. The typical debtor in the study is a person without maintenance obligations with non-preferential executions, net income of CZK 27,000. Total debt of CZK 500.00. The key to the decision-making process is the size of the debtor's disposable income, i.e. his non-sizable minimum. The model calculates the values valid in 2023.

Table 1 – Non-deductible income

Non-forfeitable income in case of foreclosure	22.546 CZK (the execution deduction is 4.454 CZK)
Non-forfeitable income in debt relief	18.092 CZK (deduction for debt relief 8.908 CZK

Source: own elaboration

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2.1 Model and Data

For the debtor-arbitrator, the most important thing is the amount of his disposable income, so he has only one criterion and does not take other circumstances into account. The decision options are V1, and V2, i.e. income in foreclosure, income in insolvency. The possible variants are therefore assessed solely on the basis of one criterion. Since there is only one criterion, its weight (importance to the decision maker) is 1.0. Decision table, it is clear that the debtor chooses option 1, i.e. income on foreclosure.

Table 2 - Single-criteria decision making

Criterion K_1	
v1	.0 (v1)
V1	22.546
V2	18.092

Source: own elaboration

2.1.1 Multi-Criteria Decision

The borrower decision-maker will include in his decision-making process the circumstances that will affect his future situation - that is, he will add more criteria and assign weights to them. The criteria include the length of time he or she will be able to repay his or her total debt, constraints in the labour market and constraints in the market for financial products. The criterion of the time taken to repay the total debt appears to be very important to him, so he will give it a higher weight.

Total debt repayment period criterion

- In the framework of the execution, if we count only the amount that is deducted from the debtor for simplicity and do not take into account the order of individual claims, interest and execution costs and other conditions set by law in the execution procedure, he will pay his total debt for about 112 months.
- In the context of the insolvency proceedings, he will repay his debt for a maximum of 60 months, again for the sake of simplicity we do not consider the monthly payment to the insolvency administrator

This criterion is perceived by the debtor as essential and is given a weighting of 30 %.

Labour market constraints criterion

- The debtor arbitrator is working, but he knows that employers are unfriendly to people with foreclosures and are reluctant to employ them for many reasons, so if he were forced to change jobs, his foreclosure would affect that. The restriction on you would come into play for the duration of the foreclosure.
- Under debt relief, the debtor is not restricted in the labour market, but rather is encouraged to change jobs so that his income is higher.

This criterion is also important for the debtor and is weighted at 20%.

Criterion of restrictions in the market for financial products

- Debtors in foreclosure have difficulty accessing their bank accounts and cannot, for example, take advantage of employer benefits in the form of life insurance contributions or supplementary pension savings. Debtors in insolvency are not affected by these restrictions, or only marginally, so the restriction would again only apply to the period of debt repayment in execution.
- The borrower perceives the financial market constraint as not significant and assigns it a weight of 10%.

We enter the criteria values and weights into a table, assign points to each criterion for each variant - we create normalized values that we can compare with each other. We give the best variant in a given criterion a number of points corresponding to the weight of the criterion and for the remaining variants we calculate the points by the ratio between the best and the variant under consideration. The weights for each criterion are determined using the Saaty method, the weights are converted to percentages and the points for each criterion in both variants are calculated. The option which receives the higher number of points is more favorable.

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Figure 1 - Saaty matrix for determining the weights of the criteria

$$\begin{pmatrix} 1 & 9 & 5 & 3 \\ \frac{1}{9} & 1 & 3 & 2 \\ \frac{1}{5} & \frac{1}{3} & 1 & 2 \\ \frac{1}{3} & \frac{1}{2} & \frac{1}{2} & 1 \end{pmatrix}$$

Source: own elaboration

Table 3 - Point values recalculated from weights calculated by Saaty's method

		Option 1 foreclosure		Option 2 of debt relief	
Criterion	weight in %	CZK	body	CZK	body
disposable income	61	22546	61	18092	49
repayment period	17	112	9	60	17
labour market constraints	10	112	0	0	10
financial market restrictions	12	112	0	0	12
sum of points			**70**		**88**

Source: own elaboration

It is clear from the table that Option 2 of the debt settlement is more advantageous with a score of 88.

The debtor used multi-criteria decision-making to decide whether to remain in enforcement proceedings or to use debt relief to resolve his indebtedness; in the first case, he determined the weights for his criteria himself, and in the second case, the weights were calculated using the Saaty method. Once the weights for each criterion were determined, the scores for both options were added up, with the higher score deciding on the more favourable option. In both cases, Debt Service Option 2 scored higher and thus qualified for the more favourable option.

3 Results and Discussion

Understanding the complex decision-making process of debtors when choosing between staying in foreclosure and entering debt relief. The results show that borrowers' decision-making is largely influenced by the amount of their disposable income after foreclosure or bankruptcy deductions, supporting the hypothesis that financial motivation is one of the key factors. However, economic calculations alone are often not sufficient to explain the full range of borrower behaviour, which is also influenced by a number of socio-economic and psychological aspects.

One important finding is that debtors often perceive enforcement proceedings as a permanent state from which it is difficult to escape, which can lead to passivity and resignation to resolving their indebtedness. This situation may be the result of both a lack of information about the possibilities of debt settlement and psychological factors such as feelings of shame, fear of bankruptcy or ignorance of the debt settlement process. The results show that even though debt relief represents a more favourable option for debtors (e.g. shorter repayment period and more flexibility in the labour market), many debtors choose to remain in foreclosure, suggesting the need for improved financial literacy education and awareness of the available debt resolution options.

Another key factor is the influence of the socio-economic environment on borrowers' behaviour. As the literature review shows, individuals' financial decision-making is strongly influenced by social norms and consumption pressures. Borrowers are often driven to borrow because of the pressure to maintain a certain social status, which leads to overspending and subsequent debt. This phenomenon is particularly evident in economies where

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consumption is promoted as the main engine of growth. Hence, to address the problem of debt, it is necessary not only to improve individual financial literacy but also to address the broader social and cultural factors that encourage overconsumption and risky credit behaviour.

Banks and other financial institutions could benefit from adapting their credit risk management strategies to take into account specific socio-economic factors and the level of financial literacy of the population. This approach could help mitigate the risk of over-indebtedness and encourage more responsible lending behaviour. They could also play an important role in providing information and education to borrowers on debt management options and foreclosure prevention.

Finally, the study shows that the legislative framework in the area of personal bankruptcy and foreclosures should be continuously re-evaluated and adjusted to better protect the interests of debtors and creditors and to promote sustainable debt resolution. Overall, the issue of household debt requires a comprehensive approach that considers not only economic factors but also broader socio-economic and psychological aspects. The results of this study can serve as a basis for further research and policymaking aimed at alleviating the problem of over-indebtedness and promoting household financial stability.

4 Conclusion

The key insight is that economic calculation alone is not sufficient to explain credit behaviour. The socio-economic environment, consumption pressures and cultural norms also play an important role, which may encourage risky financial decision-making. These factors mean that debt and over-indebtedness are not only financial problems but also social problems that need to be addressed at the level of legislation, education and social work.

Recommendations for banks are to revise their credit risk management strategies. banks need to adapt their assessment tools to better reflect the unique characteristics of the national economy and the financial literacy of the population. This recommendation aims to improve credit risk management in light of identified socioeconomic factors

In conclusion, household indebtedness is a complex problem that requires a thorough understanding of the economic, social and psychological factors influencing borrower behaviour. It shows that the decision between staying in foreclosure and entering into debt relief is a complicated one for many borrowers and depends mainly on the amount of disposable income, which is often the main criterion they consider. Although debt relief offers a shorter repayment period and better economic prospects, many borrowers do not use this option, which may be due to lack of information, fear of the process or psychological barriers.

Legislative changes around foreclosure and personal bankruptcy can contribute to a fairer and more efficient system that better protects the interests of debtors while allowing creditors to recover their claims. Overall, the issue of household indebtedness requires a comprehensive and multidisciplinary approach that takes into account not only financial aspects but also the broader social context in which debtors find themselves. The solution may lie in an amendment to the Insolvency Act, which transposes the Pope's Insolvency Directive, reduces the period of debt relief from 5i years to 3 years, and removes the condition of payment of 30% of the registered claims by the debtor. The amendment is to a certain extent more debtor-friendly, eases the conditions for the fulfilment of the debt relief, while emphasising the debtor's honest intention; the performance of the verifier, which is already reduced by the amendment, may be questionable; the amendment will promote individual assessment of the fulfilment of the debt relief.

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A New Peak or a Change in the Main Patterns? Effect of the War in Ukraine on the Official Development Assistance of Czechia and Poland

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Abstract

Official development assistance (ODA) is one of the key sources of external finance for many less developed countries. It is provided by more developed countries (donor countries) to promote development in less developed countries (recipient countries). However, ODA is quite a broad concept and also includes humanitarian and emergency aid that enables reacting to urgent crises, like the war in Ukraine. The Czech Republic and the Republic of Poland are officially recognized donors of ODA thus they contribute to the fulfilment of Sustainable Development Goals (SDGs) in the ODA recipient countries. Despite the progress Czechia and Poland have made in recent years, they have not met international commitments concerning the volumes of ODA in most years. However, in 2022, both countries increased their financial allocations to ODA and met the ODA commitments for the first time. The aim of the analysis, which results are presented in the paper, was to identify and examine changes in the main patterns of ODA provided by the Czech Republic and the Republic of Poland between 2018 and 2023. The main findings confirmed that the increase in ODA volumes in 2022 resulted from the beginning of the war in Ukraine and the most important part of this increase resulted from the increased expenditures on refugees coming from Ukraine who were hosted by both countries. Because of this main consequence, a sharp increase in ODA volumes in 2022 was followed by a sharp decrease in 2023 in the case of both countries.

Keywords: *Czechia, Humanitarian Aid, Official Development Assistance, Poland, Refugees, Ukraine*

JEL Classification: *F35, F63, H87*

1 Introduction

The Czech Republic and the Republic of Poland, further shortly referred to as Czechia and Poland, belong to the donors of official development assistance (ODA), gathered in the Development Assistance Committee of the OECD (DAC OECD), and thus both countries contribute using ODA to the sustainable development in less developed countries. As the ODA donors, Czechia and Poland have many common characteristics. Both countries have the same historical roots of their current development policies and behave similarly because their thematic and geographical priorities seem to be the same. Both countries experienced the aid recipient status in the early 1990s. However, in the mid-1990s, they introduced their first development cooperation programmes focused on less developed countries. Their donor's effort was later stimulated by their accession to the Organization for Economic Co-operation and Development (1996) and the European Union (2004). In 2013, both countries became members of the DAC OECD – as the first post-communist countries. To prepare for the

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entrance to this elite club of ODA donors, they modernized the institutional and legal framework of their development policies, adopted acts on development cooperation, and reviewed their priorities in ODA. Despite the remarkable progress in the last years, both countries stayed behind the international commitments concerning the ODA volumes. However, data on ODA indicated in 2022 that Czechia and Poland increased their financial allocations to ODA because of the increased allocations they assigned to Ukraine.

Since its independence in 1991, Ukraine has been an ODA recipient country. The armed conflict in the Eastern part of Ukraine (started in 2014) and the Russian armed attack resulted in a war (started in February 2022) increased the foreign aid allocated to Ukraine. As a consequence of the war, foreign aid allocated to Ukraine was increased by most donor countries. In the first month of the war (from 24 February to 27 March 2022), the United States, the European Union and its member states, and Canada offered Ukraine the biggest government support, where Poland's commitments were the second largest and Czechia's were the eleventh largest (Antezza et al., 2022). The most discussed in the media was the military support but also the ODA allocated to Ukraine started to grow in 2022. In 2022, ODA for Ukraine reached the value of 29,4 bil. USD, when 99 % was spent by the DAC OECD member states (OECD, 2024a).

Czechia and Poland are considered long-standing proponents and supporters of Ukraine and they recognize it as an ODA partner country. Ukraine is specified in the current framework of Czechia's development cooperation as a specific partner country. Before the war, education, healthcare, and humanitarian aid (focused on the Eastern regions affected by the armed conflict since 2014) were the key thematic priorities of Czech development cooperation in Ukraine (Ministry of Foreign Affairs, Czech Republic, 2024). Between 2016 and 2020, Poland's cooperation with Ukraine was focused on topics like entrepreneurship and the private sector, human capital, and good governance. Poland also sent humanitarian aid to Ukraine (Government, Republic of Poland, 2024). The partnership between Poland and Ukraine dates back to 2005 (Zalas-Kaminska, 2024). After the beginning of the war in 2022, Czechia and Poland started to provide military aid to Ukraine that is not classified as a part of official development assistance. However, both countries also increased their ODA for Ukraine.

The analysis presented in the paper aims to identify and examine changes in the main patterns of ODA provided by Czechia and Poland between 2018 and 2023. The main attention is paid to the effect of the war in Ukraine on the volume and structure of ODA provided by both countries. The aim of the analysis reflects two research questions: RQ_1) Did the increased ODA for Ukraine lead to the increase in total volumes of ODA provided by both countries?; RQ_2) Did the increased ODA for Ukraine lead to the decrease in other forms of ODA provided by both countries? To answer these two research questions, methods of descriptive statistics were used to analyse the data downloaded from the OECD statistical database. The analysis and its results are introduced in the broader context as the main characteristics of Czechia's and Poland's development cooperation are also briefly described.

2 Theoretical Background: Official Development Assistance, its Forms, and Motivation of Donor Countries

In general, foreign aid is an aid provided by a donor to a recipient, which are two different countries. Foreign aid consists of all resources necessary for development – physical goods, skills, technical knowledge, financial grants (gifts), and loans provided with concessional interest rates. Aid is provided to meet humanitarian needs, support development, and help to eradicate poverty in less developed countries. Foreign aid can also include aid provided for military purposes (Riddel, 2008). In 1969, official development assistance (ODA) was adopted as the gold standard of foreign aid. Although ODA is also quite a broad concept, its scope is narrowed down as loans and credits for military purposes are excluded from ODA. The OECD defines ODA as government aid designed to promote economic development and welfare in developing countries (listed in the ODA recipient list). ODA includes financial assistance through grants and soft loans, technical cooperation, and emergency or food help (OECD, 2024b). ODA must be provided by official agencies, including states and local governments, or by their executive agencies, according to the thematic and geographical priorities of donor countries (Kovářová, 2021). In the context of public economics, ODA is considered a public good supplied by the government of a donor country (Fuchs et al., 2014).

ODA donor countries, that are members of the OECD, cooperate in the DAC OECD, which represents a unique international development forum. The DAC OECD was established to promote development cooperation and other relevant policies and nowadays includes 32 important ODA donors (OECD, 2024c). However, some important donor countries stay outside the DAC OECD, like Saudi Arabia or China. Donor countries follow

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moral, political, cultural, or commercial motives when they define their priorities in development cooperation (Francisco et al, 2021, Dufková, 2021). The moral motives refer to the donors' altruism while following the commercial motives, donors consider ODA a way that can help them to open or strengthen trade and investment relations with recipient countries. Although one motive is usually predominant for a specific donor-recipient relationship, in general, motives are often mixed (Lancaster, 2006) and can even change over time (Opršal et al., 2021). The behaviour of ODA donor countries is confluence by international and domestic forces (Gulrajany and Calleja, 2019), having positive or negative impacts on ODA programmes and funding. In most cases, ODA is distributed according to the preferences of donor countries and not according to the real needs of recipient countries (Hennessy et al., 2023). This is visible from the international statistics on ODA, measuring primarily the spending of donors on ODA but not considering the benefits of ODA for recipients (Kenny, 2020).

ODA can be provided as bilateral or multilateral aid. Bilateral aid represents a direct relationship between the ODA donor country and the ODA recipient country. Multilateral aid means that ODA is provided by the donor government to the ODA-eligible multilateral development agencies or international organizations to support their programmes and funds in recipient countries (Kovářová, 2021). A specific form of multilateral ODA is represented by the so-called earmarked multilateral ODA. It represents aid distributed through multilateral organizations, but still following the preferences and priorities of donor countries. In this case, international organizations serve just as contractors delivering ODA to a specific recipient country or specific project (OECD, 2023). Several other types of ODA can be recognized, reflecting its main purpose. The OECD classifies bilateral ODA according to the type of activity to these categories (OECD, 2024b): country programmable aid, humanitarian and food aid, administrative costs, and costs on refugees hosted in donor countries (so-called in-donor refugee costs). Some of these ODA categories can be discussed whether they are still provided in line with the main purpose of ODA (to promote development and welfare in ODA recipient countries) despite quite a broad understanding of development, including inter alia economic and social progress, addressing the global problems, humanitarian relief or democratization (Lancaster, 2006). The expenditures on refugees hosted in donor countries are considered this category in question (Hynes and Scott, 2013). Therefore, some ODA donor countries decided not to report these expenditures as a part of their ODA allocations (OECD, 2024e).

According to the United Nations (UN), donor countries must provide at least 0,70 % of their GNI on ODA. This international commitment was adopted by the UN General Assembly with Resolution nr. A/RES/2626(XXVI) in 1970. Despite many proposals for the review, it was reaffirmed officially several times and it is still applied (Jung et al., 2024). For instance, this commitment has been incorporated into the 2030 Agenda for Sustainable Development as the sub-goal of the sustainable development goal nr. 17. The DAC OECD members who are also members of the European Union are committed to the EU-declared ODA/GNI targets, defined specifically for the countries accessing the EU before and after the year 2003 because of their different experience with the ODA donor status. Countries accessing the EU after the year 2003 should have spent on ODA at least 0,17 % of their GNI by 2010, resp. 0,33% by 2015. The second target was extended to 2030. Other EU donor countries should contribute to the collective commitment of the EU to spend on ODA 0,70 % of GNI (Kovářová, 2021). However, most donor countries have stayed behind these international UN or EU commitments. Latest data show, that although the total volume of ODA was higher in 2022 and 2023 than in previous years, only five members of the DAC OECD – Denmark, Germany, Luxembourg, Norway, and Sweden – met or exceeded the targeted value of the ODA/GNI ratio (0,70 %) in 2023 (OECD, 2024a).

3 Data and Methods

Official development assistance is considered the gold standard of foreign aid since the 1960s. Therefore, it is quite a frequent research topic, examined in various consequences. The most common research consequences refer to the volumes and efficiency of ODA, resp. its contribution to development and poverty reduction. The objective of the research which partial analysis is presented here in the paper is to identify and assess the differences in the behaviour of emerging and traditional donors of ODA. So-called emerging donors are represented in the research by EU member states, that have been accessing the EU since 2003 and are members of DAC OECD. The analysis, which results are presented in the paper, aimed to identify and examine changes in the main patterns of ODA provided by Czechia and Poland between 2018 and 2023. The aim of the analysis reflects two research questions: RQ_1) Did the increased ODA for Ukraine lead to the increase in total volumes of ODA provided by both countries?; RQ_2) Did the increased ODA for Ukraine lead to the decrease in other forms of ODA provided by both countries? Methods of descriptive statistics were used to answer these two research

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questions. The Pearson correlation coefficient (PCC) was calculated to examine whether any relationship between specified volumes of ODA existed in the specified period.

Statistical data used in the analysis were downloaded from the statistical database of the OECD (OECD Data Explorer) and from the OECD publications. By the end of 2017, the OECD used the flow-basis methodology to collect data on volumes of ODA. This methodology was based on the cash flow method, where ODA provided to less developed countries increased total ODA volumes, and the repayments of loans decreased them. Since 2018, ODA volumes have been calculated using the grant-equivalent methodology, where the loans are recalculated to be expressed as grants, and repayments of loans are not considered. This change in the OECD methodology is reflected in the analysis because data on the values of ODA/GNI ratio before and after the year 2018 are not considered fully comparable. ODA volumes are presented in USD in the 2022 constant prices and data on ODA disbursements were used, which means that real expenditures on ODA of donor countries were analysed.

4 Results

Czechia and Poland are ODA donor countries having the same historical experience with foreign aid they provided in the second half of the 20th century. However, in those days, foreign aid was affected by the communist regimes of both countries and the Cold War determining the relations in the world economy and politics. Therefore, this foreign aid did not mostly meet the criteria of ODA. After the regime falls in the 1980s, Czechia and Poland experienced the status of ODA recipient countries because of the foreign support provided to help both countries with economic and political transformation (Opršal et al., 2021). However, in the mid-1990s, both countries started their own ODA programmes to promote development in less developed countries (Skolimowska, 2017; Horký-Hlucháň, 2015). Czechia's and Poland's shift from recipients to donors was prompted further by their accession to the OECD (in 1996) and later to the EU (in 2004) (Opršal et al, 2021). Because of their quite short experience with the ODA donor status, Czechia and Poland are sometimes called the emerging, re(emerging), rising, or new ODA donors to highlight their difference from the traditional or old ODA donors, represented by mainly the Western European countries having a long history in providing ODA (Jančovič, 2023; UNDP, 2011). Nowadays, the term emerging donor is also used to speak about ODA donor countries staying outside the DAC OECD, but still important providers of ODA (Robledo, 2015; Sato et al., 2010).

4.1 Priorities and Motives of Czechia's and Poland's ODA

Czechia and Poland are members of the Development Assistance Committee of the Organisation for Economic Co-operation and Development (DAC OECD). Czechia became a DAC OECD member in 2013, but its first steps in becoming an ODA donor date back to 1995. The main objective and forms of Czechia's development cooperation are defined by the *Act on Development Cooperation and Humanitarian Aid, and Amending Related Laws*, being in force since 2010. The Act specifies the objectives of the development cooperation, the main principles and rules for aid funding, and the competencies of the state institutions in ODA (principal authority is assigned to the Ministry of Foreign Affairs). The Act declares that the Czech development cooperation aims to contribute to the eradication of poverty in the context of sustainable development, to promote social and economic development, environmental protection, to protect human rights, and to promote good governance in developing countries (Ministry of Foreign Affairs, Czech Republic, 2010). The strategic priorities of Czechia are specified in the multiannual strategies adopted by the Ministry of Foreign Affairs. The last strategy - *The Development Cooperation Strategy of the Czech Republic 2018-2030* - was adopted in 2017. It formulated the priorities for the period 2018-2030 (see details in Table 1).

Poland became a DAC OECD member in 2013 as well. Similarly, development cooperation is an integral part of Poland's foreign policy with the main responsibility assigned to the Ministry of Foreign Affairs. Poland's *Development Cooperation Act* was adopted in 2011. It describes a framework of Poland's development cooperation. The act defines its objectives as follows: to promote and support the development of democracy and civil society (including for instance principles of good governance, and respect for human rights); to support long-term social and economic development in developing countries; and to undertake actions contributing to poverty reduction (Ministry of Foreign Affairs, Republic of Poland, 2024a). The priorities are declared then with the multiannual programmes, adopted by the Ministry for specific periods. The last programme - *The Multiannual Programme for Development Cooperation for 2021 – 2030: Solidarity for Development* - specifies Poland's priorities by the end of the year 2030 (see details in Table 1).

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Table 1 –Thematic and geographical priories of Czechia and Poland

Czechia	***Development Cooperation Strategy of the Czech Republic 2018-2030***
Thematic priorities followed by ODA allocations	Good democratic governance, sustainable management of natural resources, economic transformation and growth, agricultural and rural development, inclusive social development (Declared links to SDGs 2, 6, 7, 8, 13, 15, 16)
Geographical priorities followed by ODA allocations	Priority partner countries: Bosnia and Herzegovina, Cambodia, Ethiopia, Georgia, Moldova, and Zambia Specific countries: Afghanistan, Palestine, Ukraine, and Syria
Poland	***The Multiannual Programme for Development Cooperation for 2021 – 2030: Solidarity for Development***
Thematic priorities followed by ODA allocations	SDG 16 Peace, justice and strong institutions; SDG 4 Quality education; SDG 8 Decent work and economic growth; SDG 10 Reduced inequalities; SDG 3 Good health and well-being; SDG 6 Clean water and sanitation, SDG 11 Sustainable cities and communities, SDG 13 Climate action
Geographical priorities followed by ODA allocations	Priority partner countries: According to the Multiannual Programme, they will be selected among the countries qualified for the European Neighbourhood Policy, including Eastern Partnership countries, and selected Middle Eastern, North African, and sub-Saharan countries. In July 2024, the Polish Ministry of Foreign Affairs reported on its websites these ten priority partner countries: Belarus, Georgia, Moldova, Ukraine, Ethiopia, Kenya, Lebanon, Palestine, Senegal, and Tanzania.

Note: SDGs means Sustainable Development Goals – the global development agenda adopted by the United Nations in 2015 for the period 2015-2030. SDGs include 17 goals that should help to transform society towards a more sustainable one.
Source: Ministry of Foreign Affairs, Czech Republic (2017); Ministry of Foreign Affairs, Republic of Poland (2024b); Kovářová (2024), own processing

Czechia and Poland derive their ODA priorities from the SDGs as the UN and OECD require and thus their ODA is designed to contribute to the fulfilment of SDGs in their ODA partner countries. The SDGs focused on peace, good governance, socio-economic development or climate action seem to be the key priorities for both countries. Czechia and Poland cooperate with similar priority partner countries, including post-Soviet countries like Moldova, Georgia, and Ukraine. However, they provide ODA to some Middle East, or African countries as well.

OECD (2024a) describes the motives of Czechia's ODA as follows – it is focused on *reducing global poverty, fragility, and inequality while promoting its national interests, such as strengthened security and economic diplomacy through stronger political, trade, and investment relations*. The motives of Poland's development cooperation are related by the OECD (2024a) to Poland's engagement with the European Union as its multilateral priorities, with a strong promotion for the Eastern Partnership initiative aiming at stability and successful transformation in the countries surrounding the EU in the East. Poland's ODA is a mix of *motives of pragmatic, political, and economic natur*e (Skolimowska, 2017, p. 125). Opršal et al. (2021) consider the motives of both countries a mix of geopolitical and development objectives.

4.2 Meeting of the ODA/GNI Targets by Czechia and Poland

Czechia and Poland as members of the UN, OECD, and EU are committed to the declared commitments concerning the volumes of ODA. According to the UN target, both countries should provide on ODA at least 0,70 % of their GNI. According to the EU target, they should have spent on ODA at least 0,17 % of their GNI by 2010, resp. at least 0,33 % by 2030. Both countries also try to meet their national targets concerning the ODA volumes. The long-standing target of Poland is to meet the EU targeted value of the ODA/GNI ratio. This commitment was officially confirmed with the last two multiannual programmes for development cooperation. Czechia declared its official ODA/GNI commitment in the strategy framing its development cooperation during

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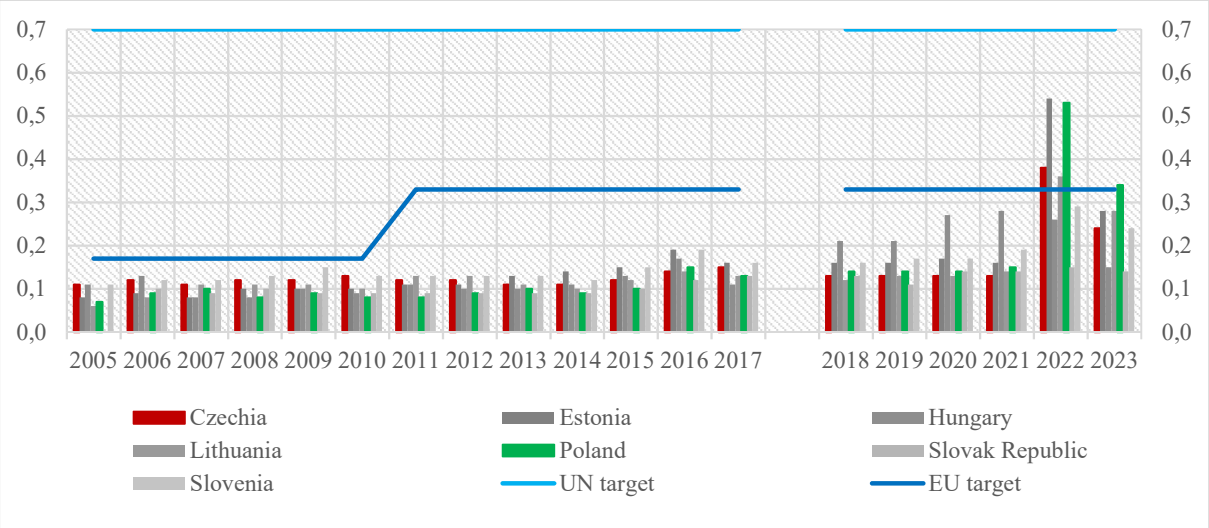
the period 2010-2017. The Strategy introduced the aim to stabilize the value of the ODA/GNI ratio at the level of 0,11 % and to increase it annually by 0,01% (Kovářová, 2021). Despite the declared commitments, both countries stayed behind them in most years in the period 2005-2022 (see Figure 1). However, their values of ODA/GNI ratio did not differ significantly from other emerging ODA donors from Central and Eastern Europe.

Figure 1 – Values of ODA/GNI ratio (in %)



Note: 2005-2017 data on net ODA, 2018-2023 data on ODA grant equivalent
Source: OECD Data Explorer (OECD, 2024d), own data processing

The values of ODA/GNI ratio did not indicate any differences in the behaviour of the emerging donors from Central and Eastern Europe. However, lines in Figure 1 revealed that Hungary was the most generous ODA donor country in terms of ODA/GNI ratio between 2018 and 2021, but still staying behind the declared commitments. A significant increase in the values of the ratio was reached in 2022. In this year, four countries exceeded the EU-targeted value of the ODA/GNI ratio, namely Czechia, Estonia, Lithuania, and Poland. These increased values resulted from the increased ODA for Ukraine after the beginning of the war in February 2022. However, data on all countries are not fully comparable in 2022 and 2023 as Hungary decided not to include its expenditure on refugees in ODA and Slovakia did not include the expenditure spent on refugees coming from Ukraine in ODA (OECD, 2024e).

Table 2 – Values of ODA/GNI ratio in 2021, 2022 and 2023

Country	2021	2022	Y-o-y change 2022/2021	2023	Y-o-y change 2023/2022
Czechia	**0,13 %**	**0,38 %**	**0,25 pp**	**0,24 %**	**-0,14 pp**
Estonia	0,16 %	0,54 %	0,38 pp	0,28 %	-0,26 pp
Hungary	0,28 %	0,26 %	-0,02 pp	0,15 %	-0,11 pp
Lithuania	0,14 %	0,36 %	0,22 pp	0,28 %	-0,08 pp
Poland	**0,15 %**	**0,53 %**	**0,38 pp**	**0,34 %**	**-0,19 pp**
Slovakia	0,14 %	0,15 %	0,01 pp	0,14 %	-0,01 pp
Slovenia	0,19 %	0,29 %	0,10 pp	0,24 %	-0,05 pp

Source: OECD Data Explorer (OECD, 2024d), own data processing

Between 2021 and 2022, the values of Czech and Polish ODA/GNI ratio grew by 0,38 pp, resp. 0,25 pp, which means the highest upward shifts in the group of compared countries. However, their downward shifts were again the highest next year. These sharp changes indicate that both countries did not sustain their ODA volumes between 2022 and 2023.

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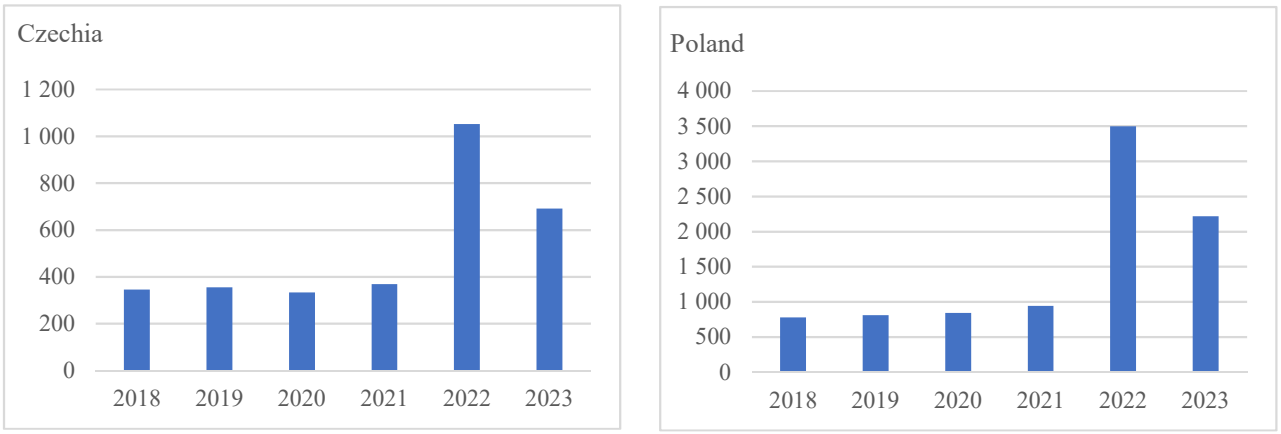
4.3 Effects of the War in Ukraine on the Structure of Czechia's and Poland's ODA

At first sight, Poland and Czechia reached new peaks in their ODA/GNI spending in 2022 and met the EU-targeted value of ODA/GNI ratio. The increased values of the ODA/GNI ratio presented in Section 4.2 indicated that Czechia and Poland increased their ODA volumes between 2021 and 2022, which is confirmed in Figure 2.

Figure 2 – Total volumes of ODA (grant equivalent, disbursements, 2022 constant prices, in mil. USD)



Source: OECD Development Co-operation Profiles 2024 (OECD, 2024a), own data processing

Czechia's ODA grew by more than 682 mil. USD and Poland's by more than 2 500 mil. USD between 2021 and 2022. In 2022, ODA volumes of both countries hit the maximum value in the last 14 years. However, a sharp increase was followed in both countries by a sharp decrease in 2023. OECD (2024a) indicated Czechia and Poland as the countries with the sharpest declines in ODA between 2022 and 2023. Poland reached the second-largest decline, whereas Czechia was a country reaching the third-largest decline. Table 3 revealed that the increase in ODA volumes of both countries resulted from the increase in bilateral ODA assigned to Ukraine. As ODA cannot include grants and loans provided for military purposes, bilateral ODA in other categories should have been increased as well.

Table 3 – Volumes of ODA and bilateral ODA for Ukraine (grant equivalent, disbursements, 2022 constant prices, in mil. USD 2022)

Year	Czechia			Poland		
	Total ODA	Bilateral ODA	Bilateral ODA for Ukraine	Total ODA	Bilateral ODA	Bilateral ODA for Ukraine
2018	345,39	86,26	4,10	775,78	242,91	68,09
2019	355,25	91,36	3,68	811,28	219,73	85,04
2020	333,50	61,34	3,44	843,60	217,81	65,95
2021	368,98	64,99	4,11	939,49	279,34	90,64
2022	1 051,26	714,60	34,75	3 496,23	2 661,79	317,62
2023	690,39	N/A	13,95	2 216,42	N/A	195,04
PCC	0,9877	0,9990	---	0,9969	0,9961	----

Source: OECD Development Co-operation Profiles 2024 (OECD, 2024a), own data processing

Values of the Pearson correlation coefficient (PCC) indicated that in both countries the total volumes of ODA and volumes of bilateral ODA were positively and strongly correlated with the volumes of bilateral ODA for Ukraine. In 2022, Czechia provided around 9 mil. USD to Ukraine in the form of country-programable aid (CPA) and the rest was allocated in Ukraine in the form of humanitarian aid to address the humanitarian crisis caused by the war. One year before the war, all Czech ODA for Ukraine was spent as the CPA (OECD, 2024a). Similarly, Poland increased its spending on humanitarian aid for Ukraine in 2022 (accounting for 211 mil. USD) and slightly increased its CPA (from 42 to 52 mil. USD). Due to the increased ODA, Ukraine became the most important partner country for both countries in 2022. Czechia allocated to Ukraine 56,26 % and Poland 73,45 % of their bilateral ODA (OECD, 2024a).

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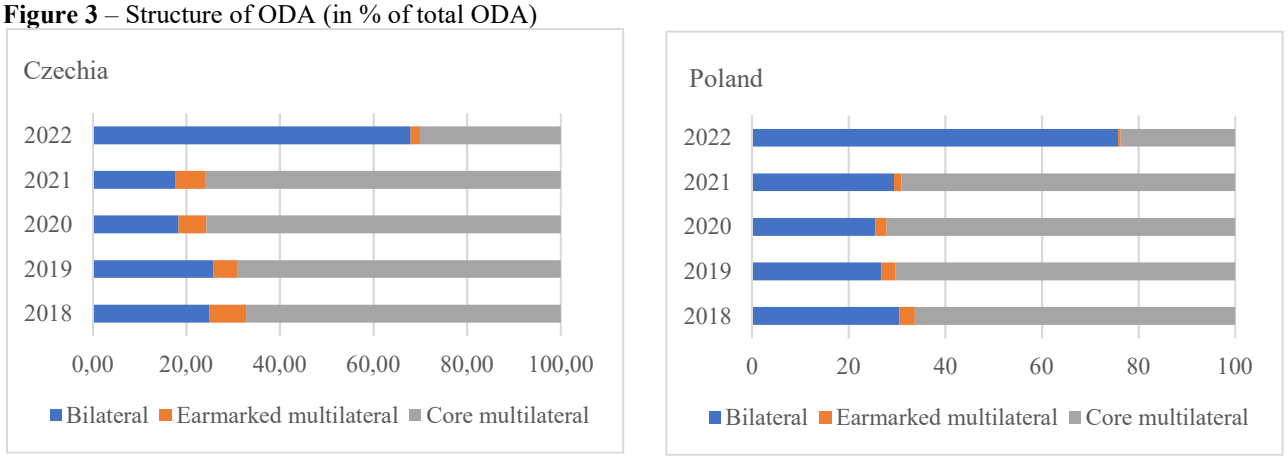
The war in Ukraine changed not only the volumes of Czechia's and Poland's ODA but also its structure. The growth of bilateral ODA was connected with its increased share and decreased share of multilateral ODA in total ODA (see Figure 3). However, the increases in bilateral ODA did not hit ODA allocations to multilateral development agencies and international organizations in absolute terms. In Poland, despite the decreases in the shares of earmarked and core multilateral ODA in total ODA (earmarked from 1,56 % to 0,47 %, multilateral from resp. 69,06 % to 23,73 %), allocations to both forms of multilateral ODA grew in absolute terms between 2021 and 2022. The earmarked ODA grew from 14,81 mil. USD to 16,43 mil. USD, core multilateral ODA grew from 656,54 to 833,07 mil. USD. In Czechia, the share of core multilateral ODA declined from 75,82 % to 30,10 %. In absolute terms, Czechia allocated to the core multilateral ODA 316,42 mil. USD in 2022, and increased it by 36,64 mil. USD in comparison with the year 2021. However, Czechia decreased its earmarked multilateral ODA in absolute terms from 24,22 mil. USD to 20,24 mil. USD between the same years.

Figure 3 – Structure of ODA (in % of total ODA)



Source: OECD Development Co-operation Profiles 2024 (OECD, 2024a), own data processing

The increased bilateral ODA for Ukraine provided by Czechia and Poland can be attributed mainly to the increased in-donor refugee costs, which means expenditures on refugees hosted by donor countries, following the refugee influx to both countries after the beginning of the war. Reflecting the bilateral ODA classified according to the type of expenditure, Czechia spent 87,9 %, and Poland 81,9 % of their ODA disbursements on refugees they hosted (OECD, 2024a). As of 2 June 2024, Czechia registered 615 235 applications for asylum, temporary protection, or similar national protection schemes submitted by refugees from Ukraine. Poland registered 1 802 670 applications, as of 11 June 2024 (UNHCR, 2024).

Expenditures on refugees hosted by a donor country are considered ODA when they meet the OECD criteria. However, they represent humanitarian aid of temporary character and not real support for development in recipient countries. Respecting five DAC OECD clarifications specified in 2017 to include the in-donor refugee costs in ODA, donor countries can report the expenditures on a refugee they host as ODA only for 12 months after applying for asylum. Then, a refugee is considered a resident of donor countries (DAC OECD, 2017). This clarification and slowdown in refugee influx can help to understand the sharp decrease in Czechia's and Poland's bilateral ODA for Ukraine in 2023.

5 Conclusion

Czechia and Poland belong to emerging donors of ODA. They designed the legal and institutional framework of their development policies to contribute to the fulfilment of the SDGs in their ODA recipient countries. However, despite the progress they made as ODA donors in recent years, they have not met their commitments concerning the volume of ODA in most years since their entrance to the DAC OECD. However, in 2022, their ODA allocations were sharply increased. The analysis presented in the paper aimed to identify and examine changes in the main patterns of ODA provided by Czechia and Poland between 2018 and 2023. The main attention was paid to the effect of the war in Ukraine on the volume and structure of ODA provided by both countries.

The OECD data on ODA revealed that Czechia and Poland similarly to other DAC OECD members increased their ODA for Ukraine in 2022. Primarily, they increased humanitarian aid to address the humanitarian crisis

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caused by the war. Increased expenditures on refugees from Ukraine who were hosted by both countries increased the spending of Czechia and Poland on humanitarian aid. This increased in-donor refugee costs positively affected the total volumes and structure of ODA of both countries. As a result, Czechia and Poland exceeded for the first time the EU-targeted value of the ODA/GNI ratio (defined at the level of 0,33 %). However, the same consequence led to a decrease in the total volumes of ODA of both countries in 2023.

In the case of Czechia, the expenditures on refugees grew rapidly between 2021 and 2022 (by 9 885,3 %). In 2022, expenditures on refugees accounted for 87,9 % of Czechia's bilateral ODA. In 2023, Czechia introduced some changes in policies focused on refugees from Ukraine, primarily the temporary protection system. The influx of refugees to Czechia has also slowed down in recent months. And respecting the OECD criteria, expenditures on refugees coming to Czechia in 2022 should have been included in ODA only for 12 months. These consequences resulted in a decrease in Czechia's bilateral ODA for Ukraine in 2023. Poland also reported a large increase in in-donor refugee costs in 2022, accounting for 81,9 % of its bilateral ODA. In 2023, Poland's ODA spending on humanitarian aid declined by 70,4 %, partly because of the decreasing expenditures on refugees because of the consequences as in the case of Czechia. However, it was found in the analysis that in 2022, the increased bilateral ODA did not constrain significantly the allocations of Czechia and Poland to multilateral ODA and as a result, their total ODA spending increased significantly in 2022.

In 2022, Czechia and Poland hit new peaks in their ODA volumes and values of ODA/GNI ratio but according to the premilitary data for the year 2023, it seems that the main patterns of their ODA were not changed. Data for the year 2023 indicate that ODA provided for Ukraine by both countries was mainly humanitarian aid of temporary character, connected primarily with the expenditures on refugees from Ukraine. On the other hand, increased bilateral ODA for Ukraine did not constrain funds spent by Czechia and Poland on other forms of ODA (besides the earmarked ODA of Czechia), which indicated that Czechia and Poland were well-prepared to cope with the humanitarian crisis caused by the war and such crisis did not have a negative influence on their multiannual priorities in providing ODA. In the past, not all traditional ODA donors behaved similarly to Czechia and Poland in 2022. Some EU countries reduced their ODA programmes at the beginning of the migration crisis in 2015 as a consequence of the increased in-donor refugee costs (Knoll and Sherriff, 2017).

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Macroeconomic Stabilization Process in Poland and the Czech Republic in the Period 1995-2023

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Abstract

Achieving macroeconomic stability is crucial for sustainable growth and economic development of any country. The article attempts to assess the process of macroeconomic stabilization in Poland and the Czech Republic from 1995 to 2023, considering macroeconomic variables that have a key impact on the level of this stabilization. The study employed the Macroeconomic Stabilization Pentagon (MSP) method, allowing for the analysis of the level of stabilization using five indicators: GDP growth rate, unemployment rate, inflation, budget balance, and current account balance. The results of the analysis indicate that both countries show upward trends in the MSP indicator with some fluctuations influenced by unprecedented events in the global economy (financial crisis, pandemic, war). Furthermore, it was found that for the majority of the studied period, the Czech Republic exhibited much greater macroeconomic stability than Poland, which was the case until 2019. Poland, on the other hand, demonstrated higher resilience to economic shocks occurring over three decades, as exemplified by the debt crisis in the eurozone. Additionally, the study revealed that since 2018, there has been a significant collapse of macroeconomic stability in the Czech Republic, lasting until 2022. In Poland, clear drops in the MSP indicator were recorded in the year of the pandemic outbreak and subsequently the war in Ukraine. The year 2023 indicates a chance to reverse these unfavorable phenomena in both countries. Additionally, it should be noted that the stabilization structure in both countries was diverse, resulting from different economic policies and levels of openness to cooperation with foreign countries.

Keywords: *Czech Republic, Macroeconomic Stability pentagon, Poland*

JEL Classification: *E62, E63, E66*

1 Introduction

Macroeconomic stabilization is one of the key goals of economic policy in every country, essential for achieving sustainable growth and economic development. Poland and the Czech Republic, which in the early 1990s embarked on the path of systemic transformation from a centrally planned to a market economy, while also being members of the European Union and future candidates for the eurozone, represent an interesting example of countries facing similar economic challenges.

The aim of the article is to analyze the process of macroeconomic stabilization in Poland and the Czech Republic from 1995 to 2023 and to identify the key factors that influenced it.

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The first part of the article discusses the essence and significance of macroeconomic stabilization for sustainable growth and economic development. Next, the method of the macroeconomic stabilization pentagon is presented, used to assess the degree of stabilization of both economies. The following subsection presents and discusses the results of analyses showing changes in the macroeconomic stability of Poland and the Czech Republic in the face of various economic challenges that both countries had to confront over the last three decades. The final part contains a summary and conclusions from the conducted research.

2 Macroeconomic Stabilization – Essence and Significance

Macroeconomic stabilization is a key issue in both economic theory and practice, as it relates to achieving balance in the national economy, which is a condition for its sustainable growth and development. This stability involves maintaining equilibrium between various economic factors, such as production, employment, prices, incomes, and the balance of payments, in a way that minimizes the risk of economic destabilization and makes the economy resilient to crises (Janecki, 2018; Kotliński, 2020). Macroeconomic equilibrium, as emphasized in the literature, includes both internal and external balance of the country. Internal macroeconomic equilibrium refers to ensuring a stable level of production, employment, and prices, in which the economy operates at an optimal level, avoiding both unemployment and overheating. External balance means a balanced trade and payment balance, allowing the country to maintain stable economic relations with abroad without excessive indebtedness. Macroeconomic stability can thus be defined as an appropriate configuration of economic indicators that enable sustainable economic growth under conditions of financial and economic stability. Key indicators of this stability include the growth rate of gross domestic product (GDP), the inflation rate, the unemployment level, the budget balance, and the current account balance (see: Grynia & Marcinkiewicz, 2017; Roszko-Wójtowicz, Grzelak, 2020; Raczkowski & Komorowski, 2023). Kulbacki (2021) emphasizes that there is consensus in the literature regarding the key importance of macroeconomic stability for economic growth (Fischer, 1992; Vasylieva, et al., 2018), socio-economic development (Stiglitz et al., 2006), as well as in the area of microeconomic phenomena, including reducing uncertainty in conducting business, in the investment process, including foreign investments (Strat et al., 2015; Shah, 2016).

The dynamics of GDP growth is one of the key indicators of macroeconomic stabilization. Stable and moderate GDP growth allows for the even utilization of economic resources and is the basis for long-term development. Strong economic growth fosters job creation and increases the efficiency and competitiveness of the economy. On the other hand, low or negative GDP growth can lead to macroeconomic destabilization, as it hampers investment, reduces consumption levels, and causes an increase in unemployment. Macroeconomic stability thus requires striving for stable GDP growth, which not only stimulates consumption but also allows for better risk management and stabilization of the budget and the current account balance.

The level of the unemployment rate also plays a very important role in macroeconomic stability, as it affects consumption levels, household incomes, and overall economic activity. A high unemployment rate reduces the consumption ability of the population, resulting in decreased demand for goods and services, leading to a decline in production and investment. Such a situation can lead to a deepening recession, creating a risk of economic destabilization. A low unemployment rate increases macroeconomic stability by better utilizing the labor force and increasing production. Moreover, stable employment reduces state costs associated with benefits and other forms of social support, positively impacting the budget and the balance of public finances. Therefore, countries strive to achieve the lowest possible level of unemployment through a balanced economic and monetary policy, which supports long-term macroeconomic stability.

The inflation rate is another key indicator of macroeconomic stabilization. Inflation at a stable, moderate level promotes price predictability, supports financial planning, and allows the economy to flexibly adapt to changing conditions. Too high inflation reduces the purchasing power of money, thereby increasing the cost of living and limiting consumer demand. High inflation leads to increased production costs, decreases the real value of income and savings, while also exerting pressure to raise interest rates, which further hinders investment and economic development. Too low inflation, especially deflation, is also unfavorable, as it leads to a decrease in demand in anticipation of further price drops and consequently a decline in production and an increase in unemployment. Therefore, countries aim to maintain inflation at a stable and predictable level conducive to improving investment conditions, beneficial for economic growth.

The budget balance is another indicator of macroeconomic stability. The ratio of the budget deficit to GDP reflects the state's ability to manage public finances and debt. A too high budget deficit leads to an increase in

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public debt, which raises debt servicing costs and limits the financing possibilities for public projects, such as education or healthcare. Excessive debt can also lead to a loss of investor confidence, increased borrowing costs, and currency exchange rate instability. A balanced budget is therefore the foundation of macroeconomic stability, as it allows for flexible responses to crises and changing economic conditions.

The current account balance to GDP is an indicator of macroeconomic stability that reflects trade balance and a country's ability to service foreign debt. A surplus in the current account means that a country exports more than it imports, which strengthens its financial stability, positively affects foreign exchange reserves, and enhances resilience to external shocks. A deficit in the current account, on the other hand, indicates dependence on foreign sources of financing, leads to an increase in foreign debt, which increases a country's vulnerability to changes in conditions in international financial markets and sudden changes in capital flows. A large deficit may signal structural problems in the economy, such as low productivity, lack of competitiveness, or excessive dependence on imports.

In conclusion, it can be said that macroeconomic stabilization is a key condition for sustainable economic growth and development, by ensuring harmonious interaction of various economic indicators conducive to achieving internal and external balance. Therefore, assessing the level of macroeconomic stabilization is a significant challenge as it allows for identifying potential threats to financial stability, evaluating the effectiveness of the applied economic policy, and identifying and predicting changes occurring in the economy.

From this point of view, it seems very interesting to analyze the evolution of the macroeconomic condition of two economies, Poland and the Czech Republic, which in the 1990s embarked on the path of systemic transformation from a centrally planned to a market economy. To assess the degree of macroeconomic stabilization of both economies in the years 1995-2023, the model of the macroeconomic stabilization pentagon (MSP) was used.

3 Data and Methods

The concept of the macroeconomic stabilization pentagon (MSP) was used to analyze and assess the level of macroeconomic stabilization of the economies of Poland and the Czech Republic. The MSP method was developed in 1990 at the Institute of Economic Forecasts and Foreign Trade Prices (now the Polish Economic Institute), with significant participation from Professor Grzegorz Kołodko, an economist and politician, Minister of Finance in the Polish government from 1994–1997 and 2002–2003. Research based on the MSP method was presented by, among others, Kołodko (1993, 2020), Misala and Bukowski (2003), Matkowski, Rapacki (2003, 2005), Misala, Siek (2006), Misala (2007), Koberska (2011), Żuchowska (2013), Grynia, Marcinkiewicz (2017), Janecki (2018), Dobrzański, Bobowski (2020). The essence of macroeconomic stabilization analysis using the pentagon method comes down to observing the formation of five macroeconomic variables (Kołodko, 1993, p. 52):

- the growth rate of gross domestic product (GDP),

- the registered unemployment rate (U),

- the inflation rate (CPI) – measured by the increase in consumer goods prices,

- the public sector debt ratio (G) – measured by the ratio of the state budget balance to GDP,

- the foreign debt ratio (CA) – measured by the ratio of the current account balance to GDP.

The above-mentioned indicators can be appropriately scaled to the form of the vertices of the macroeconomic stabilization pentagon in such a way that the better the formation of these indicators, the points representing them are located further from the center of the system. Hence, the applied scale can be increasing and initiated with negative values (as is the case with the current account balance, the state budget, or real processes measured by the GDP growth rate), or it can be decreasing (as in the case of the unemployment rate or the inflation rate). The optimal arrangement of the five macroeconomic indicators used in the original model from the early 1990s is presented in Figure 1.

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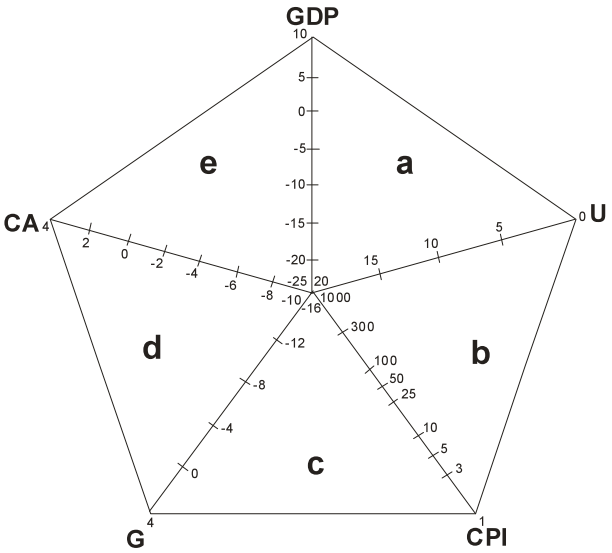
Figure 1 - Macroeconomic stabilization pentagon



Source: G. Kołodko (1993), *Kwadratura pięciokąta. Od załamania gospodarczego do trwałego wzrostu.* Poltext, Warszawa, s. 52.

The total area of the pentagon presented in Fig. 1 consists of the sum of five triangles, namely triangle a (defined as the triangle of the real sphere, i.e., the rate of economic growth and the unemployment rate), triangle b (the triangle of stagflation, i.e., the unemployment and inflation rates), triangle c (the triangle of the budget and inflation), triangle d (the triangle of financial equilibrium), and triangle e (the triangle of the external sector). The total area of the considered pentagon can be defined by the formula:

$$MSP=[(\Delta GDP \cdot U) + (U \cdot CPI) + (CPI \cdot G) + (G \cdot CA) + (CA \cdot \Delta GDP)] \cdot K \quad (1)$$

where: K=½sin72°, which is a constant coefficient with a value of 0.4755 illustrating half of the sine of the angle located at the central vertex of each of the triangles marked in Fig. 1 with the letters a, b, c, d, and e; this angle is assumed to be 72°, i.e., one-fifth of a full angle.

As Kołodko (1993, p. 53) explains, a change in any of the parameters locating the vertices of the pentagon entails a change in the size of the two adjacent triangles. Thus, the triangle of the real sphere (**a**) increases when the scale of production decline decreases or when its absolute level rises faster and when the unemployment rate falls. Changes in this rate automatically entail changes in the size of the stagflation triangle (**b**), whose shape is also dependent on the inflation rate. This, in turn - along with the relationship of the budget balance to gross domestic product - determines the area of the inflation triangle (**c**). This balance also affects the position of the financial equilibrium triangle (**d**), which is additionally determined by the position of the point reflecting the state of the current account. Finally, this last one, along with the indicator of the dynamics of the real sphere, from which the analysis began, determines the size of the external sector triangle (**e**).

The larger the area of the pentagon drawn based on the actual macroeconomic data of the analyzed economy, the greater stability it exhibits. However, it should be emphasized that achieving the optimal solution, i.e., MSP=1=5x0.2, is not practically possible for many diverse reasons. The most significant aspect is that it concerns an attempt to optimize somewhat competitive (not complementary) goals of economic policy (e.g., accelerating economic growth may lead to a reduction in the unemployment rate, but it causes inflationary pressure and a tendency to increase foreign debt, and vice versa). It is worth noting that the interpretation of the obtained results requires caution, as there is no single level at which one can consider the economy stable. The assessment should primarily focus on the trends in the MSP indicator over time and its value and shape compared to other economies.

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The MSP model has undergone modifications over the years. The changes mainly concerned the approach to the inflation indicator, specifically the replacement of the CPI indicator with the Harmonised Index of Consumer Prices (HCPI), which shows changes in the prices of a basket of goods and services offered in the EU member states. This approach stemmed from a reference to the inflation target of the European Central Bank, which is the central bank of the countries belonging to the eurozone, and was used in comparative analyses of macroeconomic stabilization covering EU member countries, including eurozone countries (see: Koberska, 2011; Kulbacki 2021). Raczkowski (2016) in his analysis covering 28 EU countries and concerning the period 2008-2015 also adjusted the relationship of the current account balance to GDP, adopting a scale from -25% to 12%, arguing that the scale used in the original model did not allow for the actual situation to be reflected in the MSP indicator, as most data did not fit within the scale. He also extended the unemployment axis by 10 percentage points due to the high unemployment in Greece and Spain.

To analyze the evolution of macroeconomic stability in Poland and the Czech Republic, two economies that have been on the path of systemic transformation from a planned economy to a market economy since the early 1990s, MSP indicators for the period 1995-2023 were calculated. Since the analysis period covers almost three decades, thus also referring to the economic situation of both countries at the beginning of the systemic transformation period, the classic pentagon model was used for MSP calculations, i.e., a model whose arms were scaled according to the actual macroeconomic parameters that existed at that time (see Fig. 1). The study assumed that if the observed values of variables used in the research exceeded the range established in the original MSP model, then extreme values would be used. Such data adjustment was applied to the following indicators: inflation rates (CPI) in Poland and the Czech Republic in 2003 and 2014-2016 and unemployment rate (U) in Poland in 2002-2003, which slightly differed from the values fixed in the oryginal MPS model. The source of the statistical data used in the study was the databases: AMECO and IMF.

5 Data Analysis and Findings

Chart 1 shows the MSP indicators for Poland and the Czech Republic from 1995 to 2023. During the analyzed period covering nearly three decades of economic development in Poland and the Czech Republic on the transformation path from a centrally planned economy to a market one, the MSP indicators of both countries show an upward trend, with a low coefficient of variation for the Czech Republic (CV=0.22) and an average one for Poland (CV=0.34). In the first year of the analyzed period, i.e., in 1995, both countries exhibited almost the same level of macroeconomic stabilization at MSP=0.39. Over the decade preceding Poland and the Czech Republic's accession to the European Union, the difference in the level of the MSP indicator significantly increased to the detriment of Poland, reaching the largest gap in 2004, primarily as a result of a significantly deteriorating macroeconomic stability in Poland (in 2004, MSP_{PL} fell to 0.17, while MSP_{CZ} was 0.45). The first three years of EU membership were a period of spectacular improvement in macroeconomic stabilization for Poland – the MSP indicator more than doubled, reaching 0.38. This good streak was disrupted by the outbreak of the global financial crisis. Although Poland was the only EU country that did not experience a recession in 2009, there was a decline in the MSP indicator (contributed to by an increase in the budget deficit and unemployment), especially in 2010. During this time, the Czech Republic recorded a significant drop in the MSP indicator in 2009, which was associated with a large decline in GDP and a significant increase in the budget deficit, as well as rising unemployment. From 2011 until 2019, Poland recorded annual improvements in the macroeconomic stabilization indicator, which were not disrupted by the debt crisis in the eurozone, which was reflected in 2012 in the decline of macroeconomic stability in the Czech Republic. Poland demonstrated relatively high resilience to the debt crisis in the eurozone, which was related, among other things, to the relatively low share of public debt.

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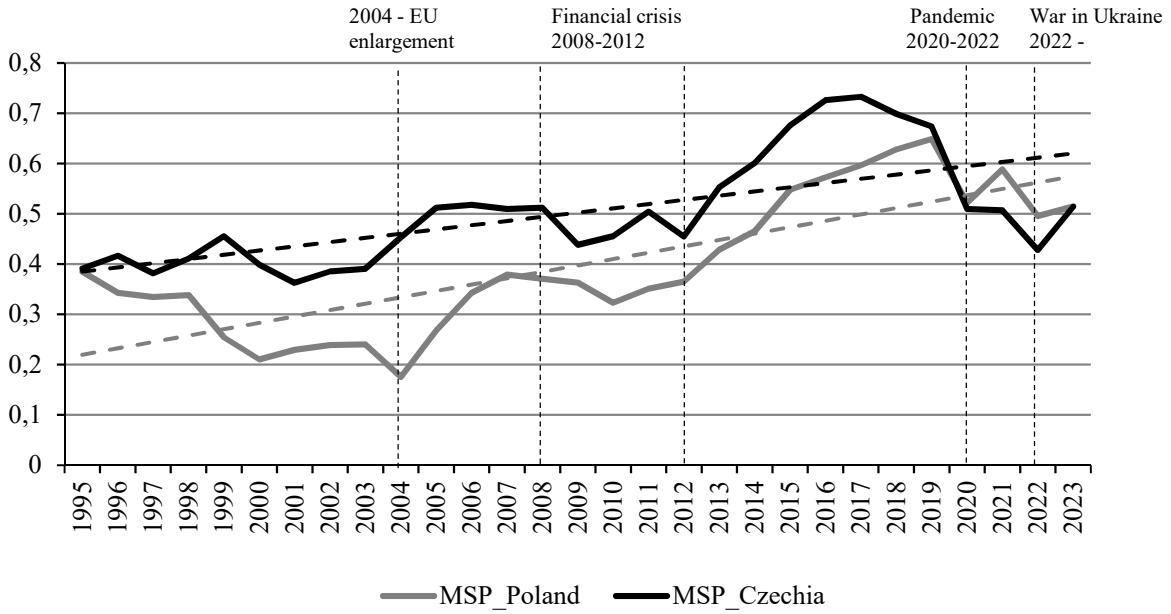
Chart 1 - MSP scores for Poland and Czech Republic in 1995-2023



Source: Own work on the basis of data from table T.A1.

On the other hand, the strong economic ties of the Czech Republic with eurozone countries, especially Germany, significantly affected the decline in demand for Czech exports, which in turn contributed to the weakening of economic growth and the return of recession in the Czech Republic in 2012. The very high share of exports in Czech GDP (about 70%-80%) made and still makes this economy very sensitive to demand shocks in partner countries. The next five years were a period of very dynamically increasing MSP index for the Czech economy, rising from 0.46 in 2012 to 0.73 in 2017. In the following two years, the Czech economy experienced an economic slowdown, especially due to labor shortages and a decline in exports, which translated into a decrease in macroeconomic stabilization indicators in 2019 to a level of 0.67. It should be noted that throughout the analyzed period, the Czech Republic exhibited a much higher level of macroeconomic stabilization than Poland, but after 24 years, the MSP indicators for Poland and the Czech Republic nearly equalized again (MSP_{PL} = 0.64 and MSP_{CZ} = 0.67). The year 2020 was marked by an unprecedented global crisis resulting from restrictions and limitations related to the outbreak of the Covid-19 pandemic. Both countries took various remedial measures aimed at addressing challenges such as a decline in economic activity, rising unemployment, pressure on healthcare systems, and the necessity to implement extensive aid programs. All of this was reflected in macroeconomic parameters, leading to a decrease in MSP indicators by 20% in Poland and 25% in the Czech Republic. After two years of the pandemic, the MSP index for Poland was 0.59 and for the first time was higher than in the Czech Republic (0.51). In February 2022, a full-scale war broke out in Ukraine, which also had wide economic consequences for both Poland and the Czech Republic. These countries had to face various challenges in key areas of the economy, such as disruptions in international trade, including in energy raw materials and agricultural production, inflationary pressure, aid programs for refugees, and pressure on public spending, as well as a redefinition of defense policy and military spending. All of this contributed to another significant decline in the macroeconomic stability of both countries. In 2022, the MSP in Poland fell to 0.50, and in the Czech Republic to 0.43. In the following year, there was a slight rebound so that in 2023, the MSP for both countries equaled 0.51.

An essential feature and at the same time an advantage of the utilized model of the pentagon of macroeconomic stabilization is the possibility of distinguishing the area of the pentagon dependent on internal factors (the areas of triangles a, b, and c marked as MSP 1) and external factors (the area of triangles d and e, marked as MSP 2). During the analyzed period, the process of stabilizing the Polish economy was influenced to varying degrees by internal and external factors, as evidenced by the share of MSP 1 and MSP 2 in total MSP (see Chart 2). In 1995, external factors (including a positive current account balance) had a significant impact on macroeconomic stabilization in Poland. In the second half of the 1990s, macroeconomic stabilization in Poland was largely the

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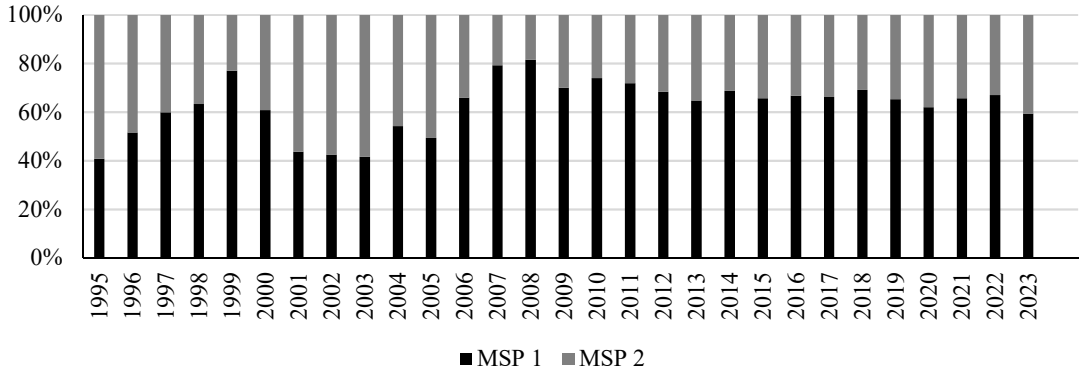
result of internal stabilization (including a high rate of economic growth and effective combat against inflation). In the years 2001-2003, external stabilization again played a more significant role (including a relatively low current account deficit). Since 2006, internal factors have had a greater influence on the stabilization process in Poland, including effective policies to reduce unemployment (triangle b) and combat inflation (except for 2022 and 2023). The external sphere should be positively assessed, more specifically the maintenance of a relatively low current account deficit (triangle e). In the analyzed period from 1995 to 2023, changes in the value of MSP in Poland were most strongly correlated with changes in the triangle of the real sphere (r-Pearson 0.75), the triangle of stagflation (r-Pearson 0.75), and the triangle of financial equilibrium (r-Pearson 0.64).

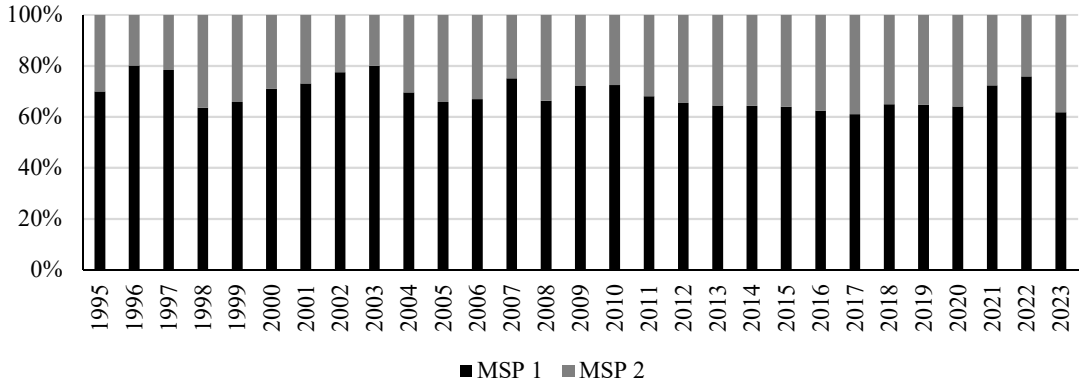
Chart 2 - MSP 1 and MSP 2 scores for Poland in 1995-2023



Source: Own work on the basis of data from table A.1

In the Czech Republic, the share of internal and external factors in the stabilization process did not undergo significant changes (see Chart 3). Throughout the analyzed period, internal factors were dominant (the share of MSP 1 in the overall MSP index was at the level of 60-70%). In this case, the policy of reducing unemployment and inflation positively influenced the stabilization process, which corresponded to an increase in the value of the stagflation triangle area.

Chart 3 - MSP 1 and MSP 2 scores for Czechia in 1995-2023



Source: Own work on the basis of date from table A.1.

Changes in the MSP indicator in the Czech Republic were the result of the changing pace of GDP growth (including significant declines in 2009 and 2020), accompanied by changes in the budget deficit, as well as changes in foreign trade. In the Czech Republic, the greatest impact on changes in the level of the MSP indicator was from financial equilibrium triangles (r-Pearson 0.65) and the external zones (r-Pearson 0.59).

Figure 2 presents the development of the MSP indicator for Poland and the Czech Republic in 1995 and 2023 (the first and last year of the analysis). These are the years in which the overall value of the MSP indicator in both countries was at a very similar level.

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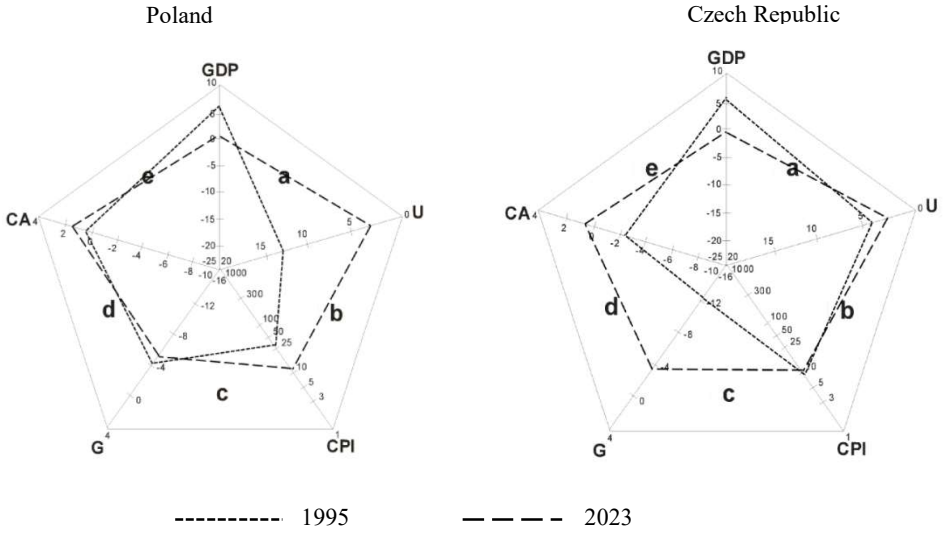
In 1995, the value of the MSP indicator in both countries was influenced by different macroeconomic variable developments included in the analysis. In Poland, the value of the indicator was determined by a high unemployment rate and a high inflation rate, while in the Czech Republic, a significant budget deficit had a substantial impact. Comparing the value of the indicator in 2023, the differences between the countries were not as pronounced. The analyzed macroeconomic variables were at a similar level.

Figure 2 - MSP scores for Poland and the Czech Republic in 1995 and 2023



Source: Own work based on data from AMECO (GDP, U, G, CA) and IMF (CPI).

Based on the comparison, it can be concluded that while in the 1990s the countries faced different problems regarding achieving and maintaining macroeconomic stability, recent years of the analyzed period indicate the need to address the same issues in both countries (unsatisfactory GDP growth rate, high inflation and excessive public finance deficit).

5 Conclusion

Macroeconomic stabilization is a key condition for sustainable economic growth and development by ensuring the harmonious interaction of various economic indicators that contribute to achieving internal and external balance. Therefore, assessing the level of macroeconomic stabilization is a significant challenge as it allows for identifying potential threats to financial stability, evaluating the effectiveness of the applied economic policy, and identifying and predicting changes occurring in the economy. During the first ten years of the analyzed period, both Poland and the Czech Republic were characterized by a relatively low level of macroeconomic stabilization, which in the case of Poland even worsened. With the accession of both countries to the European Union, there was a period of significant improvement in macroeconomic stabilization indicators, which lasted almost fifteen years, excluding the years affected by the global financial crisis. This favorable trend was disrupted by the outbreak of the Covid-19 pandemic and deepened by the war in Ukraine. These recent events had a greater impact on the level of macroeconomic stabilization in the Czech Republic. The course of the macroeconomic stabilization process in Poland and the Czech Republic was influenced by both internal and external factors. In Poland, the value of the overall MSP indicator was strongly correlated with stabilization in the real sphere, stagflation sphere, and financial balance sphere. In the Czech Republic, however, the strongest relationships were found in connection with the financial balance sphere and external balance. It can be concluded that the greatest challenge for economic policy in both Poland and the Czech Republic is to stimulate economic growth while simultaneously reducing inflation and curbing the tendency to deepen the public finance deficit. This is a task that will require responsible actions in the area of fiscal and monetary policy.

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Apendix 1 - Sub-indices and the MSP index for Poland and Czechia (1995-2023)

Year	Poland						Czechia					
	MSP triangles					MSP	MSP triangles					MSP
	a	b	c	d	e		a	b	c	d	e	
1995	0.06	0.03	0.06	0.09	0.14	0.38	0.14	0.11	0.02	0.02	0.10	0.39
1996	0.07	0.04	0.06	0.06	0.10	0.34	0.13	0.11	0.09	0.04	0.05	0.42
1997	0.08	0.05	0.07	0.05	0.08	0.33	0.11	0.10	0.09	0.04	0.04	0.38
1998	0.08	0.06	0.08	0.05	0.07	0.34	0.10	0.09	0.08	0.07	0.08	0.41
1999	0.05	0.04	0.10	0.03	0.03	0.25	0.08	0.10	0.12	0.07	0.08	0.46
2000	0.03	0.02	0.08	0.03	0.05	0.21	0.09	0.09	0.10	0.05	0.07	0.40
2001	0.01	0.01	0.09	0.06	0.07	0.23	0.09	0.09	0.08	0.04	0.06	0.36
2002	0.00	0.00	0.10	0.06	0.08	0.24	0.10	0.12	0.09	0.03	0.05	0.39
2003	0.00	0.00	0.10	0.05	0.09	0.24	0.10	0.12	0.09	0.03	0.05	0.39
2004	0.00	0.00	0.09	0.03	0.05	0.18	0.10	0.10	0.12	0.06	0.08	0.45
2005	0.01	0.01	0.11	0.06	0.08	0.27	0.11	0.11	0.12	0.07	0.10	0.51
2006	0.05	0.05	0.12	0.05	0.07	0.34	0.12	0.11	0.12	0.07	0.10	0.52
2007	0.09	0.09	0.12	0.03	0.04	0.38	0.13	0.12	0.13	0.06	0.07	0.51
2008	0.11	0.10	0.10	0.03	0.04	0.37	0.12	0.11	0.10	0.08	0.09	0.51
2009	0.09	0.09	0.07	0.04	0.07	0.36	0.08	0.13	0.11	0.06	0.06	0.44
2010	0.08	0.09	0.07	0.03	0.05	0.32	0.10	0.12	0.11	0.05	0.07	0.46
2011	0.09	0.08	0.09	0.04	0.06	0.35	0.10	0.12	0.12	0.08	0.09	0.50
2012	0.07	0.08	0.10	0.05	0.06	0.36	0.09	0.11	0.10	0.07	0.08	0.46
2013	0.07	0.09	0.12	0.07	0.08	0.43	0.09	0.12	0.14	0.10	0.10	0.55
2014	0.09	0.11	0.12	0.06	0.08	0.47	0.11	0.14	0.14	0.10	0.11	0.60
2015	0.10	0.12	0.13	0.08	0.10	0.55	0.13	0.15	0.15	0.11	0.13	0.68
2016	0.11	0.14	0.14	0.09	0.10	0.57	0.13	0.16	0.17	0.14	0.13	0.73
2017	0.13	0.13	0.13	0.09	0.11	0.60	0.15	0.15	0.15	0.14	0.14	0.73
2018	0.14	0.15	0.14	0.09	0.10	0.63	0.14	0.16	0.15	0.13	0.12	0.70
2019	0.14	0.15	0.14	0.11	0.12	0.65	0.14	0.15	0.14	0.12	0.12	0.67
2020	0.11	0.14	0.07	0.08	0.12	0.52	0.10	0.14	0.08	0.09	0.10	0.51
2021	0.15	0.13	0.11	0.09	0.11	0.59	0.14	0.14	0.09	0.06	0.08	0.51
2022	0.15	0.10	0.08	0.07	0.10	0.50	0.14	0.11	0.08	0.05	0.06	0.43
2023	0.12	0.11	0.07	0.09	0.12	0.52	0.12	0.11	0.08	0.09	0.10	0.51

a - real sphere triangle, b - stagflation triangle, c - budget and inflation triangle, d - financial equilibrium triangle, e - external sector triangle

Source: Own calculations based on data from AMECO (GDP, U, G, CA) and IMF (CPI).

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The Impact of Covid-19 Pandemic and War in Ukraine on Trade Between Poland and The Czech Republic

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Abstract

The article presents the development of trade between Poland and the Czech Republic in the period 2018-2023, with particular emphasis on the impact of the Covid-19 pandemic and the ongoing war in Ukraine. The volume and commodity structure of foreign trade were analyzed and the mutual competitive position was determined using the following measures: the revealed comparative advantages indicator, the intensity of intra-industry trade indicator and index of compatibility of exports and imports structure. The analysis showed that neither the Covid-19 pandemic nor the war in Ukraine had a significant impact on the mutual trade relations between Poland and the Czech Republic. Trade between the two countries shows resistance to the negative effects of both tragic events, and the key indicators used to assess bilateral trade relations indicate a relatively strong position of Poland, which demonstrates the ability to adapt to the changes taking place, to operate in unstable conditions and take advantage of the opportunities generated by the crisis.

Keywords: *Foreign Trade, Intra-Industry Trade, Comparative Advantage, Economic Integration*

JEL Classification: *F14, F15, F41*

1 Introduction

International trade is the most common and obvious form of cooperation between countries. The Czech Republic and Poland have been very close economic partners for many years, and the growth of trade between Poland and the Czech Republic over the last twenty years reflects all the cause-and-effect relationships of economic integration described in economic theory (see Misala, 1990, 2009, 2012, 2014). Both countries benefit from their geographical proximity, increasingly better infrastructure connections, and membership in the European Union's single market. The development of bilateral cooperation is perfectly illustrated by data on trade exchange values. In 2004, when both countries joined the European Union, the trade exchange between Poland and the Czech Republic did not exceed 2.6 billion euros in Polish exports and 2.7 billion euros in imports. After twenty years of EU membership, exports from Poland to the Czech Republic increased more than sevenfold, while imports from the Czech Republic increased more than fourfold (2023: 22.12 billion euros and 14.16 billion euros, respectively). These figures clearly show that EU membership has resulted in increased trade exchange between these two countries. For information on the size and structure of trade between Poland and the Czech Republic from 2004 to 2019, see Kozuń-Cieślak & Siek (2020). The COVID-19 pandemic that broke out in early 2020 has had a significant impact on foreign trade due to the restrictions introduced, border closures, travel restrictions, and changes in consumer behavior - all of which have seriously disrupted international trade. Many companies have had to suspend or limit their operations due to border closures, supply chain disruptions, and reduced

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demand for products and services. Restrictions on the transport and flow of goods have also resulted in higher logistics costs and longer delivery times. Companies have had to adapt their trade strategies to the new conditions, looking for alternative sources of supply and sales markets. Another factor strongly affecting international commodity exchange markets is the ongoing war in Ukraine, which began in 2022. In Poland, this has resulted in a change in the structure and dynamics of Polish foreign trade—Ukraine's significance has increased while Russia's share in Polish trade has decreased significantly. In the context of trade between Poland and the Czech Republic, this situation may have some indirect effects, arising from changes in transport routes or logistics costs (the situation in Ukraine has indeed affected the flow of goods in the Central and Eastern European region).

The aim of this article is to answer the question of whether the COVID-19 pandemic and the war in Ukraine have affected trade exchange between Poland and the Czech Republic. For this purpose, the volume and commodity structure of foreign trade were analyzed and the mutual competitive position in the sphere of trade of both economies was determined using the following indicators: revealed comparative advantages (RCA), the intensity of intra-industry trade (IIT) and the index of compatibility of exports and imports structure (C_{jk}).

2 Data and Method

The identification of the impact of the pandemic and the war in Ukraine on bilateral trade relations between Poland and the Czech Republic was based on statistical data from 2018-2023, i.e. the period covering two years before the pandemic, then two years affected by the pandemic and two years of the ongoing war in Ukraine The following statistical data from Eurostat were used to analyze the size and economic importance of bilateral trade between Poland and the Czech Republic: the value of Poland's exports to the Czech Republic expressed in euro (in current prices), the value of imports from the Czech Republic to Poland, the value of Poland's total exports and imports, the value of Poland's GDP. Based on the above data, the following indicators were calculated and characterized:

- the share of exports to the Czech Republic in Poland's total exports (Exp_CZ/PLexp),

- the share of imports from the Czech Republic in Poland's total imports (Imp_CZ/PLimp),

- the share of exports to the Czech Republic in Poland's GDP (Exp_CZ/GDP_PL),

- the share of imports from the Czech Republic in Poland's GDP (Imp_CZ/GDP_PL).

The analysis of the commodity structure of trade between Poland and the Czech Republic used data on exports and imports of goods according to the Standard International Trade Classification (SITC), which identifies 10 main commodity categories (sections), which are divided into 2-digit divisions, and these are further divided into groups, subgroups and items (UN, 2006). The 1-digit SITC distinguishes the following categories of goods:

SITC code	commodity groups	SITC code	commodity groups
0	food and live animals	5	chemicals and related products
1	beverages and tobacco	6	manufactured goods classified chiefly by material
2	crude materials, inedible, except fuels	7	machinery and transport equipment
3	mineral fuel, lubricants and related materials	8	miscellaneous manufactured articles
4	animal and vegetable oils, fats and waxes	9	commodities and transactions not classified

According to traditional theories of international trade, comparative advantages are the basis for favorable specialization and trade between countries. However, contemporary theories indicate many more possible reasons for the development of such specialization. In particular, they explain the premises and effects of the current world trade dominated by developed countries, the predominant part of which is intra-industry trade.

To identify the nature of trade between Poland and the Czech Republic, we applied three commonly used indicators (see: Misala, 2007, 2014; Chapcakova et al., 2021, Bórawski et.al., 2022, Paniko et al., 2024):

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- the revealed comparative advantages indicator (RCA) – calculated using 2-digit SITC classification,
- the intensity of intra-industry trade indicator (IIT) - calculated using 2-digit SITC classification,
- the index of compatibility of exports and imports structure (C_{jK}) - calculated using 3-digit SITC classification.

1) The revealed comparative advantages indicator (RCA) derived from Balassa (1965). The formula is as following:

$$\mathrm{RCA_i} = \left[\frac{\mathrm{x_{ij}^k}}{\mathrm{m_{ij}^k}} \div \frac{\mathrm{X_j^k}}{\mathrm{M_j^k}}\right] \quad (1)$$

where:
x_{ij}^k - exports of commodity group *I* from country *k* to country or group of countries *j*,
m_{ij}^k - imports of commodity group *I* to country *k* from country or group of countries *j*,
X_j^k - total exports of country *k* to country or group of countries *j*,
M_j^k - global imports of country *k* from country or group of countries *j*,
I - SITC section (Standard International Trade Classification),
k - in this study: Poland,
j - in this study: the Czech Republic.

If RCA_i is greater than zero it points to revealed comparative advantages and to the intensity of this advantage. RCA_i below zero denotes the absence of the revealed comparative advantage with either smaller or greater intensity. The logarithmical form of the formula makes it possible to maintain the symmetrically of the positive or negative RCA_i indicators in a range hovering around zero.

The average value, especially weighted average, of RCA_i indicators can be treated as composite indicator of international inter-industry competitiveness.

2) The intensity of intra-industry trade indicator developed by H. Grubel and P.J. Lloyd (1971, 1975). The formula is as following:

$$IIT_i = \frac{x_{ij}^k + m_{ij}^k - \left|x_{ij}^k - m_{ij}^k\right|}{x_{ij}^k + m_{ij}^k} \quad (2)$$

where:
x_{ij}^k - exports of commodity group *i* from country *k* to country or group of countries *j* (here from Poland to the Czech Republic),
m_{ij}^k - imports of commodity group *i* to country *k* from country or group of countries *j* (here from the Czech Republic to Poland).

In contemporary international exchange, a significant and generally increasing role is played by intra-industry trade (also known as two-way trade), which is based on parallel imports and exports by a specific country or group of countries of finished products and/or their parts and components coming from the same sector in a given period, usually during a year.

The *IITi* index ranges from 0 to 1, the higher *IITi* index the more intensive intra-industry trade. If IIT = 0 it means 100% inter-industry exchange, if IIT = 1 than 100% of trade with a given country is intra-industry. The indicator expressed as a percentage shows the share of intra-industry trade in the total trade.

The average value, especially weighted average, of *IITi* indicators can be treated as composite indicator of international intra-industry trade.

3) The index of compatibility of exports and imports structure proposed by M. Michaely (1996). The formula is as following:

$$C_{jk} = 1 - \frac{1}{2}\sum_{i=1}^{n}\left|M_{ik} - X_{ij}\right| \quad (3)$$

where:
M_{jk} - the share of imports of product (commodity group) *i* in the total imports of country (group of countries) *k*
X_{ij} - the share of export of product (commodity group) *i* in the total exports of country (group of countries) *j*

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The compatibility of exports and imports structures defined as adaptation of the export supply structure to the partners' demand structure can be observed and analyzed in reference to a specific period t as well as to a specific time bracket t_1-t_n.

The C_{jk} index ranges from 0 to 1, where 0 means that product (commodity groups) i exported by country j (here: Poland) is not at all the subject of importation to country (group of countries) k (in our case Czech Republic). In turn, index C_{jk} has maximum value of 1 when the share of imports of products $i,...,n$ of the analysed country (group of countries) k is exactly the same as the corresponding share in the exports of the analysed country j to other country (or group of countries). The higher $C_{jk,}$ index the more adapted is the export supply of the analysed country to the import demand structure of its partner (or group of partners).

3 Data Analysis and Findings

3.1 Size and Structure of Trade between Poland and the Czech Republic (2018-2023)

3.1.1 Size of Export and Import between Poland and the Czech Republic

The Czech Republic is an important partner in Poland's foreign trade. Between 2018 and 2023, Polish exports to the Czech Republic accounted for approximately 6% of Poland's total exports, placing the Czech Republic in second place among the most important trading partners receiving goods from Poland. For many years, Germany has held the first place in Polish exports, being the recipient of about 30% of Poland's exports. In turn, imports from the Czech Republic constitute around 4% of Poland's total imports, which means that the Czech Republic is also a significant supplier of goods in Poland's foreign trade, ranking within the top eight (depending on the year).

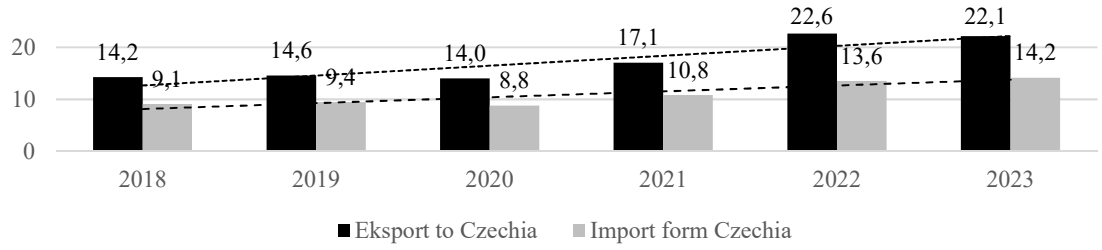
Trade with Poland also plays a significant role for the Czech economy. During the studied period, Poland maintained a third-place position as a recipient of Czech exports (after Germany and Slovakia) and was the second or third partner in Czech imports (after Germany and China).

From the perspective of this article's goal, the emphasis is placed on identifying changes in trade turnover between Poland and the Czech Republic that occurred between 2020 and 2023, during the pandemic and the ongoing war in Ukraine.

Based on the data presented in Figure 1, it can be stated that during the analyzed period of 2018-2023, the volume of exports and imports between Poland and the Czech Republic maintained the upward trend observed since 2004 (see Kozuń-Cieślak & Siek, 2020), with slight fluctuations. For many years, Poland has recorded a positive trade balance with the Czech Republic. From 2018 to 2020, the balance remained steady at 5.2 billion euro, and in subsequent years, it increased, reaching its highest level of 9 billion euro in 2022 (which is 70% higher than before the pandemic).

Thus, it can be concluded that neither the COVID-19 pandemic nor the ongoing war in Ukraine has had a negative impact on the trade exchange between Poland and the Czech Republic. The upward trend observed for twenty years on both the export and import side has continued. The significant increase in the positive trade balance with the Czech Republic observed since 2021 may indicate that the changing economic conditions in Europe, related first to the pandemic and then to the war in Ukraine, have been used to advantage by Polish economic entities.

Figure 1 - Polish export and import to/from the Czech Republic in 2018-2023 (current bln EUR)



Source: Own work on the basis of data from Table A1 (annex).

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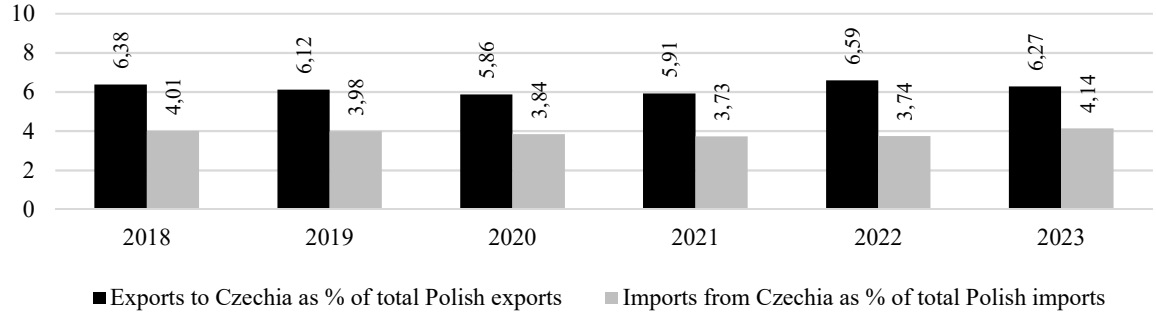
Figure 2 presents the share of exports and imports to/from the Czech Republic in total Polish exports/imports in the years 2018-2023. In the period under review, the share of exports to the Czech Republic in total Polish exports (Exp_CZ/PLexp) ranged from 5.86% to 6.59%. In 2018-2019, i.e. just before the outbreak of the Covid-19 pandemic, the average annual value of the Exp_CZ/PLexp indicator was 6.25%. In this period, exports to the Czech Republic accounted for approximately 2.8% of Polish GDP (Table A1). During the years of the pandemic, the Exp_CZ/PLexp indicator fell to 5.89% (but had no impact on the ratio to GDP). This almost six percent decrease in the indicator recorded during the pandemic was offset by increases in the following two years. The average annual Exp_CZ/PLexp ratio in 2022-2023 was 6.43%, slightly above the pre-pandemic level. It is worth noting that during this period, the average annual value of exports to the Czech Republic in relation to GDP increased to 3.2%, which indicates the continuation of the upward trend that has been ongoing for twenty years.

Figure 2 - Foreign trade between Poland and the Czech Republic in 2018-2023



Source: Own work on the basis of data from Table A1 (annex).

Very similar changes occurred in relation to imports from the Czech Republic to Poland. The average annual ratio of imports from the Czech Republic in relation to total Polish imports (Imp_CZ/PLimp) was 4% in 20218-2019. During the pandemic, this ratio dropped to 3.79%, i.e. by about 5%. In the next two years, i.e. 2022-2023, the Imp_CZ/PLimp ratio returned to a similar pre-pandemic level (3.94%). Based on the above analyses, it can be concluded that the limitations and restrictions that accompanied economic activity during the Covid-19 pandemic had a small impact on Poland's trade with the Czech Republic (the share of exports/imports to/from the Czech Republic in the total value of Polish exports/imports fell in 2020-2021 by about 5-6%). The end of the pandemic allowed these indicators to return to levels similar to those recorded before the pandemic. At the same time, it can be stated that the war in Ukraine has no impact on Poland's trade with the Czech Republic.

3.1.2. Polish Export and Import in Bilateral Trade with the Czech Republic (by SITC sections)

In order to obtain a more in-depth assessment of trade between Poland and the Czech Republic, the commodity structure of exports and imports was analyzed according to SITC (including 2-digit SITC codes). According to the data presented in Figure 3, it can be stated that Polish exports to the Czech Republic are dominated by three commodity groups, i.e.: Manufactured goods classified chiefly by material (SITC 6), Machinery and transport equipment (SITC 7) and Miscellaneous manufactured articles (SITC 8), which together account for about 70% of the total value of goods sold to the Czech Republic, and among them the largest share is held by goods from the SITC 7 section (about 30%).

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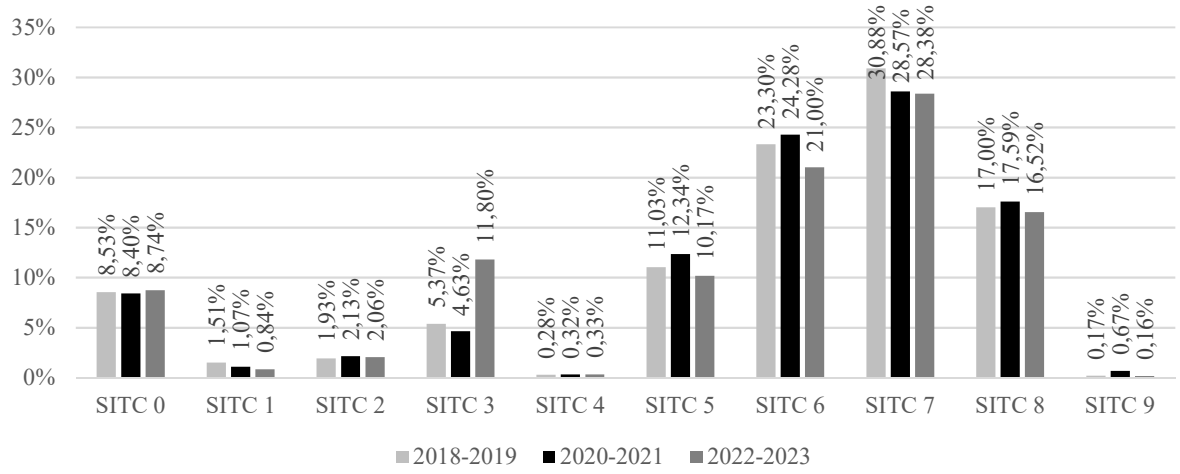
Figure 3 - Structure of export from Poland to the Czech Republic by SITC commodity groups (%), averages from periods: 2018-2019, 2020-2021, 2022-2023



Source: Own work on the basis of data from the Table A2 (annex).

The analysis of the coefficients of variation (CV) of the share of individual SITC sections in Poland's total exports to the Czech Republic (Table A2) indicates that in the period under review, only three product categories experienced variability that could be interpreted as high or medium. These are: SITC 9 – *Commodities and transactions not classified* (CV = 0.8), SITC 3 – *Mineral fuels, lubricants and related materials* (CV = 0.5) and SITC 1 – *Beverages and tobacco* (CV = 0.3). Of these three commodity groups, only SITC 3 will be subject to in-depth analysis, while the other two are of marginal importance in Polish exports.

SITC 3, i.e. *Mineral fuels, lubricants and related materials*, is interesting mainly because in 2022-2023, compared to 2018-2021, the share of this commodity group in the structure of Polish exports to the Czech Republic more than doubled. In 2022-23, the value of exports in the SITC 3 section increased by more than 2.5 times, and the share of this section in total exports increased from 5% to 11%. It is worth noting that within the SITC 3 section, the largest share is held by three divisions: SITC 32 – *Coal, coke and briquettes* (approx. 45%), SITC33 – *Petroleum, petroleum products and related materials* (approx. 29%) and SITC 35 – *Electric current* (approx. 22%). In 2022-2023, the value of exports in the SITC 35 – *Electric current* division increased very significantly (over 13 times), which increased its share in the SITC 3 section from 22% to 56%.

The SITC 7 section, which is the most important item in Poland's exports to the Czech Republic, i.e. *Machinery and transport equipment*, also deserves in-depth analysis. During the pandemic, the share of this section in total exports decreased by more than 2%, and it continued in 2022-2023. The largest decline in the value of exports during the pandemic was recorded in two divisions accounting for approximately 45-50% of the total export value in the SITC 7 group, namely: *Power-generating machinery and equipment* (SITC 71) and *Road vehicles* (SITC 78). At the same time, the largest increase in the value of exports concerned the *Electrical machinery, apparatus and appliances* (SITC 77) and *Machinery specialized for particular industries* (SITC 72) subsections. Overall, the value of exports in the SITC 7 section fell by only 0.5% during the pandemic compared to the period 2018-2019. However, in the next two years, i.e. 2022-2023, the export value increased in all divisions of the SITC 7 section, especially in SITC 77, 78, 71, which constitute approx. 70% of the SITC 7. Ultimately, the export value in the SITC 7 section increased by as much as 43% compared to the pandemic period. Despite this, the share of the SITC 7 section in the total export value did not return to the pre-pandemic level, which was related to changes in the export value in the remaining SITC sections, and especially SITC 3. The observed fluctuations in the level of export in individual divisions did not cause significant changes in the level of the share of the SITC 7 section in total exports, which is reflected in the very low coefficient of variation (CV = 0.07).

In the second largest commodity group of Polish exports to the Czech Republic, *Manufactured goods classified chiefly by material* (SITC 6), attention is drawn to the 3% decline in the share of this section in total exports, which occurred in the period 2022-2023. However, this decline was not the result of a decrease in the value of exports of goods classified in this section. On the contrary, the value of exports in the SITC 6 section increased,

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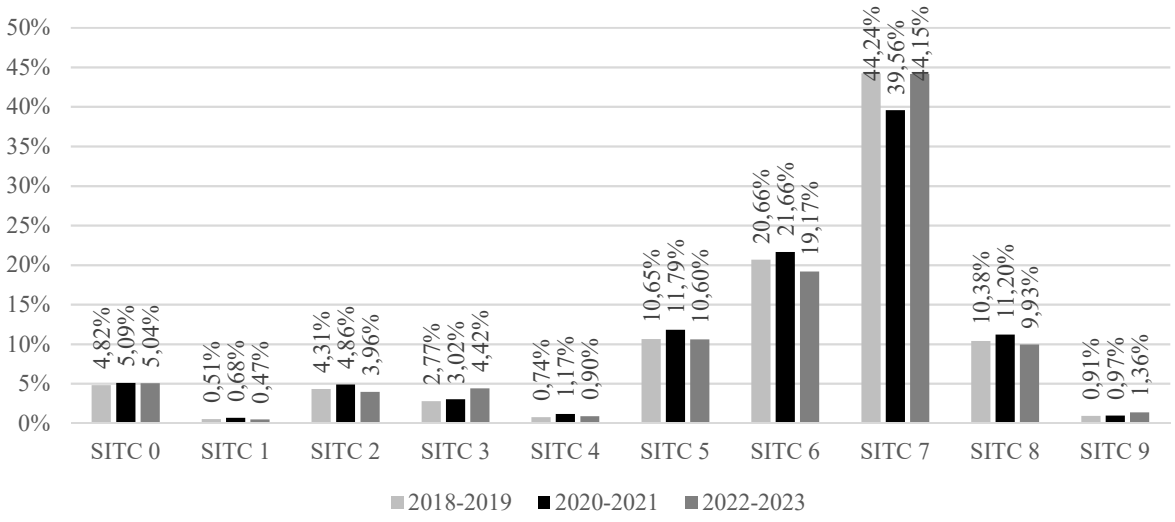
especially in the two most important divisions: *Iron and steel* (SITC 67) and *Non-ferrous metals* (SITC 68). Despite this, a decrease in the share of the SITC 6 section in total exports was recorded, which was the result of the already mentioned very significant increase in exports in the SITC 3 section. In general, the share of the SITC 6 section in total exports in the analyzed period showed a low level of diversification (CV = 0.13). Based on the above analyses, it can be concluded that the negative effects of the Covid-19 pandemic were felt most by Polish exporters in the automotive industry. In turn, the ongoing war in Ukraine and the changes taking place on the electricity market at the same time (Derski, 2024) placed Polish exporters of this energy in a favorable position.

An analogous analysis was conducted for the import of goods from the Czech Republic. According to the data presented in Figure 4, it can be stated that Polish import from the Czech Republic was dominated, similarly to export, by goods from the SITC 7 section, i.e. *Machinery and transport equipment*, whose share in total import was 40%-45%. The second most important product category is section: *Manufactured goods classified chiefly by material* (SITC 6), whose share in total import was about 20%. Additionally, two sections, i.e. *Chemicals and related products* (SITC 5) and *Miscellaneous manufactured articles* (SITC 8), each accounted for about 10% of total import. Since none of the above-mentioned sections recorded any significant variation in the indicators of its share in total imports (CV ≤ 0.08) in the period under review, only section SITC 7 was subjected to in-depth analysis. The remaining product groups played a marginal role in Polish imports from the Czech Republic, so they were not analyzed in detail either. The exception is section SITC 3, which showed an medium level of variability (CV = 0.30). Although SITC 9 showed very strong variation (CV = 0.87), due to its extremely low significance in Polish import, no in-depth analysis was performed in this case either.

Figure 4 - Structure of import from Poland to the Czech Republic by SITC commodity groups (%), averages from periods 2018-2019, 2020-2021, 2022-2023



Source: Own work on the basis of data from the Table A2 (annex).

In the *Machinery and transport equipment section* (SITC 7), a 5% decline in the share of this section in total imports was recorded during the pandemic. This was primarily due to a decline in imports in the SITC 78 – *Road vehicles division,* by around 25%. In the following years, the indicator returned to the pre-pandemic level. In the *Mineral fuels, lubricants and related materials section* (SITC 3), in 2018-19, the largest share in imports was held by the SITS 33 - *Petroleum, petroleum products and related materials division* (54%) and the SITC 32 - *Coal, coke and briquettes division* (26%). During the Covid-19 pandemic, an increase in the value of imported goods was recorded in all divisions (on average by around 20%), which did not significantly affect the shares of the two most important divisions in this section. In 2022-23, the value of imports in the dominant divisions (33 and 32) increased by 136% and 124%, respectively, and their total share in SITC 3 increased to over 86%. In addition, the value of imports of SITC 35 - *Electric current also increased* (by over 54%). These changes resulted in an increase in the share of SITC 3 in total imports to approx. 4%. Based on the above analyses, it can be concluded that the negative effects of the Covid-19 pandemic were felt most by Czech exporters in the

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automotive industry, while after the pandemic their situation improved significantly. The changing economic conditions in Europe, related to the war in Ukraine, were used to advantage by Czech entities exporting coal and crude oil to Poland.

3.2 Results of Foreign Trade Indicators Analysis – RCA, IIT, C_{jK}

3.2.1 The Revealed Comparative Advantages Indicator (RCA)

The revealed comparative advantages indicators (RCA) presented in Table 1, calculated according to the formula (1), allow for the assessment of Poland's relative comparative advantage in the production and export of goods to the Czech Republic. RCA indicators >1 allow for the identification of commodities (according to the SITC classification) in which Poland demonstrates comparative advantages as well as for the assessment the strength of these advantages. Throughout the entire analyzed period of 2018-2023, Poland demonstrated no comparative advantages in the *Crude materials, inedible, except fuels* (SITC 2) section, weak advantages in the *Machinery and transport equipment* (SITC 7) section and medium advantages in the *Manufactured goods classified chiefly by material* (SITC 6) and *Miscellaneous manufactured articles* (SITC 8) sections. In the *Animal and vegetable oils, fats and waxes* (SITC 4) and *Chemicals and related products* (SITC 5) sections, during the pandemic and the war in Ukraine, advantages decreased from medium to weak. The strong advantages revealed in 2018-2019 fell in the following periods to the medium level for SITC 0 and 1. The only commodity group that reveals abnormally high comparative advantages is SITC 9, i.e. *Commodities and transactions not classified* (and will not be analyzed in detail here). It is worth paying attention to the *Mineral fuel, lubricants and related materials* (SITC 3) section, for which the RCA index increased significantly in 2022-2023, indicating the existence of strong comparative advantages, which is consistent with the observed jump in the importance of this section in total Polish exports, as discussed in section 3.1.2.

Table 1 - Revealed comparative advantage indicators (RCA) for Polish – Czech trade

Years	Revealed comparative advantage indicators (RCA) for Polish – Czech trade by SITC sectors										$\overline{RCA}$*
	0	1	2	3	4	5	6	7	8	9	
2018-2019	4.64	7.10	0.66	2.81	3.39	2.04	2.56	1.86	2.18	1233.07	4.71
2020-2021	3.83	2.46	0.60	2.44	1.60	1.70	2.37	1.03	2.06	122.51	2.63
2022-2023	4.00	3.27	0.67	12.52	1.56	1.67	2.58	1.05	2.01	58.05	3.40

* RCA SITC 0-9 weighted average value, as weights we used the shares of SITC groups of goods exported from Poland to Czechia (according to 2-digit SITC)
Source: Own calculations on the basis of data from the Table A3 (annex).

The weighted average of the RCA indicators for all SITC sections ($\overline{RCA}$) can be treated as a composite indicator of inter-industry competitiveness. The analysis of the ($\overline{RCA}$) shows that before the pandemic Poland demonstrated rather strong comparative advantages in trade with the Czech Republic, while in the subsequent periods the revealed advantages can be assessed as average.

3.2.2 The Intensity of Intra-Industry Trade Indicator (IIT)

The analysis of the commodity structure of Poland's trade with the Czech Republic (part 3.1.2 of this study) showed that both exports and imports are dominated by the same four SITC sections, i.e.: *Chemicals and related products* (SITC 5), *Manufactured goods classified chiefly by material* (SITC 6), *Machinery and transport equipment* (SITC 7) *and Miscellaneous manufactured articles* (SITC 8), with section 7 being the most important. These four SITC sections cover on average 80%-85% of total Polish-Czech exports/imports. This indicates a strong development of mutual intra-industry trade. This observation is confirmed by the analysis of the intensity of intra-industry trade indicators (IIT). The closer the IIT indicator value is to 1, the higher the intensity of intra-industry trade. The data presented in Table 2 confirm that there is strong intra-industry trade in the four SITC sections mentioned above, as evidenced by the indicators $0.52 \geq IIT \leq 0.85$. Very strong intra-industry trade was also identified in the SITC 2 section, i.e. *Crude materials, inedible, except fuels* ($0.80 \geq IIT \leq 0.84$). In the analyzed period, fluctuations in the values of IIT indicators of varying strength and direction were noted, with increases in almost all SITC sections (except SITC 4 and 5) during the pandemic. For example, in 2020-2021, the IIT indicator for trade in section SITC 7 was 0.85, which can be interpreted as 85% of the value of trade within this section being intra-industry trade (it was focused primarily on trade in goods from SITC 78 – *Road*

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vehicles divisions). The remaining part of the exchange within this section (15%) was of an inter-industry nature. The IIT indicators for the remaining commodity groups should be interpreted in a similar manner.

Table 2 - Intensity of intra-industry trade indicators (IIT) for Polish – Czech trade

Years	Intensity of intra-industry trade indicators (IIT) for Polish – Czech trade by SITC sectors										$\overline{IIT}$*
	0	1	2	3	4	5	6	7	8	9	
2018-2019	0.43	0.32	0.80	0.46	0.43	0.70	0.67	0.74	0.53	0.00	0.64
2020-2021	0.46	0.52	0.81	0.52	0.39	0.66	0.67	0.85	0.55	0.01	0.67
2022-2023	0.43	0.47	0.84	0.24	0.46	0.69	0.66	0.79	0.52	0.05	0.61

* IIT SITC 0-9 weighted average value, as weights we used the shares of SITC groups of goods exported from Poland to Czechia (according to 2-digit SITC)
Source: Own calculations on the basis of data from the Table A4 (annex).

To assess intra-industry competitiveness in bilateral trade between Poland and the Czech Republic, a composite indicator $\overline{IIT}$ was used, which is a weighted average of IIT indices for all SITC sections. The analysis $\overline{IIT}$ shows that in the entire analyzed period, intra-industry trade accounted to approx. 61%-67% of Poland's total trade with the Czech Republic, i.e. at a level similar to the values recorded for the past twenty years.

3.2.3 The Index of Compatibility of Exports and Imports Structure (C_{jk})

The final step of our research is examining the compatibility of exports and imports structures in Polish – Czech trade. Table 3 shows indicators C_{jk} calculated according to the formula (3).

Table 3 - Index of compatibility of exports of Poland with imports of Czechia (2018-2023)

Year	2018	2019	2020	2021	2022	2023
C_{PLCZ}	0.58	0.58	0.64	0.69	0.63	0.65

Source: Own calculations on the basis of EUROSTAT on-line data (according to 3-digit SITC).

In the analyzed period, the index of compatibility of exports of Poland with imports of Czechis (C_{PLCZ}) showed an medium adjustment of the supply of Polish exports to the structure of demand for products imported by the Czech Republic from Poland (the C_{PLCZ} index ranged from 0.58 to 0.69). In the period preceding the pandemic, the C_{PLCZ} index amounted to 0.58. In the following two years, the index showed an upward trend to the level of 0.64 and 0.69. In turn, in the years 2022-2023, slight decreases in the C_{PLCZ} index were observed, but its level still remained higher than before the pandemic. It can therefore be concluded that in the last four years of the analyzed period, there was an improvement in the adjustment of the structure of supply of Polish exports to the structure of import demand of the Czech Republic.

4 Conclusions

Poland and the Czech Republic have been each other's leading trading partners for many years. The unprecedented events that both economies have had to face in recent years, namely the Covid-19 pandemic and the war in Ukraine, fortunately did not cause negative disruptions in bilateral trade, and even intensified them in some commodity groups. The analyses carried out allow us to formulate the following conclusions:

- Neither the Covid-19 pandemic nor the ongoing war in Ukraine had a negative impact on trade between Poland and the Czech Republic. The upward trend observed for 20 years on both the export and import side has continued, and the significant increase in the positive trade balance with the Czech Republic since 2021 suggests that Polish entities are taking advantage of the changing economic conditions in Europe.
- Polish exports to the Czech Republic are dominated by three commodity groups: *Manufactured goods classified chiefly by material*, *Machinery and transport equipment* and *Miscellaneous manufactured articles*, which account for about 70% of the total value of goods sold to the Czech Republic. On the other hand, Polish imports from the Czech Republic are mainly concentrated on goods from the *Machinery and transport equipment* and *Manufactured goods classified chiefly by material sections*, which together account for about 60% of total imports. This indicates the great importance of intra-industry trade.
- In the dominant, both in exports and imports, SITC 7 section – *Manufactured goods classified chiefly by material*, a large decline in exports was observed during the pandemic, mainly in the divisions: *Power-*

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generating machinery and equipment and *Road vehicles*. This was accompanied by an increase in exports in the *Electrical machinery, apparatus and appliances* and *Machinery specialized for particular industries* divisions. In turn, in 2022-2023, there was a strong increase in exports in all divisions of the SITC 7 section. These changes can be indirectly related to the restrictions related to the Covid-19 pandemic, which has greatly destabilized supply chains on a global scale.

- From the point of view of the purpose of this study, it is worth paying attention to the SITC 3 section, in which in 2022-23 there was a more than two-fold increase in exports, mainly in goods from three divisions: *Coal, coke and briquettes*, *Petroleum, petroleum products and related materials* and *Electric current*. The value of exports in the *Electric current* division increased more than thirteen-fold. It can be assumed that these extreme changes in the trade in goods (especially coal, crude oil, electricity), whose markets were strongly destabilized by the war in Ukraine and the related political restrictions and economic constraints, reflect the adjustment activities of both Polish exporters and importers.
- Analysis of the indicators of revealed comparative advantages (RCA) showed that, in general, Poland does not demonstrate strong and lasting comparative advantages in any SITC SECTION, and where they did occur (usually assessed as medium or weak), they were subject to fluctuation indicating a decrease in relative advantages, which indicates the replacement of inter-industry specialization of production and trade with intra-industry specialization.
- Analysis of the indicator of intra-industry trade intensity (IIT) showed that intra-industry trade dominates in the commodity groups that constitute the most important items in Poland's trade with the Czech Republic. In addition, the composite IIT indicator confirms that approximately 60%-70% of Poland's total trade with the Czech Republic takes place within the intra-industry exchange. Specialization and intra-industry trade based on it constitute a more advantageous form of participation of the economy in the international division of labour compared to inter-industry trade.
- The analysis of the compatibility of exports and imports structure (Cjk) indicator showed that during the years of the pandemic and the war in Ukraine, there was an improvement in the adjustment of the structure of Poland's export supply to the structure of the Czech Republic's import demand.

In conditions of strong and complex international dependencies, the outbreak of the COVID-19 pandemic has caused an unprecedented demand, supply and communication shock and, as a consequence, has seriously disrupted the functioning of global supply chains and negatively affected world trade. As if that were not enough, the outbreak of a full-scale war in Ukraine has disrupted the functioning of numerous commodity markets, including primarily markets of strategic importance for Europe's energy security, affecting the prices of energy resources. The embargoes introduced on trade with Russia have forced many countries to seek alternative sources of supply for energy resources, and the emphasis on energy transformation towards renewable energy sources has increased. The growth of geopolitical uncertainty has led to changes in the security strategies of many countries and has also led to the reconstruction of international alliances. Many European countries, including Poland, have significantly increased their investments in defence and military cooperation. In the context of the above changes and turmoil on international commodity markets, both new threats and new opportunities are emerging, which provide opportunities for rapid improvement of the competitive position. Entities capable of using them can achieve extraordinary benefits and accelerate their development. Analysis of trade turnover between Poland and the Czech Republic in the period 2018-2023 has shown that commodity exchange between both countries shows resistance to the negative effects of both tragic events, and key indicators used to assess bilateral trade relations indicate Poland's relatively strong position, which demonstrates the ability to adapt to ongoing changes, to operate in unstable conditions and take advantage of opportunities generated by the crisis.

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Annex

Table A1 - Bilateral trade between Poland and the Czech Republic (2018-2023)

Trade between Poland and the Czech Republic	2018	2019	2020	2021	2022	2023
Polish export to Czechia in bln EUR	14.23	14.58	14.02	17.05	22.60	22.12
Polish import from Czechia in bln EUR	9.12	9.44	8.79	10.81	13.55	14.16
Polish export to Czechia as % of Polish GDP	2.85	2.74	2.67	2.96	3.44	2.95
Polish import from Czechia as % of Polish GDP	1.83	1.77	1.67	1.87	2.07	1.89
Polish export to Czechia as % of total Polish export	6.38	6.12	5.86	5.91	6.59	6.27
Polish import from Czechia as % of total Polish import	4.01	3.98	3.84	3.73	3.74	4.14

Source: Own work on the basis of EUROSTAT on-line data.

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Table A2 - Polish export and import in bilateral trade with the Czech Republic - structure by SITC sections (%)

SITC section	Commodity structure by SITC sections (%)													
	Polish export to the Czech Republic							Polish import from the Czech Republic						
	2018	2019	2020	2021	2022	2023	CV*	2018	2019	2020	2021	2022	2023	CV*
0	8.62	8.44	8.89	7.92	8.05	9.43	0.07	4.87	4.77	5.36	4.82	4.93	5.16	0.05
1	1.65	1.38	1.25	0.90	0.75	0.93	0.30	0.47	0.54	0.81	0.54	0.48	0.46	0.24
2	1.83	2.03	2.13	2.13	2.28	1.83	0.09	4.69	3.94	5.31	4.42	4.62	3.30	0.16
3	5.67	5.06	4.65	4.61	13.04	10.57	0.50	2.52	3.03	2.57	3.47	3.56	5.27	0.30
4	0.26	0.31	0.30	0.33	0.40	0.26	0.17	0.69	0.80	1.16	1.18	1.14	0.65	0.27
5	10.51	11.56	12.31	12.37	10.82	9.52	0.10	10.32	10.97	11.33	12.26	11.22	9.98	0.07
6	23.42	23.17	22.71	25.86	22.78	30.89	0.13	21.76	19.56	20.79	22.52	20.58	17.76	0.08
7	31.50	30.25	29.51	27.64	25.87	30.89	0.07	43.21	45.26	41.12	38.00	40.91	47.39	0.08
8	16.42	17.59	17.76	17.42	15.84	17.20	0.04	10.61	10.15	11.08	11.32	9.84	10.02	0.06
9	0.13	0.22	0.50	0.83	0.17	0.16	0.83	0.85	0.98	0.45	1.48	2.71	0.00	0.87
0 - 9	100	100	100	100	100	100	1	100	100	100	100	100	100	1

*CV- coefficient of variation

Standard International Trade Classification (SITC) sections:

0 food and live animals
1 beverages and tobacco
2 crude materials. inedible. except fuels
3 mineral fuels, lubricants and related materials
4 animal and vegetable oils. fats and waxes
5 chemicals and related products
6 manufactured goods classified chiefly by material
7 machinery and transport equipment
8 miscellaneous manufactured articles
9 commodities and transactions not classified

Source: Own work on the basis of EUROSTAT on-line data.

Table A3 - Revealed comparative advantage indicators (RCA) for Polish – Czech trade

Year	Revealed comparative advantage indicators (RCA) for Polish – Czech trade by SITC section										$\overline{RCA}$
	0	1	2	3	4	5	6	7	8	9	
2018	4.67	8.89	0.64	2.60	5.01	1.87	2.44	2.01	2.09	978.46	3.73
2019	4.61	5.32	0.67	3.03	1.77	2.22	2.68	1.72	2.27	1487.68	5.7
2020	4.12	1.95	0.53	2.90	2.14	1.65	2.41	1.15	2.11	187.56	2.95
2021	3.55	2.97	0.67	1.98	1.06	1.74	2.34	0.91	2.02	57.47	2.32
2022	3.43	2.77	0.63	19.16	1.50	1.94	2.37	0.88	1.91	13.88	4.12
2023	4.57	3.77	0.70	5.89	1.63	1.41	2.79	1.21	2.12	102.23	2.68

* RCA SITC 0-9 weighted average value, weighted average (as weights we used the shares of SITC groups of goods exported from Poland to Czechia, according to 2-digit SITC)

Source: Own calculations on the basis of EUROSTAT on-line data

Table A4 - Intensity of intra-industry trade indicators (IIT) for Polish – Czech trade

Year	Intensity of intra-industry trade indicators (IIT) for Polish – Czech trade by SITC section										$\overline{IIT}$
	0	1	2	3	4	5	6	7	8	9	
2018	0.43	0.27	0.71	0.43	0.38	0.7	0.69	0.74	0.55	0	0.64
2019	0.44	0.36	0.88	0.49	0.48	0.69	0.66	0.74	0.52	0	0.63
2020	0.46	0.55	0.82	0.47	0.33	0.67	0.68	0.83	0.53	0.01	0.66
2021	0.47	0.5	0.79	0.57	0.45	0.65	0.66	0.87	0.56	0.02	0.67
2022	0.44	0.5	0.85	0.21	0.44	0.69	0.65	0.84	0.53	0.08	0.61
2023	0.43	0.43	0.84	0.27	0.47	0.7	0.67	0.75	0.52	0.01	0.61

* IIT SITC 0-9 weighted average value, weighted average (as weights we used the shares of SITC groups of goods exported from Poland to Czechia, according to 2-digit SITC)

Source: Own calculations on the basis of EUROSTAT on-line data

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Automating Processes in Organizations Using Artificial Intelligence

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Abstract

This article analyzes the impact of artificial intelligence (AI) process automation on efficiency, decision-making, and innovation within modern companies. It aims to identify key trends and challenges associated with AI implementation in business processes. The methodology includes a comprehensive literature review of recent studies on AI applications in business, along with an analysis an analysis of current ethical, legal, and security considerations related to AI deployment. The findings indicate that AI-driven automation significantly enhances productivity by streamlining repetitive tasks and enabling data-driven decision-making. However, alongside these benefits, new challenges also arise, including ethical issues, data security, and the need to comply with legal regulations. The conclusion emphasizes that artificial intelligence presents not only opportunities for increasing productivity and innovation but also challenges in the areas of ethics and legal compliance. Educational institutions can play a key role in preparing AI professionals, thereby contributing to bridging the growing demand for these skills in the labor market.

Keywords: *Artificial Intelligence (AI), Digitalization of Organizations, Efficiency, Legal Regulations, Process Automation*

JEL Classification: *G53, K10*

1 Introduction

Digitalization is a key factor in increasing the efficiency and competitiveness of modern organizations, enabling faster information processing and automation of routine tasks. Artificial intelligence (AI) plays a vital role in this process by providing advanced data analytics and supporting intelligent decision-making processes that would be time-consuming and complicated for human workers. By linking AI with digitized systems, organizations can respond more quickly to market changes and optimize their processes based on real data. Digitization with AI integration not only allows organizations to streamline their operations and innovate the ways in which tasks and processes are performed, but also create opportunities for growth.

Adoption of AI refers to the process of introducing and integrating AI technologies into different areas of an organization or industry. This includes the adoption and use of AI technologies such as machine learning, natural language processing, or process automation to improve efficiency, innovation, or decision-making. Adoption of AI can take place at different stages, from experimentation and pilot projects to full scaling within an organisation. (Mcelheran et al. 2024). The adoption of AI has been gradual for more than two decades, but more significant deployments can be dated back to 2010. At that time, however, AI was mostly in academia, and its

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practical use was very limited. Yet AI has deeper historical roots, going back to the word "robot," first used by Karel Capek in his drama R.U.R. in 1920. Another important milestone in AI history was in 1950, when Alan Turing laid the foundations of machine learning theory and introduced the Turing Test, which still serves as a criterion for judging the ability of machines to "think" like humans. It should also be pointed out that views on the development and understanding of AI are varied. According to Ali et al. (2023) there is room for different interpretations of what really drives AI, and what techniques are key to making it work. This diversity of views not only highlights the complexity of the technology itself, but also opens up a debate about the direction future AI research and applications should take. Thus, the development of AI is not only a technological but also a philosophical challenge, prompting reflection on what the true potential of AI is and how we should manage its progress. The term artificial intelligence refers to a variety of technologies (Amankwah-Amoah et al. 2024; Nahar 2024), e.g. Machine Learning, Natural Language Processing, NLP, Computer Vision, Robotic Process Automation, RPA, Generative AI.

Generative artificial intelligence is only now coming into full swing. Generative AI is a type of artificial intelligence that is capable of creating new content. This content can include text, images, music, or even program code. Generative AI learns from existing data and then uses it to create new examples that are similar to the ones it has seen during its training. Examples of generative AI are models that generate text based on given input (e.g., GPT, which is what ChatGPT is based on), or models that create realistic images based on descriptions. Singla et al. (2024) state in their study that 2023 was the year that the world fully discovered generative AI, but it was only in 2024 that organizations started to actually use it and take it for business activities. The use of generative artificial intelligence translates into innovation, lower costs and increased revenue. In the coming years, artificial intelligence will impact almost every industry, including energy systems, cybersecurity, financial markets, payment systems, sales, logistics, manufacturing, and civil engineering, as well as the health, energy, and environmental sectors (Ahmad et al. 2021; Nahar 2024; Verma et al. 2024). Nahar (2024) predicts that artificial intelligence will also impact the SDGs, both positively and negatively. The use and impact of generative AI in creative industries such as art, music, film, fashion, design, advertising and IT (e.g. software, services and computer games) is discussed in Amankwah-Amoah et al. (2024), (Atkinson, Bench-Capon, Bollegala 2020) describe directions and possibilities for AI in law and legal argumentation.

The rapid increase in the use of generative AI has brought a downside alongside its many benefits (Dirican 2015), which is becoming an increasingly pressing issue. One of the biggest risks is the spread of harmful content such as deepfakes, hate speech, and misinformation. Another significant challenge is the conflict with current legislation. Generative AI disrupts traditional legal frameworks in areas such as copyright, data protection and privacy. For example, the generation of content based on existing works raises copyright issues. In the area of data protection and privacy, the issue is how to prevent the misuse of personal data that may be inadvertently included in the training data of AI models.

This situation raises the need to modify and amend existing laws. Lawmakers around the world are beginning to respond to these new challenges, but the process is complex and requires a deep understanding of the technological aspects of AI. New legal frameworks need to be developed that are flexible enough to cover rapidly evolving technologies while ensuring the protection of fundamental rights and freedoms. This includes not only updating copyright and data protection regulation, but also introducing new rules on the use of generative AI to minimise the risks associated with its misuse. In addition, cooperation at international level will be necessary to ensure that rules are harmonised, and that new legislation is effective on a global scale. A first attempt is the regulation in the frame of the European Union, the so-called Artificial Intelligence Act referred to as the AI Act (Bas et al. 2024; Pehlivan 2024), with the aim of regulating AI to ensure its transparency, safety, traceability, non-discriminatory nature. But at the same time, regulation should not affect innovation, i.e., specifically slow it down.

The aim of the article is to identify an overview of current trends and key aspects of AI implementation in organizations, with an emphasis on balancing the benefits and risks associated with this technology. The result is not only to raise awareness of the benefits of AI, but also to promote the responsible and sustainable use of this technology in corporate practice.

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2 Material and Methods

In order to gain a comprehensive view on the issue of process automation using AI, it will be crucial to conduct a thorough literature search. This means a systematic examination of existing peer-reviewed publications, academic studies and research reports that provide valuable information on the level of AI implementation, areas of application, benefits and challenges of implementation. The review will enable the authors of the paper to identify current trends, best practices and technologies being used in this area, while also revealing gaps in current research. The data collected will be compiled to provide a quantitative overview of how organizations are adopting AI, in what areas automation is occurring, and reveal the key challenges organizations face. We will also focus on potential issues associated with AI automation, such as ethical challenges, legal issues, and technological threats linked to previous research. The results of this analysis will be used to develop a framework for balancing benefits and risks, allowing organizations to take a strategic approach to AI implementation and minimize potential negative impacts.

2.1 Overview of AI Technology Options for Automation

Several different types of artificial intelligence are used to automate processes in organisations, each specialising in specific aspects of automation. The choice of a particular type of AI depends on what processes the organization needs to optimize and what goals it has set, for example, whether it is data processing, automating decision-making processes, or improving customer support. (Maestro, Rana 2024) Thus, it is crucial that organizations carefully consider which type of AI best suits their specific needs and how it can contribute to achieving their goals. Several types of artificial intelligence are used in process automation. Of course, this is not an exhaustive list, and individual methods may complement, use or overlap each other.

Cloud computing is a technology that enables access to a shared pool of computing resources, including networks, servers, storage, applications and services, i.e., storing and processing data on remote servers accessible via the Internet whenever needed, instead of local computers. (Kanungo 2024; Rinkey, Bhatia 2023) This allows organizations to flexibly access computing capacity and data anytime, anywhere, which is crucial for running applications such as data analytics or online services without the need to invest in expensive infrastructure. Artificial intelligence is integrated into cloud services in several ways.

Machine Learning allows systems to learn from data and improve without the need for explicit programming, for example in predictive maintenance of machines. (Holstein et al. 2019; Sahlgren 2024) Machine learning models are used in healthcare, finance, and autonomous vehicles.

Natural Language Processing helps AI to understand and generate human language (Guan et al. 2019; Zhang 2024), which is used, for example, in chatbots to automate customer support.

Generative AI generates new content based on existing data, which is applied to automating the creation of marketing copy or design, for example, and has the advantage of communicating with us in natural language (Ali et al. 2023; Amankwah-Amoah et al. 2024; Tomczak 2024), further generating text, summarizing long documents, answering questions, translating text.

Computer Vision enables AI to analyse and interpret visual information (Rajasekaran 2023), which is used for e.g. chatbots, virtual assistants, image recognition technologies, or visual output inspection.

Robotic Process Automation automates repetitive administrative tasks, such as invoice processing or data entry, using software robots (McKay 2023). It uses computer vision, machine learning other types of AI to do this. Horvat, Ivanišević, Gluščević (2024) states that implementation is complex and brings risks both during its development and implementation I during use. Robotic process automation is not only applied in businesses, but also in the public sector such as education, finance, medicine, security and others.

Quantum Technologies use the principles of quantum physics to develop computing systems that are able to process complex problems much faster than conventional computers. Examples of applications are extensive, such as the use of quantum simulation for the development of new materials and drugs, applications in banking, weather forecasting and supply chain optimization (Rayhan, Rayhan 2023).

Virtual Reality and **Augmented Reality** allow virtual objects to interact in a real environment. Uses include, for example, training employees with simulations, visualising products in a real environment or assisting with complex technical operations in industry. (Sergeevna et al. 2024).

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New analysis by the McKinsey Technology Council highlights which technology trends are among the most important for companies in 2024 (Yee et al. 2024). The study shows that technologies such as cloud computing, generative AI and applied AI are more prevalent among organizations. This is also supported by the results of Gartner's survey (Gartner 2024a), according to which generative AI is the most commonly used AI solution. Newer and more advanced technologies such as quantum technologies and augmented reality (future of space technologies, future of robotics) are in the earlier stages of adoption, with fewer organisations having fully implemented them. This suggests that generative and applied AI-based technologies often serve as the foundation for the adoption of newer and less developed technologies. (Yee et al. 2024). Gartner (Gartner 2024b) in its 2023 report states that the most common areas of AI application are customer service, data analytics, marketing, supply chain management, and administrative process automation.

According to a PwC study (Rao, Verweij 2017) artificial intelligence (AI) has the potential to drive global economies, with strategic investments in various AI technologies being a key growth driver.

Increased labour productivity through automation and more efficient use of labour will lead to an initial increase in GDP as firms organisations are able to automate certain tasks and roles. PwC research shows that 45% of total economic gains by 2030 will come from product improvements through AI. The largest economic gains from AI are expected in China (26% increase in GDP in 2030) and North America (14.5% increase), which together will deliver an economic benefit of $10.7 trillion, or nearly 70% of the global economic impact. Overall, according to the authors of the study (Rao, Verweij 2017), AI could contribute up to $15.7 trillion to the global economy in 2030, with $6.6 trillion coming from increased productivity and $9.1 trillion from consumption-side effects. This potential shows the fundamental change that AI can bring to the global economy.

3 Results and Discussion

Managing innovation in companies is a complex process that requires constant decision-making and the ability to solve complex problems. The process is often unpredictable and chaotic because it deviates from standardised procedures and requires flexibility in approach. As Pietronudo et al. (2022) point out, it is artificial intelligence that can enable organizations to optimize the entire innovation process and automate decision making based on algorithms and big data, thus better finding and solving potential problems. However, as stated by World Economic Forum (2023) generative AI not only has potential for every industry as it offers opportunities for competitive advantage, but also has risks. It encourages innovation as businesses can react faster to market changes and come up with new products or services. Innovation must be aligned with a company's strategic objectives, otherwise it risks making poor decisions. Therefore, it is imperative that AI is only a tool to support decisions that will be subject to human judgement.

One of the main benefits of generative AI is the significant simplification of administrative tasks, leading to increased efficiency and productivity in organizations. Generative AI, such as ChatGPT, can be widely used for NLP (Natural Language Processing) tasks such as text generation, language translation, and generating answers to a plethora of questions, which has both positive and negative impacts (Dwivedi et al. 2023). With the ability to automatically generate text such as letters, contracts or emails, workers can focus on more complex and strategic tasks, while routine administrative work is quickly and accurately handled by AI. This not only speeds up processes, but also reduces the risk of human mistakes.

The involvement of generative Ai in the individual processes of an organisation can be different and depends on the investment of the company. For example, a Gartner study (Gartner 2024c) categorizes investments by the degree of use and incorporation of GenAI. The basic approach involves the use of off-the-shelf commercial applications, which are the cheapest but offer limited opportunities for exploitation. This is followed by integrating GenAI APIs into custom applications, which increases personalization and with it costs. The next level is to extend GenAI models through data mining, which adds complexity and cost. Customizing the models to the specific needs of an organization, such as creating a virtual assistant, already requires significant investment. The most challenging and expensive approach is then where organisations build their own AI models from scratch, which allows for maximum customisation but requires very high upfront and ongoing costs. (Gartner 2024c) Businesses need to carefully consider the level of customisation they need and tailor their investments accordingly, in line with the expected benefits.

However, with these benefits comes the risk of data leakage, especially if an employee accidentally uploads internal company data to an AI system, which can then publish or use this sensitive data for AI training. This risk is particularly serious in the context of GDPR, where the mishandling of personal data can lead to significant

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legal penalties and loss of customer trust. From a company's perspective, trade secrets may be leaked or confidentiality breaches may occur (Dohnal, Chaloupková 2024). That risk can be minimized by implementing security measures such as establishing rules for the use of AI, holding regular training sessions for employees, encrypting data, conducting regular security audits, and limiting access to sensitive information to authorized persons only.

AI can take automate repetitive tasks, such as invoice processing or inventory management, or reduce the time to process them. One of the significant risks associated with the widespread use of AI in enterprises is the dependence on technology (Dirican 2015) and the possibility of system outages. The risk of AI dependency means that a failure or error in an AI system can lead to disruption of the entire process, serious operational problems, loss of data, and even financial losses. To minimize this risk, it is crucial to implement change management, backup systems, and ensure that human control remains part of critical processes. Equally important is to regularly test and update AI systems to ensure they are ready for unexpected challenges and minimise the risk of failure, which again means having skilled experts. And last but not least, although this is one of the important elements, being prepared for cyber-attacks, which are becoming increasingly sophisticated. (Špičková, Hrdličková 2024).

AI can significantly improve accuracy and reduce errors in business processes, especially when dealing with large volumes of data or complex calculations. For example, in financial reporting or demand forecasting, AI can offer more accurate results than a human analyst. However, there is a risk that if AI algorithms are incorrectly set up or trained on flawed data, they can generate incorrect outputs, which can lead to incorrect decisions. To avoid these risks, it is essential to regularly monitor and validate AI results and ensure that algorithms are trained on good quality and representative data.

AI can deliver significant savings by reducing the need for human labour in repetitive or manual activities and optimising operational costs. (Furman, Seamans 2019) For example, automation can enable companies to run systems with fewer employees, leading to reduced payroll and training costs. However, this approach also carries the risk of social and ethical implications, including potential redundancies and reduced job opportunities. To minimize these risks, it is advisable to invest in retraining your employees and creating new roles that focus on managing and optimizing AI systems.

According to a study by McKinsey (Yee et al. 2024) there is a growing demand in the labour market for workers with a background in artificial intelligence (AI). Specifically, in 2023, the number of technology-related job openings grew by 8% compared to 2021, indicating the potential for longer-term growth in this sector, according to the study. Yet less than half of potential candidates globally possess the highly desirable technical skills required in these job postings. According to the article's authors, this trend presents a significant opportunity for universities to expand their technology and AI-focused curricula. Universities can respond to the growing job market demand by offering specialized majors and courses focused on AI, data science, and other technical skills. In this way, universities can not only prepare students for attractive career opportunities, but also help bridge the gap between available skills and industry needs. We believe that investing in these programs can contribute to enhancing the competitiveness of graduates in the global labor market in the long run. In this connection, there are also opportunities to offer specialized courses through distance education, the benefits of which have been discussed, for example, in Kaplan, Haenlein (2016).

We can conclude that the implementation and management of artificial intelligence in enterprises really requires capable and qualified personnel. These professionals must not only understand AI technologies, but also have knowledge in security, legal compliance and crisis management. They need to be able to design, monitor and maintain AI systems to ensure their reliability and safety. In addition, they need to be able to respond quickly to potential problems such as system outages or security threats and have the skills to interpret decisions made by AI, which is key to ensuring transparency and accountability. As AI technologies are constantly evolving, it is also important that employees have a willingness to learn and improve, or as they say, keep up with technological innovations and trends. This means that businesses need to invest in training and development of their employees so that they have experts who can effectively use and manage AI systems.

We show the complexity of managing innovation in enterprises and the role that artificial intelligence can play in optimizing this process. The authors believe that AI offers significant benefits, including automating decision-making, increasing efficiency and improving accuracy in business processes. However, with these benefits come significant risks, such as dependence on technology, the potential for system outages, and legal challenges related to data protection or ethical issues with employment. Crucially, AI should be seen as a decision support

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tool rather than a substitute for human decision-making, particularly in the area of strategic decisions where the wider context and long-term goals of the organization need to be considered. It is also essential that organizations invest in the development of their staff, which includes not only technical AI skills but also competencies in security, legal compliance and crisis management. This approach can ensure that the benefits of AI are maximized while risks are effectively minimized. There is also a significant opportunity here for educational institutions, which can prepare the next generation of AI professionals and thus contribute to bridging the gap between the demand for these skills and their availability on the labor market.

4 Conclusion

This article examines the impact of artificial intelligence (AI) on business processes, highlighting both the benefits and challenges associated with AI adoption. Key points include the significant role of AI in improving productivity, efficiency and decision-making in organizations by automating routine tasks and optimizing operations. Emphasis is placed on the potential of AI to optimise the process of innovation and economic growth, particularly through the development of generative AI that can create new content and products.

Generative AI is becoming an increasingly important tool in various industries, with its use leading to innovation, cost reduction and revenue growth. However, generative AI also poses a number of challenges, particularly in the areas of legal, privacy and ethical issues related to copyright. ChatGPT and other similar tools are trained on large amounts of publicly available data. Organisations need to be aware that they are not compliant with the General Data Protection Regulation (GDPR) and other copyright laws, and therefore need to control how the enterprise, and hence employees, use these platforms.

Please note the potential dependency on technology and possible system outages that can have serious impacts on the operations of organisations. In addition, there are social and ethical implications, particularly in relation to possible redundancies and reduced job opportunities, which requires a proactive approach to retraining workers. In the take article, we highlight the use of AI as a decision support tool subject to human judgement, especially in strategic decisions. However, as stated by McKay (2023) companies must always weigh the advantages AND disadvantages of each process automation option.

There is a significant opportunity here for educational institutions, which can play a key role in preparing the next generation of artificial intelligence (AI) professionals. In this way, they can contribute to bridging the gap between the growing demand for AI skills and their lack of availability in the labour market. Educational institutions have the potential to expand their programmes with specialised courses in AI, data science and related technologies, which would not only prepare students for attractive career opportunities but also support industry in its efforts to keep pace with technological change. In this context, it is imperative that research continues in the field of education to develop effective methods and strategies for teaching AI. Emphasis should be placed on creating flexible and innovative educational programmes that not only provide the theoretical knowledge but also the practical skills needed to effectively use and manage AI technologies. Such research could bring new approaches to distance education, make these programmes more widely available and ensure that future professionals are sufficiently equipped for the demanding requirements of a rapidly evolving technology market.

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Methods of Financing Small and Medium-Sized Enterprises (SMEs) in the Opole Region (Poland) as an Element of the Regional Sustainable Development

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Abstract

The study examines the methods of financing SMEs in the Opole Voivodeship and their role in promoting sustainable development. Small businesses are crucial element of the regional economy, contributing significantly to the local employment, innovation, and social stability. The research focuses on identifying the most prevalent financing methods. The findings suggest that access to diverse financing sources is critical for small enterprises to thrive and contribute to the broader goals of sustainable development. The study highlights the need for policy interventions to improve access to finance to ensure the balanced and inclusive growth of the region.

Keywords: *Small and Medium-Sized Enterprises (SMEs), Financing Methods, Opole Region, Sustainable Development*

JEL Classification: *O3, O1, O11*

1 Introduction

Small and medium-sized enterprises (SMEs) play a key role in driving economic growth, social development, and the achievement of various sustainable development goals (SDGs) [Tonis, 2015].To enhance their appeal, SMEs should highlight their commitment to the SDGs, making it a key aspect of their brand. By focusing on goals related to reducing waste and promoting recycling, SMEs can attract consumers who value sustainability. When customers recognize that an SME is actively contributing to SDGs, such as goals 8, 9, and 12, they are more likely to support the business further [Šebestová, 2020].

What is more, SMEs are a cornerstone of regional economies, driving local employment, fostering innovation, and contributing to social stability [Smith et al., 2022].

Since the early 1980s, SMEs have gained global recognition as key contributors to employment and economic growth. The European Union defines SMEs as businesses with fewer than 250 employees, an annual turnover below 50 million euros, or a balance sheet total not exceeding 43 million euros [European Commission, 2005]. SMEs play a crucial role in national economies, being present across all sectors, particularly in services, catering, wholesale and retail trade, consumer goods, and the food industries [Velinov & Ponomarev, 2016].

The importance of SMEs has consistently increased, positioning them as a critical component of the global economy and a key driver of economic growth [Meyer & De Jongh, 2018; Androniceanu, 2019; Androniceanu et

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al., 2019]. This is largely due to their dynamism, innovation, and efficiency, with their smaller size enabling quicker decision-making processes. As a result, many SMEs view internationalization and export opportunities as essential strategies for maintaining competitiveness in the market [Massaro et al., 2017].

In the Opole Voivodeship of Poland, these enterprises play an important role in shaping the economic landscape and influencing the region's overall development. As the Opole region seeks to advance its sustainable development agenda, understanding the financing mechanisms available to small businesses becomes increasingly crucial.

This study explores the various methods of financing small businesses in the Opole Voivodeship, focusing on their impact on regional sustainable development. Small enterprises, due to their dynamic nature and potential for innovation, require access to diverse and effective financing sources to support their growth and operational needs. However, these businesses often face challenges related to obtaining adequate funding, which can hinder their ability to contribute fully to regional development goals.

The Opole region, characterized by its unique economic structure and development priorities, presents a distinctive context for examining financing methods. This study aims to identify and analyze the prevalent financing options available to small businesses in the region, including traditional bank loans, European Union funds, venture capital, crowdfunding, and government-backed financial instruments. By assessing these methods, the research seeks to highlight the effectiveness of each financing source in supporting small businesses and facilitating their role in sustainable regional development.

The research method consists of literature review, desk research, and analysis of available statistical data concerning small and medium-sized enterprises in the Opole Voivodeship.

The findings of this study underscore the importance of diverse financing options for the growth and sustainability of small businesses. They also reveal the need for targeted policy interventions to enhance access to finance, ensuring that small enterprises can thrive and contribute to the balanced and inclusive growth of the Opole Voivodeship. Through this analysis, the study aims to provide insights that can inform regional economic policies and support frameworks, ultimately contributing to a more resilient and sustainable local economy.

2 General Classification of Enterprises in Poland

Enterprises are the fundamental entities of every country's economic system, generating the largest share of national income, and their efficiency impacts the standard of living in a given society. The concept of an enterprise is difficult to define precisely, primarily due to the fact that enterprises vary in their positioning within the national economy, and there is a wide diversity of enterprises in terms of size, ownership structure, legal status, type, and nature of activities [Zalega, 2016].

Enterprises are key components of any country's economic system, responsible for generating the majority of national income, and their performance has a direct effect on the standard of living within society. Defining an enterprise precisely is challenging due to the diversity in its role within the national economy, as well as the variety in size, ownership, legal status, and the nature of their operations [Sudoł, 2006].

Generally, an enterprise can be described as an entity within the economic system that organizes business activities, regardless of the scale, type of operation, legal structure, or ownership form. Enterprises are integral to both the economic and political systems in which they function. They exist in various forms and are subject to changes driven by the dynamic economic conditions, influenced by the state, structure, and fluctuations of their environment.

In essence, an enterprise is an economic entity that determines what it produces, for whom, and how, while also having some control over its production costs and the markets where it offers its products. Production involves using available resources to generate goods and services, though in the short term, enterprises are limited by existing technology. Additionally, an enterprise is a named organization that makes decisions about the use of production factors and the methods for manufacturing its goods.

From a legal perspective, the concept of an enterprise is closely linked to that of an entrepreneur. An entrepreneur may be an individual, a legal entity, or an organizational unit without legal personality but granted legal capacity by a specific law, conducting business activities in its own name [Kodeks cywilny].

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In the literature on the subject, numerous classifications of enterprises can be found, characterizing these entities from different perspectives. The main classification of enterprises divides them based on size, ownership structure, and the nature of their operations. Additionally, enterprises can also be categorized by the territorial scope of their activities and the legal form of the entity [Ambroziak, 2008].

Thus various types of enterprises can be distinguished depending on the criteria (Table 1). An organized classification plays a key role in this context, as it is essential for the rational support and promotion of enterprise development.

Table 1 - Typology of enterprises

Division Criterion	**Type of Enterprise**
Quantitative Measures	- Micro-enterprises - Small enterprises - Medium-sized enterprises
Qualitative Measures	- Local - National - International - E-enterprises - Traditional
Ownership Structure	- State-owned - Private - Cooperatives - Local government-owned - Mixed ownership
Legal Form	- Regulated by civil law - Regulated by commercial law
Scope of Responsibility	- Sole proprietorships - Parent companies - Affiliated companies
Source of Capital	- Domestic companies - Companies with foreign trade involvement
Amount of Intellectual Labor	- Low intellectual labor - Medium intellectual labor - High intellectual labor
Level of IT Development	- Virtual enterprises - Virtual organizations

Source: Own elaboration based on: Zalega T. (2016), Microeconomics, Scientific Publishing House of the Faculty of Management at the University of Warsaw, Warsaw 2016, p. 218.

Nevertheless, the primary classification of enterprises is based on the number of employees. It distinguishes between micro-enterprises, small enterprises, medium-sized enterprises, and large enterprises. A micro-enterprise is characterized by an average annual employment of fewer than 10 employees in at least one of the two most recent financial years. It also features an annual net turnover from the sale of services, goods, and products, or a balance sheet total at the end of one of those financial years, not exceeding the equivalent of two million euros.

A small enterprise is defined by an average employment of 10 to 49 people during at least one of the two most recent financial years. It must also meet the condition of having an annual net turnover from the sale of services, goods, and products that does not exceed the equivalent of 10 million euros, or a balance sheet total in at least one of the two most recent financial years that is less than 10 million euros.

A medium-sized enterprise employs fewer than 250 people on average during one of the two most recent financial years. Another condition for qualifying as a medium-sized enterprise is that the annual net turnover from the sale of products, goods, and services must not exceed the equivalent of 50 million euros, or the balance sheet total prepared at the end of one of the two most recent financial years must not exceed the equivalent of 43 million euros.

The values specified in euros should be converted into Polish zlotys based on the average exchange rate published by the National Bank of Poland on the last day of the entity's financial year. The law does not provide

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a specific definition of a large enterprise; therefore, any entity that does not meet the above conditions is classified as a large enterprise [Grzegorzewska-Mischka, 2009].

3 Characteristics of Small Businesses in the Opole Voivodeship

The Opole Voivodeship, located in southwestern Poland, is characterized by a relatively low population density and a predominantly rural landscape. The regional economy is driven by agriculture, manufacturing, construction, and services, with small businesses forming the majority of enterprises in these sectors. Many small businesses in the region operate in niche markets, contributing to the diversification of the regional economy.

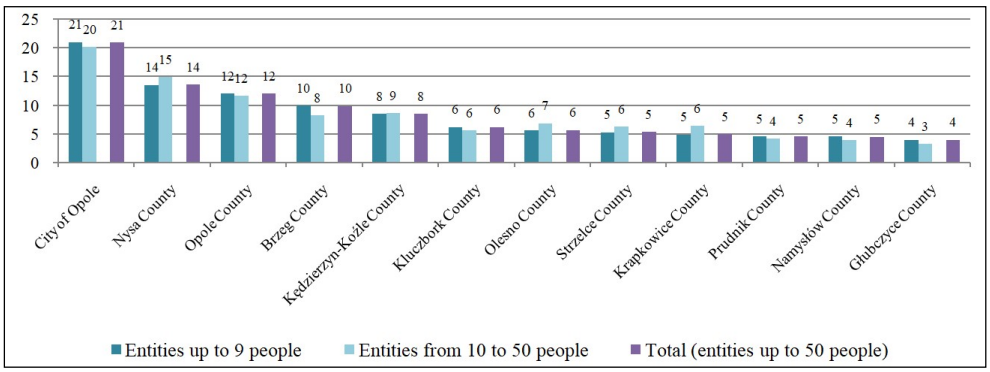
The unique socio-economic landscape of the Opole region presents both challenges and opportunities for small businesses. The region has faced population decline due to emigration, in other parts of Poland or abroad. This demographic trend has created a need for sustainable economic strategies that can generate local employment and stimulate innovation. Small businesses, with their inherent flexibility and local focus, are positioned to address these challenges.

The Opole Voivodeship, compared to other regions in Poland, exhibits a moderate level of entrepreneurship. In 2021 and 2022, the number of newly established businesses per 1,000 residents was 5.1. The first-year survival rate for newly formed enterprises in 2023/2022 was 67.5%, compared to 44.8% in the previous year (2022/2021) [PARP, 2024]. Additionally, the region is characterized by a high percentage of family-owned businesses (PARP, 2009). In 2017, family businesses made up 37.1% of enterprises in the region [GUS, 2022]. Nationwide research conducted by Anna Kowalewska further suggests that 1/4 to 1/3 of these businesses are craft enterprises [Kowalewska, 2023].

In the Opole Voivodeship, small businesses dominate, making up 99% of all enterprises in the region. This is supported by data from the Central Statistical Office [GUS, 2024a] as well as reports from keen observers of social life [Wyborcza, 2015]. Among the entities listed in the REGON register in the Opole region, the majority are sole proprietors [Opole Statistical Office, 2024]. In the first half of 2024, there were 109,833 entities in the Opole Voivodeship employing up to 9 workers, and 3,065 entities employing between 10 and 50 people. Small businesses in the Opole region account for 2% of all small firms registered in Poland. In terms of distribution by county, the highest number of small businesses is located in the city of Opole (21%), while the fewest are in Głubczyce County (4%). Detailed data is presented in Diagram 1a.

Within the microenterprise category, 2,739 companies operated in the public sector, while 105,613 were in the private sector, of which 80,497 were sole proprietorships. Among small businesses, 829 operated in the public sector, and 2,225 were in the private sector (including 670 sole proprietorships) (GUS, 2024b). In the public sector, the most microenterprises were located in Nysa County (22%) and the fewest in Krapkowice County (2%). As for small businesses, the most operated in Opole County (14%) and the fewest in Głubczyce County (4%). In the private sector, the highest number of micro and small enterprises were located in the city of Opole (21% and 23%, respectively), while the fewest were in Głubczyce County (4% and 3%, respectively). Detailed information is presented in Diagram 1b.

Diagram 1a – Deatiled data



Source: Own processing

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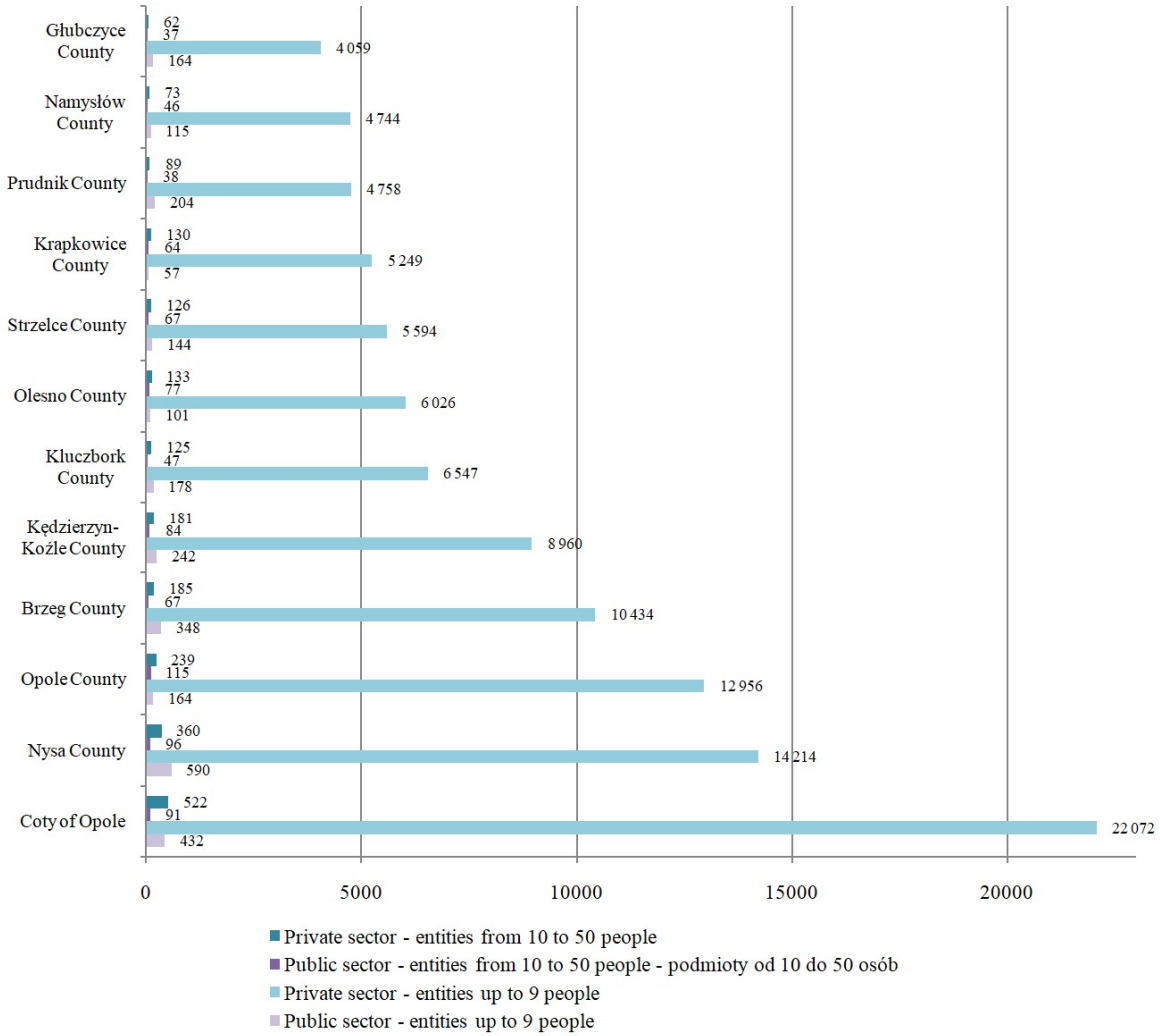
Diagram 1b – Deatiled information



Source: Own processing

Diagram 1a-b. The number of small national economy entities in the counties of the Opole Voivodeship according to the REGON register (%) broken down by: a) size of the entity, b) public and private sectors. Own elaboration based on [GUS, 2024a, b].

Analyzing the REGON register, which shows the number of national economy entities, it can be observed that between 2005 and 2023, the number of enterprises employing up to 50 employees in the Opole Voivodeship increased (Diagram 2a-b). This trend is particularly noticeable among businesses employing up to 9 people. During this period, the increase in the group of companies with up to 9 employees amounted to 26 percentage points, while for those with 10 to 50 employees, it decreased by 8 percentage points. Overall, for all small enterprises in the region, the change was 24.5 percentage points.

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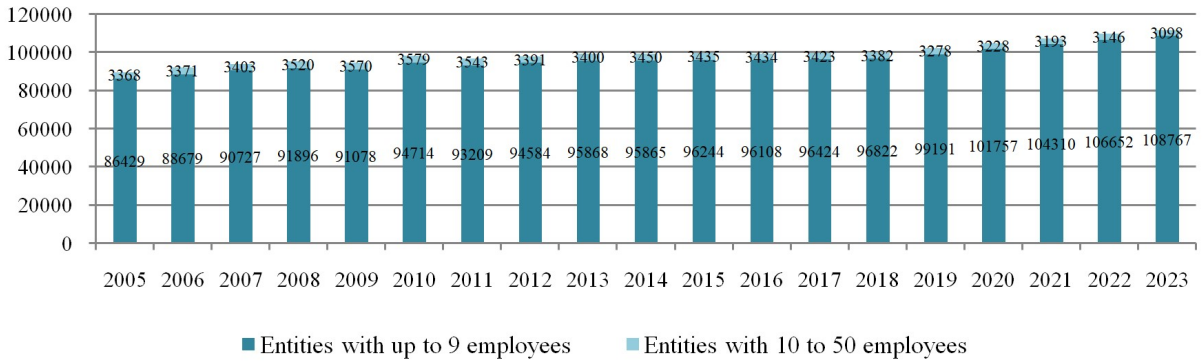
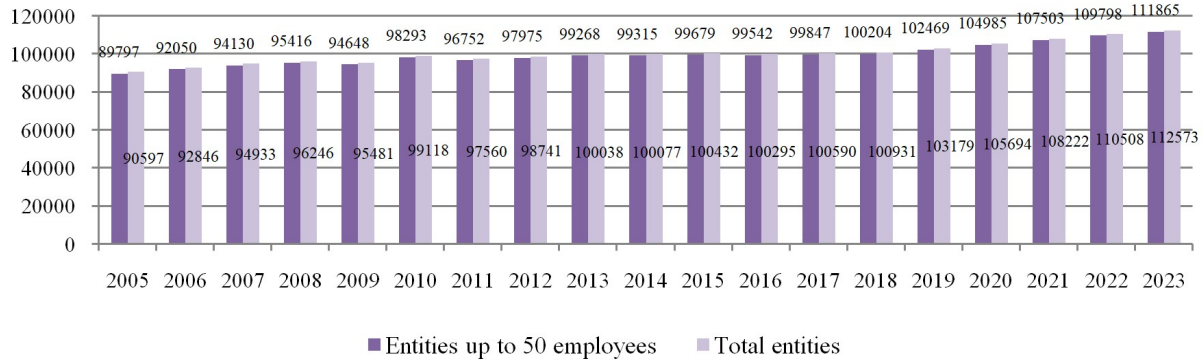
Diagram 2a – Deatiled data



Source: Own processing

Diagram 2b – Deatiled information



Source: Own processing

Diagram 2a-b. The number of small national economy entities in the Opole Voivodeship according to the REGON register, categorized by: a) size of the entity, b) division into small enterprises and all entities in the Opole Voivodeship. Own elaboration based on [GUS, 2024].

In 2022, out of 46,310 microenterprises and 1,109 small businesses, there were 116,025 employees (190,585 in microenterprises and 23,440 in small businesses). These businesses generated revenues amounting to 48,351 PLN (30,554 PLN in microenterprises and 17,797 PLN in small businesses) and incurred investment expenditures totaling 938,011 PLN (473,907 PLN in microenterprises and 464,104 PLN in small businesses). In that year, the average salary in active businesses in the Opole Voivodeship was 3,893 PLN in microenterprises and 5,863 PLN in small businesses [PARP, 2024].

Research on innovation in microenterprises conducted from 2011 to 2013 revealed that small businesses in the Opole Voivodeship exhibited a low level of innovation. During this period, these companies contributed to 12.7% of product innovations, 14.4% of process innovations, 13.6% of organizational innovations, and 7.3% of marketing innovations nationwide, highlighting their innovation performance as among the lowest in the country. Similarly, in 2013, the share of revenues from new or significantly improved products in total sales was only 2.9% in the Opole Voivodeship [Statistical Research and Education Center, GUS]. Over time, there has been a dramatic increase in the number of SME support projects related to investments in research and development infrastructure, financing the innovation process, and implementing research and development

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activities. These projects also include financial support for organizing training sessions, workshops, and courses aimed at expanding knowledge, developing skills, and enhancing qualifications of employees in this sector.

4 Materials and Methods

To investigate the methods of SMEs in the Opole region, a bibliographic study based on the Web of Science (WoS) and Scopus databases was planned. Key words and their synonyms were used, along with the Boolean operators AND/OR, presented in Table 2.

Table 2 - Operators and action guidelines

AND →	AND →	
OR ↓	OR ↓	OR ↓
Keywords		
"Small and medium-sized enterprises"	*"financing methods"*	*"Opole region"*
"Small and medium enterprises"	"financing strategies"	*"Opolszczyzna"*
SMEs		*"Opole Silesia"*
		"Opole province"
		"Opole Voivodeship"
		"Opolskie"

Source: own elaboration

In the WoS database, the search included the field "All Fields", while in the Scopus database - "Article title, Abstract and Keywords". In both databases, not a single material meeting these criteria was found. The above indicates a huge research gap regarding the issues of financing methods and SMEs in the Opole region.

Due to the lack of published research on the selected issues in databases of scientific texts, industry reports and publications of financing intermediaries such as the Opole Economic Development Center (in Polish: Opolskie Centrum Rozwoju Gospodarki/OCRG), it was decided to continue the research using the desk research method, which included the analysis of all found materials devoted to this issue.

5 Principles of Financing SMEs

Financing is an important component of small business operations, determining the ability to invest, grow, and remain competitive. The main sources of financing for small businesses in the Opole region, as in other parts of Poland are presented in the table 3.

Table 3 - Financing sources of SMEs

Financing source	**Description**
Bank Loans	Bank loans are one of the most traditional forms of financing available to small businesses. Polish banks offer a variety of loan products tailored to the needs of small enterprises, including investment loans, working capital loans, and overdraft facilities. However, access to bank loans is often limited for small businesses due to stringent collateral requirements, high interest rates, and complex application processes. These challenges are particularly acute for startups and businesses without an established credit history.
European Union Funds	European Union (EU) funds play a significant role in financing small businesses in Poland. The EU's Cohesion Policy and the European Regional Development Fund (ERDF) provide grants, loans, and guarantees to support the growth and innovation of SMEs. In the Opole region, these funds have been instrumental in facilitating investment in infrastructure, technology, and human resources. Specific programs, such as the Operational Program Eastern Poland,

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	offer targeted support to underdeveloped areas, promoting regional convergence and sustainable development.
Venture Capital and Private Investors	Venture capital (VC) and private investors represent alternative financing methods for small businesses with high growth potential, particularly in innovative industries. While VC funding is still relatively underdeveloped in Poland compared to Western European countries, it has been growing steadily. Startups and small businesses in sectors like IT, biotechnology, and renewable energy are increasingly attracting attention from venture capitalists and angel investors.
Crowdfunding and Peer-to-Peer Lending	Crowdfunding and peer-to-peer (P2P) lending platforms have emerged as popular financing options for small businesses, especially for startups and creative industries. These platforms allow businesses to raise funds directly from individuals, bypassing traditional financial institutions. Although crowdfunding is still in its infancy in Poland, it is gaining traction due to the low entry barriers and the ability to reach a wide network of potential investors.
Government-Backed Loans and Guarantees	The Polish government offers various financial instruments to support small businesses, including government-backed loans, guarantees, and subsidies. The Polish Development Fund (PFR) and the Bank Gospodarstwa Krajowego (BGK) play central roles in providing financial support to SMEs through loan guarantee schemes, which reduce the risk for banks and make it easier for small businesses to access credit. These instruments are particularly important for businesses located in less developed regions, such as the Opole Voivodeship.

Source: Own elaboration.

In summary, Table 3 illustrates the diverse financing options available to SMEs in the Opole region. Each source has specific advantages and limitations, and the effective use of these resources is crucial for the success and sustainability of small businesses. Understanding and navigating these financing options can significantly impact the ability of SMEs to invest, grow, and remain competitive in the regional and national economy.

6 Support Programs for SMEs – Examples of Current Initiatives in the Opole Voivodeship

In addition to traditional financing methods, there are several regional and national programs designed to support small businesses in the Opole region. These programs aim to enhance the competitiveness of SMEs and promote sustainable development through innovation, digital transformation, and environmental sustainability.

For example, the Regional Operational Program for the Opole Voivodeship is a key tool for financing small businesses in the region. This program, co-financed by the EU, provides grants for investment in infrastructure, energy efficiency, and innovation. The program also supports initiatives aimed at fostering entrepreneurship, reducing unemployment, and improving the quality of life in rural areas.

As part of the broader European Green Deal and Poland's commitment to sustainable development, green financing initiatives have gained importance. These programs support small businesses in adopting environmentally sustainable practices, such as investing in renewable energy, energy-efficient technologies, and waste reduction. The Green Growth Fund, for example, provides low-interest loans and grants to SMEs that commit to reducing their carbon footprint.

Another example are business incubators and accelerators in the Opole region, which offer not only financing but also mentoring, networking, and business development services. These institutions help startups and small

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businesses refine their business models, attract investment, and scale their operations. The Opole Science and Technology Park is one such initiative that fosters innovation and entrepreneurship in the region.

As part of government initiatives, new financial support programs for small and medium-sized enterprises (SMEs) have been launched, focusing on projects such as [Fundusze europejskie]:

- Investments in Fixed Assets. This includes investments in research infrastructure in micro-enterprises directly related to research and innovative activities.

- Investments in Fixed Assets for SMEs. This applies to small and medium-sized enterprises (including private research organizations) involved in research and innovation activities.

- Investments in Intangible Assets. This pertains to micro-enterprises investing in intangible assets directly connected to research and innovative activities.

- Investments in Intangible Assets for SMEs. This includes small and medium-sized enterprises (including private research organizations) investing in intangible assets related to research and innovation.

- Innovation Processes in SMEs. This encompasses innovations in processes, organization, marketing, co-creation, user-oriented innovations, and demand-driven innovations.

Table 4 presents selected examples of financial support programs dedicated to the SMEs.

Table 4 - Examples of Financial Support Programs

Projects	**Purpose of Fund Utilization**
Development of Cluster Offerings for Businesses	Loan for: - Development of Research or Demonstration Infrastructure essential for building the coordinator's potential to provide a new or significantly improved service to cluster members. - Enhancing Human Resources Potential. Activities related to improving staffing capabilities in strategic areas. - Organizing and Participating in Economic Missions. Activities related to organizing inbound economic missions and participating in trade fairs, outbound economic missions, seminars, congresses, and conferences.
Loan for Education	The loan pertains to education in the form of postgraduate studies, courses, training, and other educational programs offered by domestic and foreign entities, with the exception of bachelor's, master's, and doctoral studies, and integrated master's programs. The maximum duration of the educational program is 36 months.
Support for Improving Energy Efficiency	Loan for improving Energy Efficiency in a company. This includes energy modernization of factory buildings, increasing the energy efficiency of manufacturing processes, enhancing the efficiency of media circulation systems in plants, transport lines, and auxiliary systems, installing heat recovery systems from industrial processes, improving lighting, installing renewable energy devices with energy storage, and installing equipment for the production, storage, and transportation of renewable hydrogen. For improvements in building energy efficiency, the minimum threshold for required primary energy savings, considering the scope of the project, is 30% (excluding historical monuments). For increasing the energy efficiency of production lines/technological processes, the minimum threshold for primary energy savings, considering the scope of the project, is 10%. The scope of actions related to buildings, technical equipment, or installations and technological processes must be based on energy audits. Individual boilers powered by fossil fuels are excluded from eligibility.
Loans for Social Economy Entities (PES)	Funding for starting a business, specifically for: 1. Early Stage Operating Costs, covering the costs of operating a social economy entity (PES) during the early phase of business development. 2. Asset Growth increasing assets, including enhancing the value of fixed assets—

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	such as purchasing new equipment, replacing worn-out assets, or modernizing existing fixed assets related to the PES's ongoing or planned expanded activities. This includes buying equipment, machinery, devices, and transportation means directly linked to the PES's activities. 3. Purchase of Intangible Assets acquiring intangible assets. 4. Business Expansion financing initiatives aimed at increasing revenue, including starting new or different activities compared to the current ones. 5. Job Creation creating new job positions. 6. Implementation of New Technological or Technical Solutions. Other economic goals that contribute to the development of the PES.
Development of Long-Term Care	Loan for: - Renovation, Expansion, or Modernization. Refurbishing, expanding, or modernizing the infrastructure of healthcare facilities, or constructing new healthcare infrastructure. - Acquisition of Modern Equipment equipping facilities with modern medical equipment and apparatus. - Implementation of Necessary Infrastructure Actions carrying out essential infrastructure-related activities.

Source: Own elaboration based on: https://www.funduszeeuropejskie.gov.pl/wyszukiwarka/mikro-male-i-srednie-przedsiebiorstwa/#/wojewodztwo=2819.

7 Conclusions

The Opole Province, compared to the entire country, represents a moderate level of entrepreneurship. Small enterprises predominate within its borders, with a large proportion of them being family businesses. Micro and small businesses in the region are the strength of the private sector. The number of small businesses is growing year by year, especially in the group of micro enterprises. The increase in available financial support projects has a positive impact on the level of innovation of business entities in the province and strengthens the human capital of the region.

This article highlights the various methods of financing small businesses in the Opole region and their alignment with sustainable development goals, suggesting pathways for strengthening the financial landscape for SMEs in this part of Poland. The methods of financing small businesses in the Opole Voivodeship are diverse, ranging from traditional bank loans to innovative platforms like crowdfunding and P2P lending. While small businesses in the region face significant challenges, including limited access to capital and demographic shifts, they also benefit from a range of support programs, particularly those backed by the European Union and the Polish government.

To enhance the role of small businesses in promoting regional sustainable development, policy interventions should focus on improving access to diverse financing sources, particularly for startups and businesses operating in rural areas. Furthermore, increasing awareness and availability of green financing can encourage small businesses to adopt sustainable practices, contributing to the long-term resilience of the Opole economy.

The findings of this study underscore the importance of fostering an inclusive financial ecosystem that supports small businesses as key drivers of innovation, employment, and sustainability in the Opole region. Ensuring that these enterprises can access the necessary financial resources will be crucial for achieving balanced and sustainable growth [Ullah, 2023].

This study has several limitations. First, the focus on secondary data and qualitative insights limits a deeper, quantitative analysis of the impact of financing methods on SMEs and regional sustainable development. Additionally, concentrating on the Opole region restricts the generalizability of the findings to other areas with different economic conditions. The study also does not fully consider external factors, such as global economic shifts or environmental crises, that could affect SME financing and sustainability. Finally, the analysis does not explore the potential trade-offs between short-term financial support and long-term sustainability outcomes in depth.

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Future research should include primary data collection, such as surveys or interviews with SMEs and policymakers, to better understand the direct impact of financing methods on sustainability. Comparative studies across different regions could provide insights into best practices. Additionally, further exploration of innovative financing mechanisms like green bonds or crowdfunding is needed, as these may offer new opportunities for SMEs to contribute to sustainability. Finally, examining the role of digital transformation in promoting sustainable development among SMEs would be a valuable area for future study.

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Municipalities in Selected Countries of the European Union

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Abstract

An important element in both the structure and functioning of modern European Union member states is local and regional government. The purpose of this article is to present the functioning of the current administrative division in selected countries of the European Union and to compare the described levels of local government administration with an indication of the most important characteristics of each local government system.

Keywords: *Administrative Division, European Union, Public Finance*

JEL Classification: *H10, H70, N90*

1 Introduction

In the literature on the subject, everything that refers to the term "local" , is often reserved for the lowest level of public administration structures, namely the municipal level. Other approaches, in turn, point to the existence of various types of localism, referred to other levels of public authority, including indirect (district, department), regional, as well as central. It is widely believed that local government as a form of public authority consists mainly in organizing a given community in such a way that it is capable of solving its own problems (satisfying collective needs and interests) either directly or through its representatives. The main purpose of the publication is to synthetically present the functioning of the administrative division in selected countries of the European Union and to compare the levels of local government administration, taking into account the most important characteristics of each local government system.

2 Self-Government in the Countries of the European Union

The position of the local government subsector in the economic and financial systems varies across the EU member states. This is primarily due to the different territorial organization of the local government subsector. Single-tier local government is found, among others, in Ireland, Luxembourg, Estonia, Slovenia, while two-tier in Denmark, the Netherlands, Slovakia Sweden, and three-tier in Belgium, Spain, Poland [1].

Taking into account both the efficiency and effectiveness of local government, as well as the related model of public management in the local government subsector of specific European Union member states, there are distinguished based on the literature of the subject, five groups of countries. The most developed model of local self-government takes place in four countries which include: Denmark, Sweden, Finland and Luxembourg. The most important features of this model are [2]:

a) high share of revenues and expenditures of the local government subsector in relation to revenues, as well as expenditures of the public finance sector in general;

b) high level of fiscal autonomy of local government;

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c) high support of local government from the welfare state in terms of basic social services;

d) the significant position of corporate bodies;

e) a high level of political culture in the relationship between the state and local government;

f) the use of modern methods and tools of public management by the public administration;

g) high activity of both citizens and civic institutions;

h) a significant degree of public confidence in functioning public institutions;

i) citizen satisfaction with the quality of public goods and services.

Another group of countries that includes a developed model of local self-government are four, which include: Germany, Ireland, the Netherlands and Austria. In these countries, local self-government operates in a manner consistent with the standards of modern public management, although its efficiency, as well as its productivity, is lower than that of the Scandinavian countries. On the other hand, the third group of European Union member states, characterized by an average level of efficiency and also efficiency of local self-government, includes six countries which include: Belgium, Cyprus, France, Estonia and Malta. The fourth group includes the following countries: Slovenia, Spain, Portugal, Poland, Hungary, the Czech Republic, Slovakia, Latvia and Lithuania. Countries in the fourth group are introducing reforms to improve the effectiveness and efficiency of local self-government. The final, fifth group is represented by countries with a low rate of management efficiency in the local government sector.

The functioning of municipalities in each country is presented below.

In Poland, the system reforms that were initiated in 1990 led to the restitution of local self-government. One of the primary goals of these reforms was, among other things, to launch a process of decentralization of power, as well as to bring about real empowerment of local communities. The granting of legal personality to municipalities, as well as the possibility of independent action, consequently unleashed the potential that lay in local communities. Ultimately, the success of the first stage of the reform of the local government system contributed to the work undertaken in 1991-1993 to prepare further reforms of supra-municipal government structures [3].

The result of these efforts was the referral of a draft district map and several variants of a new territorial division of the provinces to the Sejm. However, the lack of a firm will to implement further reforms on the part of the then ruling coalition meant that it was not until 1997-1998 that meaningful systemic solutions were developed. Poland now has 16 provinces, 380 counties and 2,477 municipalities. The result of the measures taken was the preparation and enactment of laws on district self-government [4], provincial self-government, as well as a law introducing [5] a three-tier territorial division [6]

Luxembourg (Lëtzebuerg) - the Grand Duchy of Luxembourg (Grossherzogtum Luxemburg, Grousherzogdem Lezebuurg) located in Western Europe. It borders France to the south, Germany to the east and Belgium to the west and north. Luxembourg is the smallest member state of the European Union. It has borne the name of constitutional monarchy since 1866. The state's system is governed by one of the oldest fundamental laws in force in Europe: The Constitution of Greater Luxembourg, which has been in force since October 17, 1868. Luxembourg is made up of 12 cantons, which in turn are divided into 102 municipalities. Prior to October 3, 2015, the state was further divided into 3 districts. Local government operates at the level of municipalities. The municipal council is the legislative body of the municipality and consists of councilors elected for a period of six years, using a proportional system or first past the post, depending on the demographic size of the municipality. The council represents the municipality, chaired by the mayor. The College of the may. and.aldermen (collège des bourgmestre et échevins) is the executive and administrative body of the municipality. It consists of a mayor and councilors, the number of whom varies depending on the demographic size of the municipality and who are nominated by the national government from among the members of the municipal council. The college is both an organ of the municipality (local government) and a state body (implementing laws, Grand-Duke and ministerial decrees and decrees, with the exception of the police). The mayor (mayor) is appointed by the national government from among the members of the municipal council for a six-year term. He heads the college of mayor and municipal councilors and the municipal council. The mayor can act both as a municipal body and as a state body. In particular, he is in charge of implementing laws and police regulations. Luxembourg's municipalities are financed by three sources, each accounting for nearly 1/3 of revenues: the commercial tax

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collected by the state on behalf of the municipalities, a portion from state revenues (VAT, personal income and road fund) and from independent sources (rent, water, gas, electricity, public transportation, cleaning and public services) [7].

Denmark is a unitary state, consisting of municipalities (kommuner) and regions (region). The local level includes 98 municipalities (kommuner), while the regional level includes 5 regions (regioner). Before 1970, before reforms were introduced, there was considerable fragmentation of units. There were nearly 1,300 parishes within 25 districts, as well as 86 counties [8]. Today, after the reforms, Danish local government has a municipal council (kommunalbestyrelsen or byradet) consisting of members elected by direct universal suffrage for four years and from a system of proportional representation. It is responsible for the municipal budget, running local institutions and adopting local policies. Executive committees (kommunale udvalg) are responsible for local administration. Their members are appointed by the Municipal Council for four-year terms. Standing committees assist the municipal council in preparing decisions. The council is required to establish a finance committee, but can also appoint special committees, such as the education committee, the employment committee and the health and social affairs committees. The municipal council also elects a mayor (borgmesteren) for four years. He heads the municipality's administration and the city council. The regional council (regionsrådet) is the deliberative body for the region and consists of members elected by direct universal suffrage for a period of four years through a system of proportional representation. It can establish special committees, such as a hospital committee, a regional development committee and a sustainability committee, which can be assisted by special secretariats. The regional council also appoints its own chairman. Executive committees (udvalg) consist of members elected by the regional council for four years. They oversee the administration of the region and assist the regional council in preparing and implementing its decisions [9].

The Czech Republic was established as a result of the division of the Czech and Slovak Federal Republics on January 1, 1993. That same year, the constitution also came into force. The document was amended five times in the following years. The Czech Republic is a unitary state, comprising municipalities (present) and regions (countries). There are currently 6,254 municipalities and 14 regions. The municipal council (Zastupitelstvo obce) is a deliberative assembly of the municipality and consists of members elected by direct popular vote for a four-year term. The municipal committee (Rada obce) is the executive body of the municipality and consists of members elected by the municipal council for a four-year term. The mayor and deputy mayors are also members of the committee, which can create special commissions such as the financial commission, cultural commission and minority commission. The mayor (starosta for smaller municipalities or cities and primaries for larger cities) is elected by the municipal chamber for a four-year term. He heads the municipal commission and administration and represents the municipality. In municipalities with fewer than fifteen municipal council members, the mayor provides executive authority. The regional assembly (Zastupitelstvo kraje) is the deliberative body of the region

and consists of members elected by direct popular vote for a four-year term. It controls the regional budget and subsidies given to municipalities. It can also submit draft legislation to the national chamber of deputies. The regional committee (kraj council) is the region's executive body and consists of the president (hejtman), vice-presidents and other members elected by the regional assembly for four years. It is assisted by a regional body (krajský urad), headed by a director and divided into several departments responsible for specific areas, such as social affairs, transportation, urban planning and the environment. The president (hejtman) is elected by the regional assembly for a term of four years. He represents the region at the local, national and international levels. The city of Prague is both a municipality and a region with only one assembly [10].

Finland is a country whose system of both government and territorial-administrative division has been shaped by a complicated history and geopolitical location. It is a unitary country, divided since 1997 into six provinces, namely Southern Finland, Eastern Finland, Lapland, Oulu Province, as well as the Åland Islands. In Finland, local government is composed of municipalities (kunt), whose administration is based primarily on the self-government of its residents. The local system of government is single-level in nature. It assumes the existence of one type of municipality. A municipality may, however, include the word “city” in its name, although this fact is only related to prestige, as the President of Finland grants this designation as a form of honor to a municipality [11]. The municipal council (kunnanvaltuusto) consists of members elected under a system of proportional representation for a period of four years. This deliberative body appoints the board of directors and elects the mayor. It has a number of powers covering matters of importance to the municipal community, as well as in local finances. The powers of Finnish municipalities also extend to health and health care, education and municipal infrastructure, among others [12]. The board of directors (kunnanhallitus) consists of members appointed by the municipal council. It is responsible for running the municipal administration and its finances.

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The board is supported in its work by branch committees [13]. Finnish municipalities are the basic as well as competent units of local government, entrusted with the duty of making laws. They have the right to levy taxes and hold direct elections for municipal councils. All their activities include, among other things, the financing of inter-municipal, local or regional associations depends on the municipalities. The local government of the regional degree is formed primarily by inter-municipal unions. The first inter-municipal association was established in 1930 [14]. Each municipality, regardless of its size, has the same competencies in carrying out its tasks, but their implementation depends on individual capabilities. The state administration also operates at the local and regional level, although government bodies at this level do not have the authority to coordinate municipal activities. Instead, their main task is to evaluate the decisions made by the municipality in terms of financing and implementation of projects [15]. In Finland, there is a belief that local government requires agreement on formal rules for political leadership, as well as a conviction about the need to separate the political duties of the director from those of an administrative nature. The development of international contacts of local authorities, the participation of municipalities in a number of European organizations, has consequently triggered a discussion regarding political leadership. Currently, many municipalities are considering this possibility [16].

France is a permanent member of the Security Council, the United Nations, a member of the European Union, as well as the North Atlantic Treaty Organization (NATO). Over many centuries, France has played an important role in Europe. The foundation for the functioning of France's current self-governing and territorial structure is based on assumptions implemented by laws after 1982. Between 1982 and 1985, local administration reforms were carried out in France. The system in force until 1982 was centralist in nature. Although there was a council at the municipal level that elected the mayor and his deputies, the council's decisions had to be approved by the prefect before being implemented by the mayor. The fundamental solutions of the great decentralization reform of France's territorial administration were initiated by the Law of March 2, 1982 on the rights and freedoms of communes, departments and regions. These changes were aimed at a disjointed distribution of powers and adapted to the type, as well as the capacity of local communities to act. Based on the adopted solutions of the Law of March 2, 1982, provisions for the exercise of administrative supervision by state authorities with regard to legal acts taken and financial supervision over the use of financial resources by local communities were abolished. Administrative supervision was replaced by control of legality, exercised by the court. Resolutions adopted by local councils are examined for their compliance with applicable laws. In fact, direct preliminary control is exercised by the prefect, who, in case of doubt about the legality of the resolution, sends the case to the Administrative Court. The structure of French local government consists of three levels, namely the commune, the department and the region. It corresponds to the administrative division of French territory. The basic unit of local self-government (local community) is rural and urban municipalities, where the preferred concept is based on cooperation between local communities towards the formation of separate groupings of municipalities operating within: communities of cities, agglomeration communities, syndicates of municipalities and communities of communes [17]. The council of a French municipality consists of councilors elected by direct popular vote for a six-year term. The mayor and his deputies represent the executive branch of the municipality. The mayor is elected by and at the head of the municipal council for a six-year term. He directs the municipal administration and is supported by his deputies. Municipalities in France enjoy a general powers clause, which means they can intervene beyond their powers in all areas of local importance [18].

Germany is a federal state consisting of a federal and regional level. Municipalities (Gemeinden), cities (Städte) and counties (Kreise) are constitutional parts of regions (Länder). Currently, there are thirteen states (Länder) and three city-counties, which simultaneously have the status of a state. These include: Berlin, Hamburg and Bremen. The states are free to shape their internal system, but they must meet a condition: the state's internal legislation must be compatible with the federal constitution. The origins of modern German local government are based on the achievements of Prussian minister Baron Heinrich Friedrich Karl von Stein, who recognized the urban municipality as a political entity and gave it a modern representative system [19]. The German local government system is complex and at the same time diverse. It has been influenced by factors of historical, national, social, as well as political nature. The German federal system itself generates a high level of complexity in the structure of local government. Nevertheless, the aforementioned complexity and diversity does not constitute a barrier and a threat to the proper operation of German municipalities. German municipalities are characterized by a high degree of organizational freedom and self-governance, with an emphasis on a strong focus on meeting the needs, as well as the expectations of local communities, which became the result of a number of local government reforms at the municipal level in the 1990s. [20]. Today, self-government in Germany is defined as the right of citizens to direct and regulate affairs involving the public sphere at the local and regional levels [21].

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Italy, as a united state, was established in 1861, as a constitutional monarchy. This was done by King Victor Emmanuel, who united the states - the cities of the Apennine Peninsula and Sicily. The country is divided into 20 autonomous regions (including five regions with special statutes) covering 107 provinces. There are 7,904 municipalities in Italy. Italy's state territory, according to the 1948 Constitution, is divided into regions, provinces and municipalities. Provinces and municipalities are autonomous corporations. The municipality, as a self-governing corporation, has its own territory, as well as exercising powers within it, which derive from the grant of private and public law personality. In Italian self-government terminology, there is a distinction between municipalities (commune) and cities (citta) having its origin in historical tradition, since it cannot always be justified by the type of tasks performed. Municipal bodies include the municipal council (consilio communale), the municipal giunta (municipal board), the trustee (sindaco) and the municipal secretary. The council (consiglio) is elected by direct universal suffrage for a period of five years. It is the main decision-making body of the municipality, responsible for planning and controlling governance matters. In particular, the city council adopts the city budget. The city government (Giunta comunale) is the executive body of the municipality. It implements decisions made by the council. Its members are called deputy mayors (Assessori) and are appointed by the mayor. The mayor (Sindaco) is elected by direct universal suffrage for a period of five years. He delegates some of his powers to the deputy mayor, who is appointed by the mayor. The mayor also heads the local civil service [22].

Table number 1 shows the territorial organizational structures of local government of selected European Union member states

Table 1 - Territorial organizational structures of local government of selected European Union member states

Member State of the European Union	**Number of local government structures**		
	Level I	**Level II**	**Level III**
Belgium	Geemente – 581	Provincies – 10	Region - 3
Czech Republic	*Obec – 6254*	Kraj – 14	-
Denmark	Kommuner -98	Regioner – 5	-
France	Commune – 35 942	Departement – 101	Region – 18
Finland	Kunta – 320	Seutukunta- 70	Maakunta - 19
Holland	Gemeenten – 355	Provincies – 12	
Ireland	Hrabstwa – 26	Provincies - 4	-
Luxembourg	Gemeinden – 102	12 kantonów (canton; Kanton)	-
Germany	Gemeinde - 8578	Kreise – 439	Länder - 16
Poland	Gmina – 2477	Powiat -380	Województwo - 16
Slovakia	Obeców – 2927	Okresów - 79	8 Krajów
Sweden	Kommun – 290	Regioner (län)- 21	-
Italy	Comuni – 7 904	Provincies– 107	Region- 20

Source: own compilation based on http://www.ccre.org/en/article/introducing_cemr [accessed 01/09/2024].

Based on the information presented in Table No. 1, it should be noted that in terms of administrative division in the countries under discussion, there is variation in the number of municipalities at each level. Considering the first level, it should be noted that the largest number of municipalities is found in the case of France, Germany, Slovakia and the Czech Republic. The least, on the other hand, is in Ireland and Denmark. In the case of local government division at the second level, countries such as Germany, Poland and Italy have the largest number of units. The third level is not found in all countries. Such countries include the Czech Republic, Denmark, Finland, the Netherlands, Ireland, Luxembourg and Sweden. The main element that differentiates the modus operandi, organizational forms and scope of competence of local government in different European countries is the number of units themselves, especially the basic ones (municipalities). Some countries are divided into fewer than 100 municipalities (Denmark), while France has almost 36,000. Such significant differences are due not only to the

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size of the country and the number of inhabitants, but primarily to historical conditions. Based on a comparison of the administrative division in each country, it can be seen that in the states the most numerous are the municipalities at the first level. Such a division is usually due to the fact that local authorities are able to determine the needs of the municipality's residents of a socio-economic nature, which consequently allows the implementation of public tasks arising from the expectations of local communities.

Table 2 - Key characteristics of local government systems in selected European Union countries

Member State of the European Union	**Characteristics of local government systems**			
	Relations with the central government	**Terms of reference**	**Financial autonomy**	**Constitutional protection of self-government**
Belgium	high degree of autonomy	relatively small	relatively significant	constitutionally normalized
Czech Republic	high degree of autonomy	wide range of public tasks	relatively significant	constitutionally normalized
Denmark	high degree of autonomy	wide range of public tasks	relatively significant	constitutionally normalized
France	limited autonomy	relatively small	limited autonomy	constitutionally normalized
Finland	high degree of autonomy	wide range of public tasks	relatively significant	constitutionally normalized
Holland	high degree of autonomy	wide range of public tasks	relatively significant	constitutionally normalized
Ireland	Strong dependence programmatic, autonomy operational	relatively wide	limited autonomy	there are no constitutional norms
Luxembourg	high degree of autonomy	wide range of public tasks	relatively significant	constitutionally normalized
Germany	high degree of autonomy	wide range of public tasks	relatively significant	constitutionally normalized
Poland	high degree of autonomy	wide range of public tasks	relatively significant	constitutionally normalized
Slovakia	high degree of autonomy	wide range of public tasks	relatively significant	constitutionally normalized
Sweden	high degree of autonomy	wide range of public tasks	relatively significant	constitutionally normalized
Italy	limited autonomy	relatively small	limited autonomy	constitutionally normalized

Source: own compilation based on Eurostat data

Table 2 contains the most significant features of the local government system in selected countries of the European Union. On the basis of the data contained therein, it should be noted that in most countries in terms of the relationship between local government and central government, there is a significant level of autonomy. Limited autonomy is particularly present in the case of Ireland, France and Italy. It should be noted that in all the countries studied (except Italy) local government units have a broad catalog of public tasks to perform. These tasks are reflected in the significant level of financial autonomy of municipalities. Legal regulations for the functioning of local government units are constitutionally normalized. The exception is Ireland. A certain degree of local autonomy is standard in all European countries. Among the member states of the European Union, it is difficult to identify those in which some form of local self-government would not function.

3 Conclusion

Today, local self-government is an important link in the system of public power. The constitutional position of local self-government reflects the idea of participation of citizens and their organizations in solving many public tasks, primarily involving the problems of communities of territorial communities. The historical experience of

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many European Union member states shows that local self-government is capable of carrying out a wide range of public tasks aimed at meeting the needs of the local community.

Considering the institution of local government in the context of selected European Union countries, it should be emphasized the existence of significant organizational and functional differences in the models adopted by individual countries. European countries have adopted different solutions for the number of levels of territorial division. In smaller countries such as Luxembourg, self-government functions at the municipal level. Luxembourg is one of the small countries (it covers only 2,586 square kilometers) and hence there is no need for a third level of local government. Another group is made up of countries where the second level occurs in close connection with the countries' system or regional level of central government. Differences in the administrative division in the various countries of the European Union are due, among other things, to the size of the country, the number of inhabitants, but above all to historical conditions.

Today, local self-government in most countries is a permanent institutional element of the political order. Self-government of municipalities, cities, provinces, departments, among others, is an important factor in the economic and civilizational-cultural progress of a country. Currently, local governments are pretending to be a partner in relation to the EU authorities in processes involving issues of taking action in the practical application of EU legal acts. With the deepening of European integration, the role of local governments in all member states is increasing.

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Analysis of Strategic Planning and Digitalization of Enterprises in the Moravian-Silesian Region and the Czech Republic

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Abstract

Strategic management plays a crucial role in the success of businesses in the digital age, requiring businesses to adapt their strategies to the changing digital environment, identify new opportunities and threats, and respond flexibly to changes and innovations. The aim of the article is to map the current state of strategic planning and the degree of digitalization of companies in the Moravian-Silesian Region and the Czech Republic. The research was carried out by means of a questionnaire survey using the CAWI method. The questionnaire survey was conducted at the beginning of 2024. Statistical methods including Spearman's correlation coefficient were used for data analysis. Based on the results, it can be concluded that Czech enterprises introduce new technologies mainly for competitiveness reasons. Considering that strategic management plays a key role for the success of enterprises in the digital environment by providing a framework for identifying and exploiting new opportunities and minimizing the risks associated with digital transformation. It is an essential tool for businesses that want to remain competitive and thrive in today's rapidly changing world.

Keywords: *Strategic Management, Digitalization, Management, Questionnaire Surve*

JEL Classification: *D70, J16*

1 Introduction

Strategic management is a process organization use to define their long-term objectives and the methods for achieving them. It encompasses the creation, execution, and evaluation of cross-functional capabilities to ensure that a business can reach its goals and sustain a competitive edge. This process unfolds through several stages: defining strategic goals (such as vision, mission, and objectives), analyzing both external and internal environments, formulating strategies based on this analysis, implementing these strategies, and finally, reviewing and evaluating them.

Since the 1950s, strategic management has evolved in response to changing economic conditions. Today's global and fast-paced economy, with recent disruptions like the COVID-19 pandemic and the war in Ukraine, highlights the necessity for businesses to stay agile. Companies are now adjusting to technological advancements, especially in artificial intelligence and digitalization. Digitalization refers to the adoption of digital technology, transforming organizations by leveraging IT innovations (Hess, 2013).

In the Czech Republic, digitalization is taking shape through various projects that aim to modernize public administration, enhance digital infrastructure, and improve digital literacy. Key initiatives include eGovernment

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services like digital IDs and data boxes, expanding high-speed internet and 5G networks, and fostering the digital economy. Despite progress, challenges remain—such as digital literacy gaps, the need for legislative modernization, and unequal access to technology across regions. The strategic plan "Digital Czechia," presented in 2023, coordinates the country's digital initiatives to meet these challenges, following Decision (EU) 2022/24811 of the European Parliament and Council.

As digital transformation accelerates, strategic management becomes critical for businesses to stay competitive and achieve long-term growth. Digital technologies reshape business operations, customer interactions, and internal processes, requiring companies to adapt their strategies to seize new opportunities and mitigate emerging threats. This paper explores the current state of strategic planning and digitalization in Czech companies, particularly in the Moravian-Silesian region.

The article is structured as follows: First, the foundational concepts of strategic management and digitalization are outlined. The next section discusses the survey methodology, statistical methods, and hypotheses used in the study. The results chapter presents the findings of the survey in tables and graphs, followed by a discussion of these results.

2 Theoretical Framework

In the pursuit of higher profits, customer acquisition, and market share, organizations engage in fierce competition. The key to success is achieving a competitive advantage through differentiation, which attracts customers and drives business. Strategy lies at the heart of strategic management, with numerous definitions dating back to the 1960s in America. Key perspectives on strategy include Chandler's (1962) focus on setting long-term goals and resource allocation, Ansoff's (1965) view of strategy as decision-making under uncertainty, and Porter's (1980) competitive strategy framework. D'aveni (1994) emphasized the role of strategy in creating and destroying competitors' advantages.

In today's rapidly changing market, organizations must operationalize long-term strategic goals to respond swiftly to environmental shifts. The fast pace of data flow, increased availability of information, and abundance of human potential underscore the need for strategic management systems (Rothaermel, 2019). Time horizons for strategic planning have drastically shortened, with organizations now considering 5-10 years as a maximum range (Wagner, 2014; Berisha, 2017).

Factors such as industry stability, competitive environment, uncertainty, and product life cycles influence the strategic planning period. Contractual obligations with long-term partners also play a role (Leibold et al., 2007). Strategic management is essential for creating and executing strategies to achieve desirable outcomes (Gawer & Cusumano, 2014).

Recent developments highlight that there is no one-size-fits-all model for strategic management. However, by following specific steps, managers can align their strategies as closely as possible to an ideal model based on past experience (Boyd & Reuning-Elliott, 1998; Crook, Ketchen & Snow, 2003; Shujahat et al., 2017).

In the current digital era, businesses face the dual challenges of digitalization and artificial intelligence. The "Digital Czechia" plan, in line with EU Decision 2022/24811, aims to prepare the Czech population for work and life in a digital age by developing digital skills and infrastructure. The plan seeks to support businesses in adapting to technologies like AI, while modernizing public services.

3 Materials and Methods

The data for this study was collected through a questionnaire survey conducted from January to February 2024 using the CAWI method (Computer-Assisted Web Interviewing). A total of 118 responses were received, though 9 were excluded due to incomplete data. Descriptive statistics and hypothesis testing were used for analysis, with Spearman's correlation coefficient measuring relationships between variables (Hauke & Kossowski, 2011; Schober et al., 2018).

The theoretical foundation for questionnaire testing is discussed in several publications (Bethlehem, 2009; Aithal & Aithal, 2020). This article employs descriptive statistics and hypothesis testing. Statistical hypothesis testing is essential in practical statistical analysis of empirical data (Martin & Bridgmon, 2012). In this paper, Spearman's correlation coefficient is used for two ordinal variables. The Spearman correlation coefficient values range from -1 to 1, where a value of 1 indicates a perfect positive monotonic relationship (as the value of one variable

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increases, the value of the other variable also increases). A value of -1 indicates perfect negative monotonic dependence (as the value of one variable increases, the value of the other variable decreases). A value of 0 indicates that there is no monotonic dependence between the variables (Hauke, Kossowski, 2011; Schober, et al. 2018).

4 Results and Discussion

The results were processed using IBM SPSS and MS Excel. Initially, descriptive statistics were conducted for selected questions from the questionnaire survey.

One of the first questions focused on the size of the company. 23% of respondents answered that they were micro-enterprises. Most respondents identified as small organizations (35%). 20% considered themselves medium-sized enterprises, and 22% classified their company as large. The authors were also interested in the type of ownership of the companies. The majority of respondents indicated that their company was solely Czech owned (77%). Companies belonging to multinational corporations (with a presence in the Czech Republic) accounted for 9.2%, while firms with foreign investors constituted 13.8%.

Table 1 – Contingency table of absolute frequencies

		Company ownership			
		in exclusive Czech ownership	part of a multinational corporation (representation in the Czech Republic),	company with a foreign investor	Total
Size of company	micro	15	10	0	25
	small	38	0	0	38
	medium	17	0	5	22
	large	14	0	10	24
Total		84	10	15	109

Source: own processing.

The table above shows the distribution of firms according to two variables, firm size and ownership. Firms that are smaller are owned exclusively by Czechs and firms that are larger are companies with foreign investors.

The next question asked how often strategic planning is done in the firm. Almost half (49%) responded that it is done regularly, i.e., more than once a year. Annually, 34% of respondents carry out the strategic planning process and occasionally, i.e., less frequently than once a year, 17%. One of the options was never. No one used this option. Thus, all respondents carry out a strategic planning process. The main benefits that result from strategic management are improved competitiveness, better use of resources, greater focus on the long term and innovation and growth. The following table shows how often the strategic planning process is carried out and what the main benefits are for the organization.

Table 2 – Contingency table of absolute frequencies

		What are the main benefits of strategic management for your organisation?				Total
		Improved competitiveness	Better use of resources	Greater focus on the long term	Innovation and growth	
Frequency of	Occasionally	14	0	0	4	18

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strategic planning	Annually	14	4	19	0	37
	Regularly	10	5	34	5	54
Total		38	9	53	9	109

Source: own processing.

The table provides an overview of the perceived benefits of strategic management and the frequency of strategic planning among different organizations. Greater focus on long-term goals is the most significant benefit. Thus, firms that conduct strategic planning on a regular and annual basis reported this benefit most frequently. Improved competitiveness is the most frequently cited benefit of strategic management, for firms that undertake the strategic planning process occasionally. Better use of resources and Innovation and growth are less frequently cited benefits.

The question of interest to the authors was whether there is a relationship between firm size and the frequency of conducting the strategic planning process. H0: there is no relationship between the number of employees and the frequency of conducting the strategic planning process. H1: there is a relationship between the number of employees and the frequency of conducting the strategic planning process.

Table 3 – Measures of interdependence between size company and frequency of the strategic planning

		Frequency of the strategic planning process			Total
		Occasionally	Annually	Regularly	
Size of company	micro	5	10	10	25
	small	4	9	25	38
	medium	9	4	9	22
	large	0	14	10	24
Total		18	37	54	109
p-value		0,020			
Spearman Correlation		-0,582			

Source: own processing.

It can be concluded that the hypothesis in favour of the alternative hypothesis that there is a relationship between the number of employees in the firm and the frequency of conducting the strategic planning process is rejected. The relationship is moderate and inverse - the correlation is negative. This means that if there are more employees, strategic planning is done less frequently.

The next section was devoted to digitalization and the impact on strategic management. Here the hypothesis was asked whether firms according to size implement digitalization in their strategic plans. *H0*: there is no relationship between firm size and the implementation of digitalization. *H1*: there is a relationship between firm size and implementation of digitalization.

Table 4 – Measures of interdependence between size company and implementing digitalization

		Implementing digitalization				Total
		no	Considering it	Gradually implementing	Already implemented	
Size of company	micro	2	6	8	5	21

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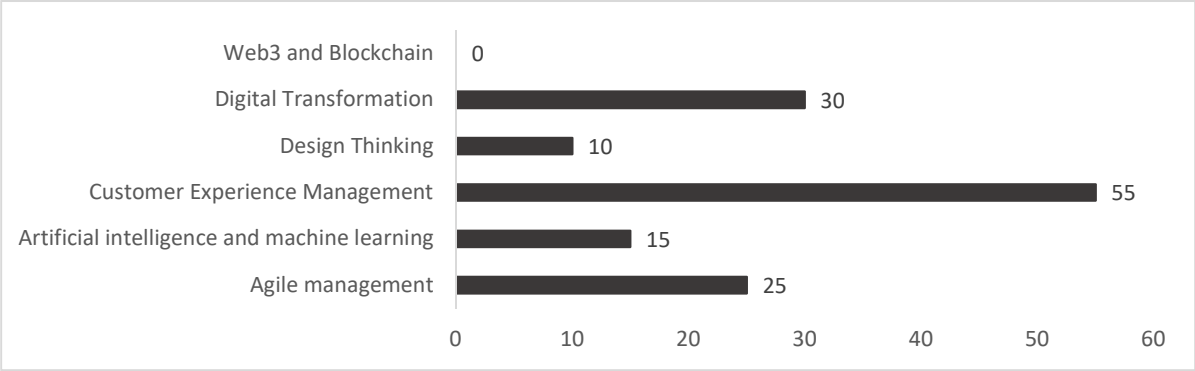
	small	4	14	14	6	38
	medium	7	9	6	0	22
	large	6	15	3	0	24
Total		19	44	31	11	105
P-value		0,000				
Spearman Correlation		-0,653				

Source: own processing.

From the table you can see the answers. When asked if they are implementing digitalization in strategic management, 4 did not answer.

The p-value of 0.02 is less than the chosen significance level ($\alpha = 0.05$), so the null hypothesis is rejected. This means that there is a relationship between firm size and implementation of digitalization. The Spearman coefficient value of -0, 653 indicates that the relationship between the variables is not perfectly linear but there is a moderate negative relationship. This means that the larger the company is, the less digitalization is implemented in the strategic planning process. The most frequently considered digitalization tools are shown in the following graph. Respondents could choose multiple options.

Figure 1 – Considered digitalization tools



Source: own processing

The customer experience management tool is the most used or considered. Customer experience management is a strategic approach that focuses on improving customer interactions with the company at all touch points. The goal is to create positive and consistent experiences that lead to higher customer satisfaction, loyalty, and ultimately better business results. This approach includes collecting and analyzing data on customer behavior and then creating customer journeys. The second most common answer was digital transformation, which is generally the process of integrating digital technology into all areas in the business. Agile management came in third place, which is an approach to project management and product development that emphasizes flexibility, collaboration, and rapid adaptation to change.

The results of a study using IBM SPSS and MS Excel were analyzed to examine various aspects of strategic planning and digitalization in enterprises. Descriptive statistics were first performed on selected questionnaire questions, revealing the distribution of enterprise size and ownership. It was found that 23% of respondents were micro enterprises, 35% were small organizations, 20% were medium enterprises, and 22% identified as large enterprises. In terms of ownership, 77% were wholly Czech-owned, 9.2% were part of multinational corporations, and 13.8% had foreign investors. Subsequent analysis focused on the frequency of strategic planning, which showed that 49% of companies conducted it regularly, 34% annually, and 17% occasionally. All respondents emphasized the benefits of strategic planning, including improved competitiveness, resource utilization, long-term focus, and support for innovation and growth. The study also examined the relationship

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between firm size and frequency of strategic planning and found a slight negative correlation, suggesting that larger firms tend to undertake strategic planning less frequently. Large enterprises undertake strategic planning less frequently precisely because they tend to have a stronger market position and may have a more stable revenue stream. Because of this stability, they may not have the need to change their long-term strategy as frequently (Sull, 2015). Another reason is that in large companies, implementing change is often more difficult due to the scale of the organizational structure, the number of stakeholders and the entrenched processes. Making frequent strategic changes could disrupt the functioning of the business and lead to a higher risk of misalignment between different departments (Susanto, Sawitri, and Widyastuti, 2023). Finally, the investigation examined the relationship between firm size and digitization efforts and found that there is a significant relationship between the two.

4 Conclusion

This article discusses the significance of strategic management in today's competitive business landscape and examines the evolving nature of strategy formulation and implementation. It emphasizes the role of strategic management in achieving a competitive edge and organizational success, delving into different perspectives and definitions that have emerged since the 1960s. The article also highlights key elements of effective strategic planning, such as goal setting, resource allocation, and adapting to dynamic market conditions.

Furthermore, the impact of digitalization on strategic management practices is explored, with a focus on the Czech Republic's strategic plan for digital development until 2030. The plan outlines objectives for enhancing digital skills, infrastructure, and public services, while addressing challenges such as digital literacy and regulatory modernization. The text stresses the necessity of strategic adaptation in response to the digital transformations reshaping business operations and customer interactions. The ultimate aim of this article is to assess the current state of strategic planning and the extent of digitalization in firms, specifically in the Moravian-Silesian Region of the Czech Republic.

This paper investigates the state of strategic planning and the level of digitalization in companies in the Moravian-Silesian region of the Czech Republic. The study finds that a significant portion of the surveyed companies belong to micro and small organizations, while medium-sized and large enterprises make up a smaller portion. The majority of companies are owned by Czech owners, with a smaller percentage being part of multinational corporations or having foreign investors. In terms of the frequency of strategic planning, half of the companies do it regularly, while one-third do it annually and the remaining companies do it occasionally. The benefits of strategic planning include increased competitiveness, resource optimization, long-term focus, and promoting innovation and growth. The analysis also reveals that larger firms engage in strategic planning less frequently and adopt digital strategies less frequently compared to smaller firms. There is a moderate negative relationship between firm size and the adoption of digital strategies.

Finally, popular digitalization tools were identified, with customer experience management proving to be the most prevalent. the aim of this tool is to improve interactions for greater satisfaction and loyalty. Digital transformation and agile management were also noted for integrating digital technologies and supporting flexible and collaborative business approaches. Nowadays, businesses face significant pressure regarding digitalization. In addition, it has to deal with new challenges such as ESG programmes and diversity initiatives, which will be further explored.

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Enhancing Project Management Resilience in Local Authorities: Strategies for Sustainable Regional Development

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Abstract

This paper explores the importance of resilience in local government project management and its impact on sustainable regional development. Given the increasing complexity and variability of the environment, resilience in project structures is proving to be essential for the effective use of resources, including EU funds, and for the successful management of unexpected challenges. The study identifies key factors that promote project management resilience, such as flexible organisational structures, decentralised decision-making, systematic crisis management and technological innovation. Based on case studies from European regions where successful adaptation strategies have been implemented, the paper suggests measures to strengthen the competences of project teams and recommends more effective ways of cooperation between regional and national institutions. Recommendations include introduction of agile processes, promotion of training in crisis management, automation of monitoring systems and sharing of knowledge and resources across institutions. The paper provides new insights on how the resilience of public sector projects can be improved, which is crucial for the long-term development and competitiveness of regions.

Keywords: *EU, Local Governments, Project Management, Regional Development, Resilience*

JEL Classification: *H43, M11, O22, R11, Q01*

1 Introduction

Resilience in project management enables projects and organizations to overcome obstacles, learn, and adapt for future success. This dynamic process requires flexibility, innovation, and a quick response to challenges. In regional development, resilience is essential for sustainability and competitiveness, especially for local governments. It allows them to implement projects that withstand socio-economic shocks, environmental threats, and political shifts. The use of EU funds, which aim to boost regional growth, adds complexity to this process as authorities must navigate administrative challenges, limited resources, and stakeholder coordination alongside rapid technological and legislative changes, ensuring transparency and accountability throughout project cycle.

This paper highlights the importance of resilience in local government project management and explores best practices to address challenges and optimize EU fund usage for sustainable regional growth. The objective of this paper is to analyse and underscore the importance of integrating resilience principles into project management within local governments, particularly in the context of sustainable regional development. By identifying key resilience factors and best practices, the paper aims to provide strategies that strengthen local authorities' capacities to effectively manage unforeseen challenges, optimize the use of EU funds, and contribute to the long-term development and competitiveness of regions. Through a comparative analysis of case studies in

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Europe, it identifies key resilience factors and offers strategies for effective resource utilization with a focus on EU funding mechanisms. The main research questions are:

- What factors influence resilience in local authority project management?
- How can local governments enhance resilience in project implementation?
- What strategies and best practices can build project resilience in different regions?

The paper employs a mixed-method approach (Tashakkori, Teddlie (2010), Creswell, Plano Clark (2017), Snyder (2019)), combining case study analysis from resilient European regions with thematic analysis to uncover key resilience patterns. This methodology not only reveals factors influencing resilience but also examines their importance and interconnections, providing actionable insights for local governments to foster sustainable, resilient projects.

2 Theoretical Background of Resilience in Project Management

Resilience in modern management enables organizations to adapt and thrive amid unpredictable challenges. In local government project management, resilience is crucial for implementing initiatives that yield long-term community benefits. Applying resilience principles helps manage risks while turning challenges into opportunities for innovation and growth. Key factors include a flexible, learning-oriented culture, visionary leadership, effective financial management (including EU funds), technological infrastructure, and supportive socio-economic conditions. Integrating these elements strengthens local governments' capacity to deliver sustainable projects that boost regional competitiveness and quality of life.

2.1 Overview of Resilience Theory in Management

Resilience has gained prominence in management, especially in response to the increasing complexity and uncertainty of the global business environment. Originally developed in ecology as the capacity of ecosystems to recover from disturbances, and in psychology as the ability of individuals to cope with stress, resilience in management refers to organizations' capacity to anticipate, prepare for, respond to, and adapt to crises (Walker, Holling, Carpenter, Kinzig, 2004; Boin, Hart, Stern, Sundelius, 2005; Comfort, 2007; Boin, van Eeten, 2013). In management literature, resilience is closely linked to agility, adaptability, and sustainability, providing a framework for organizations to navigate contemporary challenges. Organizations with high resilience can proactively identify risks, absorb shocks through robust processes, adapt strategies and structures to seize new opportunities, and foster a culture of continuous improvement and innovation. Research highlights that resilience is not a static trait but a dynamic, ongoing process that demands continuous attention and investment. Developing an organizational culture that encourages openness, knowledge sharing, and collaboration across all levels is essential for sustaining resilience. Practical applications of resilience in management include supply chain resilience (ensuring continuity despite disruptions), organizational resilience (overall ability to withstand turbulent environments), and project resilience (managing uncertainty across project lifecycle to achieve key aims).

2.2 Applying the Concept of Resilience to Project Management in Local Governments

Project management in local governments is a unique area where public interests, political pressures, and limited resources intersect. Applying resilience in this context is crucial to ensure projects that positively impact the community are successfully implemented. As highlighted by Loughlin, Hendriks, Lidström (2010), Brown (2022), Drennan, Dudau, McConnell, Stark (2024), key aspects of resilience include integrated risk management (incorporating risk identification, assessment, and mitigation throughout the project cycle), flexible planning (allowing adjustments to legislative changes, economic shifts, or evolving community priorities), stakeholder engagement (promoting shared ownership and increasing project support through active involvement of citizens and relevant stakeholders), capacity building (investing in staff training to enhance response capabilities), and technological adaptation (leveraging modern project management tools to boost efficiency and transparency). Case studies (World Bank, 2024; World Economic Forum, 2024) demonstrate that local governments using resilience principles have improved crisis management outcomes in events like natural disasters, economic recessions, or pandemics. Cities with flexible plans and strong community communication managed to respond and minimize COVID-19 impacts (European Commission, 2021; Ferry, 2021; Flexigrant, 2024). Resilience enables local governments to effectively address current challenges while preparing for future uncertainties.

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2.3 Factors Affecting the Resilience of Project Management in the Local Environment

Project management resilience in local environments is shaped by internal and external factors. Identifying these factors is essential for developing strategies that help projects withstand and adapt to change. Internal factors include organizational culture, leadership, team skills, and financial management – elements that, when well-managed, enhance a project team's adaptability and problem-solving capabilities. External factors encompass the legal and regulatory framework, political climate, economic conditions, social influences, technology trends, and environmental conditions. Tables 1 and 2 summarize these factors, adding management strategies and practical examples to provide local governments with tools for effective resilience-building. Tailoring strategies to local conditions and learning from practical examples can inspire solutions for similar challenges, helping local authorities better prepare for and succeed in implementing resilient projects.

Table 1 – Internal factors affecting the resilience of project management in the local environment.

Factor	Description	Impact on resilience
Organizational culture	Encourages innovation, learning, and open communication	Enhances adaptability and rapid response
Leadership	Strong, clear vision, and supportive management	Boosts team cohesion and decision-making under uncertainty
Team skills	Well-trained, competent staff with problem-solving abilities	Improves handling of unexpected challenges

Source: own elaboration (2024) based on Hollnagel, Woods, Leveson (2006), Kutsch, Hall (2016).

Table 2 – External factors affecting the resilience of project management in the local environment.

Factor	Description	Impact on resilience
Legal framework	Stable regulations, minimal changes	Reduces risks and planning disruptions
Political environment	Supportive, stable local leadership	Ensures project continuity and funding
Economic conditions	Regional economic stability	Provides reliable resources and support
Social factors	Community engagement and support	Boosts project acceptance and success
Technological trends	Access to modern tools and systems	Increases efficiency and adaptability

Source: own elaboration (2024) based on Hollnagel, Woods, Leveson (2006), Kutsch, Hall (2016).

3 The Importance of Project Management in Local Authorities

Project management in local authorities is essential for implementing regional development strategies and delivering public services that impact residents' quality of life. Projects facilitate efficient resource use for infrastructural, social, economic, and environmental development. However, local governments often face challenges like financial constraints, political instability, and a shortage of skilled staff, complicating project implementation. Nevertheless, successful projects – such as upgrading transport, revitalizing historic centres, implementing e-government, and creating green spaces – demonstrate that effective management can drive economic growth, social benefits, environmental sustainability, and stronger public trust.

3.1 The Role of Projects in Regional Development and Public Service Delivery

Local authority projects are crucial for implementing regional development strategies and delivering public services, turning policy objectives into actions that impact residents' quality of life. Projects facilitate efficient resource use, drive innovation, and promote sustainable growth and regional competitiveness. They support infrastructure (transport, energy, telecommunications), social services (education, health), economic growth (SME support, job creation), and environmental sustainability (renewable energy, waste management). Effective project management enables local authorities to plan, coordinate, and monitor these initiatives, ensuring they meet objectives and maximize community benefits.

3.2 Typical Challenges in Project Management in Local Governments

Local governments face several challenges that can hinder project implementation, such as financial constraints, political instability, limited human resources, and administrative hurdles. Financial limitations require careful investment prioritization and navigating complex criteria for additional funding, like EU grants. Political changes can disrupt project continuity, as new leaders may shift priorities, affecting investor confidence. Human resource challenges stem from a lack of skilled project managers and limited training opportunities.

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Administrative barriers, including complex legislation and bureaucratic delays, can slow project progress. Additionally, limited access to modern technology hampers efficient planning, monitoring, and coordination, making effective communication essential for project success.

4 Factors Affecting the Resilience of Project Management

Project management resilience in local authorities depends on the interplay of institutional, financial, technological, and human factors. Decentralization and a supportive organizational culture promote adaptability and innovation. Financial flexibility and crisis preparedness enable project continuity during unexpected events, reinforcing stability and confidence. Technological readiness and digital transformation improve efficiency, communication, and transparency, preparing organizations for future challenges. Quality leadership and human resource development are also critical, as adaptive managers and skilled employees drive innovation and performance. An integrated approach combining these factors helps local authorities manage current challenges and prepare for future uncertainties, supporting sustainable regional development and enhancing community quality of life.

4.1 Institutional Structure and Governance

Institutional structure and governance are essential for an organization's ability to respond to challenges. Decentralizing decision-making and building a flexible structure enable faster adaptation and innovation, while also increasing employee engagement and responsiveness to local needs. However, effective coordination and communication are necessary to avoid inconsistencies. A positive organizational culture that promotes collaboration, open communication, and learning strengthens team cohesion and resilience by creating an adaptive, problem-solving environment. Thus, both a supportive governance structure and a strong culture are key to enhancing project management resilience. Table 3 provides further details on these effects.

Table 3 – Impact of institutional structure and governance on project management resilience

Factor	Positive effect on resistance	Potential challenges
Decentralisation	- Faster decision-making - Adapting to local conditions - Fostering innovation and employee engagement	- Risk of uncoordinated - Need for effective communication between levels - Possible duplication of effort
Organisational culture	- Promoting open communication and teamwork - Learning from mistakes - - Innovative approaches	- Resistance to change - The risk of a rigid culture hindering adaptability

Source: own elaboration (2024) based on Brady, Davies (2014), Flexigrant (2024).

4.2 Financial Planning and Crisis Management

Financial stability and preparedness are crucial for project continuity and success. Budget flexibility enables organizations to adjust financial plans in response to changing conditions, allowing efficient resource allocation despite financial fluctuations or unexpected costs. Contingency funds further support resilience by providing rapid access to resources during emergencies, minimizing negative impacts on projects and the community. Table 4 details these financial factors influencing project management resilience.

Table 4 – Financial factors affecting project management resilience

Factor	Contribution to resilience	Key strategies
Budget flexibility	Adapting financial plans to changing conditions - Maintaining project continuity during financial fluctuations	- Diversifying funding sources - Incorporating financial reserves - Regularly reviewing and updating budgets
Emergency funds	Rapid response to crisis situations - Minimising impacts on projects and the community - Supporting project continuity	- Establishing and managing emergency funds - Planning for emergency scenarios - Establishing clear procedures for the use of funds

Source: own elaboration (2024) based on Flexigrant (2024).

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4.3 Technology Readiness and Digital Transformation

In today's fast-paced technological landscape, technology readiness and digital transformation are vital for resilient project management. Modern tools and digital processes boost efficiency, transparency, and responsiveness, improving communication and collaboration within the organization and with external partners. Key aspects include adopting project management software, digitalizing processes, enhancing cybersecurity, and providing staff training to ensure effective technology use.

4.4 Leadership and Human Resource Development

Leadership quality and human resource development are crucial for an organization's adaptability and resilience. Training staff, especially managers, in adaptive skills like strategic thinking, decision-making, emotional intelligence, and communication enhances organizational resilience. Well-trained employees effectively implement projects, innovate processes, and manage challenges. Strong leaders inspire teams, drive innovation, and guide organizations through uncertainty. Table 5 details leadership and HR factors supporting resilience.

Table 5 – Leadership and HRD factors affecting resilience

Factor	Contribution to resilience	Key strategies
Employee training	- Enhancing competences and skills - Better preparedness for new challenges - Promoting innovation and efficiency	- Investing in training and professional development - Supporting lifelong learning - Talent management programmes
Adaptive skills of managers	- Ability to lead effectively under uncertainty - Quick and informed decision making - Motivating and inspiring the team	- Leadership and soft skills training - Mentoring and coaching - Strategic thinking support

Source: own elaboration (2024) based on Flexigrant (2024).

5 Case Studies and Empirical Evidence

This chapter examines examples of project management resilience in EU local governments. By analyzing successful strategies for handling unexpected challenges, we identify key resilience factors. A comparative analysis across government levels will further explore how institutional structures impact project management in uncertain environments.

5.1 Examples of Project Management Resilience in Specific Local Governments

Successful project management in local governments hinges on their resilience to unexpected challenges and adaptability to change, crucial for sustainable regional development and competitiveness. This section presents case studies from European cities that exemplify resilient project management. Each project showcases unique approaches to challenges, effectively utilizing resources, technology, community engagement, and EU funds. These examples highlight how resilient projects yield significant economic, social, and environmental benefits, strengthening the sustainability of cities and regions.

5.1.1 Rotterdam, Netherlands: Adapting to Climate Change

Rotterdam, one of Europe's largest port cities, faces significant challenges related to climate change, in particular rising sea levels and increased risk of flooding. The local government has initiated an ambitious project**,** which aims to transform the city into a climate-resilient metropolis. For more details on the project, see Table 6.

Table 6 – Rotterdam, Netherlands: Adaptation to climate change

Key elements of the project	Results and impacts
- Infrastructure Innovation: Construction of floating buildings and parks adapted to rising water levels. - **Green Infrastructure:** Installation of green roofs and facades to improve drainage and reduce heat islands. - **Water Management**: Creation of water squares serving as temporary retention basins during heavy rains.	**- Increased resistance to flooding**: Reducing the risk of school caused by flooding. - **Environmental benefits**: Improving air quality and biodiversity in the city. - **Economic stimulation:** Attracting investment and creating new jobs in green technologies.

Source: own elaboration (2024) based on Rotterdam Climate Initiative (2013), City of Rotterdam (2019).

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5.1.2 Turku, Finland: Sustainable Urban Development

Turku, a historic city in south-west Finland, has decided to become a leader in sustainable development with the aim of achieving carbon neutrality by 2029. The project includes a wide range of initiatives focusing on energy, transport and the circular economy. For a closer look at the project, see Table 7.

Table 7 – Turku, Finland: Sustainable urban development

Key elements of the project	Results and impacts
- Renewable energy: investment in solar and wind energy, bioenergy from waste. **- Sustainable transport**: expansion of the cycle path network, promotion of electromobility, modernisation of public transport. **- Circular economy**: promoting recycling, reusing materials and reducing waste.	**- Reduction of CO_2 emissions**: significant reduction of the city's carbon footprint. **- Engaging communities**: Active participation of residents in environmental projects, raising awareness of sustainability. **- Economic development**: creation of new businesses and jobs in the green sector.

Source: own elaboration (2024) based on City of Turku (2020).

5.1.3 Ostrava, Czech Republic: Transformation of Industrial Region

Ostrava, known for its heavy industrial past, faced challenges related to the restructuring of the economy and the environmental impacts of mining and metallurgy. The local government has launched strategic transformation plan using EU funds. See Table 8 for a closer look at the project.

Table 8 – Ostrava, Czech Republic: Transformation of industrial region

Key elements of the project	Results and impacts
- Revitalisation of brownfields: transforming abandoned industrial sites into cultural, educational and business centres. **- Promoting innovation**: creating technology parks and incubators for start-ups. **- Environmental measures**: remediation of contaminated soils, improvement of air quality.	**- Economic diversification**: reducing dependence on heavy industry, developing services and technology. **- Improving the environment**: Significant reduction in air pollution, increase in green spaces. **- Social revitalisation**: improving the quality of life of residents, strengthening local identity.

Source: own elaboration (2024) based on Statutory City of Ostrava (2020).

5.1.4 Bilbao, Spain: Cultural Transformation of City

Bilbao, formerly an industrial centre, has become a symbol of urban regeneration thanks to the "Bilbao Ria 2000" project, which used culture and architecture as a catalyst for change. For more details see Table 9.

Table 9 – Bilbao, Spain: Cultural transformation of city

Key elements of the project	Results and impacts
- Construction of the Guggenheim Museum: an iconic building attracting international attention. **- Waterfront revitalization**: transforming industrial zones into public spaces and parks. **- Transport infrastructure**: upgrading the metro and airport to improve connectivity.	**- Tourism boom**: Significant increase in the number of visitors and tourism revenue. **- Economic diversification**: development of the service and creative sectors. **- Social renewal**: Increasing the pride of the inhabitants in their city, improving the quality of life.

Source: own elaboration (2024) based on Plaza, Haarich (2013), City of Bilbao (2020).

5.1.5 Copenhagen, Denmark: Smart City of Future

Copenhagen aims to become the smartest and greenest city in the world. Projects funded by the EU and other sources focus on integrating technology to improve quality of life. For more details on the project, see Table 10.

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Table 10 – Copenhagen, Denmark: Smart city of future

Key elements of the project	Results and impacts
- Smart Grid technology: optimising energy consumption through smart grids. **- Data-driven governance**: using big data for real-time decision making. **- Sustainable mobility**: promoting cycling, shared transport and autonomous vehicles.	**- Energy efficiency**: reducing energy consumption and emissions. **- Improving services**: faster and more efficient public services through digitalisation. **- Citizen participation**: involving citizens in the development of urban applications and solutions.

Source: own elaboration (2024) based on City of Copenhagen (2020).

5.2 Analysis of Successful Strategies and Practices in Dealing with Unexpected Challenges

Effective management of unexpected challenges is essential for achieving project goals and continuity. This chapter analyses strategies from case studies, showcasing how local governments have strengthened project resilience. Key practices include proactive planning and risk management to anticipate potential threats, flexibility to adapt quickly to environmental changes, and effective stakeholder communication to build trust. The use of modern technologies and innovation enhances efficiency and responsiveness, while investment in human resources and leadership development fosters adaptive teams capable of addressing challenges. Table 11 provides a summary of these strategies.

Table 11 – Strategies and practices in dealing with unexpected challenges

Strategy/Practice	Description	Practical example
Proactive risk management	Regular scenario planning, risk reviews, and specialized risk teams	Rotterdam's climate scenarios and Turku's quarterly risk assessments
Flexibility and adaptability	Modular design, agile methods, decentralized decision-making	Copenhagen's modular smart city projects and agile management in Bilbao
Stakeholder engagement	Transparent communication, participatory planning, inter-organizational collaboration	Turku's public meetings and Ostrava's community workshops
Technology and innovation	Use of digital tools, innovative solutions, cybersecurity	Bilbao's project software and Rotterdam's water system cybersecurity
Human resource development	Continuous education, support for innovation, adaptive leadership	Ostrava's retraining programs and Turku's innovation centers

Source: own elaboration (2024) based on European Commission (2021), Ferry (2021), Flexigrant (2024).

5.3 Comparative Analysis between Different Levels of Government

Understanding differences in project management resilience between different levels of government is key to identifying best practices and knowledge transfer, i.e. we will conduct a comparative analysis between local, regional and national governments to reveal how institutional structure, authority and resources affect the ability to effectively manage projects in uncertain environments. The analysis will provide a better understanding of how different levels of government can work together and how local authorities can leverage lessons from higher levels to strengthen their resilience.

5.3.1 Local vs. Regional Governments

Local and regional governments play key roles in the implementation of regional development projects, but their approach and capacity can vary considerably. A comparison of key attributes, strengths, and limitations of local and regional governments is presented in Table 12.

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Table 12 – Comparison of key attributes, strengths, and limitations of local vs. regional governments

Criterion	Local governments	Regional governments
Proximity to citizens	High – Direct contact, knowledge of local needs	Medium – Balance between local and broader regional needs
Financial resources	Limited – Need to prioritize investments, reliance on higher government levels	Higher than local – Ability to fund larger projects, access to national and EU funds
Administrative capacity	Limited – Quick decision-making but constrained expertise	Higher than local – Can handle complex projects, though slower decision-making
Flexibility	High – Rapid adaptation to changes, focus on specific local needs	Lower – Better coordination across areas, consistency with regional goals
Strategic overview	Limited to the local level – Detailed understanding of local context	Broader regional perspective – Coordination of projects across localities

Source: own elaboration (2024) based on Hesse, Sharpe (1991), Hooghe, Marks (2016), OECD (2017, 2018, 2019, 2020, 2023), Ferry (2021).

5.3.2 Centralisation vs. Decentralisation

Different levels of centralisation in institutional structures of governments can significantly affect the resilience of project management. Table 13 show strengths and limitations of centralized vs. decentralized systems.

Table 13 – Key strengths and limitations of centralized vs. decentralized systems

Aspect	Centralized systems	Decentralized systems
Decision-making	Consistent decisions, easier control, but slower response	Faster local responses, adaptable, risk of inconsistency
Adaptability	Standardized approach, but may overlook local needs	Tailored to local needs, fosters innovation, may lack cohesion
Policy coordination	Unified policies, supports national goals	Diverse approaches, promotes experimentation, but complex coordination
Resource efficiency	Efficient allocation, reduces duplication	Locally adapted resources, potential for inequality

Source: own elaboration (2024) based on Hesse, Sharpe (1991), Hooghe, Marks (2016), Kyriacou, Roca-Sagalés (2018), Ferry (2021).

5.3.3 Examples from Different Countries

This section examines how institutional structure influences project management resilience by comparing Germany, France, and Sweden, each with distinct models of government organization and decentralization. This analysis reveals varying approaches to power distribution and their impact on resilience, providing best practices for local and regional governments. Exploring degrees of decentralization also shows how governments can collaborate effectively and optimize resources, including EU funds. Germany's federal system promotes regional innovation and local needs but faces coordination challenges. France's centralized model ensures policy consistency but limits flexibility. Sweden balances local autonomy with strong coordination, fostering both innovation and regional consistency. Table 14 summarizes these structures.

Table 14 – Comparative analysis of government structures in Germany, France, and Sweden

Aspect	Germany (Federal)	France (Centralized)	Sweden (Decentralized)
Decentralization level	High – Regional autonomy, fosters innovation	Low – Central control, consistency in policy	High – Local autonomy, customized responses
Decision-making	Regional flexibility; faster local responses; risk of inconsistency	Centralized; efficient control; slower adaptation	Quick local decisions; flexible; requires coordination
Resource management	Significant regional control; complex coordination	Centralized resources; efficient but less adaptable	Local resource control; potential for inequality
Policy coordination	Balanced between national and regional policies	Uniform policies; easier national goal alignment	Diverse local policies; complex inter-level coordination

Source: own elaboration (2024) based on Page, Goldsmith (1987), Cole, John (2001), Bäck, Heinelt, Magnier (2006), Dyson, Goetz (2012), Dick, Gaesing, Inkoom, Kausel (2016).

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5.3.4 Impact of Institutional Structure on the Resilience of Project Management

Comparative analysis highlights that government structure significantly impacts project management resilience. Decentralized systems offer greater flexibility, quicker responses to local challenges, and promote innovation but need strong coordination to avoid inconsistencies. Centralized systems ensure policy coherence and efficient resource use at the national level but lack flexibility and may respond more slowly to local needs, see Table 15.

Table 15 – Institutional structure impact on project management resilience – pros and cons

Structure	Advantages	Disadvantages
Decentralized	Fast local response, tailored solutions, fosters innovation	Risk of inconsistency, potential inequalities
Centralized	Consistent policies, efficient resource use, easier control	Less flexibility, slower adaptation to local needs

Source: own elaboration (2024) based on Andrews, Boyne (2010), Dick, Gaesing, Inkoom, Kausel (2016), Kyriacou, Roca-Sagalés (2018).

6 Conclusion

The resilience of project management in local authorities is essential for the effective implementation of projects that support regional development, competitiveness, and sustainability. Based on analysis and case studies, several key recommendations emerge to enhance resilience in local government project management.

Firstly, improvements in organizational structure and processes are crucial. Adopting agile organizational models enables faster adaptation to change, while decentralizing decision-making fosters flexibility and responsiveness to local needs. Process optimization using methods such as Lean and Six Sigma can further increase efficiency, and digitization and automation of routine tasks free up capacity for strategic activities, ultimately strengthening the adaptability of project teams. Education and training play a pivotal role in building resilience. Specialized crisis management training, combined with fostering a culture of lifelong learning, enhances the ability of staff to handle unexpected challenges. Additionally, mentoring programs, where experienced managers guide younger colleagues, contribute to the development of adaptive leadership skills and other competencies essential for navigating uncertain environments effectively. Innovation in project planning and monitoring is another critical area. Implementing agile project methodologies, using advanced technologies like artificial intelligence for risk prediction, and standardizing and automating processes all contribute to a more transparent and responsive approach to project management. These innovations allow local governments to respond swiftly to changes and maximize the effectiveness of their resources. Intergovernmental collaboration also supports resilience. Strengthening partnerships and communication platforms across local, regional, and national government levels fosters effective knowledge and resource sharing. Coordinated strategic planning across these levels ensures that projects are consistent, aligned with broader policy goals, and optimized for collective impact.

Future research could further strengthen project management resilience by developing metrics to measure resilience, exploring the impact of organizational culture and social dynamics on adaptability, examining how technological advances like artificial intelligence and blockchain affect resilience, and expanding comparative studies across regions to identify best practices and transferable models.

For local governments, these strategies offer an opportunity to enhance project resilience, leading to more effective use of resources, improved public services, and sustainable regional development. National policymakers can also support resilience by encouraging decentralization while maintaining effective coordination between government levels. Educational institutions play a crucial role by creating programs that focus on crisis management, adaptive leadership, and technological skills, preparing a workforce ready to manage resilient projects. Academia's continued research can enrich the field by developing innovative approaches and tools for local governments.

In conclusion, resilient project management is vital for local authorities, as it underpins successful projects that contribute to regional development and quality of life improvements. Key factors influencing resilience include organizational structure and governance, financial planning, crisis management, technological readiness, and leadership. Case studies illustrate how proactive planning, flexibility, strong communication, technological investment, and human resource development enable local governments to handle unexpected challenges effectively. Increasing project management resilience in local authorities requires an integrated approach

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encompassing organizational change, human resource development, technological innovation, and inter-institutional collaboration. Implementing these measures supports sustainable regional development, enhances competitiveness, and strengthens community resilience against future challenges.

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Economic and Socio-Social Potential of Municipalities in the Czech-Polish Borderland: Case Study of the Horňácko Microregion

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Abstract

The aim of the presented research is to evaluate the economic and social potential of the municipalities of the Horňácko microregion in 2023. This aim is achieved using the Weighted Sum Approach (WSA) in combination with the Mean Weight (MW) for determining the weights of selected criteria. The criteria to be monitored include the total liquidity (EK3), the absolute number of information published on the official notice board concerning the municipality's budget (SP2) or absolute number of posts published on the municipality's Facebook profile (SO1). It was found that the municipality of Kuželov has the biggest economic potential, while the best municipality in terms of socio-social potential is the municipality of Tasov. The evaluated municipalities can be divided into four groups according to the results achieved in the overall assessment of economic and social potential. From these groups, individual recommendations for the municipalities also follow. The municipalities that are at the forefront of economic potential are recommended to invest in various projects and at the same time inspire and motivate other municipalities. The best performing municipalities in terms of social potential are advised to transfer this potential into communication with citizens.

Keywords: *Economic Potential, Horňácko Microregion, Socio-Social Potential, WSA Method*

JEL Classification: *C19, C58, H72, H83*

1 Introduction

If we are to talk about microregion in our work, it is first of all necessary to clarify the concept of "region" and the different perspectives on it (see also Levický et al., 2024). By region we mean a part of the country to which we attribute common characteristics. This may be a way of government (or management by the same public administration) or it may be a union of other characteristics that are common to a region. It can also be a collection of several parts that are independent of each other, but because we find common features, we can proceed to unite these areas under a common region. According to Radulovic, Pindžo, Radulovic (2015), the region with the European concept only has significance as an economic, statistical functional territorial integrity, which can be classified in the developed or the underdeveloped region, for implementation of regional policies. It is therefore a designation for larger areas where we divide the territory. The sum of these regions and their sub-regions in practice forms the state itself. A region is therefore a geographical area with similar characteristics and it's a subject of different research, see Pechrová, Simpach (2013), Kovácsová (2014), Tolstykh et al. (2018), Slavata (2020), Vaňková (2020), Nezhivenko, Golovikhin, Nezhivenko (2021), or Kovářová (2022). Typical characteristics of regions are, for example, a common climate, structure, governance or language. A region can

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be understood in a broad context from several possible perspectives. We therefore identify different types in terms of specific character.

From the perspective of geography, we look at areas where we find common features for individual territories that ultimately form the character of the region, see Vujadinovič, Šabic (2017). In terms of the economic area, here we can associate areas (regions) that are similar in their economic structure, in the world, for example, the oil area. In the context of the political region, we focus on the area governed by a particular government and here, in turn, different territories governed by different units emerge. Historically, we have several such regions that have their territories united, such as kingdoms. Social regions are created with regard to Karl Marx's concept that common spaces, as larger units (regions), are built in accordance with social and production relations. Similarly, this is true for cultures, where regions are formed with similar cultural orientations (e.g. religion). (CS Economy pedia, 2024) On the other hand, we encounter the view that a region derives from differences in the landscape sphere just within the regions. At the same time, the region is defined by specific elements that determine the infrastructure that works for us. At the same time, the development of the region involves citizens who share a common interest, namely improving their own well-being. Regions are determined by how they are defined, either as administrative units (based on political considerations) or they emerge naturally as an offshoot of culture or nationality. They are also religious entities. According to their characteristics, regions are divided into homogeneous, while according to their relations they are heterogeneous (Turečková, 2024).

According to Flak, Glód, Mikoláš (2022), a potential is defined as the resource of ability, capacity, efficiency, power or performance inherent in someone or something. Mikoláš (2021) see a potential as the difference between what it is and what it can be (e.g. results of knowledge) or it must be (e.g., limitations resulting from natural and legal laws), see also Krasucka (2020), In our research we understand social potential as the strength and capacity of a local government unit (municipality, city, region). These units try to carry out activities that ensure their survival and their development. The social potential itself is then directly derived from the territorial potential within all areas. These areas may be economic, location, development, resource (Zich et al., 2006). The potential itself (see also Varadzin, Bečica, 2016) is then made up of the social capital possessed by the people living in the region. Social potential must be seen in relation to the economic capital of the people. At the same time, we place social potential alongside territorial potential, which is, however, more complex in nature. Social potential itself is made up of networks of social capital, where people enter networks of social capital simultaneously.

2 Material and Methods

The aim of the presented research is to identify the potential of the municipalities of the Horňácko microregion in 2023. This aim is determined on the basis of our own interest in the development of the municipalities of the Horňácko microregion. We consider it important to evaluate their potential and therefore to determine the direction in which the municipalities should go, or to give them clear recommendations that will lead to their economic and social development. All of this is done in accordance with the development of the municipalities and the size of the municipalities. In order to achieve the objective, it must be divided into two partial objectives:

- PO1: Identify the economic potential of the municipalities in 2023.

- PO2: Identify the socio-economic potential of the municipalities in 2023.

The basic set of the research sample is all municipalities in the Czech Republic. There are 6254 of them as of 1.1.2023. The sample is the municipalities of the Horňácko microregion, which were deliberately selected because we are concerned with the best possible assessment of the potential of the municipalities of this micro-region.

As already mentioned, the sample is made up of municipalities of the Horňácko microregion, located in the South Moravian Region, in the Hodonín district, at the foot of the White Carpathians. It consists of a total of 10 municipalities, which are Velká nad Veličkou, Javorník, Nová Lhota, Suchov, Kuželov, Hrubá Vrbka, Malá Vrbka, Lipov, Louka and Tasov. The municipality of Tasov is included among these municipalities because of the current economic and social cooperation, which. Historically, this municipality was not classified from the municipalities that fall under the Horňácko region. (Horňácko microregion, 2024) The largest municipality is Velká nad Veličkou, which in 2023 had 2823 inhabitants. On the other hand, the smallest municipality in the

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Horňácko microregion is Malá Vrbka with 161 inhabitants. The arithmetic mean of the population values in these municipalities is 871.9 inhabitants.

2.1 Characteristics of the Monitored Indicators

In order to meet the above objective, it is necessary to specify the period to be monitored, which is the five-year period from 2018 to 2022. This is the potential of the year 2023. In the case of meeting the objective concerning the economic potential, data from the Monitor (2024), which is the portal of the Ministry of Finance, where the financing of state institutions, including local government units, is published. Specifically, the monitoring criteria that will serve us here can be found in the "monitoring and audit" section of the website. We refer to these criteria as EK1 - EK3. These are:

EK1 - Budgetary responsibility rule (expressed as a percentage),

EK2 - the ratio of external resources to total assets (expressed as a percentage),

EK3 - total liquidity (in thousands of CZK).

The formula below also shows us how the economic potential of municipalities in 2023 is calculated based on the potentials of previous years. These are always multiplied by a constant that decreases by 0.1 the older the year.

$$EKP23 = 0,6*EKP18 + 0,7*EKP19 + 0,8*EKP20 + 0,9*EKP21 + 1*EKP22$$

where: EKP18 – economic potential in 2018
EKP19 – economic potential in 2019
EKP20 – economic potential in 2020
EKP21 – economic potential in 2021
EKP22 – economic potential in 2022

The second part is the socio-social potential, which sap re the needs of this research consists of two parts. Separate attention is paid to the social potential and the social potential, which are processed in a later stage into one partial criterion.

Looking separately at the social potential, here the data was drawn from the official boards of each municipality, which can be found on their websites. Here, the municipalities publish online documents that give us a vivid testimony of the social development of the municipalities. The period of observation here is the months from January to December 2023. The data is divided into 4 areas (SP1 - SP4). They are:

SP1 - budget (absolute number of information published on the official board concerning the municipality's budget),

SP2 - information from the notice board (absolute number of information published on the notice board concerning the municipality's budget),

SP3 - local public address announcements (absolute number of information published on the official notice board concerning the local public address announcements of the municipality),

SP4 - other (absolute number of information published on the official notice board relating to other).

The social potential of the municipalities can be seen from the information obtained on the profiles of individual municipalities on the social network Facebook. Here, data was collected within a 12-month period in 2023. Activity from the municipality was tracked sequentially, with the number of posts within these months being counted). Within the social potential, the following is tracked:

SO1 - number of posts (absolute number of posts published on the municipality's Facebook profile),

SO2 - number of "likes" (absolute number of "likes" on posts published on the municipality's profile on the social network Facebook),

SO3 - number of comments (absolute number of comments on the published posts on the municipality's profile on the social network Facebook).

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2.2 WSA Method

There are many different MCDM (Multi-Criteria Decision-Making) methods. A more comprehensive description, breakdown and theoretical overview of the MCDM method captures the research of Ustinovichius et al. (2007), Brauers, Zavadskas (2009), Karabasevic et al. (2018), Ardielli, Szotkowská (2020), Salabun et al. (2020), or Vavrek (2024a), Vavrek (2024b). The WSA method was used to achieve the individual sub-objectives, or to fulfil the main objective of this research. According to Ardielli, Bečica (2018) or Karnufková, Vavrek (2021), when using the WSA method we have to have the cardinal matrix Y, the cardinal information and the vector of weights v. The output of this method is in the result the overall evaluation of all available options. In the case of our work, these are individual criteria based on aspects of economic, social and social potential. The detected values take values <0; 1>, from worst to best. This is ensured by the principle of the WSA method, which is based on utility maximization. The formula itself is based on the total utility and expresses to us the weighted sum of the partial utilities.

$$u(a_i) = \sum_{j=1}^{m} v_{j.} u_{j.}(y_{ij})$$

where: u_j – partial utility function of individual criteria
v_j – the weight of a criterion

The actual practical calculation of the WSA method is based on a predefined procedure consisting of 3 steps. First, we search for an ideal variant, which we denote as H, with rank (h_1, ... h_n). and a basal variant D with rank (d_1, ... d_n).

$$r_{ij} = \frac{y_{ij} - d_j}{h_j - d_j}$$

where: d_j – variant of the j-th criterion
h_j – ideal value of the j -th criterion
r_{ij} – transformed values of all criteria
y_{ij} – value of i-th variant of j-th criterion

The calculation continues by creating a standardized matrix R, the calculation of which is based on the above formula. The matrix R itself is therefore the value matrix of the function of the i-th variant of the j-th criterion. The basal variation is equal to 0 and the ideal value is 1.
The last step therefore follows from the calculation itself (see formula above). This is the calculation of the aggregate utility function itself for each of the criterion variants. In the WSA multicriteria analysis, we also determine the weights of each criterion. In the framework of our work, within the economic potential, the weights for all criteria were chosen equally, namely 1/3. Within the social potential, the weights of the criteria were also determined to be the same, namely 1/7. The comparison of selected methods is offered also by Vavrek, Bečica (2022), Vavrek (2019).

3 Results and Discussion

The overall result is based on the values obtained by the WSA method. The values of the individual municipalities are expressed in the following graph. The x-axis shows the economic potential and the y-axis the social potential.

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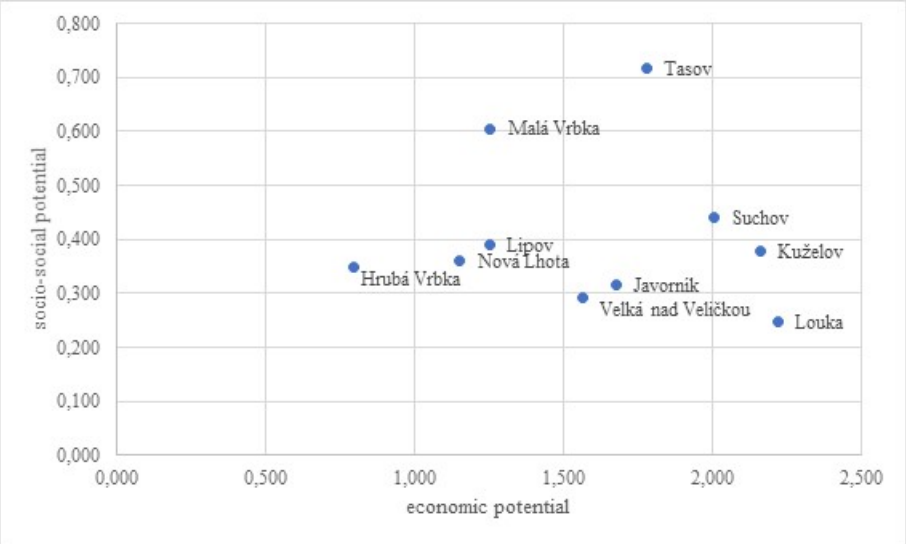
Figure 1 – Overall assessment of the economic and social potential of municipalities using the multi-criteria WSA method



Source: Own processing

The strongest economically strong municipality in the Horňácko microregion is the municipality of Kuželov, which achieved a value of 0.794 in the overall assessment using multicriteria analysis. This municipality scored 130.42% on criterion EK1 (budget responsibility rules) in 2018, which is the highest value we record for this criterion. The second-best municipality in terms of economic potential is the municipality of Louka, with a value of 2.219. This municipality has reached this position due to the fact that we try to minimize the values of criterion EK2, and the municipality of Louka actually has the lowest values. At the same time, we can see that Louka has the highest arithmetic average for criterion EK3. The third best municipality in the overall ranking using the WSA multicriteria analysis is the municipality of Suchov. This municipality achieves the second highest average values for criterion EK1. At the same time, we can see the highest value for criterion EK3, namely 52.38 thousand. CZK. The fourth best-rated municipality in terms of economy is the municipality of Tasov. This municipality is the weakest across the criteria EK1, but it makes up for it in criteria EK2 and EK3, where it ranks at the top with its results. In the middle of the overall assessment is the municipality of Javorník. Among its strongest points are its results in criterion EK3. At the same time, it is also the municipality that has criterion EK1 zero in all years. The sixth municipality in the ranking for economic potential is Velká nad Veličkou, the largest municipality in the microregion by population. This municipality is assigned a value of 1.563 according to the relevant calculation. This municipality has a zero value for criterion EK1, but is among the best across criterion EK2. In the evaluation of criterion EK3, this municipality is in the second half of the final ranking. In seventh place is the municipality of Lipov with an economic potential value of 1.253. This municipality is the strongest in criterion EK2, where it has an arithmetic mean value of 9.43%. The eighth best municipality is Malá Vrbka, which is also the smallest municipality in the entire Horňácko microregion. The most interesting thing about this municipality is that in 2018 it had a criterion EK1 value of 91.58%, which it completely reset in the following years. In the ninth place we find the municipality of Hruba Vrbka, and this is definitely because the municipality has zero values almost everywhere, except for the criterion EK2. The worst municipality in terms of economic potential is Nová Lhota, which has low values in all criteria. Thus, it is the worst performer in criterion EK3.

The assessment of the social potential is based on data obtained from the websites of the individual municipalities. The information posted here refers to the official board, i.e. budget information, notice board information, local radio announcements and others. The best and most active municipality in this respect is the municipality of Malá Vrbka. This is mainly due to the activity under criterion SP3. The best municipality for criterion SP1 per 1000 inhabitants is Malá Vrbka. The municipality of Tasov can also be ranked in the foreground. For criterion SP2 we find the municipality of Kuželov in the first place, which is therefore the best in this respect. Across the SP4 criteria, Tasov is the best municipality. The best municipalities for criterion SP3

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are Malá Vrbka, Suchov and Lipov. In general, we can say that the most passive municipalities are Velká nad Veličkou and Louka.

The social potential is evaluated on the basis of the activity of the municipalities on their part and on the part of the observers. The most active municipality and the greatest potential in this respect is the municipality of Tasov. If we think about the fact that the values of the municipalities are calculated in relation to the number of observers, the results between the municipalities are quite balanced. However, the worst municipality in this respect is Kuželov, which is very inactive on social networks. The most active municipalities are Louka, Hruba Vrbka and Lipov. All of these municipalities are trying to be active on social networks and to map the life on their territory. The municipalities try to inform about cultural or sports life.

4 Conclusion

According to the results obtained, we are able to divide the municipalities into 4 groups, depending on the results they have achieved in terms of both economic and social potential. These results result from a multi-criteria analysis, from the WSA method. The first group consists of the municipalities of Tasov and Malá Vrbka. It is typical for these municipalities that they are strong in social potential within the set of municipalities under study. This can be exploited by the municipalities because they are close to their citizens thanks to these activities. These municipalities can take advantage of this to implement participatory budgeting, where citizens can practically get involved in decision-making on the development of their municipality. These municipalities have a high chance of getting the opinion of their citizens through their activity. In the second group we find the municipalities of Kuželov and Louka. It is typical for these municipalities that they are strong in economic potential. This creates opportunities for various investment projects for the municipalities. The economic potential can be translated into benefits for the citizens in the form of establishing things for them, such as repairing a playground, establishing new building plots, etc. The third group consists of the municipalities of Javorník, Velká nad Veličkou and Suchov. These municipalities form a kind of average in the evaluation of all criteria. The municipalities should try to combine the different focuses. The municipality of Suchov is the strongest of these municipalities in terms of economic potential, so it should focus on its social potential and be more active on its website and social networks and thus be closer to its citizens. Velká nad Veličkou should therefore improve in both respects. In the middle between these municipalities is the municipality of Javorník, which can serve as a "model" for the remaining municipalities to find a compromise in their potential. The fourth group consists of Hrubá Vrbka, Nová Lhota and Lipov. These municipalities do not stand out in any of the criteria and can therefore be described as weak. The municipalities in the fourth group should take inspiration from the leaders in the first and second groups. Municipalities could take inspiration from what these municipalities do well and try to emulate them in these respects. We see the sense in bringing municipalities together and thinking about finding common solutions to problems. To start with, these municipalities could look for small project schemes without the necessary co-funding.

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The Impact of Remote Work on Work-Life Balance

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Abstract

The introduction of digitalisation in the enterprise has accelerated the transformation of traditional methods of work and communication in the workplace. This has led to the possibility of moving workplaces from traditional offices to employees' homes. The phenomenon of teleworking is not new, however, recent events such as the global pandemic caused by the SARS-CoV-2 virus have spurred an increase in the number of industries looking to implement teleworking options. The practice of working from home has proven to be an effective solution not only in the immediate term, but also as a potential avenue for growth and innovation for employers and employees across a spectrum of industries and sectors. In this survey, employees of various government agencies and institutions were interviewed. The aim of the present paper is to determine the impact of remote work on work-life balance and to compare how men and women perceive this significant change in the workplace. The structure of this paper is as follows. First, an introduction is given to provide the motivation and theoretical background of this topic. The next section describes the data, and the methods used. The third section is devoted to the results, followed by a discussion.

Keywords: *Work Form Home, Work-Live Balance, Human Resources Management, Covid-19*

JEL Classification: *M10, M12, M54*

1 Introduction

The issue of work-life balance emerged as a response to demographic, economic, and cultural changes (Lazar et al., 2010). The Covid-19 pandemic has dramatically changed the approach to the work environment and the way we work. More and more employees are working from home, bringing new challenges and opportunities in the area of work-life balance. This situation affects the attitudes of both women and men and is also gaining political significance in the context of the European Union directive. There are more than 61 000 employees in the public administration of the Czech Republic, while the state administration employs about 500 000 people. Work-life balance is beneficial for both employers and employees, contributes to high and stable productivity, and a satisfied worker increases the value of work. Organisations should focus more on work-life balance, as an imbalance can have a negative impact on employees and the organisation as a whole. A positive aspect in this situation is the discovery of family values and closeness (Adisa et al., 2021).

Work-life balance is now a high priority in academia and in the business world. A good work-life balance affects employee satisfaction and also serves as a mediator between work culture and employee well-being. Equitable distribution of work, family responsibilities and efforts to minimize work-life conflicts are associated with better

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mental well-being. Employers should therefore emphasise work-life balance and make it one of the top priorities of human resources management.

Disrupted work-life balance can lead to physical and mental health problems. Lack of adequate care for the body can manifest itself in lack of sleep, sleep disorders and poor diet. Mental health can be marked by depression, mood swings, panic attacks and anxiety. Alienation from colleagues and loss of boundaries between work and private life exacerbates the situation and leads to feelings of loneliness. Working from home can have a negative impact on individuals' psychological well-being, such as disturbed sleep, lack of social interaction with co-workers and lack of positive stimuli.

Work-life conflict is more often experienced by women due to the unequal distribution of family and childcare responsibilities. Despite the progressive gender equality in society, gender differences still exist, especially in relation to career advancement. During the COVID-19 pandemic, women spend more time on domestic work than men, leading to increased stress and burnout. Conversely, the number of men caring for children has increased, which may contribute to increased male responsibility for household care and a reduction in the gender gap in domestic responsibilities.

Overall, work-life balance is important for maintaining the mental and physical health of employees. Employers should take a positive approach to this issue and seek to promote work-life balance. It is also important to reduce the gender gap and ensure equality between men and women in the role of family and household care. The COVID-19 pandemic has brought new challenges that can lead to a change for the better in the area of work-life balance. Work-life balance includes employee training, which is important for both employers and employees. Studies show that men with more education are more likely to seek work-life balance, while women with less education tend to think that this balance is less likely. Higher education is associated with less interest in traditional norms for both genders and less time spent on housework. Telework has become more common recently, not least because of the Covid-19 pandemic. However, it is important to consider that not every employee is able to work from home. Some do not have the discipline or suitable conditions to work from home. The decision between working remotely and working in an office has an impact on the employee's performance and well-being. In the case of working from home, it has also been shown that employees are better able to balance work and personal responsibilities.

Certain factors are also important for achieving work-life balance. For example, having a dedicated office space at home and fewer household members is associated with a better work-life balance. Stressful situations in working life can have a negative impact on mental and physical health. Long-term employment in excess of 55 hours per week increases the risk of heart disease and stroke. Deteriorating health is one of the main reasons for changing the current imbalance in favour of work. Overall, therefore, it is important to take into account the training of employees in the work-life balance. Teleworking brings both benefits and challenges, and the needs of employees and their ability to work from home need to be taken into account. Work-life balance is key to maintaining the physical and mental health of employees and should be promoted by both employers and employees themselves.

The aim of the present paper is to determine the impact of remote work on work-life balance and to compare how men and women perceive this significant change in the workplace. The structure of the paper is organized to guide the reader through a logical exploration of the topic. First, the Introduction provides an overview of the motivation behind the research and outlines the theoretical framework. The second section, Data and Methods, outlines the dataset utilized in this study, including the sampling process, the questionnaire design, and the techniques employed for statistical analysis. In the third section, Results, the findings of the study are presented. This part highlights key insights into how remote work has influenced work-life balance for both men and women, examining the disparities in their experiences. It includes tables, charts, and statistical analyses that provide a clear picture of how remote work impacts different aspects of work and personal life, such as time management, job satisfaction, stress levels, and family engagement. The final section, Discussion, reflects on the implications of the findings. It offers a deeper interpretation of the results and places them in the context of existing literature on remote work and work-life balance.

2 Material and Methods

The primary quantitative research was conducted in May 2022. The research team posed the following question as a basis for their investigation: What factors contribute to the work-life balance of civil service employees in the Czech Republic?

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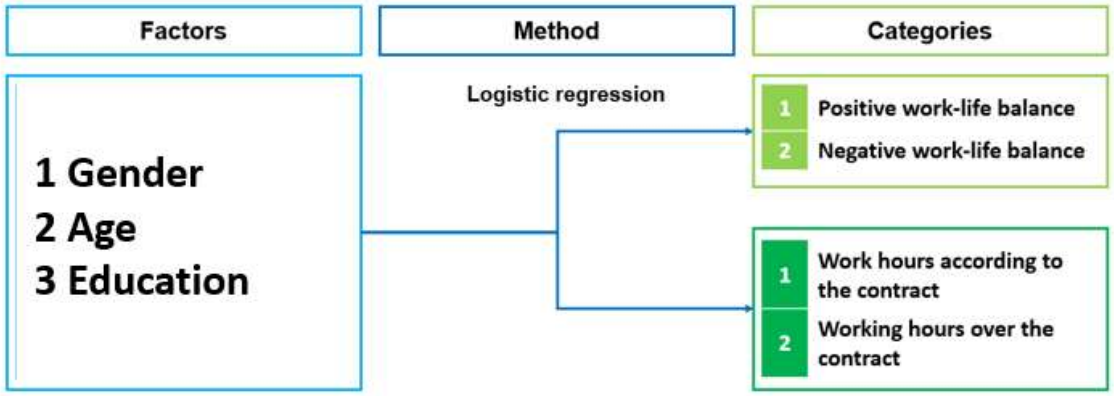
This research question is consistent with the aforementioned literature and theoretical background, as well as the authors listed below. This topic has been addressed in several academic papers, for example, Kyzlinková et al. (2020), in which the authors describe the likely impacts of working from home on the lives of employees. Another valuable contribution to this field is the paper by Berry, Gregory R. (2021), entitled "Enhancing Work-Life Balance Using a Resilience Framework." In their article, "Quality of Work Life and Work-Life Balance," Bhende et al. (2021) elucidate the dimensions of quality of work life and work-life balance, emphasizing the effects on work-life balance. The aforementioned literature formed the basis for the development of a model that characterises the key factors influencing work-life balance.

For the sake of convenience, the research background, that is to say the research question with stated hypotheses, reflecting the various factors that were hypothesized to influence work-life balance among civil servants, is presented below.

The design of the questionnaire survey includes six main factors that examine their influence on selected categories of work-life balance among civil servants. These factors, as well as the method (logistic regression) and the categories considered for examining the influence, are presented in the following diagram.

Figure 1 - Research design visualized



Source: Own creation

2.1 Questionnaire Creation and Data Collection

The questionnaire was anonymous and was implemented using the CAWI method. This ensured that there is no potential conflict of interest or possibility of misrepresentation by researchers; The results were not dependent on the people who analyzed them. This ensured objectivity.

Out of the 3,895 respondents surveyed, 932 returned (23.9% return). During data processing, incomplete or otherwise misleading responses were found, with 32 responses not recorded in the subsequent statistical analysis. The total sample used for further analysis is 900. The data were processed by statistical methods in June 2022. Based on the overall evaluation of the obtained data, the result of the investigation is answering research questions, denying / confirming formulated hypotheses and formulating more general conclusions as a basis for possible future research of this issue.

3 Results

The research sample consists of 900 participants who provided responses through a structured electronic questionnaire, with data deemed suitable for statistical analysis (from an initial 932 responses, incomplete or otherwise unclear answers were excluded). To assess the impact of various factors on work-life balance, responses were gathered from employees working in institutions and offices within the public administration. Figure 3 below offers a detailed view of the sample, breaking it down by gender, age, education level (following ISCED standards), total years of employment in the public sector, the number of job positions held (ranging from first to fifth in their career), and whether they held a managerial position.

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Figure 2 - Identification of respondents

	N=900	Absolute frequency	Relative frequency
Gender	Man	510	57%
	Woman	390	43%
Education level	Low	265	29%
	Medium	30	3%
	High	605	67%
Age	<25 years old	15	2%
	26-41 years	290	32%
	42-57 years	495	55%
	58-76 years	95	11%
	>77 years old	5	1%

Source: Own creation

Of the 900 respondents, 57% were male (510 in absolute terms) and 43% were female (390 in absolute frequency). A further factor used to distinguish between respondents was their level of educational attainment. A total of 265 respondents (29%) indicated that their educational level was at the medium level. Only 30 cases (3%) indicated a low level of education. The majority of respondents, representing 67% (680 individuals), are employees in the state administration who are university educated, indicating a high level of education.

In terms of age structure, the majority of respondents are within the 42-57 age group (495–55%), with the second largest group comprising individuals aged 26-41 years (290–32%). For a more detailed examination of the sample in question, please refer to Figure 3 below. The remaining identification data pertaining to the aforementioned sorting factors is also presented.

Figure 3 - Identification of respondents

	N=900		Absolute frequency	Relative frequency
Job positions	**Management**	Men	140	15%
		Women	105	12%
	Non management	Men	370	41%
		Women	285	32%

Source: Own creation

Of the 900 respondents, 140 men (15%) and 105 women (12%) hold managerial positions. In non-managerial roles, there are 370 men (41%) and 285 women (32%). For a more detailed analysis of responses regarding work-life balance, the next section presents seven questions with their respective answers, shown in both absolute and relative frequencies. The questions are presented in the same order as in the questionnaire, as some also serve as screening questions. Additional details can be found in the descriptions below each table

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Figure 4 - Q1 How do you perceive your balance of work and private life?

Reply	Absolute frequency	Relative frequency
I can handle both without any problems	635	71%
I manage to work at the expense of private life	215	24%
I manage my private life at the expense of work	15	2%
I can't handle both, I feel overloaded	35	4%
Total	900	100%

Source: Own creation

In order to ascertain respondents' perceptions of work-life balance, they were first asked to provide an overall assessment in response to the initial question. The response "I am able to manage both without any issues" was the most prevalent (635, 71%). The respondents' perception of work-life balance is therefore entirely positive. The second most common response was "I manage to work at the expense of my private life." This was selected by 215 respondents in absolute terms and 24% of respondents in relative terms. The remaining responses, "I can handle my private life" and "I can't handle both, I feel overloaded," were recorded in only 2% and 4%, respectively. For the purposes of statistical analysis using logistic regression, the initial question was employed. In order to meet the requirement for a dependent variable in a dichotomous form, the preceding question, which pertains to the perception of the reconciliation of work and private life, was encoded into two categories. The initial category is designated as follows: The first category is entitled "I can handle WL balance," while the second is entitled "I cannot handle WL balance." The initial category, entitled "I manage WL balance," encompasses the following responses: The first category, "I can handle both without problems," includes the following answers: The individual in question is able to manage their private life, albeit at the expense of their work. The respondents indicated that they were able to work at the expense of their private lives, while others reported feeling overloaded and unable to manage both. For purposes of clarity, please refer to the table below.

Figure 5 - Categories for logistic regression

Category	Reply	Abs.	Rel.
1) I can handle WL balance	I can handle both without any problems	635	71%
2) I can't handle WL balance	I manage my private life at the expense of work	265	29%
	I manage to work at the expense of private life		
	I can't handle both, I feel overloaded		
	Total	900	100%

Source: Own creation

Given the disparate responses pertaining to the comprehensive administration of WL balances, it was feasible to proceed with the logistic regression calculation. In order to perform the calculation, the aforementioned categories were employed as the dependent variable. The "I can handle" category for WL balance was assigned the value of 1, while the "I can't handle WL balance" category was assigned the value of 2. All available identification questions were selected as independent variables (predictors) and their statistical significance for predicting the result of weight loss (WL) balance in the given category was tested using the p-value of logistic regression. Specifically, the variables under consideration are age, education, length of tenure in government, sequence of previous jobs, and position. The results of the logistic regression and their interpretation are presented below.

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Figure 6 - Results of logistic regression*

Category	Variable	B	S.E.	Exp(B)	95% C.I.for EXP(B)		Sig.
					Lower	Upper	
Gender	Female			**1**			
	Male	-1,14	0,18	**0,32**	0,23	0,46	**0,00****
Age	<25 years old			**1,00**			**0,59**
	26-41 years	0,62	0,61	**1,85**	0,56	6,13	**0,31**
	42-57 years	0,68	0,61	**1,97**	0,51	6,48	**0,27**
	58-76 years	0,29	0,68	**1,34**	0,36	5,01	**0,66**
Education level	Low			**1,00**			**0,00****
	Medium	-1,41	0,52	**0,24**	0,09	0,67	**0,07****
	High	-0,96	0,19	**0,38**	0,26	0,55	**0,00****

*Predicted probability is for category 2 (I can't handle WL balance)
**p-value>0,05 (statistically significant)
Source: Own creation

In order to interpret the results of the logistic regression, it is necessary to note that the model was calculated for category 2, which corresponds to the statement "I am unable to maintain a weight loss balance." The expected odds (as indicated in the Exp(B) column) are therefore associated with this category. Prior to offering a specific interpretation, it is also necessary to mention which predictors of the model are statistically significant (or insignificant). In order to gain a deeper understanding of the results, the variable of age was not included in the analysis, as no item from the age categories (less than 25 years, 26-41 years, 42-57 years) or the job position was identified as a statistically significant predictor of the model.

In the context of the monitored predictors of the model (identification questions of the questionnaire), it is essential to initially highlight the gender of the respondents, which has been identified as a statistically significant factor in the model (p-value=0.00>0.05). In this context, the reference group is comprised of women (1), against whom the male population is benchmarked. From the value of Exp(B) 0.32, which represents the odds ratio, it can be concluded that the probability of women falling into the WL balance category is greater than that of men (0.32x).

Similarly, other statistically significant predictors of the model (identification questions) can be interpreted. With regard to the variable of education, where the reference group is defined as "low level" of education, it is evident that respondents belonging to the "medium level" category (Ex(B)=0.24) and the "high level" category (Exp(B)=0.38) exhibit a markedly reduced probability of being unable to manage the WL balance. Therefore, respondents with a low level of education who are employed in the state administration sector are more likely to be unable to manage the WL balance.

4 Discussion

From a comprehensive summary of the research results, it follows that managing the balance between work and private life is generally perceived positively by respondents from the ranks of state administration employees, with 71% of respondents being categorized as "I manage WL balance without problems". The remaining 29% fall into the "I can't manage WL balance" category (with the main reasons varying - from "I manage work at the expense of private life, private life at the expense of work, or I can't manage both"). This basic division then serves for a more specific breakdown of the factors that really influence the perception of the respondents, into which of the 2 already mentioned categories they fall. The first factor for determining the chance of falling into one or another category was the gender of the respondent. The results show that women are more likely to fall into the "Can't do WL at first" group. The results can be supported by research from 2005 by Crompton et al., where the Czech Republic is a "traditional country" (compared to the UK and Norway) and women are usually burdened with domestic problems, resulting in more stressful situations in everyday life. and working life.

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It is also possible to mention the results from Emslie and Hunt (2009), where the authors claim that the lack of balance between work and private life is real for both men and women, these difficulties last longer and in a more complex form, e.g. women (only groups between 50-52, which is relevant given the age distribution of the respondent of this article). In terms of age, it was not possible to clearly determine the category that would have a greater chance of "I can't handle WL balance". Thus, the assumption that younger or older state administration employees perceive the management of their WL balance significantly differently was not confirmed. A rather surprising result is the education factor, where respondents with lower education usually have a worse perception of WL balance, i.e. employees with secondary education more often manage work-life balance, while highly educated employees in administration are more likely to manage this work-life balance. This is confirmed, for example, by Siegrist (2006), where lower education is associated with the probability of leaving work earlier, in an international comparison.

Here it is also possible to mention the justification given by the respondents. For both men and women, the two most common justifications for spending more time at work were "busy with work and can't say no." If we summarize the negative answers (pressure from the superior, fear of the superior, I can't say NO), then almost 40% of men spend more time at work for these reasons compared to 45% of women. In the second category of respondents, who devote themselves more to their private life than work, the reasons are almost the same for men and women. Respondents were also divided into two groups according to whether they work under or outside a full-time employment contract. 400 respondents (44%) reported working in line with their contract hours, while 500 work beyond their full-time contract hours. The first difference can be observed in the expressions of men and women. Women interviewed in the civil service are almost 1.8 times more likely to fall into the category of "work beyond normal working hours", this result is particularly significant with regard to the perception of the balance of WL, where men were more likely to say not to manage WL. Similar to the perception of WL balance, no significant difference was found in the number of hours worked within/overtime.

From the point of view of education, however, the group of respondents with secondary education is most likely to fall into the "I work part-time" category. Employees who are not in their current job in their first job are also more likely to work overtime. From the point of view of job position, the respondents work in managerial positions beyond their full-time employment.

5 Conclusion

The article deals with the issue of work-life balance of employees in public administration. The research was conducted through a questionnaire survey that focused on how employees manage to balance work and personal life, especially with regard to the differences between men and women. The quantitative research was conducted in May 2022 using an online questionnaire. Out of a total of 3,895 respondents, 932 respondents returned the survey, representing a return rate of 23.9%. During data processing, several incomplete or misleading responses were identified and were not included in the statistical analysis. The total sample used in the data processing is 900 respondents. The results were processed using statistical methods, mainly logistic regression, in June 2022.

This text deals with the work-life balance in the public administration in the Czech Republic. The findings show that factors such as gender, education and time spent in the civil service influence work-life balance. It also shows that actual working hours vary by gender, age, education, time spent in the civil service and job position. However, it should be taken into account that the return rate of the questionnaires sent was only 23.9%, which may affect the generalisation of the conclusions of this study. The authors suggest future research focusing on businesses in other sectors and the private sector to compare results in different contexts. Overall, therefore, this study provides pilot information on work-life balance in the civil service that can serve as a starting point for further research.

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Analysis of Housing Market Regional Data in the Segment of Flats in the Czech Republic in comparison with Poland and Hungary on the level of NUTS 2 Regions

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Abstract

The paper deals with the comparison of regional housing market data in the Czech Republic, in comparison with Poland and Hungary at the level of NUTS 2 regions. The aim of the research is to analyze and compare key housing indicators on the housing market in individual NUTS 2 regions of these countries in 2024. The results of the research show significant regional differences in housing prices and availability across selected countries, which are influenced not only by economic conditions and income levels, but also by different regulatory policies, historical factors and the impact of the crisis in recent years.

Keywords: *Flats, Housing, Real Estate Market, Ownership*

JEL Classification: *R30, P50*

1 Introduction

According to Kazak, Kłysz and Kamińska (2023), the Covid-19 pandemic induced significant changes across various facets of socio-economic systems, including the real estate market. The Visegrad Group (Czech Republic, Poland, Hungary, and Slovakia) were notably impacted by these shifts and faced considerable challenges in mitigating the associated effects. Each of these countries faced specific conditions in the local real estate market (ČNB, 2024).

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OECD data reveal that the V4 countries have experienced significant fluctuations in house prices over the past five years, largely influenced by broader economic trends, inflation and policy changes. Each country has faced different patterns (OECD, 2024). In the Visegrad Group was recorded significant decline in property sales in March 2020, similar to other European regions. However, the following months brought market stabilization, partly due to a reduction in mortgage interest rates, which led to an increase in demand. In the short term, demand for property and its prices increased, as confirmed by studies from the region, see Slavata and Panova (2021), Slavata, Ardielli and Maciejasz (2022), OECD (2024), Ahsan and Sadak (2021). Similar research has focused on the impacts of the Covid-19 pandemic on property markets around the world, considering the situation not only in Europe, but also in Asia and other regions, see Aksouy Khurami and Özdemir Sari (2022), Anderson (2021), Marona and Tomal (2020).

In the Czech Republic, Poland and Hungary, housing prices have risen sharply, especially between 2021 and 2023. For example, Hungary saw an increase that was initially modest but influenced by inflationary pressures, while Poland and the Czech Republic saw particularly high price increases due to increased demand in cities and low housing availability. Housing prices in Poland are also steadily rising, driven by high inflation, increased construction costs and demand exceeding supply. Hungary faced a similar price increase, although the shift in mortgage interest rates at the time cooled the market slightly. The Czech Republic experienced high year-on-year growth rates due to similar economic conditions, but has begun to stabilize due to increased regulatory measures and higher mortgage rates aimed at controlling household debt and affordability issues (Deloitte, 2024).

Overall, the average annual increase in house prices in these countries during the pandemic years ranged between 8-15%, with the growth rate moderating only recently as interest rates and inflation concerns have adjusted regional housing dynamics. These pressures suggest that V4 housing markets are moving towards a challenging affordability situation, especially in urban centers where price-to-income ratios remain high.

Between 2018 and 2023, the Czech Republic experienced some of the highest annual price increases, often exceeding 10%, and its housing market remains one of the least affordable in Europe. This trend has largely been driven by limited housing supply, low mortgage rates ahead of 2022 and high demand from domestic and foreign investors (ČNB, 2024).

The aim of the presented research is to analyze and compare actual key real estate market indicators on the housing market with flats in individual regions of NUTS 2 level of Czechia, Poland and Hungary in 2024 and to compare the housing affordability in these regions in post-covid period.

RQ1: Average housing affordability in the Czech NUTS 2 regions is the lowest among the selected countries.

RQ2: Regions including the capital have the lowest housing affordability compared to other NUTS 2 regions of the country.

1.1 Development of Czech Housing Market in Recent Years

Czech Republic is a country with one of the highest property price growths in Europe (Slavata et al. 2024). In 2020, the development of the Czech real estate market was influenced by the reduction of interest rates and the abolition of the real estate acquisition tax, and since March 2020, the Czech Republic has faced the Covid-19 pandemic, which affected almost all segments of the economy (OECD, 2021). The demand for real estate was increasing, the supply of rental apartments increased by more than 47 %. Many offers, based on the principle of short-term rentals, were redirected to the sale of apartments and houses themselves. From the perspective of the offer prices of apartment sales in Prague and regional cities, there was only a slight slowdown in the long-term growth trend of recent years, so the reaction is only minimal. It can be stated that after the initial shock and uncertainty associated with the first wave of the pandemic during the spring, most sub-markets, with exceptions, stabilized and returned to their long-term trends (Mazáček a Panoš, 2023).

In March 2021, the impact of the COVID-19 pandemic continued to be felt on the real estate market in the Czech Republic. The reintroduction of measures significantly affected tourism in Prague, which was further transferred to the rental housing market in the form of a higher supply of new apartments in central parts of the city with lower rental prices (Linhart, Hana and Marek, 2021). However, the owner-occupied housing segment generally performed well, with the asking prices of advertised apartments increasing in the long term across the Czech Republic, which supported in particular the considerations of a part of the population about purchasing an apartment as a long-term stable investment (Lux, 2020), (Deloitte, 2021).

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In 2022, the rental market continued to grow again after the end of COVID-19 measures. The refugee wave from Ukraine had a significant impact, reducing the number of apartments for rent. The price level for the sale of apartments across the Czech Republic has been growing for a long time. Residential property prices reached their peak in Q3 2022 and then fell for three consecutive quarters. Prices are likely to reach their bottom in Q3 2023. Based on estimates of the so-called overvaluation rate of apartments, the CNB considered the situation on the residential property market to be very tense despite a partial decline in prices, especially in terms of the availability of own housing for ordinary households (Deloitte, 2022).

According to Deloitte (2024) the latest data collected in 18 countries surveyed shows that the Czech Republic is the most difficult place to afford to own a home. The standard purchase of a new home in the Czech Republic corresponds to 13.3 average annual gross wages in 2024.

2 Material and Methods

The evaluation methodology of housing affordability presented in this paper is based on four basic real estate indicators (financial and physical). The used indicators include: IR (income to rent), IP (income to price), FS (flats for sale per 1000 inhabitants) and FR (flats for rent per 1000 inhabitants). The evaluation is made based on authors´ calculated index SAI (Standard Affordability Index). The same methodology was used in Slavata et al. (2024) or Slavata, Ardielli and Maciejasz (2022) based on database creation principles see Ardielli and Janasová (2012). The added value compared to the previous research is the expansion of the research to another selected V4 country, obtaining more up-to-date data, and unifying the assessment into NUTS 2 territorial units to ensure better comparability of regions. The analysis corresponds to the situation on real estate market as of April 2024.

The calculation of SAI (Standard Affordability Index) is made according to the formula (1):

$$SAI = \frac{(FR*FS)+(FS*IP)+(IP*IR)+(IR*FR)}{2} \quad (1)$$

where

FR…….. Flats for rent per 1000 inhabitants

FS…… Flats for sale per 1000 inhabitants

IP…….. Income to price ratio

IR…….. Income to rent ratio

Average year rent is calculated per 67 m^2 flat. The selected housing indicators were compared in Czech, Polish and Hungarian NUTS 2 regions. The advantage of authors´ methodology is seen in its simplicity and complexity. It transfers all the separate indicators of housing affordability into the one indicator (SAI).vAs the main source of data describing Czech real estate market was used the internet analytical portal www.trzniceny.cz (Trzniceny, 2024). The data describing Polish real estate market were obtained from portal www.otodom.pl (Otodom, 2024). Hungarian real estate data were taken from the www.realestate.hu (Realestate, 2024).The data used are including the information about flat prices, rent prices and share of flats for sale. The other used data are describing the level of salaries in Czech, Polish and Hungarian regions and were obtained from official national statistical offices (CZSO, 2023), (GUS, 2024) and (Officeapps, 2022).

3 Results and Discussion

In the presented research the comparison of Czech, Polish and Hungarian NUTS 2 regions is performed based on selected housing indicators. The aim of the article is to assess the level of housing affordability using the calculated Housing Affordability Index (SAI) in all 31 Czech, Polish and Hungarian NUTS 2 regions. Two research questions were also defined to support the research objective:

RQ1: Average housing affordability in the Czech NUTS 2 regions is the lowest among the selected countries.

RQ2: Regions including the capital have the lowest housing affordability compared to other NUTS 2 regions of the country.

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NUTS is the designation of the standard classification of territorial units for the needs of Eurostat. Regions in the Czech Republic correspond to NUTS level 3. After joining the EU, it was necessary to create another level of territorial division corresponding to NUTS level 2, to which EU development funds are directed. This level is called the cohesion region. In the Czech Republic, the regions were combined into 8 cohesion regions. Poland is statistically divided into 6 regions (NUTS 1), 16 voivodeships (NUTS 2) and 66 subregions (NUTS 3). Hungary is divided into three so-called parts of the state at the first level of NUTS 1. At the second level, NUTS 2, it is divided into 7 regions and at the third level, NUTS 3, it is divided into nineteen counties and the capital (ČSÚ, 2024). The summary of Czech regional data is available in Table 1.

Table 1 – Housing market regional data in the Czech Republic (April 2024)

Region	Prices/m2 (EUR)	Sale ads (number)	Month Rent/m2 (EUR)	Rent ads (number)	Average year gross wages 4/2023 (EUR)	Population (2023)
Prague	5097.9	2648	16.8	3128	25 338	1 357 326
Central Bohemia	2703.3	1091	9.7	641	20 894	1 439 391
Central Moravia	2091.8	792	8.7	724	18 567	1 212 333
Southwest	2113.6	1200	8.6	710	19 235	1 257 691
Northwest	1618.8	2173	7.4	1165	18 427	1 105 932
Northeast	2170.3	1438	8.4	905	18 725	1 533 199
Southeast	2424.3	1138	9.8	1234	19 514	1 731 977
Moravia-Silesia	1690.1	909	7.5	1324	18 680	1 189 674

Source: CZSO (2023), Trzniceny (2024), own calculations

The summary of Polish regional data is available in Table 2.

Table 2 – Housing market regional data in Poland (April 2024)

Region	Prices/m2 (EUR)	Sale ads (number)	Month Rent/m2 (EUR)	Rent ads (number)	Average year gross salary in corporate sector 1/2024 (EUR)	Population (2023)
Masovia	3412.8	10317	19.6	8124	24810	5 510 612
Silesia	1571.1	7247	9.5	1382	21401	4 346 702
Greater Poland	2824.5	3676	11.0	2158	19636	3 493 577
Lesser Poland	3704.1	5242	14.4	3351	22036	3 429 014
Lower Silesia	2711.4	8799	13.6	3414	22583	2 888 033
Łódź	2147.1	3080	10.2	1389	20236	2 378 483
Pomerania	2715.5	7018	12.2	1727	21789	2 358 307
Lublin	2137.5	1912	10.2	500	18962	2 024 637
Subcarpathia	2082.9	1242	2.5	546	18221	2 079 098
Kuyavia-Pomerania	1933.7	4072	9.3	1064	18823	2 006 876
West Pomerania	1921.8	5280	12.6	1120	20238	1 640 622

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Warmia-Masuria	2192.0	1568	9.1	221	18585	1 366 430
Holy Cross Province	1854.5	778	8.7	167	18446	1 178 164
Podlaskie	1941.5	1340	8.2	368	18044	1 143 355
Lubusz	1621.4	1498	9.3	339	19817	979 976
Opole	1519.3	1024	8.7	196	19886	942 441

Source: Otodom (2024), GUS (2024), own calculations

The summary of Hungarian regional data is available in Table 3.

Table 3 – Housing market regional data in Hungary (April 2024)

Region	Prices/m2 (mln. HUF)	Sale ads (number)	Month Rent/m2 (ths. HUF)	Rent ads (number)	Average year gross salary 2022 (EUR)	Population (2022)
Central Hungary	2913.4	32069	11.6	8601	9 259	2 963 205
Middle - Transdanubia	2277.2	4546	8.8	607	8 481	1 040 689
West - Transdanubia	1763.5	5464	8.0	462	7 844	984 221
South - Transdanubia	2651.6	6792	7.9	578	6 908	844 780
Northern Hungary	1897.4	3653	7.0	519	6 730	1 079 537
North - Great Plains	2051.6	4317	8.7	795	6 823	1 391 476
South - Great Plains	1642.9	3353	7.8	511	7 023	1 189 224

Source: Realestate (2024), Officeapps (2022), own calculations

Table 4 displays the fundamental housing indicators for the Czech Republic, including the resulting SAI values for its NUTS2 regions. As it follows from the researched data, the czech NUTS2 regions with the lowest housing availability according to the calculated SAI index are Prague, Central Bohemia and Southeast. The regions with the highest housing availability are Northwest, Moravia-Silesia and Southwest, on the contrary.

Table 4 – Affordability index SAI in the Czech NUTS 2 regions (April 2024)

Region	Flats for sale/ 1000 inh.	Flats for rent/ 1000 inh.	Income/ Price	Income/ Rent	(FR x FS)/ 2	(FS x IP)/ 2	(IP x IR)/ 2	(IR x FR)/ 2	SAI
Prague	1.95	2.30	4.97	1.88	2.25	4.85	4.67	2.16	13.93
Central Bohemia	0.76	0.45	7.73	2.67	0.17	2.93	10.31	0.59	14.01
Central Moravia	0.65	0.60	8.92	2.68	0.20	2.93	11.99	0.80	15.91
Southwest	0.95	0.56	9.11	2.79	0.27	4.29	12.71	0.79	18.06
Northwest	2.21	0.99	12.31	3.10	1.06	12.68	19.28	1.54	34.57
Northeast	0.96	0.60	8.66	2.79	0.29	4.09	12.08	0.83	17.29
Southeast	0.62	0.60	8.31	2.53	0.20	2.52	10.73	0.72	14.17
Moravia-Silesia	0.76	1.11	11.05	3.11	0.43	4.22	17.16	1.73	23.54

Source: CZSO (2023), Trzniceny (2024), own calculations

In Table 5 there are presented the fundamental housing indicators in Poland, including the resulting SAI values for the NUTS 2 regions. The NUTS 2 regions in Poland with the lowest housing availability according to the

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2024 comparison include Lesser Poland, Greater Poland and Lublin. The highest housing availability according to the SAI index was found in Subcarpathia, Silesia and West Pomerania.

Table 5 – Affordability index SAI in the Polish NUTS 2 regions (April 2024)

Region	Flats for sale/ 1000 inh.	Flats for rent/ 1000 inh.	Income/ Price	Income/ Rent	(FR x FS)/ 2	(FS x IP)/ 2	(IP x IR)/ 2	(IR x FR)/ 2	SAI
Masovia	1.87	1.47	7.27	1.58	1.38	6.81	5.73	1.16	15.07
Silesia	1.67	0.32	13.62	2.79	0.27	11.36	19.00	0.44	31.07
Greater Poland	1.05	0.62	6.95	2.22	0.32	3.66	7.72	0.69	12.38
Lesser Poland	1.53	0.98	5.95	1.91	0.75	4.55	5.67	0.93	11.90
Lower Silesia	3.05	1.18	8.33	2.06	1.80	12.69	8.60	1.22	24.30
Łódź	1.29	0.58	9.42	2.48	0.38	6.10	11.68	0.72	18.89
Pomerania	2.98	0.73	8.02	2.21	1.09	11.94	8.89	0.81	22.73
Lublin	0.94	0.25	8.87	2.31	0.12	4.19	10.24	0.29	14.83
Subcarpathia	0.60	0.26	8.75	8.99	0.08	2.61	39.33	1.18	43.20
Kuyavia-Pomerania	2.03	0.53	9.73	2.52	0.54	9.88	12.26	0.67	23.34
West Pomerania	3.22	0.68	10.53	2.00	1.10	16.95	10.51	0.68	29.24
Warmia-Masuria	1.15	0.16	8.48	2.54	0.09	4.86	10.79	0.21	15.95
Holy Cross Province	0.66	0.14	9.95	2.64	0.05	3.28	13.12	0.19	16.64
Podlaskie	1.17	0.32	9.29	2.73	0.19	5.45	12.70	0.44	18.78
Lubusz	1.53	0.35	12.22	2.65	0.26	9.34	16.21	0.46	26.27
Opole	1.09	0.21	13.09	2.83	0.11	7.11	18.54	0.29	26.06

Source: Otodom (2024), GUS (2024), own calculations

In Table 6 there are summarized the basic housing indicators for NUTS 2 regions in Hungary, including the resulting SAI values. The lowest achieved housing availability was found in North - Great Plains, Northern Hungary and South - Great Plains, the highest on the contrary in Central Hungary, West – Transdanubia and South – Transdanubia.

Table 6 – Affordability index SAI in the Hungarian NUTS 2 regions (April 2024)

Region	Flats for sale/ 1000 inh.	Flats for rent/ 1000 inh.	Income/ Price	Income/ Rent	(FR x FS)/ 2	(FS x IP)/ 2	(IP x IR)/ 2	(IR x FR)/ 2	SAI
Central Hungary	10.82	2.90	3.18	1.00	15.71	17.20	1.58	1.45	35.93
Middle - Transdanubia	4.37	0.58	3.72	1.20	1.27	8.13	2.23	0.35	11.98

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West - Transdanubia	5.55	0.47	4.45	1.23	1.30	12.35	2.72	0.29	16.66
South - Transdanubia	8.04	0.68	2.61	1.09	2.75	10.47	1.41	0.37	15.01
Northern Hungary	3.38	0.48	3.55	1.19	0.81	6.00	2.12	0.29	9.22
North - Great Plains	3.10	0.57	3.33	0.97	0.89	5.16	1.61	0.28	7.94
South - Great Plains	2.82	0.43	4.27	1.12	0.61	6.03	2.39	0.24	9.27

Source: Realestate (2024), Officeapps (2022), own calculations

To support the research objective, research question 1 was formulated, RQ1: Average housing affordability in the Czech NUTS 2 regions is the lowest among the selected countries. RQ1 was not confirmed by the research. Czech NUTS 2 regions on average do not achieve the lowest housing availability according to the SAI indicator in 2024 compared to the selected countries. The lowest average value was achieved in Hungary (15.14). The average value for Czech NUTS 2 regions is 18.94 and for Polish NUTS2 regions it is 21.92, so in general housing is the least affordable in Hungary and the most affordable in Poland.

The second research question was also identified in the research, RQ2: Regions including the capital have the lowest housing affordability compared to other regions of the country. This research question was also not confirmed based on data analysis, respectively, it was confirmed only in the Czech Republic. Regions including the capital don't have the lowest housing affordability compared to other NUTS 2 regions of the country. The Hungarian NUTS 2 region Central Hungary, that includes Budapest has the highest housing availability from all Hungarian regions. In the case of polish NUTS 2 regions, the Masovia Region, which includes Warsaw, is the fourth least affordable region in sense of housing according to the rating. The situation is different in the Czech Republic. The less affordable NUTS 2 region in the Czech Republic is NUTS 2 Region Prague.

4 Conclusion

In the presented research, a comparison of real estate market indicators in NUTS 2 regions of selected V4 countries was carried out. Based on the calculated housing affordability index SAI, regions in individual countries were evaluated. The higher the value of the indicator, the more affordable housing is. The objective of the research was met, real estate market indicators were compared in all 31 NUTS 2 regions of the Czech Republic, Poland and Hungary. For greater comparability of data, price values were converted to euros. The regions were also compared in terms of the achieved SAI value. Two research questions were asked as part of the research, which were not confirmed. According to the research, on average, Czech NUTS 2 regions do not achieve the lowest housing affordability and it is not a rule that the NUTS 2 region that includes the capital has the lowest housing affordability (case of Poland and, in extreme cases, Hungary, where this NUTS 2 region has the highest housing affordability in the country). However, this statement is true for the Czech Republic, Prague is the least affordable NUTS 2 region in the Czech Republic. The research covers the first half of 2024 and will be supplemented by further research in the following years. Also the irregular trends of Hungary need a deeper analysis.

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The Methodology for Determining of the Revitalization Area on the Example of the City of Radom

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Abstract

Radom is a city with population of 194 000 inhabitants what locates it in the 15th place in the country in terms of population (www.google.pl). It deserves special attention to its image, especially the local government authorities. Entrepreneurship is the special professional predisposition of the Radom inhabitants. It is reflected in the field of the precision technology what is the basis of the city's development. Therefore, the subject of consideration discussed in the article will be problems related to its revitalization that is, the renewal. The question arises: what actions should be taken to restore the degraded areas of the city due to various reasons to their better condition. In the article there was used the Municipal Revitalization Program of the City of Radom for 2023 – 2032 elaborated by the author's team of the Institute of Cities and Regions Development.

Keywords: *City Development, Degradation, Revitalization, Revitalization Areas Rates, Revitalization Program*

JEL Classification: *H41, F63*

1 Social and Economic Aspects of the Urban Revitalization

The 19th century was the age of empires; the past 20th century was the century of states and the current 21 th century is the century of cities – said Wellington E. Webb, mayor of Denver. He was probably quite right, because based on the statistics from the beginning of the century, the number of urban inhabitants exceeded the number of people living in rural areas. The estimated data present, that approximately 180 000 people move to cities every day, what means over 60 million worldwide every year. 22 cities already have more than 10 million inhabitants. Thus, the future belongs to the smart cities ('Gates of the Country' conference). Hence, the most sophisticated of the human creations, metaphorically called 'the urban rebirth' is concentrated in the cities like in lens (Majer 2014, p. 210).

In the post-industrial era, the wealth of the city of Radom was measured in numbers of produced phones by the Radom Telephone Factory, numbers of shoes manufactured by the 'Radoskór', machines and weapons by the Łucznik Metal Plant. Prefabricated concrete slabs housing estates were growing. The urban space was divided into production and non-production districts. A worker starting work in a factory in the 1940s could be sure that it would be finished in the same factory which example are my parents, father – the Łucznik Metal Plant, mother – the Radom Telephone Factory. Currently such certainty is gone. The current division of the civilization is reorientation of the economy from industrial into service one, called postmodernity or postmodernism.

The famous concept in the past of Alvin Toffler (Tefler 1997, p. 15) presents economic development in the form of three successive waves: the first wave was development of agriculture, the second one was development of industry, the third is development of knowledge and communication. There are three types of societies correspond to these waves: agricultural, industrial and information. Right now, based on the outlined

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transformations among larger-scale urban policy ventures, the gentrification causes the greatest interest, i.e. 'refinement' the development through renovation and change of the functions, called also the revitalization of housing estates, i.e. restoration for reuse. This term in Poland has become a synonymous of the urban renewal, i.e. the reconstruction from 'the factory city' to 'the city of knowledge'. Just to be clear in the scope of the discussed issues (the revitalization act) defines it as a set of activities aimed to beneficial transformation of the urban area which requires renovation due to economic and/or social reasons. However, the gentrification is a change of a part of the city. The current opinion of the specialists about course of the urban renewal in Poland is negative, because the Polish cities are too poor to cope the challenges of the renewal that is the revitalization according to the standards of the richer countries.

In the process of changes the Central and Eastern Europe cities experienced an industrial collapse which occurred as a result of the collapse of the socialistic bloc and the decay of the former Comecon (the Council for Mutual Economics Assistance) economic system and also following what was happened on the western side, the global deindustrialization and the new international division of labour. The Centre of Europe cities including also Radom were found in a doubly difficult situation: the crisis and collapse of production joined to their peripherality. The development of cities is related with the wave of real estate investments, taking the opportunity to obtain a high rate of return, the selective renewal of city centres and the gentrification of internal districts. Examples of the building modernization were named the gentrification of facade limited only to the front walls (E.Ardielli, J. Ardielli 2018).

Based on the arguments formulated above, there is the time to answer the research question: what should be the reborn cities in the 21st century? Therefore, a research hypothesis should be formulated that the urban development planning should be neo-traditional in nature propagating the comprehensive revitalization of their centres and increasing attractiveness to cause retreat from settling the suburbs.

In the Polish cities the model of a single-family house which is spatially isolated from the city no longer arouses widespread interest as it was in the second half of the 20th century. There are also known cases that young people made contacts with people who lived in single-family houses hoping to get married. There are also known cases of people running away from a city centre for the sake of silence, healthy air and peace.

The cities following this convention have to have a restored central square (market square) and building divided into quarters. The architectural structures should be shaped through differentiation of the functions and at the same time that the whole should become a 'walking estate'. It is supposed to remind the old European cities. The smart development is not a formalized movement but a set of guidelines having similar goals.

The social movement called 'right to the city' is not contradictory with optimistic faith in the rebirth of cities. The most important thing is that the policies aiming to the rebirth should more help people than buildings. The cities are not only urban spaces and territories of inhabitants' life but also fields of various kinds of experiences. The need to experience new things seems to be deeply rooted in the human nature. The city is an emerging and growing organism according to some, not always examined rights depending on natural conditions.

In the recommendations of the Europe 2020 strategy in the context of the development diversification of the European cities was noted that the European Union cities face challenges (https:eur-lex.europa.eu/PL):

- natural (climate change, access to energy);
- economic (competition of the continents);
- social (aging society, waves of migration).

The answer to the challenges in the European dimension is the cohesion policy. Therefore, the city should be planned in such a way to cope creating a pleasant living climate for people and its development should be directed and controlled.

So far, it has been spent 100 billion Polish zloty from the EU and the investors particularly are not interested what is effect of the expenses. They are interested to spend the received funds. On the website of the Minister of Infrastructure it is presented a counter of the spending money. As it is in practice, if the experts are asked by the authorities to investigate anything so these are not results of the investments but there are difficulties in the procedures. The vast majority of the studies answer on the question: what should be done that most communes reach for the money. However, it is quite known: it is just to simplify the procedures. The presented problem becomes more complex in the aspect of the funds received from the EU.

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In the third perspective, by 2020 we had to spend 300 billion Polish zloty. In this aspect we have a new EU regulation with much stricter criteria. The investors are obliged to justify that the expense makes sense. There were agreed 11 goals which thanks to the EU funds we may achieve. One of the main goals is to support the entrepreneurship. There is also a requirement to spend less on the infrastructure, up to 50% (in Ireland it was accepted 30%).

It should be asked a question: does the infrastructure create permanent jobs and thus income? The infrastructure alone will not provide any development. Not concrete but soft measures: employees and entrepreneurship, open thinking, market opportunities, social capital, education, qualifications, ability to cooperate, trust in contractors, etc. The classical triad which determines development today are tolerance, talent, technology (3T). It is doubtful what will bring us the revitalization of the three Radom parks for which 25 million Polish zloty was spent (Sońta, 2019, p 21-31). Opponents of the opinion claim that no one lives in the park, unless a homeless person. On the other hand, airports serve prestige of the local authorities (it was enough to modernize them instead of building new ones, except 5 the biggest ones). The airports in Łódz, Bydgoszcz, Zielona Góra collapse. The case of the built Warszawa-Radom airport is debatable but, in this matter, it is necessary to wait for complete evaluation. Beginnings of functioning of each investment are expensive and difficult to assess its effectiveness.

2 Characteristics of the Researching Entity

Radom is an interesting historical city with unique urban values but also a place of dynamic industrial development in the 19th and 20th centuries. The end of the 18th century was a period of dramatic decline of the city initiated by the destruction of the second half of the 17th century. In 1765 there were only 135 houses in the town and its population was approximately 1.5 thousand residents and by the beginning of the 19th century, the number of the residents increased to 2 thousand only. In the previous historical studies, there were distinguished two basic stages of the Radom's economic development, the period of manufacture in the years 1818 – 1850 and the factory period after 1850. The mentioned development was favoured by establishment of the first industrial tannery and opening of the first railway line (Bochyński, 2014 p. 102).

We will now move to the second half of the 20th century, i.e. the post-war period. There is a little traffic in the centre of Radom. The quality of the roads is really poor and it differs significantly from today's standards. The roadway on Traugutta Street is paved the so-called "cats' heads" (cobblestones), Nowotki Street which is now Piłsudski Street was paved also cobblestones what can be seen also today. Sometimes a horse-drawn carriage, horse-drawn cart, truck or tractor delivering coal to the local power plant, which operated until 1956 passes along the road (Staniszewski, 2017). Passenger cars were rare. In reference to the public transport, it was literally just a few lines. When time was passing away, new housing estates were appearing, currently there are around 30. The buildings in the city centre had a 'backyard' character. Based on the so-called study walks it is stated that brick garbage bins were built in the backyards where residents of nearby houses discharge municipal waste without their segregation. In the summer time there is a specific smell and from time to time one could see a running rat. Removal of the waste was manual and it involved an employee entering the garbage bin and using a pitchfork the waste was removing onto a large horse-drawn cart. The tenants during the operation were closing windows in their apartments.

In reference to the residential premises, it was the old building from before 1945. The average premises usually consisted of two chambers, kitchen and room and it was very rarely equipped with toilets. The kitchen was equipped with a coal-fired tiled stove used to prepare meals and to heat. There was lack of complete sanitary facilities limited to water and sewage system in the apartments. There was a public toilet for the residents in the yard but there were occasional apartments which were equipped with toilets. The residents were taking baths in large tin bathtubs or wooden tubs. As time was passing away, gas installations were installed. In addition, the tenants were using company baths and the municipal bath, which was located in the current Radom Club of Creative Communities premises called Łaźnia. It was a common custom in that time to take baths in relatives' premises who received new apartments in block of flats (Ziółkowski, 2023). In the summer time there were available open-air swimming pools, among others at the stadiums of Bron and also Radomiak sport clubs. The apartments were overcrowded, it was very often that two families lived in one apartment having only one common kitchen and bathroom.

Taking into account access to culture, it was mostly the radio. Later, only few people could afford the television. Such situation caused that the tenants who did not have a TV set in that time were going to their wealthier neighbours to watch popular series, like for example 'Stawka większa niż życie', 'Kobra' or the television

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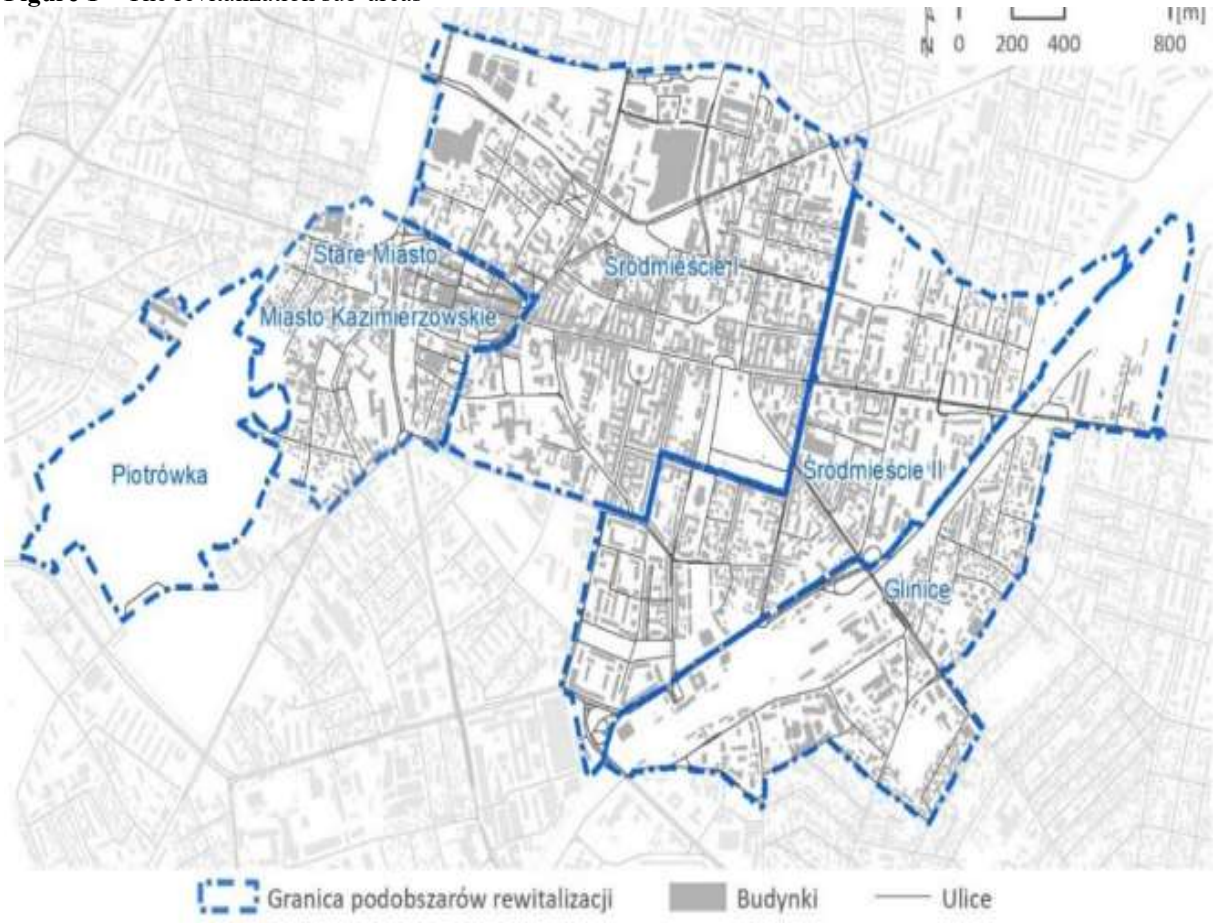
theatre, and of course different sporting events. It was quite good from social integration point of view and positively influenced integration of the communities. There were also created company clubs, where TV sets were installed and ones could use them.

3 Characteristics of Revitalization Sub-Areas

The city of Radom has been continuously conducting the revitalization process since 2004 due to the social, spatial, technical and environmental issues dating back to the post-war years. The first revitalization program was created in 2004 and covered the Kazimierzowskie City (the Resolution of the Radom City Council 535). The municipal company Revitalization was established one year earlier, which aim was to renovation of the tenement houses in this part of the city. The most important criteria for selecting this area were included high level of poverty and crime as well low standard of the apartments. In the following years, the revitalization activities were carried out based on the Radom Commune Revitalization Program for 2014 – 2023. The basis to assess the negative phenomena which required revitalization were 15 social, economic and technical factors. The revitalization area covered the Kazimierzowskie City and the Sródmieście. There were encountered problems during the revitalization, which were hindering the process. There should be mentioned predominance of private property, unregulated property matters, conservation restrictions and lack of funds from private property owners. For this reason, the Radom City Commune started to develop program for the designated revitalization area (the Resolution of the Radom City Council LXXVI/685/2022). The legal basis was the Act dated October 15, 2015 about the revitalization (Acts Journal 2921, point 485 as amended). The previous developed revitalization program based on the act dated March 8, 1990 on the municipal government has been expired.

Figure 1 – The revitalization sub-areas



Source: The diagnosis used to designate a degraded area and a revitalization area in the city of Radom

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Table 1 – The summary of the inhabitants' number and area for the sub-areas' revitalization in Radom

Name of the sub-area	Appearing units	Number of the residents	% of the city's population	Surface in [ha]	% of the city's surface
Piotrówka	37	0	0,0	56,2	0,5
Old Town and the Kazimierzowskie City	38,29	2 104	1,1	61,7	0,6
Downtown I	27,28,30	11 121	5,7	182,4	1,6
Downtown II	32,33	12 509	6,4	120,3	1,1
Glinice	47,48	2 069	1,1	111,1	1,0
Totally	x	**27 803**	**14,3**	**531,8**	**4,8**

Source: The diagnosis used to designate a degraded area and a revitalization area in the city of Radom

The area designated for the program includes 4.8% of the city surface (532 hectares from 11 107 hectares) and it is inhabited by 14.3% residents (27 803 people from all the 193 971 residents). It was divided into the sub-areas: Piotrówka, Old Town and the Kazimierzowskie City, Downtown I, Downtown II and Glinice.

There were submitted to the program both the ventures constituting continuation of the previous activities as well as new projects aimed to increase effectiveness of the revitalization process.

As the need of the Radom Commune Revitalization Program there was performed an analysis to determine the degraded areas and the revitalization area. The purpose of the analysis was to identify a part of the city where there is the greatest concentration of social negative phenomena co-occurring with at least one crisis phenomena from economic, environmental, technical or/and spatial-functional field. As a result of the study based on the statutory criteria, first the degraded area was designated and then the revitalization area. According to the article 10 about the revitalization act, the revitalization area cannot be larger than 20% of the commune's area and be inhabited by more than 30% of the commune's inhabitants. It must also be of significant importance for local development of the commune.

4 Indicators of the Intra-City Differentiation

To assess the degradation degree of the individual analytical units, 30 indicators were used: 12 related to the social field, 5 related to the economic field, 3 to the environmental field, 6 to the spatial-functional field and 4 to the technical field. The proposed indicators correspond to the negative phenomena mentioned in the article 9 of the Revitalization Act. Currently, there will be presented the indicators used to analyse the intra-city differentiation.

4.1 The Indicators of the Social Field

Methodologically, all the indicators of the field as well the other ones were calculated in relation to 1000 people. There are the most of the in the field as 12. The conclusion is that it is the field which has a decisive impact on degradation of the assessed period. The indicators concern: number of unemployed people, provided social benefits, rental arrears, number of committed crimes. The data information was obtained from the City Hall of Radom, the District Labor Office in Radom, the Municipal Social Welfare Centre in Radom, the Police.

Table 2 – The indicators of the social field used to analyse the intra-city differentiation

No	Name of the indicator
1	Number of unemployed people per 1000 people
2	Number of long-term unemployed people per 1000 people
3	Number of people using social assistance benefits per 1000 people
4	Number of people up to 18 years of age per 1000 people receiving supplementary nutrition
5	Number of people who were granted a specific targeted allowance for purchase of fuel per 1000 people
6	Amount of rental arrears in the municipal premises in PLN per 1000 people
7	Number of crimes in 2016 – 2020 per 1000 people
8	Number of disabled people receiving social welfare benefits per 1000 people
9	Number of the blue cards per 1000 people

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10	Number of people who were granted social welfare benefits due to helplessness in care and education matters per 1000 people
11	Number of the NGOs per 1000 people
12	Number of the submitted projects to the budget per 1000 people

Source: The diagnosis used to designate a degraded area and a revitalization area.

4.2 The Indicators of the Economic Field

There are not many indicators as only five in the field compared to the social one but they accurately characterise it. Preparation, coordination and creation of the conditions to carry out the revitalization is the commune's own responsibility. It uses objective and verifiable measures as well research methods adapted to the local conditions. The analysis in the field is focused on registered and deregistered business activities in the Central Register of Business Activity per 1000 people and the number of unemployed people with secondary and primary education and also in the post-productive age. The information for calculating the above-mentioned indicators was received from the City Hall of Radom, the District Labor Office in Radom, the Municipal Social Welfare Centre in Radom, the Police.

Table 3 – The indicators of the economic field used to analyse the intra-city differentiation

No	Name of the indicator
1	Number of registered economic activities in the Central Registration and Information on Business (CEIGD) at the end of the year per 1000 people
2	Number of people deregistered from the CEIDG in the three years preceding the analysis per 1000 people
3	Number of new registered in the CEIDG in the three years preceding the analysis per 1000 people
4	Number of unemployed people with lower-secondary, primary and lower education per 1000 people
5	Number of people in the post-productive

Source: The diagnosis used to designate a degraded area and a revitalization area.

4.3 The Indicators of the Environmental Field

They refer to the number of days when dust suspension containing toxic carcinogenic substances with exceeded the standard value for PM 10 concentration floats in the air. In other words, the dust suspended air and surface of products called *eternit* (asbestos tile) containing asbestos which is scheduled to be removed by 2032 in square meters per 1000 people and hazardous waste on the area of the examined entity. Information required to calculate the indicators can be obtained in the Faculty of Environmental Protection of the City Hall in Radom. There are not many indicators but they are important from the environmental pollution point of view. The hazardous waste, once released into the natural environment, may pose a threat to people, animals and other forms of life.

Table 4 – The indicators of the environmental field used to designate a degraded area and the revitalization

No	Name of the indicator
1	Number of days per year with exceeded the standard value for PM 10 concentration in the air
2	Surface of products containing asbestos in square meters per 1000 people
3	Area of the land where presence of hazardous waste was found

Source: The diagnosis used to designate a degraded area and the revitalization.

4.4 The Indicators of the Spatial-Functional Field

They are calculated based on the objects in which the commune's own tasks in the field of culture, social activity, municipal buildings without central heating systems, historical buildings, public transport stops adapted for disabled people, lengths of bicycle paths and surfaces of landscaped green areas are realized.

Table 5 – The indicators of the spatial-functional field used to designate a degraded area and the revitalization

No	Name of the indicator
1	Number of objects where own tasks of the commune in the field of culture and social activity are realized per 1000 people
2	Number of municipal buildings which require connection to heating network per 1000 people
3	Number of historical buildings included in the monuments' register per 1000 people

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4	Number of public transport stops adapted to people with special needs in the total number of stops.
5	Length of bicycle paths in meters per 1000 inhabitants
6	Surfaces of landscaped green areas per 1000 people

Source: The diagnosis used to designate a degraded area and the revitalization.

4.5 The Indicators of the Technical Field

They are applied to the municipal buildings built before 1945 and being in poor technical condition, they also concern the apartments which are not equipped with bathrooms and which are heated by coal furnaces. These are old buildings, old equipment inadequate to modern standards. It influences on an inappropriate emission in the terms of air pollution in the studied sub-areas.

Experts from Euromonitor created a ranking of cities by analysing 55 indicators in 6 main categories (fields). The company published a report in the form of a ranking of the 100 best cities in the world. The ranking was dominated by the European countries – there are 63 of them. According to the report, the success is due to the rapid development of urbanization and the implementation of new technologies as well the good public transport. In the group of the 100 cities mentioned above there are Warsaw and Cracow (Euromonitor Forbes 2023).

Table 6 – The indicators of the technical field used to designate a degraded area and the revitalization

No	Name of the indicator
1	Number of municipal buildings in poor technical condition per 1000 people
2	Number of municipal buildings built before1945 per 1000 people
3	Number of municipal apartments not equipped with bathrooms per 1000 people
4	Number of municipal premises (residential and commercial) heated by coal furnaces per 1000 people

Source: The diagnosis used to designate a degraded area and the revitalization.

5 Designation of a Degraded Area and the Revitalization

For the need of the Municipal Revitalization Program of the City of Radom there was performed an analysis to designate a degraded area and a revitalization area. The purpose of the analysis was to identify a part of the city where there is the greatest concentration of the negative social phenomena, co-occurring with at least one crisis phenomena from the economic, environmental, technical and/or spatial-functional field. As a result of the study and based on the statutory criteria, firstly the degraded area was designated and next the revitalization area. According to the article 10 of the revitalization act, the revitalization area cannot be larger than 20% of the commune's area and cannot be inhabited by more than 30% of the commune's inhabitants. It must also be of significant importance for the local development of the commune.

The criterion to acknowledge a given unit as a crisis one was deviation of the indicator's value from the average value for the city. The units having at least 6 negative social phenomena and at least one crisis phenomena in 3 out of 4 remaining fields: economic, environmental, technical as well spatial-functional were considered as the degraded ones. From the analysed 73 units, 25 fulfilled the established criterion. Additionally, referring to the article 10, paragraph 3 of the Revitalization Act, it was decided to include to the degraded area the unit 37 – uninhabited and post-industrial one. Thus, it was designated in Radom the degraded area consisting of 26 units with the total area of the city and inhabited by 81526 people (what constitutes 42% of the inhabitants). The range of the degraded area is presented on the figure 2.

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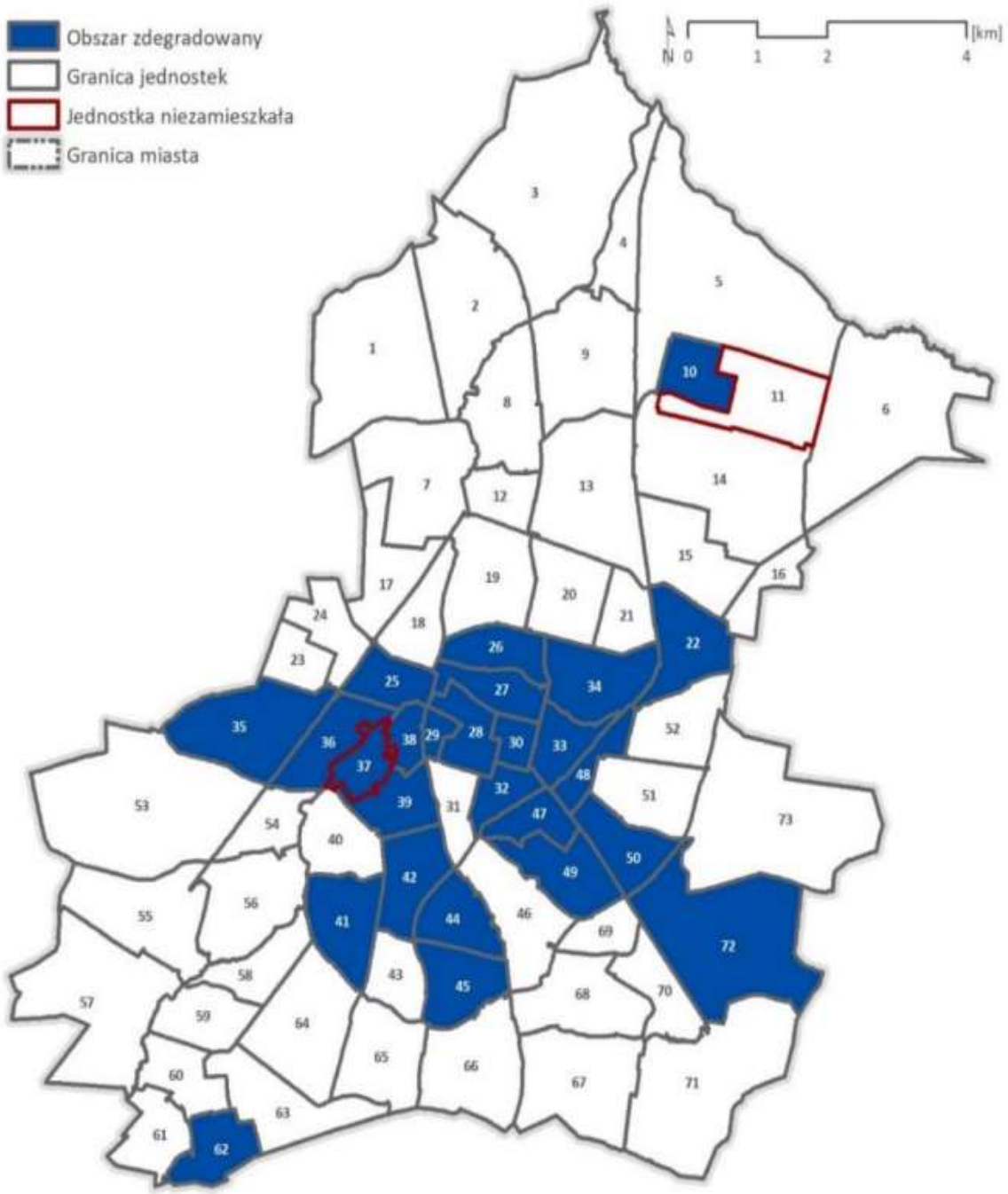
Figure 2 – The degraded area



Source: The diagnosis used to designate a degraded area and a revitalization area.

The units included in the degraded area are characterized by a particular concentration of the negative phenomena. However, the size of the degraded area prevented to designate the revitalization area within the same borders, because its surface and number of the inhabitants exceed the values permitted in the act. Therefore, it was necessary to select the units which fulfil the formal criteria in the highest range imposed for the revitalization area and also are important for the development of Radom.

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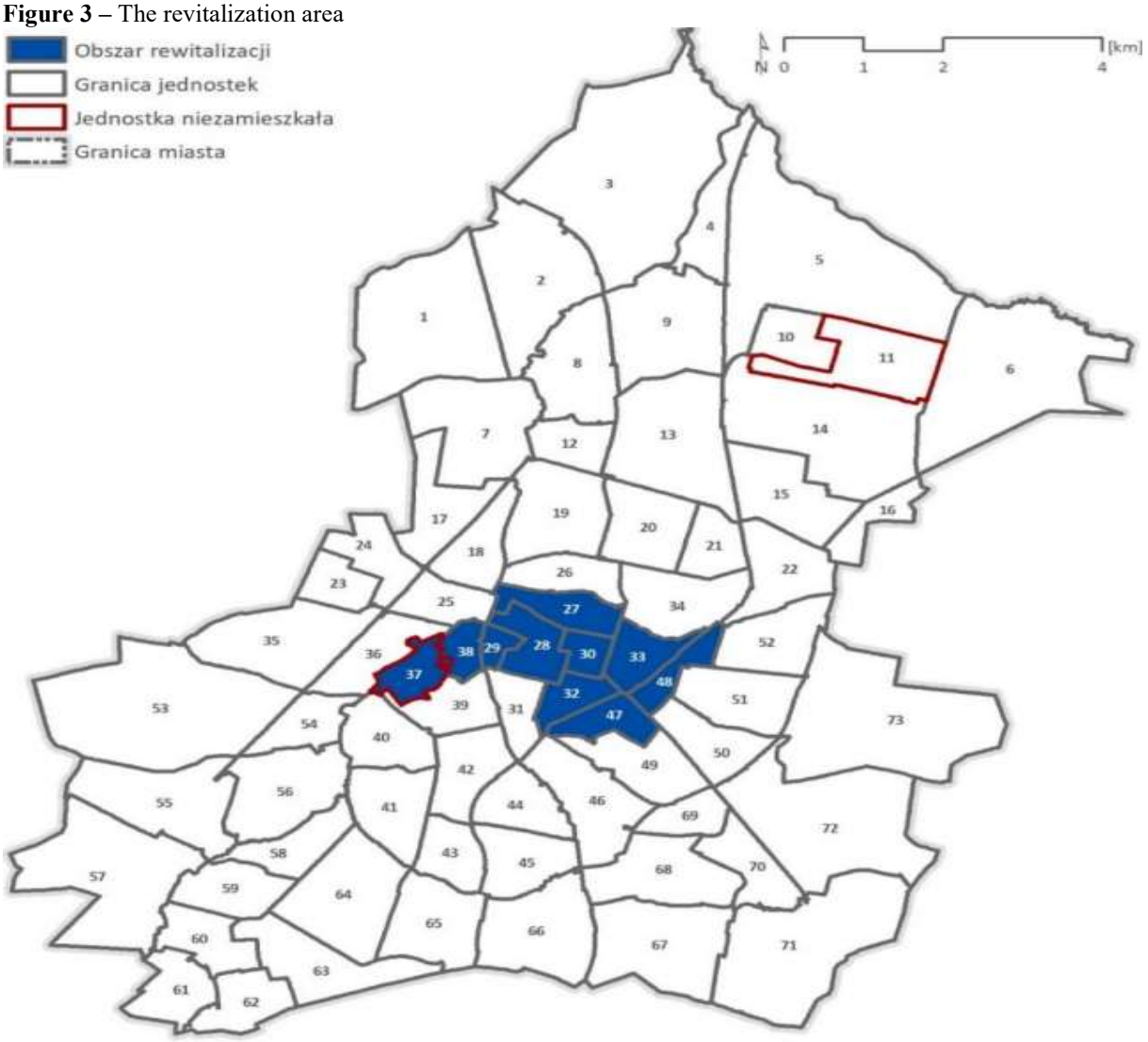
Figure 3 – The revitalization area



Source: The diagnosis used to designate a degraded area and the revitalization.

Therefore, there were compared the inhabited units of the degraded area in descending order in terms of the crisis factors and in ascending order the cumulative population of people and area of each next unit. The purpose of the compiled elaboration was to indicate units which should be included to the revitalization area due to particular concentration of the negative phenomena and the statutory formal criteria.

The elaboration presented that the units with 16 to 24 negative phenomena will be included to the revitalization area. Next, the units with particular concentration of the negative phenomena were additionally analysed in terms of their significance for the development processes of Radom in the context of importance of the unit in the strategic and planning documents, as well as the need to continue the revitalization activities from being in force then the revitalization program.

Based on the performed analyses, there was designated the revitalization area consisting of 10 units, including 9 inhabited units and 1 uninhabited and post-industrial unit in accordance with the article 10, paragraph 3 about the revitalization. The area, constituting the central part of Radom, consists of the representative districts which are important due to their performed functions and historical nature. The uninhabited Piotrówka unit – has a great development potential related to its unique historical and cultural value. The table and the map present summary of the spatial distribution of the revitalization area.

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6 Conclusion

In the article there was presented the problem of renovating cities in Poland based on the example of the city of Radom against the background of new trends concerning the changes in functioning cities in Europe over the last few centuries. The turning point in this regard was establishment of the revitalization act in 2015 which regulates the examined issues in a comprehensive and ordered manner. The basis for the conducted research was the Municipal Revitalization Program of the City of Radom developed for the years 2023 – 2032 according to the new legal regulations. The procedures which must be fulfilled to implement the revitalization deserve for special attention. According to the study, the revitalization unit should be divided into sub-areas. It should be noted that the division into the sub-areas is not equivalent with the district's division. The division into the sub-areas is related to the characteristics of a given sub-area, namely the historical period when it was created, because the characteristics the most often determines the quality of buildings and infrastructure which needs to be renewed.

The next research step is to isolate the degraded areas where concentration of the occurring negative phenomena especially affect them. Among the degraded units, there should be selected to the revitalization the ones which constitute the central part of Radom and are important due to their historical, cultural and economic functions. The diagnosis of the units which is performed using the indicators is helpful to extract the degraded and intended units for the revitalization. There are totally 30 indicators in different fields of the intra-city diversity (i.e. the social, economic, environmental, spatial-functional as well technical field), what is a sufficient number to do an accurate assessment. It is necessary to remember performing the analysis about certain restrictions introduced by the Revitalization Act, on the other hand in some justified cases, deviations from the restrictions are possible.

The revitalization program is adopted by the municipal council by a resolution. However, before is happens, the program must be subjected to extensive social consultation with active participation of the stakeholders. For the purpose, it has been established the Revitalization Committee which is a special advisory and consultative body. It was proved that any political animosity negatively affects the procedure related to adaptation of the program.

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Evaluation of the Technical Efficiency of Health Insurance Companies in the Czech Republic

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Abstract

The public health insurance system in the Czech Republic is based on the principle of compulsory insurance and ensures that every citizen is entitled to health care. Health insurance works on the principle of solidarity according to the Bismarck model. The aim of this paper was to evaluate the technical efficiency of individual health insurance companies for the period 2018-2022. The DEA (Data Envelopment Analysis) method was chosen for the evaluation, which allows to compare the performance of subjects based on their inputs and outputs. In total, 35 homogeneous production units were included in the calculation of technical efficiency. The technical efficiency was therefore estimated using two input-oriented models, the M1 and the M2. Based on the results of the M1 model, it can be argued that most insurance companies achieve a high level of technical efficiency every year and the differences between insurance companies are small. According to the results of the M2 model, the best average results for the selected period were achieved by the General Health Insurance Company (VZP ČR). The lowest average technical efficiency was recorded by the District Brethren Treasury (RBP). The results of all insurance companies over the years according to the M2 model looked like this: The lowest level of technical efficiency for all insured persons was in 2019, while the highest rate of technical efficiency was in the last monitored period in 2022. Effective tools for improving technical efficiency in health care include support for prevention programs and innovations.

Keywords: *Technical Efficiency, Model DEA, Health Insurance Companies, Expenses, Incomes, Insured Persons*

JEL Classification: *H61, I13, C14*

1 Introduction

The public health insurance system in the Czech Republic is the basis of health care financing and works on the principle of compulsory insurance. This system ensures that every citizen or permanent resident is entitled to health care. The conditions of health insurance are governed by a special law, while health insurance is based on the principle of solidarity according to the Bismarck model of health care, where all citizens are obliged to pay for health insurance to the funds of health insurance companies. This system is also set up, for example, in the Scandinavian countries, (Kullberg et al, 2023). This applies to both employees and the self-employed and persons without taxable income. For groups of citizens defined by law (e.g. seniors, students, dependent children, etc.), the state pays the premiums. (Vaňková et al, 2021)

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Public health insurance represents a large part of public budgets. In 2022, the expenditures of health insurance companies amounted to 427.67 billion. CZK, i.e. 6.07% of GDP (CZSO, 2024) or 21.5 % to total consolidated state budget expenditure (MFČR, 2023).

The Czech Republic is one of the countries where the share of health care expenditure is increasing, especially in connection with the ageing population. Health expenditure is linked to the economic situation and social situation of the region and population (Vaňková, Vrabková, 2022). A study by Bryndová, Šlégrová (2021) shows that the financing of health care, primarily from public health insurance sources, requires systemic interventions – strengthening funding sources or reducing the expenditure side, because according to their predictions, the system will head towards significant deficits from 2021.

The question is therefore whether health insurance companies in the Czech Republic achieve different or comparable technical efficiency and whether it is possible to consider that the dominant health insurance company, the General Health Insurance Company, on the insurance market in the Czech Republic is the least efficient insurance company.

The aim of the paper is to evaluate the technical efficiency of health insurance companies in the Czech Republic for the period 2018-2022, according to the input-oriented Data Envelopment Analysis (DEA) model with constant returns of scale.

The DEA model was chosen with regard to its proven and still relevant use in the evaluation of efficiency in healthcare conditions, (Farantos, Koutsoukis, 2023, Dlouhý, Havlík, 2024). The paper is divided into 4 parts. The first part consists of an introduction, where there is a summary of data on health insurance in the Czech Republic, motivation and at the same time the topic of the research is introduced. The second part consists of research questions. There are also briefly characterized the subjects of the research, which are individual health insurance companies. Furthermore, the inputs and outputs are determined, including a statistical description. The third part consists of a mathematical description of the DEA model, evaluation models and selected efficiency models, which are used for the subsequent results part. In the end, there are concentrated results and discussions.

2 Methodology

The aim of the paper is to evaluate the technical efficiency of production inputs of health insurance companies in the Czech Republic for the period 2018-2022, according to the DEA model.

To achieve the goal of the research, three research questions were formulated.

VO1: How do health care expenditures affect the results of technical efficiency of health insurance companies?

VO2: How is technical efficiency changing in individual years 2018-2022?

VO3: Which health insurance companies achieve the best results in technical efficiency?

The evaluated units are seven health insurance companies in the Czech Republic. The largest health insurance company is the General Health Insurance Company of the Czech Republic (VZP ČR), whose share of the insurance market is 56.8 %. This is followed by insurance companies: Military Health Insurance Company of the Czech Republic (VoZP) with a share of 6.5%; Czech Industrial Health Insurance Company (ČPZP) with a share of 12%; Occupational health insurance company for employees of banks, insurance companies and construction (OZP) with a share of 7%; Škoda Employee Insurance Company (ZPŠ) with a share of 1.3%; Health Insurance Company of the Ministry of the Interior of the Czech Republic (ZP MV ČR) with a share of 12.4%; District Brethren Treasury, health insurance company (RBP-ZP) with a share of 4%.

Four inputs and one output and their values for each year 2018-2022 were chosen to evaluate technical efficiency. The main sources of data were the annual evaluation reports of the Ministry of Health and the Ministry of Finance Evaluation of the development of the public health insurance system in 2018, 2019, 2020, 2021, 2022.

In total, 35 homogeneous production units (DMUs) are included in the calculation of technical efficiency. This number was determined as follows: 7 health insurance companies x 5 years (2018, 2019, 2020, 2021 and 2022).

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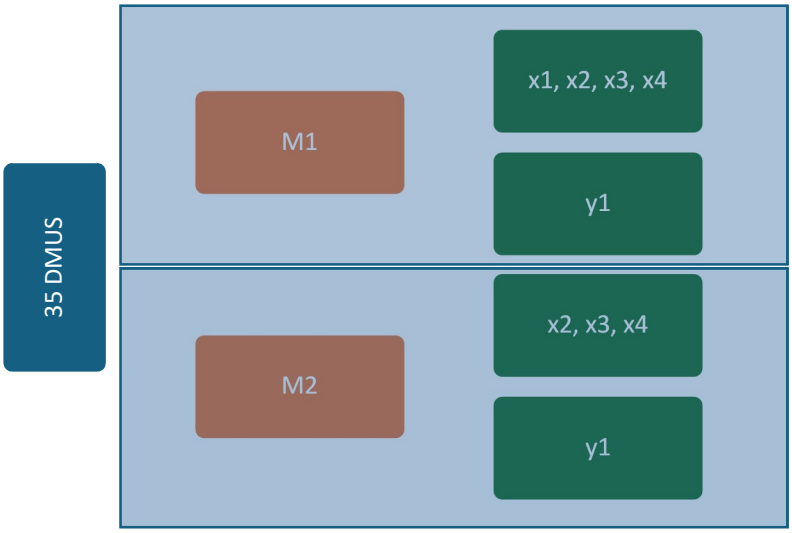
DMUs are marked with the abbreviation of the insurance company and the relevant year (e.g. VZP_2018, VZP_2019, ...).

The technical efficiency is estimated through two input-oriented (IO) models M1 and M2, which take into account constant returns to scale (CRS). Model 1 includes all inputs—x1, x2, x3, x4, and one y1 output. Model 2 includes x2, x3, x4 inputs, and one y1 output. The models are shown graphically in Figure 1

Figure 1 - Schematic of models M1 and M2



Source: own processing

For the calculation of the models, the inputs and outputs below were recalculated per insured person, with regard to reducing the influence of the size of the insurance company on the results of technical efficiency calculations. The number of insured persons includes all persons who are insured with the given health insurance company. Insured persons are divided into two groups. The first group consists of employees, self-employed persons and persons without taxable income. The second group includes people for whom the insurance is paid by the state (e.g. seniors, students or dependent children). As mentioned above, VZP CR covers more than half of the insured market. The remaining 43.2% of the market is covered by the remaining 6 insurance companies.

Expenditure on health services, in millions of CZK (x1): expenditure on health services consists of costs incurred by insurance companies for the provision of health care to insured persons (outpatient care, medical care, medicines, rehabilitation and physiotherapy, preventive care, medical devices, dental care services, psychiatric and psychological care, home care and specialised services).

Expenditure on preventive programmes, in millions of CZK (x2): expenditure on preventive programmes of insurance companies includes costs incurred by health insurance companies on activities and services aimed at disease prevention and health promotion (preventive check-ups, vaccinations, screening programmes, health education, counselling, programmes for a healthy lifestyle, psychological and psychiatric counselling and programmes for risk groups).

Expenditures on own activities, in millions of CZK (x3): expenditures on insurance companies' own activities include costs incurred by health insurance companies for their own administrative and operational activities (administrative costs, IT and technology, marketing and awareness, education and training, research and analysis, or services and support for the insured).

Number of employees (x4)**:** the data on the physical number of employees of insurance companies includes all employees who are employed by the health insurance company (administrative staff, healthcare professionals, IT specialists, marketing and communication staff, customer service staff, analysts and researchers).

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Income from insurance premiums (y1), in millions of CZK: income from insurance premiums refers to funds that health insurance companies receive from compulsory contributions from their insured persons (e.g. employees, self-employed persons, pensioners). (Ministry of Health of the Czech Republic, 2024)

Table 1 - Statistical description of selected inputs and outputs, average for 2018-2022 (in CZK millions)

	VZP ČR	ZP Škoda	VOZP	RBP	ČPZP	OZP	ZP MV ČR
x1	208 840.6	4 618.2	22 354.2	13 023.8	38 002.2	22 138.2	42 100.0
x2	740.4	35.8	137.8	90.6	313.8	161.0	270.6
x3	4 581.4	130.6	556.8	365.0	898.4	588.0	1 012.4
x4	3 581.0	79.4	396.8	236.0	653.0	400.8	675.6
y1	219 709.0	4 862.4	23 156.6	13 612.6	39 620.0	23 012.0	43 819.4

Source: own processing according to the Ministry of Health of the Czech Republic, 2024.

Table 1 shows selected inputs and outputs of individual health insurance companies in the years 2018-2022. VZP CR achieves the highest values for all selected inputs and outputs due to the fact that it covers the highest part of the market, up to 56.8% of insured people in the Czech Republic. On the other hand, ZP Škoda achieves the lowest values, both in inputs and outputs, due to the coverage of only 1.3% of the market. Both expenditures on health services x1, expenditures on own activities x3, and the number of employees x4 are higher at VZP ČR than at the rest of the health insurance companies as a whole. In terms of expenditure on preventive programmes x2, the remaining insurance companies together amounted to higher amounts than VZP ČR. The following insurance companies contributed the most to this result: ČPZP, ZP MV ČR, OZP. For Income from premiums y1, the results are as follows: VZP CR has the highest average revenues of CZK 219,709 million. The second highest average income is that of the Health Insurance Company of the Ministry of the Interior of the Czech Republic is CZK 43,819 million. The lowest average income is that of the Health Insurance Company Škoda, amounting to CZK 4,862.4 million.

3 Model Data Envelopment Analysis

The technical efficiency of health insurance companies (DMUs) in this research is calculated according to the basic input-oriented DEA model (IO) with constant returns to scale (CRS). DMUs use x inputs $\in R_+^N$ to produce *y outputs.* $\in R_+^M$ The calculated technical efficiency of DMUs is relative because the aim of the analysis is to estimate the efficiency of each DMU in relation to the best DMU in the analyzed population, where *i=1, ... , I DMUs*. To do this, scales are attached to the inputs and outputs of each DMU to solve the problem. (Dlouhý et al. 2018, Vrabková, Lee, 2023)

The so-called dual-coupled model according to the mathematical formula (1) was used for the calculation.

$$\text{maximize} eff(U_q) = \frac{\Sigma_k^r u_k y_{kq}}{\Sigma_i^m v_i x_{iq}}$$

$$\text{under conditions} \quad \frac{\Sigma_k^r u_k y_{kj}}{\Sigma_i^m v_i x_{jk}} \leq 1, \quad j = 1, 2, \ldots, n,$$

$$u_k \geq \varepsilon, \quad k = 1, 2, \ldots, r,$$

$$\geq \varepsilon, \quad i = v_i 1, 2, \ldots, m,$$

where the measure of efficiency of the unit *Uq* is expressed by *eff*(U_q), ε is the constant that ensures the condition of the positive weights of inputs and outputs, *xij*, $i = 1, 2, ..., m$, $j = 1, 2, ..., n$ expresses the value of the *i-th* input for the unit *Uj* and *ykj*, $k = 1, 2, ..., r$, $j = 1, 2, ..., n$ expresses the value of *the i-th* output for the unit *Uj.*

The interpretation of the results for individual units is as follows:

a) effective unit, here $\theta(U_q)$ is equal to *1*,

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b) inefficient effective unit, here $\theta<1$, (U_q) (Vrabková, Vaňková, 2015).

3.1 Results

The overall results for the evaluated M1 and M2 models are shown in Table 2. The results can also be interpreted in percentage terms of efficiency rate, where 100% efficiency was achieved by DMUs with a result of 1.

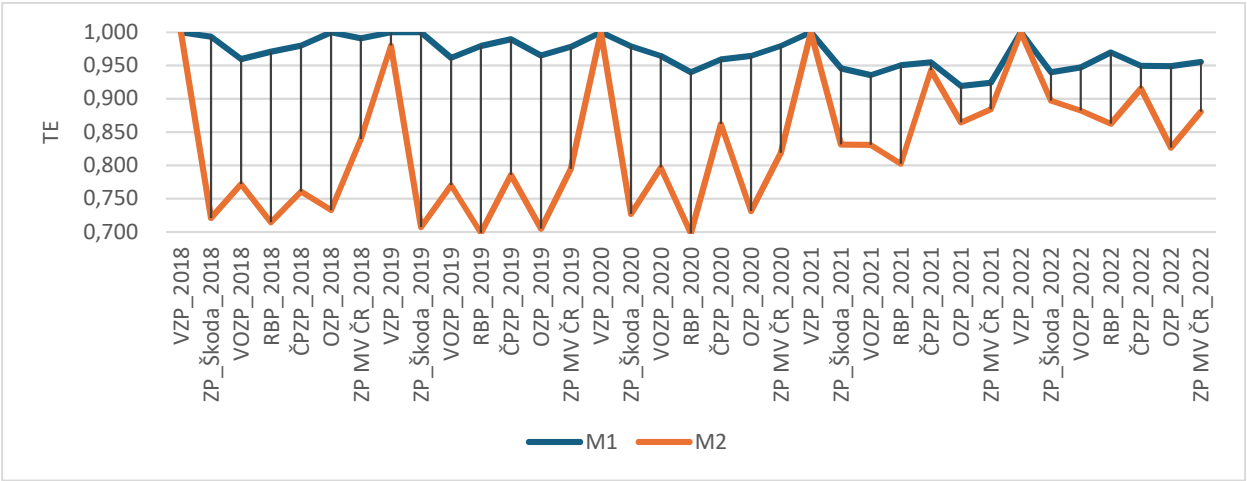
Table 2 - Basic statistical description of the results of IO_CRS

Input-oriented CRS model	M1	M2
Diameter	0.969 (96.9 %)	0.829 (82.9 %)
Median	0.965 (96.5 %)	0.826 (82.6 %)
SD	0.024 (2.4 %)	0.095 (9.5 %)
Minimum	0.919 (91.9 %)	0.698 (69.8 %)
Number of fully effective units	7	4

Source: own processing according to the Ministry of Health of the Czech Republic, 2024.

Table 2 shows the values of the mean, median, standard deviation and the number of fully effective units in the M1 and M2 models. In the M1 model, the average value of the results is 0.969 (97 %), while in the M2 model the average was lower at 0.829 (83%). The median was higher for the M1 model (0.965), for the second model it was 0.826. As for the standard deviation, it was 0.024 for the first model. For the M2 model, the standard deviation was greater than 0.096. The minimum value for the M1 was 0.919 (92 %), while the M2 was significantly lower at 0.698 (70%). The number of fully effective units was 7 for the M1 model, and the number of 4 for the model. Fig. 1 Technical efficiency of health insurance companies in 2018-2022

Figure 2 - Comparison of the technical efficiency results of 35 DMUs in M1 and M2 models



Source: Own processing according to the Ministry of Health of the Czech Republic, 2024.

A comparison of the average technical efficiency of the M1 and M2 models in terms of all seven insurance companies in individual years 2018-2022, i.e. 35 DMUs, is shown in the graph in Fig.3.

Figure 2 shows that in the M1 model in 2018, the highest values of technical efficiency were achieved by the insurance company VZP ČR and OZP, which achieved full efficiency, i.e. value 1. The least effective was VoZP, with a technical efficiency of 0.960. In 2019, VZP ČR was again the best, this time joined by ZP Škoda, while the lowest value was VoZP 0.962. In 2020, only VZP ČR achieved full efficiency, other insurance companies were worse off, and RBP was the worst with a value of 0.94019. The next year, VZP ČR was again the best with a value of 1. The worst insurance company in the given year was OZP 0.91930. In the last monitored year, 2022,

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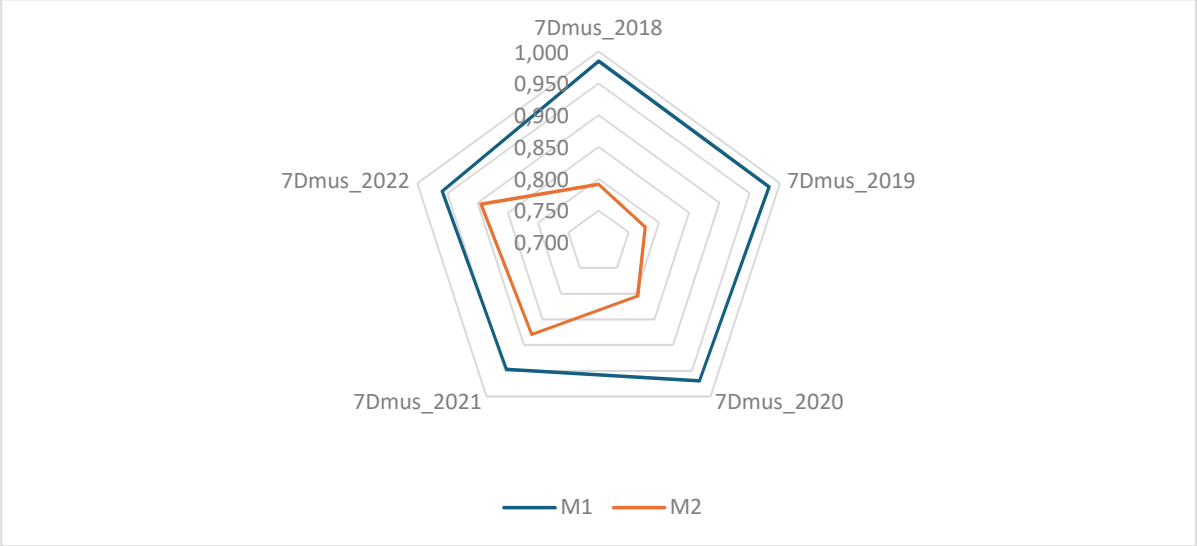
VZP CR achieved full efficiency again, as in all previous years, with ZP Škoda 0.93988 being the worst insurance company. Across all insurance companies, the average was 2018, while the worst year was 2021. As also illustrated by the cobweb graph in Fig. 3.

In the M2 model, it can be seen that the differences between the technical efficiency of insurance companies are much greater than in the M2 model. In 2018, VZP CR achieved full efficiency, with ZP Škoda 0.720 and RBP 0.714 among the worst insurance companies in that year. In the following year, VZP ČR was also the best with a value of 0.979. RBP 0.698 finished last. In 2020, as in the remaining years, VZP CR was again the best, achieving full efficiency in 2020-2022. In 2020, the worst insurance company was RBP 0.697, as was 0.80246 in 2021. On the other hand, in the last monitored year, the worst number of people with disabilities was 0.82620. In the M2 model, the average best period was 2022 (0.895), compared to 2019 (0.777).

In summary, M1 shows small fluctuations in technical efficiency between DMUs, as confirmed by the average values given in Table 1. On the other hand, in the M2 model, the differences are more pronounced, especially between VZP ČR and other insurance companies. These differences are lower in 2021 and 2022. It is clear from the above that the x1 input, which is not part of the M2 model, has a great influence on the results of the technical efficiency of health insurance companies.

Figure 3 - Comparison of average technical efficiency of M1 and M2 by individual years 2018-2022



Source: Own processing according to the Ministry of Health of the Czech Republic, 2024.

The graph in Figure 3 shows that the technical average efficiency according to M1 is the best in 2018, at 0.985. Over the years, there has been a trend of gradual decrease in efficiency, in 2019 the value was 0.982. For 2020, the value has decreased to 0.97. In 2021, it fell to 0.947, which was the lowest value for efficiency, as in 2022 efficiency increased to 0.959.

According to the M2 Model, the average technical efficiency for all insured persons in 2018 was 0.791. The next year, it fell to the lowest value of efficiency for the period under review, 0.777. From the following year, there was a positive trend, namely increasing values of technical efficiency, so for 2020 the value was 0.805. In 2021, it rose to 0.879. It had the highest value of average technical efficiency in 2022, when the value was 0.895.

The order of DMUs in the M1 and M2 models from best to worst technical efficiency illustrates the above differences resulting from the selection of inputs and the evaluation period.

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Figure 4 - Ranking in M1 models

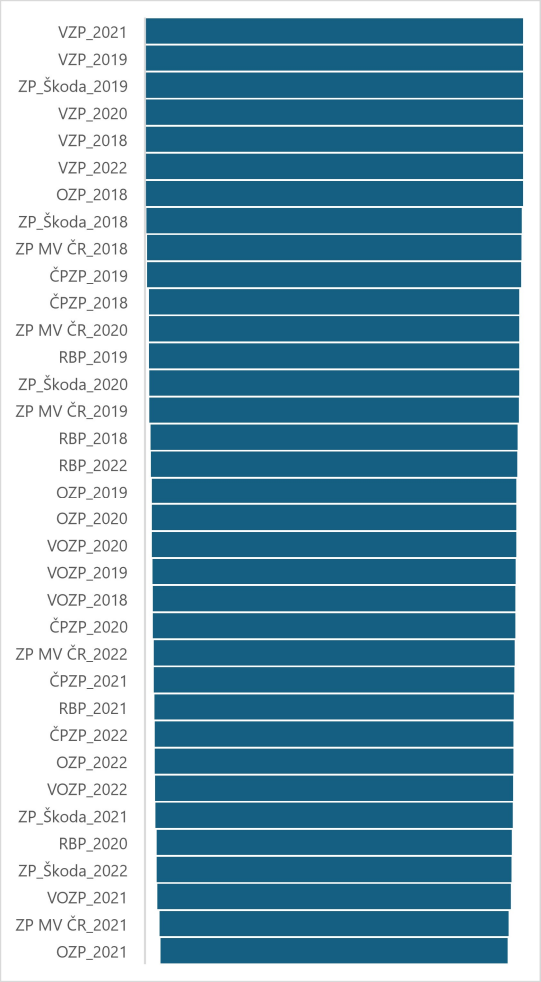
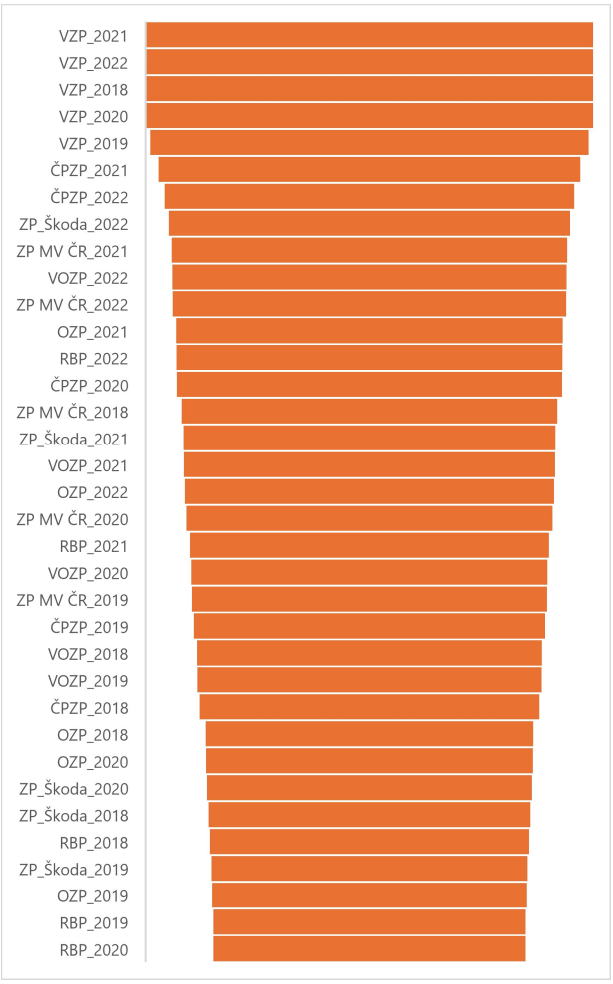


Figure 5 - Ranking in the M2 model



Source: Own processing according to the Ministry of Health of the Czech Republic, 2024.

Figure 4 shows the ranking of insurance companies based on technical efficiency, based on the M1 model for the period 2018-2022. The minimum value of technical efficiency for PWD is 0.919 in 2021 and then 0.924 for PWD in 2021. On the other hand, the highest value of 1 occurred in 7 cases. For PWD in 2018, for ZPŠ in 2019 and then in each monitored year for VZP.

Figure 5 also shows the ranking of insurance companies based on technical efficiency, but this time for the M2 model. This time, the lowest RBP value is in 2020 and 2019, respectively, at 0.698. On the other hand, as with the M1 model, VZP ČR has the highest values, reaching a value of 1 in all monitored years except 2019 (0.98).

4 Conclusion and Discussion

The paper is focused on the evaluation of the technical efficiency of health insurance companies in the Czech Republic for the period 2018-2022 using an input-oriented Data Envelopment Analysis (DEA) model with constant returns to scale. All seven health insurance companies of the Czech Republic were evaluated. The M1 model, which takes into account all inputs and outputs, shows little variation in technical efficiency between insurance companies. The M2 model, which does not take into account input x1, i.e. expenditure on health services, showed greater differences between insurance companies, reflecting the impact of these expenditures on overall efficiency.

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Based on the evaluation of the technical efficiency of health insurance companies in the Czech Republic in 2018–2022, it can be stated that most insurance companies achieve a high level of technical efficiency, with the best insurance company being the General Health Insurance Company (VZP ČR), which proved to be fully effective in most of the evaluated periods, with the exception of 2019 in the M2 model (0.98). The second best insurance company for the period under review was ČPZP, which had an average technical efficiency value of 0.853, which was 0.143 lower than the first VZP ČR. On the other hand, the worst health insurance company was RBP, which had an average technical efficiency of 0.755 for the period under review. Just above it was OZP with 0.772 and ZP Škoda 0.777. The results in the M2 model show that the highest level of technical efficiency for all insurance companies combined was recorded in the last reporting year 2022 (0.895), when most insurance companies reported high levels of technical efficiency. On the other hand, the lowest level of technical efficiency among all insurance companies was in 2019 (0.777), where the main effect of the decline in technical efficiency can be attributed to the beginning of the COVID-19 pandemic.

In order to improve the technical efficiency of insurance companies, insurance companies should reduce their inputs. An example of such a reduction can be the reduction of administrative costs, for example, through digitization or streamlining of internal processes, which can bring savings that can be invested, for example, in health prevention. Another option may be greater support for prevention programs such as vaccination programs, prevention of cardiovascular diseases, etc. These can reduce the need for costly medical interventions. The results show that insurance companies that invest in these prevention programs achieve better technical efficiency. According to a comparative OECD study, prevention and innovation are effective tools for improving efficiency in healthcare.

Acknowledgments

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The Structure of Expenditures of Regions Covered by Shared Taxes

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Abstract

The contribution is focused on the evaluation of the structure and sources of expenditures of regions in the Czech Republic (CR). In the sources of regional budgets, transfers and then revenues from shared taxes are significantly represented. The principle of budgetary allocation of taxes for regions is given by fixed shares of individual regions in shared taxes. These shares were last set in 2005 and have not changed since then, so no criteria have been set that would respond to changes in the conditions of individual regions. When looking at the expenditures of the regions, it is not possible to directly identify to what extent the relevant expenditure is covered by transfers and to what extent resources from shared taxes are used; that's what this post is about. The aim of the contribution is to assess how big they are and whether the use of resources from shared taxes in spending for a set of 13 regions changes relatively over time. The contribution analyzes the economy of the regions in two time periods and, on this basis, reaches conclusions in terms of the use of resources from the shared taxes of the regions and their changes over time. In the contribution, the expenditures of the regions are monitored both from a sectorial point of view and also from the point of view of the created specific spending areas, which mainly make up the largest shares of the regions' expenditures, and which thus indicate the main expenditures of the regions paid from shared taxes.

Keywords: *Region, Budget, Income, Expenditure, Transfers, Taxes*

JEL Classification: *H50, H72*

1 Introduction

Regional budgets are part of the public budgets in CR and form one of the three parts of territorial budgets, i.e. in addition to the budgets of municipalities and associations of municipalities. There are a total of 14 regions, however, from the point of view of the type of budget, the Capital City of Prague is the budget of both the municipality and the region. The regions are characterized by differences in terms of the size of the territory, the number of inhabitants, but also other characteristics. Regions provide public goods on their territory according to established rules based on available financial resources. The resources of the region's economy consist mainly of transfers and income from taxes.

According to Peková (2011), the basic theoretical starting point for the position and delimitation of regions is fiscal federalism, which is based on the existence of multiple levels of government, i.e. on the existence of a vertical and horizontal structure of different levels of government, including local government (Musgrave 1994, Oates, 1991, Kovařík, 1990) and defines the levels of government along vertical and horizontal lines, with the

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aim of optimal distribution of authority and responsibility between them and achieving an optimal degree of decentralization.

Resources for territorial budgets for the conditions of the beginning of the 21st century within the framework of the issue of fiscal federalism must currently respond to changes in the field of information technology, innovation, inequalities in the area of fiscal decentralization caused by globalization, etc. (Boadway, Dougherty, 2018) and the issue of fiscal decentralization in a globalized world creates new perspectives on indicators of government levels in different countries (Dougherty, Phillips, 2019).

A combined model of fiscal federalism is used to finance the regional level of budgets in CR, where the resources for managing of the regions are made up of both income from taxes and income from transfers. Part of the transfers provided to the regions is entitled, where each region receives transfers regularly every year according to the relevant criteria. The second part consists of transfers from central budgets and the EU budget, where regions submit their individual requests. The use of transfers to the region is determined by their purpose, however, only the name of transfers for the analytical impact of budgets in many cases does not allow to accurately identify their specific use from a sectorial point of view.

Setting criteria for shared and entrusted taxes creates individual conditions for individual decentralized budgets. Based on current conditions, the rules for providing appropriate tax resources to decentralized budgets should be updated, or theoretical knowledge in this area should be developed (Tománek, 2015), (Tománek, 2022), it is mainly about the role of tax revenues and provided transfers of territorial budgets, incl. issues of assessing tax autonomy within fiscal federalism (Blöchliger, 2011), (Tománek, 2017), (Tománek, 2021).

Shared taxes, which make up about a third of total resources in regional budgets, are supplemented by resources from transfers. When looking at the budgets of the regions in general, it is not possible to specify to what extent individual areas of the regions' expenses are covered by these shared taxes or, on the other hand, by transfers. The difference between these main sources is connected mainly with the fact that the use of transfers is always given for a specified purpose, while in the case of sources from taxes, the regions can decide on the method of use themselves. The aim of the contribution is to evaluate the changes in the structure of regional expenditures paid from the revenues of shared taxes in the period 2017-2019 compared to the period 2022-2023. The findings make it possible to find out whether the structure of the regions' expenses is changing significantly in connection with the fact that tax revenues are increasing every year, and the budgets of the regions can therefore have higher possibilities for making decisions about expenses.

The aim of the paper is to assess how large they are and whether the use of resources from shared taxes in spending for a set of 13 regions in the conditions of the CR changes relatively over time.

2 Methodology and Data

The methodological procedure of the solution is based on the analysis of the financial operations of the regions. The expenditure values for 13 regions in two time periods were used for the analysis. The necessary conclusions are then obtained by comparing both time periods. The analysis follows these procedural steps:

- The first part of the analysis affects the revenue structure of the regions, broken down into tax, non-tax and capital revenues and received transfers; tax revenues in the case of regions mainly represent resources from shared taxes; other tax revenues, e.g. from fees, are negligible.
- Analysis of expenditures affects the sectoral structure of regional expenditures, through the six groups of expenditures. These groups of expenses, in order to get an overview of the structure of regional expenses, are, however, too broad in terms of content in the cases of some sectors.
- The next part of the analysis is therefore based on the analysis of the created expenditure areas so that the main directions of the regions' expenditure are visible. There is total of 16 of these areas, and these areas generally cover the expenses of the regions, similar to groups of expenses.
- The analysis of the regions' expenditures does not allow identifying the sources of these expenditures, especially from the point of view that some of the regions' expenditures are significantly financed from transfers. Therefore, in the next part of the analysis, the expenditure areas are cleaned so that they express only the expenses covered by shared taxes. These cleanings mainly consist of the removing of expenses paid from transfers, but also of expenses paid from non-tax income and from capital income.

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- In the last part of the analysis, a comparison of expenses paid from the sources of budgetary allocation of taxes is made between two periods, namely the average for the years 2017-2019 and the average for the years 2022-2023. Based on these selected periods, the tendency of changes in the structure of regional expenditures can be observed, without the distortion that occurred in the specific period of 2020-2021 as a result of Covid-19.

Overall, the methodology of the contribution is based on the analysis of the management of the budgets of self-governing regions. Due to the goal of the contribution, which is focused on the economy of the regions, only 13 of the 14 existing regions are included in the analysis. And that's because the Capital City of Prague is a self-governing region as well as a municipality, so both of these functions are combined in its management, while the majority of the management is also connected to Prague as a municipality. As part of monitoring the economy of the regions, Prague could, due to the size of the budget, distort the results of the analysis too much.

Two periods are selected for the analysis, in terms of time. And that is both the period of 2017-2019 (average for that period) and the period 2022-2023 (average). The basic data in the analysis are data of the economy of the regions, which are based on data structured according to the budget structure. But aspects of the classification of the budget composition do not always allow obtaining, or linking, necessary data. This was especially evident until 2021, when, based on data about the budgetary management, it was not possible to assign resources from subsidies to the sectoral structure of expenditures. Therefore, the first monitored data interval (2017-2019) uses for analysis data that were processed by the regional offices of individual regions for work on the preparation of the change in the budget determination of taxes for the regions. The second period (2022-2023) already uses data from documents captured based on the budget structure in regional expenditures and published in the State Treasury Monitor system. At the date of data processing from the Monitor system, only data for these two years were available. Therefore, the analysis is based only on the mentioned two average state budgets of the regions.

Regarding the data analysis, as already mentioned, the basis is data on the management of 13 regions, which are published within the Monitor system. The basis of data structuring is the budget structure (Decree No. 412/2021 Coll.), which defines the existing scope and detail of monitoring financial operations in regional budgets. The budget composition tracks the financial operations of the income, expenditure and financing. From the point of view of expenditure, individual expenditure can be identified both from the point of view of type (which represents the relevant item) and also from the sectoral point of view (which constitutes the relevant paragraph). However, in general, the budget structure does not allow a certain income (which is represented by, for example, a transfer) to relate to the sector in which the funds were used in budget expenditures. The introduction of an independent part of the FIN 2-12 M statement leaded to create an obligation for territorial units to assign expenses tied to transfers, which then enables to be done structural analyses of the management of territorial units, and here this data is used for tracking of changes in the structure of regional expenditures paid from shared taxes.

3 Conclusions and Discussion

The **analysis of revenue classes of regional budgets** in the two monitored periods shows that the share of transfers in total resources increased in regional budgets, mainly at the expense of the weight of tax revenues. Although tax revenues grew and the growth was caused by the size of tax revenues and by the changes in the share of regions in tax revenues, the size of the transfer was associated with greater growth. The size of tax revenues increased by 42.69% in the monitored period, but the share of tax revenues in regional budgets decreased by almost 4 percentage points. In the case of transfers, their size increased by 67.69% and their share in the region's income increased by almost 3 percentage points (see Table 1); the state budget, but also the EU budget and State funds, have long been involved in transfers to the regions. The shares of non-tax and capital income remained at low values.

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Table 1 - Income structure of 13 regions 2017-2019, 2022-2023

	average 2017-2019		average 2022-2023		average 2022-2023 / average 2017-2019	
Revenues	CZK (a)	% (c)	CZK (b)	% (d)	% (b/a)	percentage points (d-c)
1. Tax revenues	69 457 219 004	33,29	99 108 901 743	29,58	142,69	-3,71
2. Non-tax revenues	5 255 424 541	2,52	11 460 274 231	3,42	218,07	0,90
3. Capital revenues	357 646 070	0,17	496 189 061	0,15	138,74	-0,02
4. Received transfers	133 594 488 343	64,02	224 030 170 109	66,86	167,69	2,83
Total income	208 664 777 959	100,00	335 095 535 143	100,00	160,59	0,00

Source: Own processing based on the Monitor of State Treasury

The analysis of regional budget expenditures shows that total regional expenditures increased by 58.73% in the monitored period. If we follow the sectoral structure of regional expenditures (see table 2), the group of services for natural persons is the most represented in the structure of expenditures in the long term, which is at the level of two thirds of the total expenditures of the regions. In the monitored period, the expenses of this group increased by 53.82% and its representation in the structure of regional expenses decreased by approximately 2 percentage points. Within the expenditure groups, the largest increase in the monitored period was registered by the public administration and services group, which is more than doubled (by 115.85%). Its share in regional expenditures increased to 5.06%. Even if the expenses for the salaries of regional office officials are part of the expenses of this group, these did not increase much, and the growth of the expenses for humanitarian foreign aid and interest paid on loans contributed to the size of this group.

Table 2 - Expenditure structure of 13 regions 2017-2019, 2022-2023

Group	average 2017-2019		average 2022-2023		average 2022-2023/ average 2017-2019	
	CZK (a)	% (c)	CZK b/a	% b/a	% b/a	percentage points d-c
1 Agriculture, forestry and fisheries	119 394 144	0,06	77 294 757	0,02	64,74	-0,04
2 Industrial and other sectors of the economy	39 359 831 878	19,33	63 419 813 050	19,62	161,13	0,29
3 Services for natural persons	137 541 058 807	67,53	211 571 552 996	65,45	153,82	-2,08
4 Social affairs and unemployment policy	18 338 568 525	9,00	31 133 229 510	9,63	169,77	0,63
5 State security and legal protection	731 712 756	0,36	725 616 577	0,22	99,17	-0,14
6 General public administration and services	7 573 132 674	3,72	16 346 934 569	5,06	215,85	1,34
In total	203 663 698 785	100	323 274 441 459	100	158,73	0,00

Source: Own processing based on the Monitor of State Treasury

Changes in regional budgets from the point of view of the structure of expenditures by expenditure categories can be captured in more detail through a more detailed view of the structure of expenditures by expenditure categories (see Table 3).

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These created **expenditure categories** represent expenses that either significantly contribute to the total expenses of the regions, or so that the entire expenditure structure of the regions is affected. The highest expenditures in regional budgets represent expenditures intended for direct education costs (especially teacher salary expenditures) for kindergartens, primary and secondary schools in the regions, which are determined by the state by its rules, and which basically only pass through the regional budgets.

The core of the solution, however, is to find out what are the **shares of coverage of expenditure categories with funds from shared taxes** and to compare these shares for the two time periods 2017-2019 and 2022-2023. The following findings of the analysis characterize the real state of changes that could have been caused by high inflation in the monitored period, but also by other causes. The contribution captures the most significant changes and tendencies, but in order to find out the exact causes of action in various areas of the regions' expenditures, a further analysis of expenditures at a lower level of differentiation would have to take place. Therefore, this contribution captures only the structural consequences and only the main causes of changes in the monitored period.

The largest percentage changes associated with a structural decrease in expenses paid from the budgetary allocation of taxes were recorded in the areas of regional expenses (see Table 4 for data used):

- land transport (subsection 221, decrease of 1.9 percentage points); Regions can partially delay spending in this area due to a lack of funds by reducing spending on repairs and investments.
- education (sections 31-32, decrease of 1.87 percentage points); the regions have apparently succeeded in preventing the increase in expenditure on education, which is provided to the schools by the regions as founders, i.e. in such a way that the increase did not exceed the value of the average growth of the regions' expenditure,
- healthcare (section 35, decrease of 1.4 percentage points),

  (decreases in the shares of other expenditure areas are lower than 0.59 percentage points, see table 4).

Table 3 - Expenditures of 13 regions according to selected areas

Group, section, subsection	average 2017-2019		average 2022-2023		average 2022-2023/ average 2017-2019	
	CZK (a)	% (c)	CZK (b)	% (d)	increase in % (b/a)	percentage points (d-c)
1	119 394 087	0	77 294 757	0,02	64,74	0,02
21	723 912 332	0,36	1 330 209 017	0,41	183,75	0,05
221	20 918 453 839	10,27	32 160 704 366	9,95	153,74	-0,32
222-9	16 720 243 017	8,21	28 868 231 159	8,93	172,65	0,72
23-25	997 222 680	0,49	1 060 668 508	0,33	106,36	-0,16
31-32	116 356 174 167	57,13	182 423 433 118	56,43	156,78	-0,70
33	4 532 156 295	2,23	6 682 270 461	2,07	147,44	-0,16
34	1 626 973 759	0,80	1 841 271 553	0,57	113,17	-0,23
35	11 147 604 273	5,47	15 136 219 986	4,68	135,78	-0,79
36	1 499 232 327	0,74	3 207 991 306	0,99	213,98	0,25
37	2 356 719 245	1,16	2 175 794 087	0,67	92,32	-0,49
38	1 050 667	0,00	786 138	0,00	74,82	0,00
39	21 075 042	0,01	103 786 348	0,03	492,46	0,02
4	18 338 568 717	9,00	31 133 229 510	9,63	169,77	0,63

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5	731 712 627	0,36	725 616 577	0,22	99,17	-0,14
6	7 573 131 869	3,72	16 346 934 569	5,06	215,85	1,34
In total	203 663 624 942	100,00	323 274 441 459	100,00	158,73	0,00

Source: Own processing based on the Monitor of State Treasury

Note to the table: Used designations of groups, sections and subsections in table 3: 1 Agriculture, forestry and fisheries, 21 Industry, construction trade and services, 221 Roads, 222-9 Transport services, 23-25 Water management and others, 31- 32 Education, 33 Culture, 34 Sports and recreational activities, 35 Healthcare, 36 Housing, communal services and territorial development, 37 Environmental protection, 38 Other research and development, 39 Other activities, 4 Social affairs and employment policy, 5 State security and legal protection, 6 General public administration and services.

The largest percentage changes associated with the growth of expenses paid from the budgetary allocation of taxes were recorded in the areas of regional expenses:

- traffic services (subsection 222-9, an increase of 3.79 percentage points); the increase in expenses can be linked mainly to the increase in fuel prices,
- social affairs and employment policy (group 4, increase of 2.02 percentage points); in particular, subsidies to organizations providing social services are included,
- housing, communal services and territorial development (section 36, share increase of 0.4 percentage points).

(increments in the shares of the representation of other expenditure areas are lower than 0.29 percentage points, see table 4).

Table 4 - Share of expenses of 13 regions paid from sources of budgetary allocation of taxes

Paragraphs	average 2017-2019		average 2022-2023		average 2022-2023/ average 2017-2019	
	CZK (a)	% (c)	CZK (b)	% (d)	increase in % (b/a)	percentage points (d-c)
1	102 384 092	0,15	77 294 757	0,08	75,49	-0,07
21	631 114 553	0,94	1 244 258 172	1,23	197,15	0,29
221	15 423 926 607	22,71	21 011 762 857	20,81	136,23	-1,90
222-9	13 560 190 217	19,98	23 996 591 069	23,77	176,96	3,79
23-25	748 702 541	1,38	1 024 752 563	1,02	136,87	-0,36
31-32	9 599 513 025	14,46	12 710 427 627	12,59	132,41	-1,87
33	4 100 697 616	5,97	6 047 063 336	5,99	147,46	0,02
34	1 372 670 771	1,99	1 415 590 220	1,40	103,13	-0,59
35	9 956 666 431	14,76	13 484 109 171	13,36	135,43	-1,40
36	916 020 600	1,83	2 249 511 271	2,23	245,57	0,40
37	215 173 345	0,59	580 310 718	0,57	269,69	-0,02
38	1 050 667	0,00	691 671	0,00	65,83	0,00
39	20 262 247	0,03	103 375 738	0,10	510,19	0,07
4	3 560 196 430	5,39	7 475 932 858	7,41	209,99	2,02
5	664 559 583	0,98	696 232 804	0,69	104,77	-0,29

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6	4 552 206 251	8,84	8 837 708 945	8,75	194,14	-0,09
In total	65 425 334 975	100,00	100 955 613 776	100,00	154,31	0,00

Source: Own processing based on the Monitor of State Treasury

4 Conclusion

The aim of the contribution was to assess how large and whether the use of resources from shared taxes in regional expenditures for a set of 13 regions changes relatively over time, between the years 2017-2019 and the period 2022-2023.

On the basis of the selected expenditure categories of the regions, it can be stated that between the monitored periods there were changes in the relative shares of representation in the range from -1.9 percentage points (land transport) to +3.79 percentage points (traffic services), however, apart from these two extreme values, for other expenditure areas, the changes in absolute value were at most up to approx. percentage points.

In terms of the absolute size of the changes, the biggest change is the increase in the share of expenses for traffic services. Even if the aim of the contribution was primarily to identify the values of changes in shares, then in the given area of expenditure, where it concerns the provision of transport within the territory of the region, it can be inferred in particular the effect of the increase in energy prices, which acts here in connection with the prices of diesel and electricity for the operation of transport.

Among the areas with the highest growth in expenditures is group 6, General public administration and services, whose share of representation in regional expenditures fell by 0.09 percentage points. In comparing the mentioned periods, it must be noted that there was no such large increase in administrative expenses for the regions, but in the last two years, expenses in connection with humanitarian aid have been shown here.

High inflation, especially in 2022, contributed differently to the change in spending by spending categories. However, when comparing the two observed periods, it becomes clear (with knowledge of the mentioned economic impacts, especially high inflation) that the structure of expenses paid by the regions from the means of budgetary allocation of taxes within the management of 13 regions is relatively stable, and the given findings about this structure thus give a picture of a relatively large stability of the system, which can be used for shaping the rules for the budgetary allocation of taxes for the regions.

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Exogenous Limits of Technical Efficiency of Regional Capacities within the Psychiatric Care Infrastructure

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Abstract

Regional needs in the availability of psychiatric care vary, as they are determined by the socio-economic needs of the inhabitants. The research objective is to detect regional differences and exogenous limits of technical efficiency of capacities within the psychiatric care infrastructure in the Czech Republic during 2010–2021. The object of inquiry includes all 14 regions of the Czech Republic over 12 years. Technical efficiency of the DMUs is estimated according to the input-oriented models. Subsequently, the calculation of multiple regression equation according to the Tobit model is made, which includes the results of calculation of technical efficiency within dependent variables Y (Y1–Y3) and as an independent variables were the selected socio-economic nad medical exogenous factors. The total technical efficiency of infrastructure capacities in psychiatric care in the regions is affected by seven exogenous factors, 65% of their influence may be explained. The pure technical efficiency of infrastructure capacities in psychiatric care in the regions is affected by eight exogenous factors, 49% of their influence may be explained. The scale efficiency of infrastructure capacities in psychiatric care in the regions is affected by four exogenous factors, 34% of their influence may be explained.

Keywords: *Mental Health, Technical Efficiency, Regional Capacities, Exogenous Factors, TOBIT Model*

JEL Classification: *C02, C52, I14*

1 Introduction

Mental health, more specifically healthcare focused on mental health, has been at the forefront of political interest in all developed countries. The main reason behind this is the fast-mounting burden caused to societies by mental illnesses and poor mental health. According to the European Mental Health Action Plan 2013–2020, mental disturbances are among the main public health problems in Europe, affecting up to 25% of the population. The above also applies to the Czech Republic. Official reports of IHIS (the Czech Institute of Health Information and Statistics, 2023) state that prevalence of patients in psychiatry shows an increasing trend over time; the prevalence was 4.5% in 2007, while in 2020, it reached 6% per 1000 persons in the population.

Although being a prerequisite of functioning healthcare, available capacities of the infrastructure in healthcare are widely criticised, pointing out either insufficient capacity against the demand, or, by contrast, excessive capacity without justifiable demand, causing inefficiencies. Both contradicting criticisms of the robustness of the infrastructure capacities in psychiatric care have been reflected in public policies as well as professional analyses and researches, e.g., (Raboch et al., 2012; Moran and Jacobs, 2013; Moopen, 2020; Kagstrom et al., 2023). For

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instance, Moopen (2020) states that almost half of the world population has no access to healthcare they currently need, a result that is very alarming.

It is not surprising that the infrastructure capacities in psychiatric care have also been the object of internal reform in healthcare in many countries, based, in the long term, in the principles of de-institutionalisation, as shown, for instance, by the research into the reform of psychiatric care in France (Henckes, 2016). In the Czech Republic, this is documented by the Psychiatric Care Reform Strategy 2013–2023 and the National Mental Health Action Plan 2020–2030. De-institutionalisation of psychiatric care is described by Winkler et al. as a process that requires a number of interrelated and often complex changes not just in healthcare and social services, but also in the approach by the public to mental health issues. The de-institutionalisation concept focuses on prioritising community-type services over hospitalisation in psychiatric hospitals, minimisation of long-term hospitalisations, and introduction and ensuring of sustainability of community services in mental healthcare (Wright et al., 2000; Hudson, 2019; Broulíková et al., 2019; Dvořáková and Kondrárová, 2020).

The quantitative value of the infrastructure capacities in psychiatric care is determined by the number of outpatient clinics or the number of beds in the given region, which should ideally reflect its needs as well as rational limits. Regional needs in the availability of psychiatric care vary, as they are determined by the socio-economic needs of the inhabitants. The objective of this research follows up on this objective premise.

The research objective is to detect regional differences and exogenous limits of technical efficiency of capacities within the psychiatric care infrastructure in the Czech Republic during 2010–2021.

Analysis of the distribution of resources (capacities) in healthcare in relation to the outputs was the subject of articles of numerous authors. This evaluation can be made using alternative methods (models) described, for instance by Dlouhý (2021). These include the separate evaluation, expert model, market model, common weight model, and production frontier model. The last model in particular represents a tool for successful evaluation of the technical efficiency of production units, i.e., a means to evaluate how distant are inefficient units from the production frontier.

In relation to public economy, Nemec and Lawson (1992) describe the principles of evaluation of efficiency on various levels within micro-efficiency and macro-efficiency. Micro-efficiency is addressed on the organisational and programme level, while macro-efficiency is tackled on the level of regions of various sizes and importance, utilising aggregated inputs and outputs as generated by units operating in its territory.

Healthcare, especially hospitals, represents a frequent application area for the evaluation of technical efficiency according to the Data Envelopment Analysis (DEA model), a fact that is documented by articles focusing on the meta-analysis of literature, e.g. (Emrouznejad and Yang, 2018; Kohl et al., 2019). However, in the area of healthcare, the results of technical efficiency of production units calculated using the DEA model are seldom complemented by the results of the tobit model, which uses the principle of regression analysis to evaluate the influence of selected factors on the calculated score of technical efficiency of production units. The subject of psychiatric care has been omitted in researches in terms of the evaluation of technical efficiency according to the DEA model.

For the purposes of this research, attention was paid especially to the articles of authors who implemented two-stage analysis of technical efficiency and used the tobit model for the analysis of technical efficiency of aggregated production units in the conditions of healthcare, as depicted in Fig. 1. Analysis of the six selected researches published in impact journals between 2013 and 2022 (see list of references) suggest that:

- The subject of evaluation were aggregated units (homogeneous production units) – states, regions, cities, healthcare systems;
- The period under evaluation encompassed one year as well as several years;
- Technical efficiency was modelled using the DEA statistical models (input- or output-oriented) and dynamic models (Malmquist model);
- Exogenous factors of technical efficiency were selected depending on the research topic and included economic factors like GDP, unemployment rate, Gini coefficient, specific income or expenditure; demographic and geographic factors like population of certain age, size of territory, population density; sociological characteristic of the area (city, region) such as community literacy and educational structure of the population; environmental factors like life expectancy, mortality, alcohol consumption,

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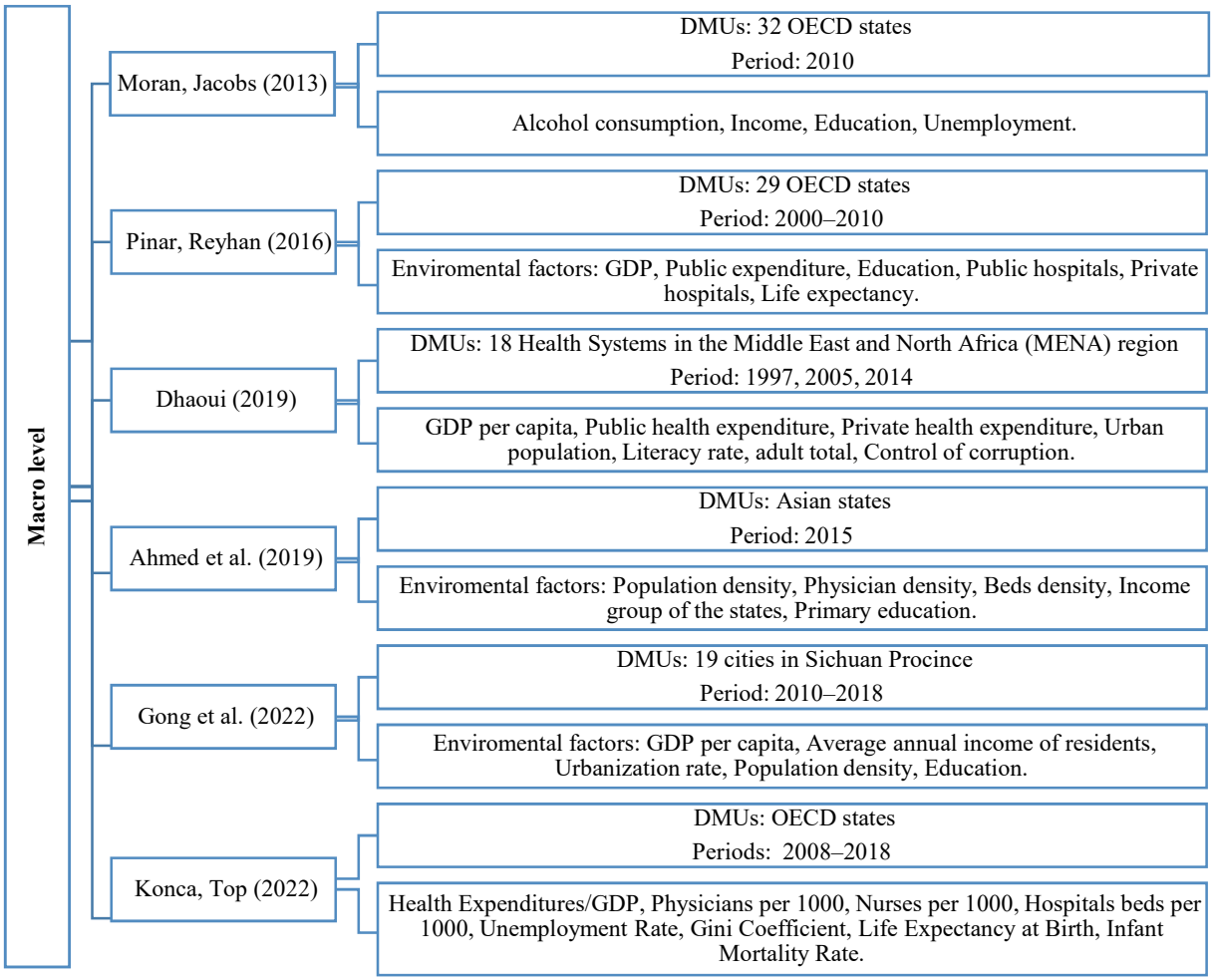
etc.; and medical factors such as prevalence of certain diseases, capacity of healthcare facilities and their legal forms (public/private).

Figure 1 - Examples of use in research of the two-stage evaluation of technical efficiency in healthcare



Source: Authors of articles, own processing

2 Methods

Methodology of this research aims to answer four research questions (RQ1–RQ4) and comprises the description of the analysis, input, output and exogenous variables (data), and selected DEA and tobit methods.

The analysis includes two separate calculations. In the first stage, the calculation of technical efficiency according to the DEA mode is made, the result of which is the technical efficiency score. Technical efficiency (TE) is divided into three components – total technical efficiency (TTE), pure technical efficiency (PTE), and scale efficiency (SE). In the second stage, the calculation of multiple regression equation according to the tobit model is made, which includes the results of calculation of technical efficiency within dependent variables Y (Y1–Y3); for the logic of methodology, see Fig. 2. The limits of technical efficiency in this research are represented by the selected socio-economic and medical exogenous factors (so-called exogenous limits of technical efficiency).

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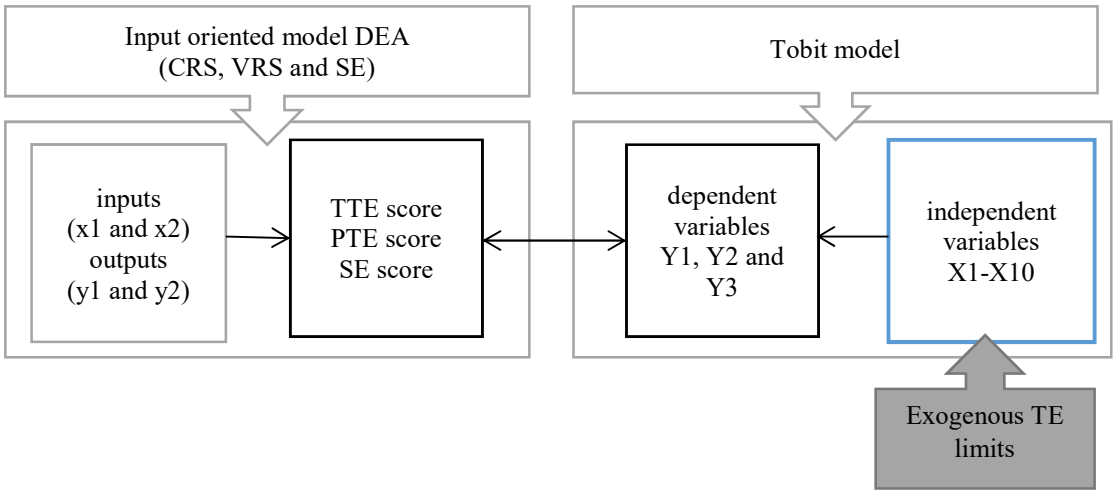
Figure 2 - The logic of methodology



Source: Own processing.

The object of inquiry includes all 14 regions of the Czech Republic over 12 years (2010–2021); the evaluated set consists of 168 DMUs in total.

Technical efficiency of the 168 DMUs is estimated according to the input-oriented models:

- CRS evaluating the total technical efficiency (TTE) and taking into account the constant returns to scale (1);
- VRS evaluating the pure technical efficiency (PTE) and taking into account the variable returns to scale (2);
- SE evaluating the scale efficiency (SE) as the quotient of the total technical efficiency and the pure technical efficiency (3).

Four research questions (RQ1–RQ4) were specified to attain the research objective:

- RQ1: Is the rate of the total technical efficiency of infrastructure capacities in psychiatric care in the regions of CR determined by the pure technical efficiency (internal efficiency), or by the scope efficiency (external efficiency)?
- RQ2: It is possible to group the regions of Czech Republic based on the results of the individual components of the efficiency of infrastructure capacities in psychiatric care?
- RQ3: Which selected exogenous factors influences the increase/decrease of the total technical efficiency of infrastructure capacities in the regions?
- RQ4: Do the exogenous factors have the same or different impacts on the increase/decrease of the pure technical efficiency and scope efficiency of infrastructure capacities in the regions. SE evaluates the scope efficiency and is calculated as the quotient of CRS and VRS.

2.1 Definition of Variables

The input and output parameters for the calculation of technical efficiency according to the DEA model represent gross and at the same time key components of production factors and production of the technical infrastructure (capacities) specialised in hospital and outpatient psychiatric care in the 14 regions of the Czech Republic. The selection of two input (x1 and x2) and two output parameters (y1 and y2) is traditional and widely utilised (Emrouznejad and Yang, 2018; Kohl et al., 2019), and it was also selected in order to obtain a universal score allowing interregional comparison. It may therefore be assumed that the resulting score of technical efficiency will not be encumbered (distorted) by other factors like work and technologies within the process of psychiatric care production. It may also be expected that the universal score TE will react more precisely to the testing of influence of socio-economic factors involving the medical variables – the most common diagnoses and their prevalence in the regions (see exogenous variables X1–X9).

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The input and output parameters are converted to 100,000 inhabitants of the respective regions as of 31 December of the reference year:

- x1 – number of providers of outpatient psychiatric care services (regardless of the public/private form of the provider);
- x2 – number of beds (in acute care, in intensive care, in specialised medical institutions);
- y1 – number of outpatients;
- y2 – number of hospitalised patients.

The statistic of inputs and outputs including the mean values and the growth coefficient for the reference period of 2010–2021 is shown in the Appendix A. Data were taken from the Institute of Health Information and Statistics of the Czech Republic (Psychiatric Yearbook 2010–2021) and the National Psychiatric Care Portal administered by the Institute of Health Information and Statistics of the Czech Republic.

Exogenous variables include external factors that provide information about certain conditions of the socio-economic environment (X1–X6) in the respective region and quasi-external factors (X7–X9) that provide information about potential need in the region with direct link to the infrastructure capacities in psychiatric care, in the form of prevalence of selected diagnoses.

- X1_No.PE – Number of persons aged 65+ converted to 100,000 inhabitants of the region as of 31 December of the reference year;
- X2_Area – Area of the region in km2 converted to 100,000 inhabitants of the region as of 31 December of the reference year;
- X3_GDP – Gross domestic product in thousand CZK converted to 100,000 inhabitants of the region as of 31 December of the reference year;
- X4_AW – Average monthly wage per employee, in Czech crowns (CZK);
- X5_Gur – Unemployment rate of the region, in percent;
- X6_No.Su – Number of suicides converted to 100,000 inhabitants of the region as of 31 December of the reference year;
- X7_PD1 – Number of treated patients (treated or examined in the respective year) with psychiatric diagnoses F0 and G30, Organic disorders and Alzheimer disease, converted to 100,000 inhabitants of the region as of 31 December of the reference year;
- X8_PD2 – Number of treated patients with psychiatric diagnosis F2, Schizophrenia; schizotypal and delusional disorders, converted to 100,000 inhabitants of the region as of 31 December of the reference year;
- X9_PD3 – Number of treated patients with psychiatric diagnosis F4, Neurotic, stress-related and somatoform disorders, converted to 100,000 inhabitants of the region as of 31 December of the reference year.

The statistical characteristic and basic dynamic of socio-economic factors and medical factors are shown in the Appendix B and C.

2.2 DEA Model

The technical efficiency of DMUs in this research is calculated according to the basic input-oriented DEA models. These models were named after their authors: the CCR model (Charnes, Cooper, and Rhodes) based on the prerequisite of constant returns to scale, and the BCC model (Banker, Charnes, and Cooper) based on the prerequisite of variable returns to scale. Production units utilise inputs $x \in R_+^N$ to produce outputs $y \in R_+^M$. The calculated technical efficiency of DMUs is relative, because the analysis aims to estimate the efficiency of each DMU in relation to the best DMU within the analysed set, where *i = 1, … , I DMUs*. To this end, weights are attached to the inputs and outputs of each DMU in order to resolve the problem (Dlouhý et al., 2018).

In dually coupled models, the input-oriented CCR model (CRS, constant returns to scale) is calculated using the mathematical formula (1), and the BCC model (VRS, variable returns to scale) is calculated using the mathematical formula (2).

CRS model:

$$\text{maximise} \qquad eff(U_q) = \frac{\Sigma_k^r u_k y_{kq}}{\Sigma_i^m v_i x_{iq}}, \tag{1}$$

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provided that $\frac{\Sigma_k^r u_k y_{kj}}{\Sigma_i^m v_i x_{jk}} \leq 1, \quad j = 1, 2, \ldots, n,$

$u_k \geq \varepsilon, \qquad k = 1, 2, \ldots, r,$

$v_i \geq \varepsilon, \qquad i = 1, 2, \ldots, m,$

where the efficiency of unit U_q is expressed by $eff(U_q)$; ε is a constant, thanks to which the condition of positiveness of weight of the inputs and outputs is ensured; x_{ij}, $i = 1, 2, \ldots, m$, $j = 1, 2, \ldots, n$ gives the value of the ith input for the unit U_j; and y_{kj}, $k = 1, 2, \ldots, r$, $j = 1, 2, \ldots, n$ gives the value the ith output for the unit U_j.

VRS model:

$$\text{maximise} \quad \Theta(U_q) = \Sigma_k^r u_k y_{kq} + \mu, \tag{2}$$

provided that $\Sigma_k^r u_k y_{kj} + \mu \leq \Sigma_i^m v_i x_{ij}, \quad j = 1, 2, \ldots, n,$

$\Sigma_i^m v_i x_{iq} = 1,$

$u_k \geq \varepsilon, \qquad i = 1, 2, \ldots, r,$

$v_i \geq \varepsilon, \qquad j = 1, 2, \ldots, m,$

$\mu - free.$

Interpretation of the results for the individual units is also identical to the CCR model – an efficient unit $\theta(U_q)$ is equal to *1*, while the following applies to inefficient units: $\theta(U_q) < 1$, (Cooper et al., 2007; Zhu, 2014).

The calculation of scale efficiency (SE) is based on the results of calculations of CRS and VRS, according to procedure (3).

$$\text{CRS } \theta_{CRS}^* = \theta_{VRS}^* \times SE$$

$$\text{SE} = \frac{\theta_{CRS}^*}{\theta_{VRS}^*} \tag{3}$$

The logic of the above decomposition of technical efficiency (TE) is based on the assumption that the calculated score according to CRS provides information about the total technical efficiency (TTE), the VRS score provides information about the pure technical efficiency (PTE), and the technical scale efficiency (TSE) is a sub-component resulting from the quotient of CRS and VRS (Cooper et al., 2007).

2.3 Tobit Model

The score of technical efficiency calculated according to the DEA model is so-called censored variable, the value of which varies between 0 and 1, and therefore standard linear regression (OLS) based on the least square method is not used. An example of tackling the characteristics of the limited dependent variable can be replacing the linear regression by the tobit model. Equation (4) has the following mathematical notation:

$$y_i^* = x_i'\beta + \varepsilon_i, \quad i = 1,2, \ldots N \tag{4}$$

$$y_i = 0 \;\; if \; y_i^* \leq 0$$

$$y_i = y_i^* \;\; if \; 0 < y_i^* < 1$$

$$y_i = 1 \;\; if \; y_i^* \geq 1,$$

where y_i^* is the latent variable. It is therefore standard regression where all negative values are presented as zeroes. The values are censored, or limited by zero (Wooldridge, 2012).

It is also necessary to add that if no value of the dependent variable y is equal to neither 0, nor 1, the coefficients of the tobit model correspond to the coefficients of the OLS model. In general, the results of the tobit model may be technically interpreted in the same way as those of the OLS model using the limiting influences. Therefore, the parameter β_i is the limiting influence of the variable X_i over the dependent variable Y^*, if the remaining independent variables remain unchanged. In cases where the explanatory variable is the efficiency calculated by the DEA model the interpretation of limiting influences is not precise. This is not a problem in the functionality of the tobit model, but rather an interpretation of efficiency as a number, with its subsequent use for the comparison of the results. Efficiency is not a metric number and cannot be easily interpreted (Hanauerová, 2018).

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3 Results: Technical Efficiency

The mean and minimum values of the evaluated set of 168 DMUs, broken down by the individual years (2010–2021) in the individual models (CRS, VRS, and SE), are shown in Table 1. Complete calculations for the three models are included in the Appendix D. The score may also be expressed in percent (1 = 100%).

The estimated average score in the CRS model is 81% (0.8103), the minimum score is 52% (0.5192), and 12 DMUs are fully efficient (e = 1) – 7% of DMUs within the evaluated set. Lower than the average score of the evaluated set was attained by 93 DMUs, i.e., 55%. In 2014–2021, the CRS model estimates higher average score than the total average for the whole period (shaded in Table 1).

The estimated average score in the VRS model is 85% (0.8534), the minimum score is 54% (0.5403), and only 19 DMUs are fully efficient (e = 1), i.e., 11% of units within the evaluated set. Lower than the average score of the evaluated set was attained by 76 units, i.e., 45%. In 2014–2021, the VRS model estimates higher average score than the total average for the whole period (shaded in Table 1).

The estimated average score in the SE model is 95% (0.9495), the minimum score is 76% (0.7557), and only 12 DMUs are fully efficient (e = 1), i.e., 7% of units within the evaluated set. Lower than the average score of the evaluated set was attained by 56 units, i.e., 33%. In 2014–2021, the SE model estimates higher average score than the total average for the whole period (shaded in Table 1).

Table 1 - Statistical description of the results of the total technical efficiency (CRS) and its components (VRS, SE)

168 DMUs	CRS			VRS			SE		
	Mean	Min.	SD	Mean	Min.	SD	Mean	Min.	SD
Total	**0.8103**	**0.5192**	**0.1221**	**0.8534**	**0.5403**	**0.1140**	**0.9495**	**0.7557**	**0.0591**
No. Score [=1; < mean]		[12; 93]			[19; 76]			[12; 56]	
Breakdown by years	Mean	Min.	SD	Mean	Min.	SD	Mean	Min.	SD
2010	0.7234	0.5192	0.1177	0.7713	0.5403	0.1296	0.9410	0.7762	0.0574
2011	0.7714	0.5358	0.1477	0.8075	0.5538	0.1342	0.9524	0.8514	0.0415
2012	0.7681	0.5445	0.1330	0.8185	0.5596	0.1317	0.9384	0.8005	0.0517
2013	0.7943	0.5927	0.1300	0.8388	0.6033	0.1248	0.9472	0.7854	0.0589
2014	0.8205	0.6239	0.1368	0.8586	0.6302	0.1268	0.9551	0.8096	0.0576
2015	0.8233	0.6551	0.1260	0.8625	0.6607	0.1144	0.9545	0.7903	0.0635
2016	0.8164	0.6666	0.1104	0.8597	0.7091	0.0940	0.9497	0.7557	0.0693
2017	0.8391	0.7050	0.1057	0.8796	0.7076	0.0887	0.9536	0.8068	0.0620
2018	0.8491	0.6949	0.1055	0.8907	0.6967	0.0877	0.9530	0.8114	0.0636
2019	0.8425	0.6950	0.0984	0.8872	0.7512	0.0794	0.9496	0.7979	0.0673
2020	0.8223	0.7077	0.0773	0.8654	0.7362	0.0728	0.9427	0.8120	0.0642
2021	0.8722	0.7583	0.0717	0.9121	0.7619	0.0772	0.9574	0.8791	0.0412

Source: Own processing

Although estimation of the technical efficiency does not involve dynamic inquiry (in time), the results of the CRS, VRS, and SE models show (see mean, minimum, and standard deviation (SD) values in Table 1) that the average score of DMUs has been increasing in all models since 2014 and the difference between the CRS/VRS and SE efficiency has been decreasing, as depicted in Figure 3. The mean and minimum values of all the models (in Figure 3) present comparable, positively increasing trends with three minor fluctuations in **2016, 2019 and 2020.** The minimum values of SE, which were balanced with the average CRS score in 2020, indicate that the external environment (conditions) in the regions becomes consolidated (disparities decrease).

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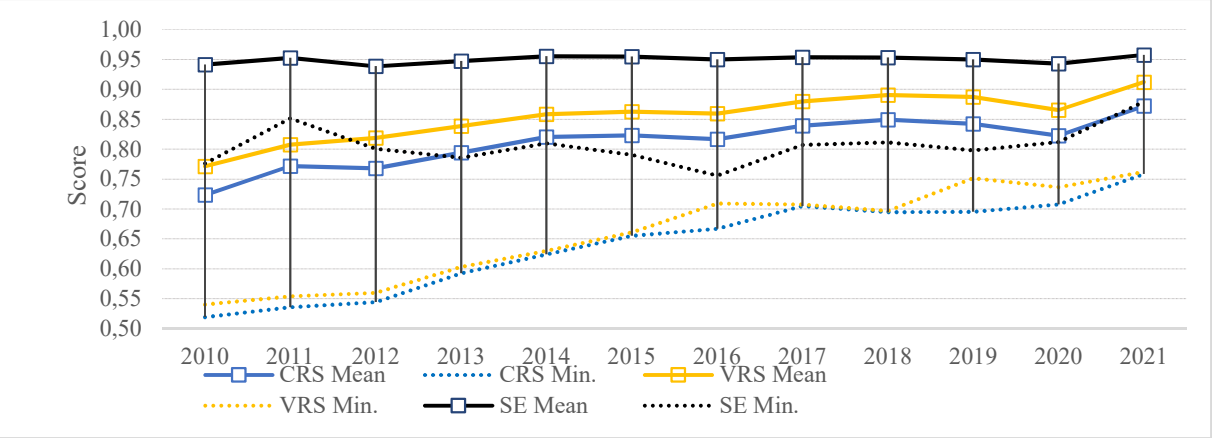
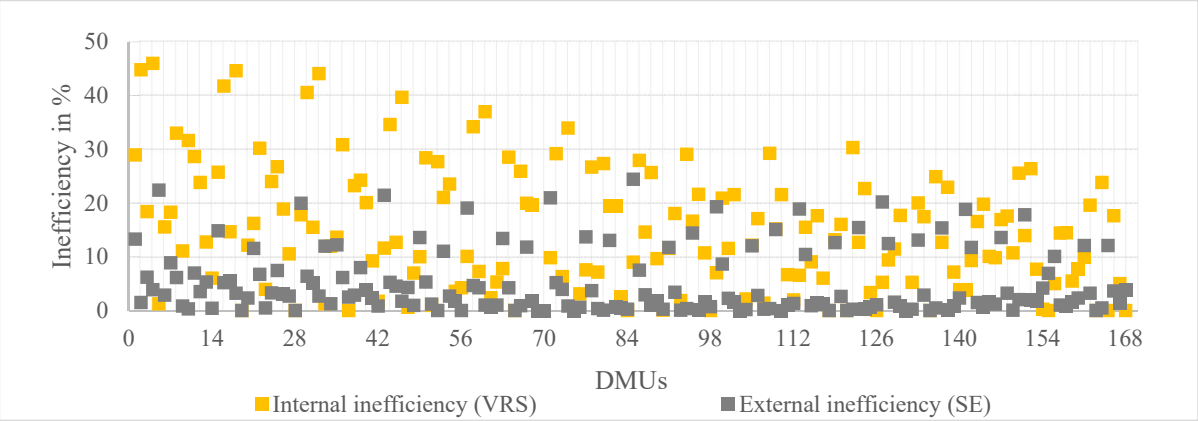
Figure 3 - Comparison of aggregated statistics: means and minimums of technical efficiency score and their components



Source: Own processing.

Significant differences between the VRS and SE scores can be interpreted as differences between the internal and external inefficiency of the system of capacities in the infrastructure of medical psychiatric care in the regions. The degree of internal inefficiency is calculated as the difference between the full efficiency (1; 100%) and the VRS score of each DMU. Similarly, the external inefficiency score is calculated as the difference between the full efficiency (1; 100%) and the SE score of each DMU. The chart in Figure 4 shows the individual results of the 168 DMUs. Visual comparison of charts in Fig. 3 and Fig. 4 proves comparable distribution and trends of the mean and nominal values of technical efficiency in the logic of 12 reference years in the 14 regions.

Figure 4 - Comparison of the internal and external inefficiency levels (in %)



Source: Own processing

The cluster analysis of the average score of CRS, VRS, and SE from the perspective of the 14 regions in view over the 12-year period (2010–2021) determines the groupings (analogies) using a dendrogram (see Figure 5). The cluster analysis detected four clusters. The mean values of the individual components of TE (CRS, VRS, and SE) differ from one another. According to the CRS value (above, below the average score of 0.87) and according to the ratio of values between the VRS, SE components (>/<), the individual clusters are defined in four performance levels and indicated as A, B, C, D:

- Best level A – attained by five regions: CZ041 (Karlovy Vary Region); CZ042 (Ústí nad Labem Region); CZ053 (Pardubice Region); CZ072 (Zlín Region); CZ080 (Moravian-Silesian Region); defined by above-average scores in all components of TE (CRS, VRS, SE);

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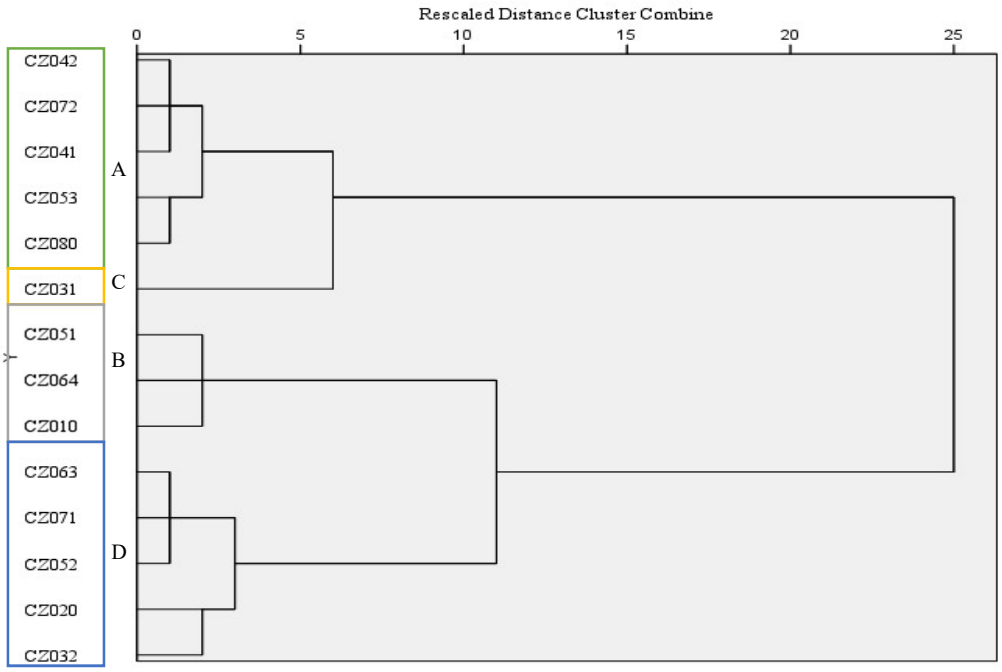
- Average level B – attained by three regions: CZ010 (Capital City of Prague), CZ051 (Liberec Region), CZ064 (South Moravian Region); defined by below-average CRS score, and the VRS score is higher than SE;
- Below-average level C – attained by one region: CZ031 (South Bohemian Region); defined by below-average CRS score, and the VRS score is lower than SE;
- Very below-average level D – attained by five regions: CZ020 (Central Bohemian Region); CZ032 (Plzeň Region); CZ052 (Hradec Králové Region); CZ063 (Vysočina Region); CZ071 (Olomouc Region); defined by very below-average CRS score (of the total technical efficiency), and the VRS score is higher than SE.

Figure 5 - Dendrogram



Source: Own processing

The second stage of the analysis investigates the relationship between the CRS→Y1, VRS→Y2, and SE→Y3 scores (dependent variables) and the exogenous factors (independent variables) using multiple regression analysis according to the tobit model. Nine selected exogenous factors are internally divided into socio-economic factors and medical factors. Exogenous factors therefore have a direct (medical) and indirect (socio-economic) relationship with the performance of capacities of the basic infrastructure in psychiatric care in the regions. Prior to regression analysis, the degree of correlation of exogenous factors and dependent variable was tested using the Pearson coefficient, see Appendix D.

The results of the regression analysis according to the tobit model are shown in Table 2. Factors in the Table 2 are divided into socio-economic and medical.

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Table 2- Results of the regression analysis according to the Tobit model

		Y1 (Pseudo R2= -0,6534)		Y2 (Pseudo R2= -0.4905)		Y3 (Pseudo R2 = -0,3410)	
		LR chi2(9) = 150,25	Log likelihood = 190,11074	LR chi2(9) = 123,98	Log likelihood = 188,37252	LR chi2(9) = 161,46	Log likelihood = 317,45152
		Coef., (t)	P>|t|	Coef., (t)	P>|t|	Coef., (t)	P>|t|
Socio-economic factors	No.PE	0.0000158 (2.30)	0.023***	0.000189 (2.72)	0.007***	-1.64e-06 (-0.51)	0.611
	Area	-0.0000752 (-3.10)	0.002***	-0.0001007 (-4.11)	0.000***	0.0000315 (2.77)	0.006***
	GDP	9.64e-07 (1.14)	0.255	2.58e-06 (3.03)	0.003***	-1.53e-06 (-3.86)	0.000***
	AW	8.38e-06 (1.24)	0.218	4.75e-06 (0.69)	0.488	3.22e-06 (1.02)	0.132
	Gur	0.0528735 (1.73)	0.007***	0.0706669 (3.61)	0.000***	-0.0120929 (-1.33)	0.185
	No.Su	0.0082146 (2.74)	0.007***	0.0082921 (2.74)	0.007***	-0.0000504 (-0.04)	0.971
Medical factors	PD1	0.0004783 (9.22)	0.000***	0.0003288 (6.27)	0.000***	0.0001803 (7.42)	0.000***
	PD2	0.0002775 (2.07)	0.040***	0.0003141 (2.31)	0.022***	-0.0000302 (-0.48)	0.632
	PD3	-0.001903 (-6.91)	0.000***	-0.0001643 (-5.90)	0.000***	-0.0000373 (-2.89)	0.004***
	cons	0.2454973 (1.83)	0.069*	0.2325706 (1.71)	0.088*	0.9624499 (15.30)	0.000***

*10 %, ** 5 %, *** 1%

Source: Own processing.

The influence of exogenous factors on the efficiency score is as follows:

- The total technical efficiency of infrastructure capacities in psychiatric care in the regions is affected by seven exogenous factors, 65% of their influence may be explained. The increase of value of five factors increases the total efficiency – number of persons aged 65+, unemployment rate, number of suicides, prevalence of diagnoses PD1 and PD2. The increase of value of two factors decreases the total efficiency – size of territory and prevalence of diagnosis PD3;
- The pure technical efficiency of infrastructure capacities in psychiatric care in the regions is affected by eight exogenous factors, 49% of their influence may be explained. The increase of value of six factors increases the pure efficiency – number of persons aged 65+, GDP, unemployment rate, number of suicides, prevalence of diagnoses PD1 and PD2. The increase of value of two factors decreases the pure efficiency – size of territory and prevalence of diagnosis PD3;

The scale efficiency of infrastructure capacities in psychiatric care in the regions is affected by four exogenous factors, 34% of their influence may be explained. The increase of value of two factors increases the scope efficiency – size of territory and prevalence of diagnosis PD1. The increase of value of two factors decreases the scope efficiency – GDP and prevalence of diagnosis PD3.

4 Discussion

In general, technical efficiency provides the basis for economic efficiency of production processes, and it is in fact attained by the production units if it is impossible to increase the output (such as the number of treated or hospitalised patients) without increasing the input signal (such as the number of outpatient clinics or the number

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of beds). This hypothesis has also been the basis for this research. If certain basic infrastructure capacities in psychiatric care are available in each region, it is then possible to ask which region, depending on the number of treated outpatients and hospitalised patients utilises the capacities efficiently, and which does not. Exogenous factors then potentially can explain why the regions differ in the efficiency score and where are the external limits.

The modelling of technical efficiency according to the DEA model generates the efficiency score of the selected group of homogeneous production units (DMUs) – in case of this research, 14 regions (higher territorial self-governing units) – and its capacities between 2010 and 2021. The modelling estimates the development and level of capacities within the territory of the Czech Republic. The calculations of technical efficiency confirmed that it is important to distinguish whether the total technical inefficiency (CRS) in the individual regions is more influenced by the component of the pure technical efficiency (VRS), or by the component of the scale efficiency (SE). The average score of 168 DMUs is 81% for the total technical efficiency, 85% for the pure technical efficiency, and 95% for the scope efficiency. The research question RQ1 may be answered clearly: the scope efficiency increases the total technical efficiency score more significantly than the pure technical efficiency. Significant differences between the VRS and SE scores may be interpreted as the differences between the internal and external inefficiency of the system of infrastructure capacities in medical psychiatric care in the regions.

The results of the technical efficiency were analysed using cluster analysis, which specified four clusters and answered RQ2. The Czech regions differ in terms of technical efficiency and may be grouped according to the comparable results of the individual components of technical efficiency. The subsequent tobit regression analysis detected external limits of pure efficiency and scope efficiency and answered RQ3. Infrastructure capacities in psychiatric care are utilised most efficiently by regions in Cluster A – Moravian-Silesian Region, Pardubice Region, Ústí nad Labem Region, Karlovy Vary Region, and Zlín Region. 65% of the best results of technical efficiency in the above regions are explained by the increase of five exogenous factors – number of persons aged 65+, unemployment rate, number of suicides, prevalence of diagnoses PD1 and PD2.

Least efficient utilisation of infrastructure capacities in psychiatric care is seen in five regions in Cluster D – Central Bohemian Region, Plzeň Region, Hradec Králové Region, Vysočina Region, and Olomouc Region. In these regions, as well as in the South Bohemian Region (Cluster C), the technical efficiency is the best in scope efficiency. 34% of the increase of the scope efficiency is explained by the decreasing values of two exogenous factors (GDP and prevalence of diagnosis PD3) and the increase in two factors – size of territory and prevalence of diagnosis PD1.

Three regions in Cluster B – Capital City of Prague, South Moravian Region, and Liberec Region – attain an average level of technical efficiency and the pure technical efficiency is better than the scope efficiency. 49% of the increase of the pure technical efficiency may be explained by the decreasing values of two exogenous factors (size of territory and prevalence of diagnosis PD3) and the increasing values of six exogenous variables – number of persons aged 65+, GDP, unemployment rate, number of suicides, prevalence of diagnoses PD1 and PD2.

An interesting finding was made in case of the exogenous factor of GDP, which reacts positively to the pure technical efficiency, but negatively to the scope efficiency. Interpretation of this limiting exogenous factor must be analysed at the level of the individual regions. Researches by Ahmed et al. (2019) and Gong at al. (2022) show that GDP is a factor with the potential to explain the efficiency score, yet its interpretation is not always unambiguous or simple within the context of production units examined.

On the other hand, this also suggests that inefficient regions either dispose of a certain spare capacity which may be offered, in crisis situations, to patients from efficient regions where capacities are fully utilised, or inefficient regions provide better quality treatment or more specific care that requires long-term hospitalisation of the individual patients (diagnoses). The interpretation of calculation results according to the DEA model is especially complicated in healthcare, with respect to discrepancy between the efficiency and the quality of care (Hollingsworth, 2008; Vrabková and Vaňková, 2021), where efficient DMUs may mean that the respective services/care are provided insufficiently or at the expense of quality.

What can be recommended to the regions that utilise the capacities in psychiatric care inefficiently? An economist would answer explicitly, recommending, within the context of the results of the DEA model, to reduce the inputs (number of beds and outpatient clinics) and increase, if possible, the number of outpatients and

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hospitalised patients. While being economically logical, this recommendation is problematic in terms of the public interest or patients' interest. The needs of care and treatment in psychiatry vary widely in terms of the diagnoses as well as the age and overall medical condition of the patients, and long-term hospitalisation, which generally reduces the efficiency of production units (hospitals), still has a strong medical rationale (Winkler et al., 2013).

The research reacts to social needs – knowledge gaps in the area of technical efficiency of key capacities in conventional inpatient and outpatient psychiatric care, attained using the Data Envelopment Analysis model (DEA model). The review of literature shows that the DEA model has been used in numerous publications and studies to estimate the technical efficiency in medical services, care, programmes, and systems, bringing vital knowledge for the academic, political, and managerial practice. However, the area of psychiatric care has been neglected in the light of the foregoing, especially in the Czech Republic. So far, professional resources thus lacked an important insight into the efficiency of psychiatric care, with the potential to show its economic and social limitations, especially in relation to the ongoing reform of psychiatric care.

This research also revealed that the regions of the Czech Republic may be clustered according to the efficiency score attained, i.e., their technical efficiency results vary, but are comparable within four specific groupings. The results are concrete and evaluate the conditions of capacities in psychiatric care over a sufficiently representative period of twelve years. On the other hand, it must be stated that the research is methodologically limited. The methods used are characterised by limitations described by many authors, and these limitations are respected in this research. The limitations of the results must therefore be taken into account during their inductive interpretation, both in terms of the changing offer in psychiatric care and technological advancements in medicine and social services.

5 Conclusion

The research uses a specific methodology to detect the technical efficiency of capacities in psychiatric care and their regional differences in the Czech Republic between 2010 and 2021. The technical efficiency is estimated according to the input-oriented DEA model and its breakdown. Regional differences in the technical efficiency are determined by cluster analysis, while the exogenous limits of technical efficiency of infrastructure capacities in psychiatric care are specified through multiple regression according to the tobit model. The evaluated set consists of 168 DMU, i.e., all self-governing regions of the Czech Republic over 12 years. The selected inputs (number of outpatient clinics, number of beds) represent a gross view of the infrastructure capacities in psychiatric care in the regions, while the outputs (number of outpatients and number of hospitalised patients) represent their principal use in the outpatient and hospital infrastructure. Exogenous limits of technical efficiency represent sociological and medical factors that may explain the level of technical efficiency attained in the regions.

The calculated rate of total technical efficiency was 81% on average (e = 0.8103), the lowest calculated rate was 52% (e = 0.5192), and full, 100% efficiency (e = 1) was detected by calculation in 12 DMUs (only 7% of DMUs of the evaluated set). Lower score than the average for the evaluated set was attained by 93 DMUs, i.e., 55%. During 2014–2021, higher average score than the overall average for the whole period was estimated in the model of the total technical efficiency, which suggests increase in the efficiency in time. The rate of pure technical efficiency was 85% on average (e = 0.8534) and the rate of scope efficiency was 95% on average (e = 0.9495).

The results of the rate of technical efficiency and its breakdown formed a basis for cluster analysis that detected four groupings of regions, confirming regional differences in the utilisation of infrastructure capacities in psychiatric care. Nine exogenous factors were selected for explaining the rate of technical efficiency. Regression analysis detected that the total technical efficiency of infrastructure capacities in psychiatric care in the regions is limited by seven exogenous factors. The increase of value of five factors increases the total efficiency – number of persons aged 65+, GDP, unemployment rate, number of suicides, prevalence of diagnoses PD1 and PD2. The increase of value of two factors decreases the total efficiency – size of territory and prevalence of diagnosis PD3. The pure technical efficiency of infrastructure capacities in psychiatric care in the regions is limited by eight exogenous factors. The increase of value of six factors increases the pure efficiency – number of persons aged 65+, GDP, unemployment rate, number of suicides, prevalence of diagnoses PD1 and PD2. The increase of value of two factors decreases the pure efficiency – size of territory and prevalence of diagnosis PD3. The scope efficiency of infrastructure capacities in psychiatric care in the regions is limited by four exogenous factors, the

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values of two factors increase the scope efficiency – size of territory and prevalence of diagnosis PD1. The increase of value of two factors decreases the scope efficiency – GDP and prevalence of diagnosis PD3.

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Appendix A - Statistical characteristics and basic dynamics of input and output between 2010 and 2021

Region	x1		x2		y1		y2	
	Mean	$\bar{k}$	Mean	$\bar{k}$	Mean	$\bar{k}$	Mean	$\bar{k}$
Capital City of Prague	19.65	1.00	128.45	0.99	9434.26	1.02	868.53	1.03
Central Bohemian Region	6.45	0.98	48.71	0.99	3695.56	1.02	210.62	1.03
South Bohemian Region	7.75	1.01	59.39	0.99	5112.16	1.03	405.32	1.01
Plzeň Region	10.83	0.97	224.80	0.99	5724.47	1.03	657.27	0.99
Karlovy Vary Region	9.06	1.03	18.37	1.06	4380.94	1.04	330.39	1.06
Ústí nad Labem Region	6.94	1.00	97.19	0.99	5038.40	1.02	524.20	0.97
Liberec Region	7.82	1.00	17.28	1.00	4245.87	1.01	187.77	0.99
Hradec Králové Region	8.54	0.99	40.45	1.00	5098.80	1.03	270.71	0.99
Pardubice Region	8.47	0.98	20.78	1.03	6072.14	1.01	271.06	0.99
Vysočina Region	10.07	1.00	259.20	0.99	4758.33	1.03	882.69	1.01
South Moravian Region	10.06	0.99	77.46	0.98	5832.54	1.02	419.90	1.02
Olomouc Region	10.55	1.00	118.17	1.00	6403.52	1.03	596.72	0.97
Zlín Region	6.69	1.00	161.43	0.98	4595.79	1.02	695.81	1.00
Moravian-Silesian Region	6.80	1.00	77.43	0.99	4891.79	1.02	538.66	0.98

Source: Own processing

Appendix B - Statistical characteristics and basic dynamics of socio-economic factors between 2010 and 2021

Region	X1		X2		X3		X4		X5		X6	
	Mean	$\bar{k}$	Mean	$\bar{k}$	Mean	$\bar{k}$	Mean	$\bar{k}$	Mean	$\bar{k}$	Mean	$\bar{k}$
Capital City of Prague	18413.62	1.02	38.84	1.00	101569.48	1.04	35418	1.04	2.50	0.96	12.7	1.00
Central Bohemian Region	17214.17	1.02	823.23	0.99	40756,.47	1.04	28288	1.05	3.48	0.93	13.7	1.02
South Bohemian Region	18668.13	1.03	1573.73	1.00	37068.76	1.04	25306	1.04	3.61	0.90	13.7	1.01
Plzeň Region	18854.10	1.03	1314.05	1.00	41284.01	1.04	27051	1.04	3.61	0.94	13.3	0.98
Karlovy Vary Region	18201.88	1.04	1114.29	1.01	30028.26	1.03	24220	1.04	6.82	0.94	15.8	1.00
Ústí nad Labem Region	17662.15	1.03	649.39	1.00	33360.32	1.04	25822	1.04	6.62	0.91	13.0	0.93
Liberec Region	17270.11	1.03	718.57	1.00	34805.71	1.05	25918	1.04	5.10	0.91	15.0	1.00
Hradec Králové Region	19712.68	1.03	863.40	1.00	39843.73	1.04	25837	1.05	4.68	0.91	14.5	1.00
Pardubice	18657.	1.03	872.65	1.00	36523.42	1.04	2508	1.04	4.46	0.90	12.9	0.97

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Region	11						1					
Vysočina Region	18815.10	1.03	1333.20	1.00	37269.91	1.04	25634	1.04	4.17	0.90	10.8	0.96
South Moravian Region	18661.31	1.00	610.84	1.00	43469.59	1.04	27040	1.04	4.83	0.90	13.4	1.01
Olomouc Region	18861.41	1.03	830.99	1.00	35133.88	1.05	25078	1.04	5.39	0.89	13.3	0.94
Zlín Region	19026.52	1.03	678.61	1.00	38703.77	1.04	24842	1.04	4.59	0.78	13.6	0.95
Moravian-Silesian Region	18192.53	1.03	448.03	1.00	37137.66	1.04	25724	1.04	6.90	0.93	13.5	0.99

Source: Own processing

Appendix C - Statistical characteristics and basic dynamics of medical factors between 2010 and 2021

Region	X7		X8		X9	
	Mean	$\bar{k}$	Mean	$\bar{k}$	Mean	$\bar{k}$
Capital City of Prague	1023.95	1.02	574.74	1.01	3624.53	1.03
Central Bohemian Region	586.90	1.05	265.90	1.01	1431.49	1.03
South Bohemian Region	761.71	1.05	402.69	1.01	1949.48	1.02
Plzeň Region	755.51	1.05	386.40	1.01	2238.37	1.03
Karlovy Vary Region	680.28	1.05	360.99	1.02	1516.19	1.05
Ústí nad Labem Region	718.69	1.03	403.18	1.01	1738.58	1.03
Liberec Region	369.41	1.00	356.15	1.00	1613.09	1.01
Hradec Králové Region	682.17	1.05	345.54	1.01	2019.53	1.03
Pardubice Region	1089.88	1.03	479.33	1.00	2045.63	1.02
Vysočina Region	724.54	1.03	370.95	1.00	1545.05	1.04
South Moravian Region	801.64	1.02	513.16	1.00	2150.33	1.02
Olomouc Region	817.27	1.03	476.12	1.00	2167.88	1.02
Zlín Region	724.43	1.05	484.44	1.01	1508.76	1.03
Moravian-Silesian Region	868.05	1.02	45772	1.01	1618.56	1.03

Source: Own processing

Appendix D - Results and and decomposition of technical efficiency 168 DMUs

DMUs	**CRS**	**VRS**	**SE**
CZ010 2010	0.6160	0.7105	0.8670
CZ020 2010	0.5438	0.5520	0.9851
CZ031 2010	0.7652	0.8160	0.9377
CZ032 2010	0.5192	0.5403	0.9609
CZ041 2010	0.7665	0.9875	0.7762
CZ042 2010	0.8199	0.8443	0.9711

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CZ051_2010	0.7443	0.8169	0.9111
CZ052_2010	0.6290	0.6700	0.9388
CZ053_2010	0.8816	0.8892	0.9915
CZ063_2010	0.6817	0.6839	0.9968
CZ064_2010	0.6635	0.7133	0.9302
CZ071_2010	0.7348	0.7618	0.9646
CZ072_2010	0.8263	0.8725	0.9470
CZ080_2010	0.9360	0.9398	0.9960
CZ010_2011	0.6322	0.7425	0.8514
CZ020_2011	0.5521	0.5825	0.9478
CZ031_2011	0.8058	0.8532	0.9444
CZ032_2011	0.5358	0.5538	0.9675
CZ041_2011	1.0000	1.0000	1.0000
CZ042_2011	0.8576	0.8782	0.9765
CZ051_2011	0.7412	0.8381	0.8844
CZ052_2011	0.6507	0.6979	0.9324
CZ053_2011	0.9554	0.9604	0.9948
CZ063_2011	0.7352	0.7600	0.9674
CZ064_2011	0.6782	0.7328	0.9255
CZ071_2011	0.7857	0.8110	0.9688
CZ072_2011	0.8701	0.8944	0.9728
CZ080_2011	1.0000	1.0000	1.0000
CZ010_2012	0.6581	0.8221	0.8005
CZ020_2012	0.5564	0.5944	0.9361
CZ031_2012	0.8013	0.8453	0.9479
CZ032_2012	0.5445	0.5596	0.9730
CZ041_2012	0.8693	0.9875	0.8803
CZ042_2012	0.8692	0.8804	0.9873
CZ051_2012	0.7579	0.8634	0.8778
CZ052_2012	0.6491	0.6918	0.9383
CZ053_2012	0.9751	1.0000	0.9751
CZ063_2012	0.7459	0.7678	0.9715
CZ064_2012	0.6972	0.7578	0.9200
CZ071_2012	0.7684	0.7992	0.9615
CZ072_2012	0.8869	0.9076	0.9772
CZ080_2012	0.9737	0.9823	0.9912
CZ010_2013	0.6941	0.8837	0.7854
CZ020_2013	0.6197	0.6540	0.9476
CZ031_2013	0.8337	0.8732	0.9548
CZ032_2013	0.5927	0.6033	0.9824
CZ041_2013	0.9511	0.9937	0.9571
CZ042_2013	0.9213	0.9302	0.9904
CZ051_2013	0.7776	0.9000	0.8640
CZ052_2013	0.6782	0.7162	0.9469
CZ053_2013	0.9781	0.9902	0.9878
CZ063_2013	0.7225	0.7228	0.9996
CZ064_2013	0.7028	0.7897	0.8900
CZ071_2013	0.7445	0.7650	0.9732
CZ072_2013	0.9460	0.9640	0.9813
CZ080_2013	0.9573	0.9574	0.9999
CZ010_2014	0.7282	0.8995	0.8096
CZ020_2014	0.6278	0.6584	0.9535
CZ031_2014	0.8883	0.9274	0.9578

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CZ032_2014	0.6239	0.6302	0.9900
CZ041_2014	0.9699	0.9761	0.9936
CZ042_2014	0.9370	0.9469	0.9895
CZ051_2014	0.7984	0.9218	0.8661
CZ052_2014	0.6846	0.7150	0.9575
CZ053_2014	1.0000	1.0000	1.0000
CZ063_2014	0.7342	0.7411	0.9907
CZ064_2014	0.7057	0.8003	0.8818
CZ071_2014	0.7890	0.8036	0.9818
CZ072_2014	1.0000	1.0000	1.0000
CZ080_2014	1.0000	1.0000	1.0000
CZ010_2015	0.7125	0.9015	0.7903
CZ020_2015	0.6715	0.7081	0.9483
CZ031_2015	0.9002	0.9369	0.9608
CZ032_2015	0.6551	0.6607	0.9915
CZ041_2015	1.0000	1.0000	1.0000
CZ042_2015	0.9630	0.9687	0.9941
CZ051_2015	0.7979	0.9245	0.8631
CZ052_2015	0.7063	0.7334	0.9630
CZ053_2015	0.9252	0.9285	0.9964
CZ063_2015	0.7263	0.7269	0.9992
CZ064_2015	0.7001	0.8053	0.8694
CZ071_2015	0.7994	0.8051	0.9929
CZ072_2015	0.9710	0.9751	0.9958
CZ080_2015	0.9976	1.0000	0.9976
CZ010_2016	0.6878	0.9101	0.7557
CZ020_2016	0.6666	0.7207	0.9249
CZ031_2016	0.8291	0.8543	0.9705
CZ032_2016	0.7350	0.7430	0.9892
CZ041_2016	0.8866	0.9032	0.9816
CZ042_2016	0.9968	0.9993	0.9975
CZ051_2016	0.7805	0.8844	0.8825
CZ052_2016	0.7918	0.8195	0.9662
CZ053_2016	0.9804	0.9813	0.9991
CZ063_2016	0.7066	0.7091	0.9965
CZ064_2016	0.7135	0.8338	0.8557
CZ071_2016	0.7836	0.7840	0.9995
CZ072_2016	0.8791	0.8927	0.9848
CZ080_2016	0.9924	1.0000	0.9924
CZ010_2017	0.7498	0.9294	0.8068
CZ020_2017	0.7224	0.7910	0.9133
CZ031_2017	0.8642	0.8845	0.9770
CZ032_2017	0.7722	0.7844	0.9844
CZ041_2017	1.0000	1.0000	1.0000
CZ042_2017	0.9763	0.9782	0.9981
CZ051_2017	0.7727	0.8787	0.8794
CZ052_2017	0.8057	0.8290	0.9719
CZ053_2017	0.9835	0.9859	0.9976
CZ063_2017	0.7050	0.7076	0.9963
CZ064_2017	0.7202	0.8478	0.8495
CZ071_2017	0.7840	0.7841	0.9999
CZ072_2017	0.9237	0.9332	0.9898
CZ080_2017	0.9672	0.9801	0.9868

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CZ010_2018	0.7581	0.9343	0.8114
CZ020_2018	0.7571	0.8453	0.8957
CZ031_2018	0.9008	0.9091	0.9909
CZ032_2018	0.8131	0.8238	0.9870
CZ041_2018	0.9286	0.9396	0.9883
CZ042_2018	1.0000	1.0000	1.0000
CZ051_2018	0.7585	0.8682	0.8736
CZ052_2018	0.8178	0.8400	0.9736
CZ053_2018	1.0000	1.0000	1.0000
CZ063_2018	0.6949	0.6967	0.9974
CZ064_2018	0.7387	0.8732	0.8460
CZ071_2018	0.7706	0.7730	0.9969
CZ072_2018	0.9595	0.9665	0.9928
CZ080_2018	0.9892	1.0000	0.9892
CZ010_2019	0.7562	0.9477	0.7979
CZ020_2019	0.7930	0.9058	0.8755
CZ031_2019	0.8714	0.8855	0.9841
CZ032_2019	0.8159	0.8233	0.9910
CZ041_2019	1.0000	1.0000	1.0000
CZ042_2019	0.9451	0.9475	0.9975
CZ051_2019	0.6950	0.7997	0.8691
CZ052_2019	0.8020	0.8257	0.9713
CZ053_2019	1.0000	1.0000	1.0000
CZ063_2019	0.7474	0.7512	0.9949
CZ064_2019	0.7386	0.8728	0.8462
CZ071_2019	0.7703	0.7708	0.9994
CZ072_2019	0.9207	0.9287	0.9914
CZ080_2019	0.9397	0.9624	0.9764
CZ010_2020	0.7814	0.9623	0.8120
CZ020_2020	0.8006	0.9069	0.8828
CZ031_2020	0.8219	0.8343	0.9851
CZ032_2020	0.7971	0.8025	0.9933
CZ041_2020	0.8839	0.8992	0.9830
CZ042_2020	0.8909	0.9016	0.9881
CZ051_2020	0.7183	0.8310	0.8644
CZ052_2020	0.7977	0.8241	0.9680
CZ053_2020	0.8920	0.8926	0.9993
CZ063_2020	0.7292	0.7445	0.9794
CZ064_2020	0.7077	0.8608	0.8221
CZ071_2020	0.7210	0.7362	0.9794
CZ072_2020	0.9061	0.9228	0.9819
CZ080_2020	0.9557	0.9972	0.9584
CZ010_2021	0.9308	1.0000	0.9308
CZ020_2021	0.8545	0.9501	0.8994
CZ031_2021	0.8471	0.8557	0.9899
CZ032_2021	0.8477	0.8552	0.9912
CZ041_2021	0.9287	0.9448	0.9830
CZ042_2021	0.9005	0.9221	0.9766
CZ051_2021	0.7923	0.9011	0.8793
CZ052_2021	0.7783	0.8043	0.9677
CZ053_2021	1.0000	1.0000	1.0000
CZ063_2021	0.7583	0.7619	0.9953
CZ064_2021	0.8791	1.0000	0.8791

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CZ071 2021	0.7940	0.8238	0.9638
CZ072 2021	0.9369	0.9500	0.9862
CZ080 2021	0.9619	1.0000	0.9619

Source: Own processing

Appendix E - Pearson Correlation Matrix

	Y1	Y2	Y3	No.PE	Area	GDP	AW	Gur	No.Su	PD1	PD2	PD3
Y1	1											
Y2	**0.902**	1										
Y3	**0.431**	0.000	1									
No.PE	**0.222**	0.192	0.124	1								
Area	-0.074	**-0.314**	**0.506**	0.078	1							
GDP	-0.163	0.103	**-0.582**	**0.258**	**-0.551**	1						
AW	**0.226**	0.156	**0.215**	**0.441**	**0.430**	-0.181	1					
Gur	0.159	0.134	0.100	**-0.490**	**0.232**	**-0.484**	**0.390**	1				
No.Su	-0.008	0.030	-0.093	**-0.479**	-0.012	**-0.260**	-0.024	**0.493**	1			
PD1	**0.373**	**0.368**	0.103	**0.492**	**-0.221**	**0.498**	-0.056	**-0.459**	**-0.427**	1		
PD2	**0.230**	**0.362**	**-0.227**	**0.204**	**-0.533**	**0.543**	**-0.234**	**-0.284**	**-0.200**	**0.677**	1	
PD3	-0.164	0.050	**-0.475**	**0.321**	**-0.422**	**0.877**	-0.124	**-0.446**	**-0.224**	**0.623**	**0.657**	1

Pearson Correlation Matrix

Correlation is significant at the 0.01 level, values in bold.

Source: Own processing

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