SELECTED ASPECTS OF SOCIAL DEVELOPMENT INDICATORS

Anna BLUSZCZ[1*], Katarzyna TOBÓR-OSADNIK[2], Iwona CHOMIAK-ORSA[3],
Marcin CHABIOR[4]

[1] Silesian University of Technology; anna.bluszcz@polsl.pl, ORCID: 000-0001-9724-5706
[2] Silesian University of Technology; katarzyna.tobor-osadnik@polsl.pl, ORCID: 30000-0003-4568-3485
[3] Wroclaw University of Economics and Business; iwona.chomiak-orsa@ue.wroc.pl,
ORCID: 0000-0003-3550-8624
[4] Silesian University of Technology; marcin.chabior@polsl.pl
* Correspondence author

Purpose: The aim of the research was a comparative analysis of the level of social development in the European Union countries, taking into account the income inequality index.

Design/methodology/approach: Research in this area is conducted using multidimensional analysis, because this phenomenon can be described based on many partial criteria. The article uses QGIS software to classify European Union countries according to the selected indicators such as: the Human Development Index and the Ginni Index describing the level of income inequality.

Findings: W artykule zidentyfikowano aspekty wpływające najistotniej na poziom rozwoju społecznego oraz określono kryteria wpływające na wzrost zadowolenia społecznego w krajach wysokorozwiniętych.

Practical implications: The article shows several trends on the example of European Union countries, that the level of development varies within the EU itself, but on a global scale on a very large scale. The presented HDI and inequality index can be a very important measurement providing synthetic information. The trend of these parameters over time is also an important element of the assessment. It has also been shown that countries with the lowest level of human development are characterized by the highest level of income inequality.

Originality/value: Research has shown that European Union countries are among the countries with the highest level of human development in the world. However, EU countries vary greatly in terms of income inequality.

Keywords: social development, inequality, sustainable development, classification.

Category of the paper: research paper**.**

1. Introduction

The issue of measuring social development is a very complex scientific problem. Measurement of this area is possible on the basis of synthetic meters, which assess many areas at the same time. Synthetic indicators of social development are characterized by the fact that, on the one hand, they constitute an important carrier of information, but depending on the component criteria, the value of this information describes the selected area of assessment. The development of society means, very generally, striving to increase the well-being of society.

The literature devoted to the criteria for assessing well-being presents a very diverse approach to this issue. This is primarily related to the perception of society's well-being in the context of striving to achieve sustainable development goals (Chomiak-Orsa et al., 2024; Hudaszek et al., 2024; Petri, Chomiak, 2024).

Moreover, the correlation of society's well-being with the level of digitalization and the use of information and communication technologies, in particular artificial intelligence, further broadens the perspective of scientific and empirical considerations. Broadcasts and analyzes are carried out on the impact of ICT on the level of well-being in the context of the impact on each person as well as in the context of cities, agglomerations or the country or the entire society of a selected geographical area (Chomiak-Orsa, 2017; Chomiak-Orsa, Hauke et al., 2023; Jelonek, Chomiak-Orsa, 2018).

The concept of well-being can be described by a wide range of factors reflecting the progress and well-being of societies. These indicators are critical to assessing the overall health and quality of life in a community or country.

The selection of the scope of factors to be analyzed and assessed depends on the perspective of assessing the well-being of society. This may concern the level of education, the use of technology, the assessment of digital or social exclusion, the state of ecological awareness, ensuring high quality education and lifelong learning or, for example, attention to gender equality (Chomiak-Orsa, Greńczuk, et al., 2023; Chomiak-Orsa, Smolag, 2024).

There are many aspects that can be analyzed and assessed. This contributed to the need to narrow down the topic of the article to select only one area of social well-being.

The article discusses the issue of assessing the well-being of society in the European Union countries. Popular synthetic indicators such as the Human Development Index and the Income Inequality Index were selected for analysis. The aim of the article is to answer the question which aspects influence the well-being of society and whether economic criteria are still the main determinants of social development. The literature characterizes the main aspects of social development indicators (Bluszcz, 2016), which include, among others: Aspects of a society's educational level measured by the literacy rate as the percentage of people aged 15 and over who can read and write, or by the school enrollment rate, which is the percentage of children

and young people attending primary, secondary and tertiary schools. Another aspect is health, which can be assessed based on the life expectancy indicator, measured as the average number of years a person can live, or the infant mortality rate, i.e. the number of deaths of infants under one year of age per 1000 live births. The most popular area is expressed by economic well-being, which is measured, among others, by the poverty index, i.e. the percentage of the population living below the national poverty line, or by the level of income inequality (Zwiech, 2022): the distribution of income between individuals or households in the population.

The article focuses on these three main areas of society's well-being, although there are many other aspects in the literature, such as: gender equality, level of security, society's involvement in social matters, ecological aspects or quality of life, however, in order to maintain the readability of the presented research, these areas will not be discussed in this article. These indicators provide a holistic view of a society's development, helping policymakers and researchers identify areas that need improvement and monitor progress over time. It's important to consider these aspects collectively to gain a comprehensive understanding of social development. Monitoring these indicators helps governments, policymakers, and researchers understand the social dynamics of a society, identify areas for improvement, and track progress over time.

2. Methodology

Human development index has two sides: the formation of human capabilities – such as improvement health, knowledge and skills – and the use people make of their acquired capabilities – for leisure, productive purposes of being active in cultural, social and political affairs. If the scales of human development do not finely balance the two sides, considerable human frustration may result. According to this concept of human development, income is clearly only one option that people would like to have, albeit an important one. But it is not the sum total of their lives (Bluszcz, 2017; Bluszcz, Kijewska, 2016). Measuring the level of social development requires a multidimensional approach, because of various aspects affect its level. Therefore, there are many kinds of synthetic indicators that enable an assessment of the level of social development through the aggregation of multiple variables in one synthetic indicator, which is a point of reference and enables conduct comparative analyzes between countries (Bluszcz, 2017; Zwiech 2016). The scope of social aspects (Grabowska et al., 2022, Saniuk et al., 2022) and social indicators in the literature is very widely discussed (Breslow, 2017) as it covers many measures developed by the OECD over the years. Social indicators provide objective measures of people's living conditions, the factors that shape these conditions, and the actions taken by governments to preserve them and improve social conditions. Social indicators provide objective measures of the conditions in which people live, the factors shaping these

conditions and the actions taken by governments to preserve and improve them (Bluszcz, Manowska, 2019).

The HDI index is a synthetic measure describing the level of social and economic development in individual countries, built on the three basic dimensions of social development: health (longevity), access to knowledge and standard of life (the material aspect). Formula of Human Development Index is the geometric mean of the normalized average indexes achieved in all areas (HDR, 2021):

$$HDI = \sqrt[3]{I_I * I_{II} * I_{III}} \tag{1}$$

where:

I_I - the index related to longevity,

I_{II} - the index related to education,

I_{III} - the index related to national income per capita.

The general formula for creating indexes for three areas has the form of:

$$I = \frac{X_{cur} - X_{min}}{X_{max} - X_{min}} \tag{2}$$

where:

X_{cur} —the current value

X_{max} —the maximum threshold value

X_{min} —the minimum threshold value

The level of the HDI indicator is normalized in the range of <0.1>. The calculations started in 1990 and are published annually in the form of ranking countries. Minimum and maximum values (goalposts) are set in order to transform the indicators expressed in different units into indices between 0 and 1. These goalposts act as the "natural zeros" and "aspirational goals", respectively, from which component indicators are standardized.

3. Results

Table 1 presents the set at the following values for calculation HDI index:

Table 1.
Minimum and maximum values for calculating HDI index

	Life expectancy at birth	Expected years of schooling	Mean years of schooling	Gross National Income (GNI) per capita (2017 PPP $)
Min	20	0	0	100
Max	85	18	15	75000
Poland	76.5	16	13.2	33 034

Source: own elaboration based on (HDR, 2021).

The calculation of the HDI 2021 for the Poland based on the models 1 and 2 are shown below:

$$\textbf{\textit{Longevity index of Poland}} = \frac{\textbf{76.5} - \textbf{20}}{\textbf{85} - \textbf{20}} = \textbf{0.86}$$

$$\textit{Mean years of schooling index of Poland} = \frac{13.2 - 0}{15 - 0} = 0.88$$

$$\textit{Expected years of schooling index of Poland} = \frac{16-0}{18-0} = 0.88$$

$$\textbf{\textit{Education index of Poland}} = \frac{\textbf{0.88} + \textbf{0.88}}{\textbf{2}} = \textbf{0.88}$$

$$\textbf{\textit{Income Index of Poland}} = \frac{\textbf{ln(33034)} - \textbf{ln(100)}}{\textbf{ln(75000)} - \textbf{ln(100)}} = \textbf{0.87}$$

$$\textbf{HDI 2021 of Poland} = (0.86 * 0.88 * 0.87)^{1/3} = \textbf{0.87} \qquad (3)$$

In its annual Human Development Report, the United Nations Development Program (UNDP) presents a ranking for 191 countries according to the Human Development Index (HDI). In 2021, selected countries Poland was classified as highly developed countries, achieving the HDI level Poland =0.87 (formula 3). In European Union countries the average values for 2021 year based on 27 countries was 0.896 points. The highest value was in Denmark: 0.948 points and the lowest value was in Bulgaria: 0.795 points. The indicator is available from 1980 to 2021.

Based on the classification of EU countries according to the level of the HDI index, three groups of similar countries were selected. The group of countries marked in yellow has a very high level of development, for which the HDI index ranged from 0.896 to 0.948. The second group consists of countries with an average EU level of HDI development between 0.829 and below 0.896, marked in gray. The third group includes countries with the lowest HDI level in the EU, up to 0.829.
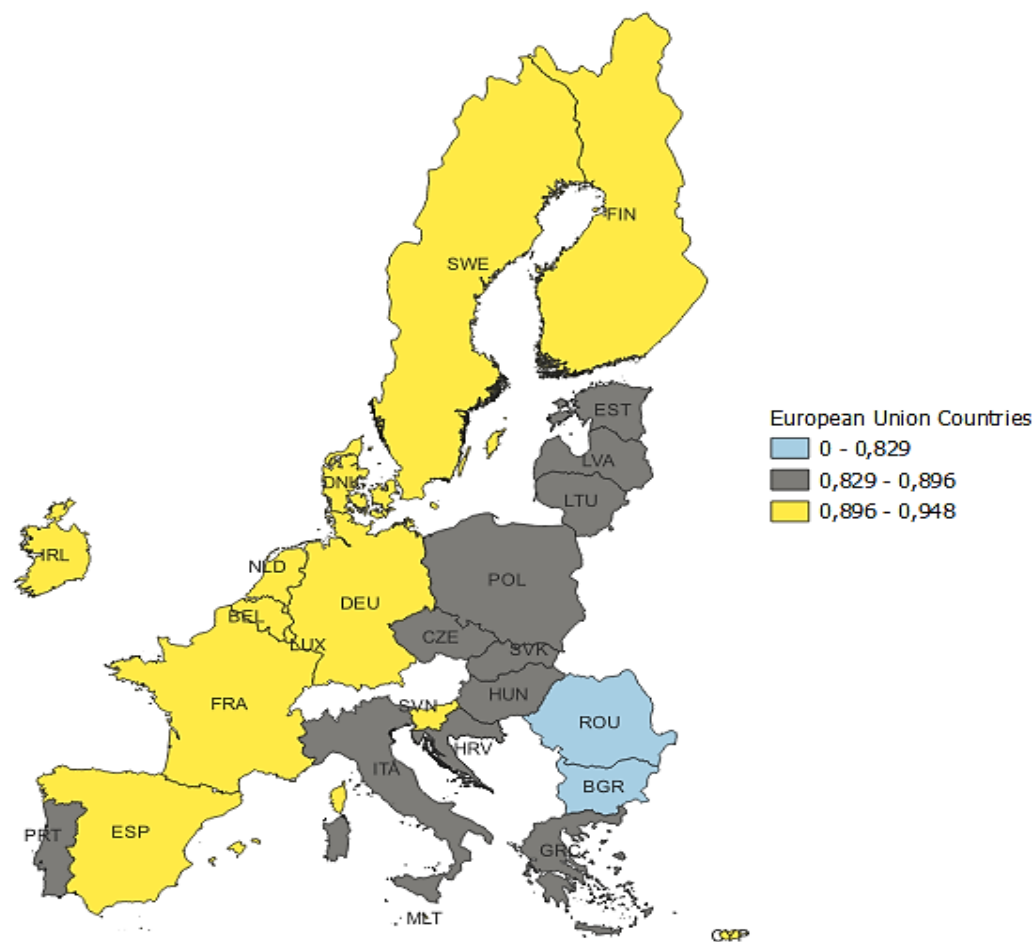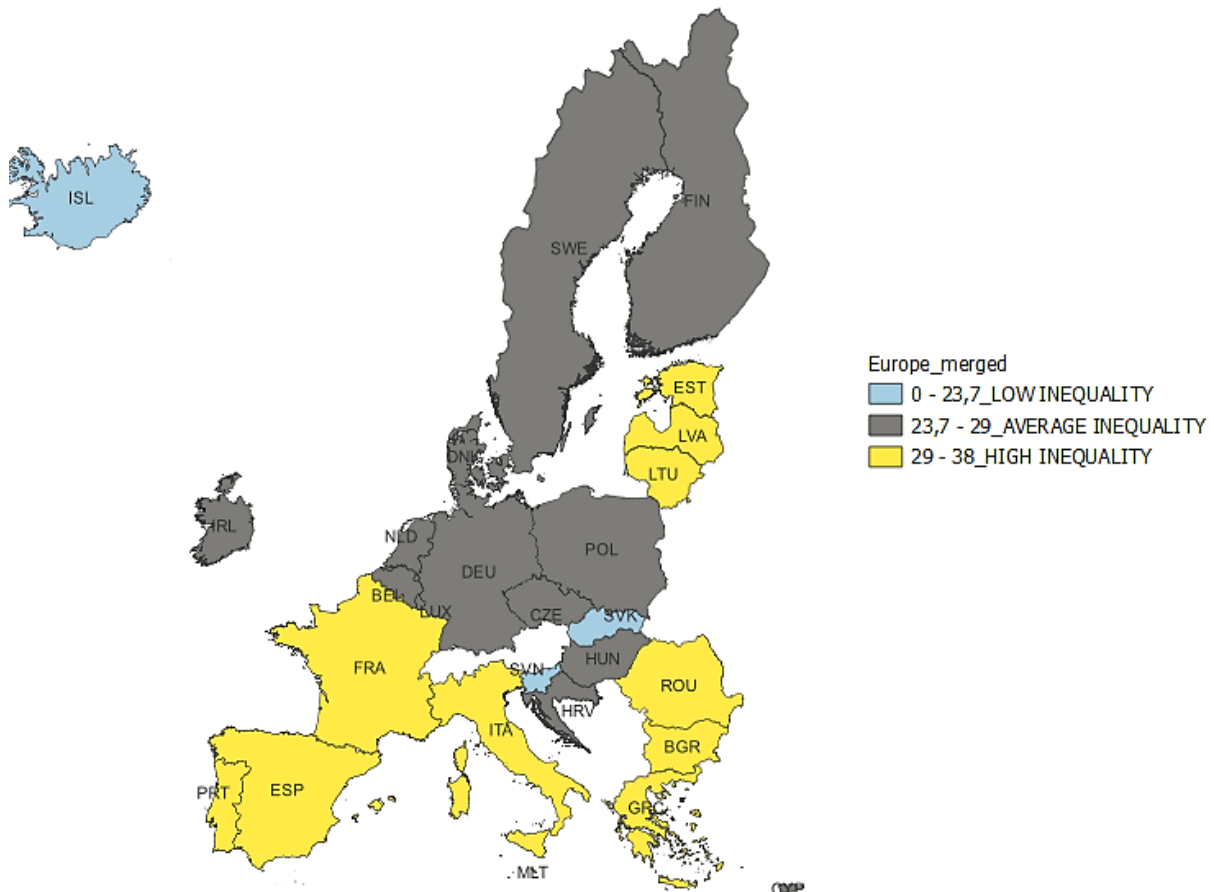
Figure 1. Classification EU according to HDI level for 202.

Source: own elaboration.

The presentation of data in this area is very necessary to assess the general social situation in given countries. However, it should be added that the level of total data collected at the national level involves the risk of large disproportions in various social classes, therefore general indicators can be used for general analysis, while for more detailed conclusions, information should be sought on possible indicators of differentiation according Gini coefficient. Inequality levels indicators provide insights into the distribution of resources, opportunities, and well-being across different segments of a population. These indicators are crucial for understanding the disparities that exist within a society. A popular indicator describing the stratification of society is the Gini index, which is a measure of concentration (unevenness) of the distribution of a random variable used in statistics. In economics, a measure of the degree of income inequality. The name of the coefficient comes from the name of its creator, the Italian statistician Corrado Gini. The Gini coefficient is a widely used measure of income or wealth inequality. It ranges from 0 (perfect equality) to 1 (perfect inequality). A higher Gini coefficient indicates greater inequality. A zero value of the coefficient indicates full uniformity of the distribution, an increase in the coefficient value means an increase in the inequality of the distribution. The higher the percentage level of the coefficient, the phenomenon should be assessed negatively, because it means a significant stratification of
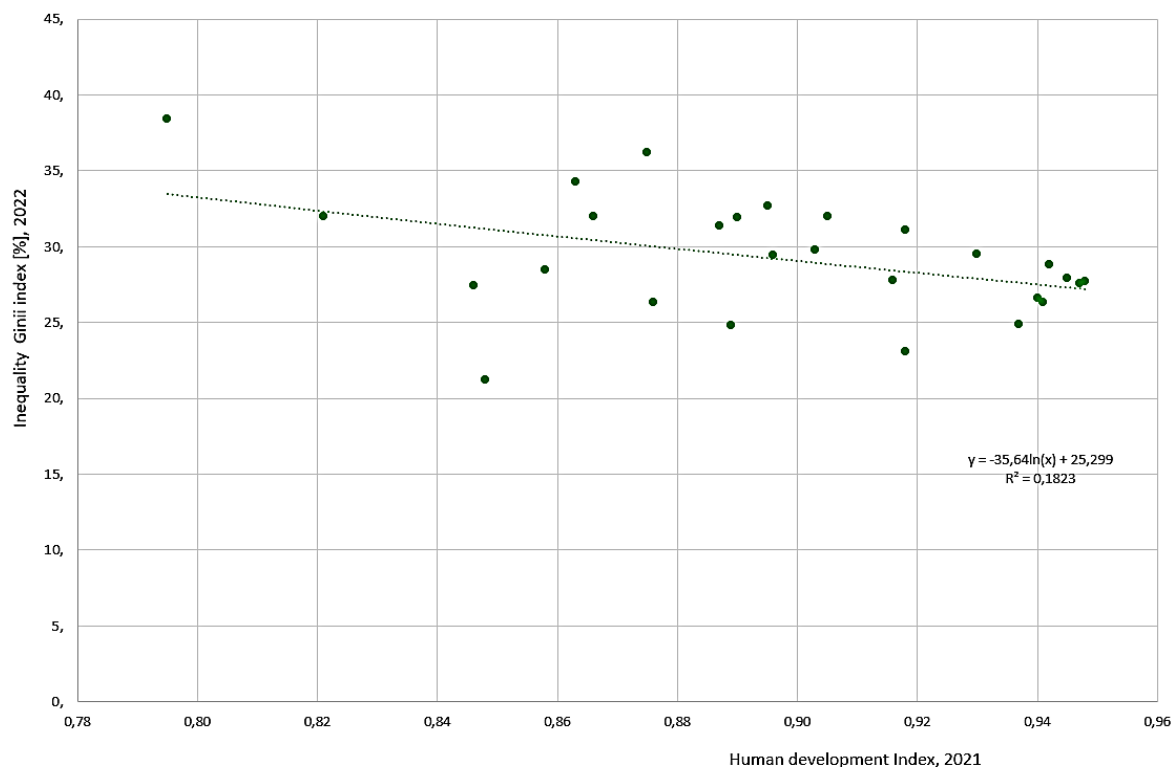
society in terms of income, while the lower the stratification, the more positively the socio-economic changes are assessed (Zwiech, 2013). Based on Eurostat database data, in 2022 the average level of the coefficient for European Union countries was 29%. Figure 2 presents the classification of EU countries into three clusters of countries similar in terms of the level of the Ginni index. Grouping was performed in QGIS.

Figure 2. Classification EU according to Inequality level for 202.
Source: own elaboration.

Figure 3 presents the relationship between HDI and the Gini index. It can be seen that countries with the lowest HDI level are characterized by the highest level of social inequality. This phenomenon is also observed in the world ranking, where for the 186 countries surveyed the discrepancies are significant, but the highest are in the group of the least developed countries. The highest level of social inequality was recorded in countries with the lowest level of human development, which include African countries (South Africa, Namibia, Suriname, Zambia), where the level ranged from 50% to 63%. The lowest level of inequality occurred in countries with the highest level of development, which include, among others, EU member states, and the level of inequality was up to 30% (www. wisevoter).

The chart shows a scatter plot with "Inequality Gini index [%], 2022" on the y-axis (ranging from 0 to 45) and "Human development Index, 2021" on the x-axis (ranging from 0,78 to 0,96). The equation shown is:

$$y = -35{,}64\ln(x) + 25{,}299$$
$$R^2 = 0{,}1823$$

Figure 3. The relationship between HDI and the social inequality index for EU countries.
Source: own elaboration.

Searching for answers to the question of how to best describe the increase in society's well-being and how to best measure it, many economists emphasize the fact that in highly developed countries, which include EU countries, the constant increase in GDP/capita no longer contributes so significantly to the increase in satisfaction. from the life of the population as it might have been a decade or two decades earlier. This statement refers to a phenomenon that is widely analyzed in the field of economics and psychology, known as the "paradox of life satisfaction and national income (Headey, 2019) ". In short, this paradox suggests that despite increases in national income, individual life satisfaction in highly developed societies may not increase at the same rate. Several factors influence this paradox, including: the so-called saturation point, which means that in wealthy societies, when the standard of living is already high, an additional increase in income does not necessarily translate into increased life satisfaction. People reach a saturation point where further material growth is no longer a key factor in their happiness. Another factor may be social differentiation, where in highly developed countries, social inequalities and lack of equal access to resources (e.g. education, health care) may affect life satisfaction more than the increase in GDP per capita. Another aspect may be the quality of life indicator (Bluszcz, 2017), as life satisfaction itself may be more related to the quality of life, access to education, health care, social security and equality, than to income alone. The final factor may be the influence of social and psychological factors, as social elements such as interpersonal relationships, social support, or feelings of belonging may have a greater impact on life satisfaction than material growth. Therefore, while GDP per

capita growth is still an important indicator of economic progress, research shows that other aspects, such as social equality, quality of life and mental well-being, are becoming increasingly important in understanding the full picture of society. This may have implications for the direction of social and economic policy in highly developed countries, where the priority is not only economic growth, but also equal access to prosperity and improving the quality of life.

4. Conclusions

The issues of measuring and describing the level of well-being and development of society as presented in the research are very extensive. The article shows several trends on the example of European Union countries, that the level of development varies within the EU itself, but on a global scale on a very large scale. The presented HDI and inequality index can be a very important measurement that provides synthetic information. The trend of these parameters over time is also an important element of the assessment. Studies have shown that European Union countries are among the countries with the highest level of human development on a global scale. However, EU countries are very diverse in terms of income inequality. It has also been shown that countries with the lowest level of human development have the highest level of income inequality. The research presented the classification of countries using QGIS software, which allows the results to be presented on maps. The issues presented in the article do not completely exhaust the problem of measuring social development, but they provide important information that may be useful in monitoring this area.

Acknowledgements

References

1. Bluszcz, A., Manowska, A. (2019). Research on the dependence of the level of economic growth on the consumption of materials and energy in selected European Union countries. *Mineral Resource*, *vol. 20, no. 2,* pp. 239-244, doi:10.29227/IM-2019-02-39

2. Bluszcz, A. (2016). A comparative analysis of selected synthetic indicators of sustainability. In: S. Kapouneka, V. Krutilovaa (eds.), *Procedia - Social and Behavioral Sciences*, *vol. 220.* Elsevier, pp. 40-50, doi:10.1016/j.sbspro.2016.05.467

3. Bluszcz, A. (2017). *Social development indicators - quality of life index*. 4th International Multidisciplinary Scientific Conference on Social Sciences and Arts: SGEM 2017, pp. 681-688.

4. Bluszcz, A., Kijewska, A. (2016). The structure of the social development of the countries on the basis of synthetic indicators. *SGEM Social Science 2016 section Sociology and Healthcare, vol. II,* pp. 1139-1146.

5. Breslow, S.J. et al. (2017). Evaluating indicators of human well-being for ecosystem-based management. *Ecosystem Health and Sustainability*, pp. 1-18, doi: 0.1080/20964129. 2017.1411767.

6. Chomiak-Orsa, I. (2017). System approach in the consistency concept as a way of organisational analysis. *International Journal of Contemporary Management*, *16(4),* pp. 7-20.

7. Chomiak-Orsa, I., Smolag, K. (2024). Remote Learning Technologies in Achieving the Fourth Sustainable Development Goal. In: S. Nowaczyk, P. Biecek, N.C. Chung, M. Vallati, P. Skruch, J. Jaworek-Korjakowska, S. Parkinson, A. Nikitas, M. Atzmüller, T. Kliegr, U. Schmid, S. Bobek, N. Lavrac, M. Peeters, R. van Dierendonck, S. Robben, E. Mercier-Laurent, G. Kayakutlu, M.L. Owoc, V. Dimitrova (Eds.), *Artificial Intelligence* (pp. 140-147). ECAI 2023 International Workshops. Springer Nature Switzerland, doi.org/10.1007/978-3-031-50485-3_12

8. Chomiak-Orsa, I., Greńczuk, A., Łuczak, K., Piwoni-Krzeszowska, E. (2024). AI in Accelerating the Creation of Renewable Energy Sources. Bibliometric Analysis. In: S. Nowaczyk, P. Biecek, N.C. Chung, M. Vallati, P. Skruch, J. Jaworek-Korjakowska, S. Parkinson, A. Nikitas, M. Atzmüller, T. Kliegr, U. Schmid, S. Bobek, N. Lavrac, M. Peeters, R. van Dierendonck, S. Robben, E. Mercier-Laurent, G. Kayakutlu, M.L. Owoc, … V. Dimitrova (Eds.), *Artificial Intelligence* (pp. 155-162). ECAI 2023 International Workshops. Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-50485-3_14

9. Chomiak-Orsa, I., Greńczuk, A., Łuczak, K., & Smoląg, K. (2023). Application of creative problem-solving methods in remote learning. Bibliometric analysis. *Procedia Computer Science*, 225, pp. 3565–3574, /doi.org/10.1016/j.procs.2023.10.352

10. Chomiak-Orsa, I., Hauke, K., Perechuda, K., Pondel, M. (2023). The use of Digital Twin in the sustainable development of the city on the example of managing parking resources. *Procedia Computer Science*, *225*, pp. 2183-2193, doi.org/10.1016/j.procs.2023.10.209.

11. Grabowska, S., Saniuk, S., Gajdzik, B. (2022). Industry 5.0: improving humanization and sustainability of Industry 4.0. *Scientometrics*, *vol. 127, no. 7.* Springer, pp. 1-28, doi:10.1007/s11192-022-04370-1

12. Headey, B. (2019). Wealth influences life satisfaction more than income. A supplement to Easterlin Paradox. *Social Indicators Research. Series book (SINS) vol. 76.*

13. https://wisevoter.com/country-rankings/gini-coefficient-by-country/, 3.01.2024.

14. Hudaszek, K., Chomiak-Orsa, I., AL-Dobai, S.A.M. (2024). Green Hardware Infrastructure for Algorithmic Trading. In: S. Nowaczyk, P. Biecek, N.C. Chung, M. Vallati, P. Skruch, J. Jaworek-Korjakowska, S. Parkinson, A. Nikitas, M. Atzmüller, T. Kliegr, U. Schmid, S. Bobek, N. Lavrac, M. Peeters, R. van Dierendonck, S. Robben, E. Mercier-Laurent, G. Kayakutlu, M.L. Owoc, V. Dimitrova (Eds.), *Artificial Intelligence* (pp. 194-200). ECAI 2023 International Workshops. Springer Nature Switzerland, doi.org/10.1007/978-3-031-50485-3_19

15. Human Development Report (2021). https://hdr.undp.org/data-center/human-development-index#/indicies/HDI, 4.01.2024.

16. Jelonek, D., Chomiak-Orsa, I. (2018). The Application of ICT in the Area of Value Co-Creation Mechanisms Support as a Determinant of Innovation Activities. *International Journal of Ambient Computing and Intelligence (IJACI), 9(2),* 32-42.

17. Petri, M., Chomiak, I. (2024). Towards a Sustainable Future: The Use of Electrical Energy in Smart Cities. In: S. Nowaczyk, P. Biecek, N.C. Chung, M. Vallati, P. Skruch, J. Jaworek-Korjakowska, S. Parkinson, A. Nikitas, M. Atzmüller, T. Kliegr, U. Schmid, S. Bobek, N. Lavrac, M. Peeters, R. van Dierendonck, S. Robben, E. Mercier-Laurent, G. Kayakutlu, M. L. Owoc, V. Dimitrova (Eds.), *Artificial Intelligence* (pp. 216-222). ECAI 2023 International Workshops Springer Nature Switzerland, doi.org/10.1007/978-3-031-50485-3_22

18. Saniuk, S., Grabowska, S., Straka, M. (2022). Identification of social and economic expectations: contextual reasons for the transformation process of Industry 4.0 into the Industry 5.0 concept. *Sustainability*, *vol. 14, no. 3, 1391*, 1-20, doi:10.3390/su14031391

19. Zwiech, P. (2013). Nierówności dochodowe w państwach europejskich − analiza przy wykorzystaniu współczynnika Giniego. *Studia Ekonomiczne*, No 145, pp. 89-102

20. Zwiech, P. (2016). *Nierówności ekonomiczne w Polsce*. Szczecin: Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, ISBN 978-83-7972-067-5

21. Zwiech, P. (2022). Approaches to Socio-Economic Inequality in Economic Theory. *Scientific Papers Of Silesian University Of Technology, Organization And Management Series, no. 164*, pp. 565-572, doi: 10.29119/1641-3466.2022.164.43