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# Table of Contents

# Spis treści

**Nierówności Społeczne a Wzrost Gospodarczy, nr 69 (1/2022)**
***Social Inequalities and Economic Growth, no. 69 (1/2022)***
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# Change in the level of socio-economic development in Poland in the subregional dimension[2]

## Introduction

An assessment of the level of the socio-economic development, including any changes, is a highly important research problem in terms of both economic theory and practice. The extent of EU fund allocation in the respective regions depends on the level of development, as well as the intensity of state aid made available in the respective regions (Spychała, 2017; Martin, 2020; Hall, 2012). A research program was initiated on the significance of the process of socio-economic development, its core, its causes and consequences, with the latter constituting the subject of many scientific compilations (Stiglitz, 2004; Grosse, 2004; Kozarova, 2013; Iyer, Kitson, Toh, 2005; Churski, 2008). A characteristic of regional development is its spatial variation. The increasing disparities in regional development constitute a sensitive problem for the contemporary economy, while the main purpose of the EU cohesion policy is convergence, i.e. activities geared towards decreasing the differences in the level of development throughout the EU (Sweet, 2012; Kološta, 2016; Krugman, 1991; Kehagia, 2013). The classification of EU regions is carried out solely on the basis of the GDP per capita of a particular NUTS-2 region and by means of comparing its value against the background of the EU average. The purpose of the compilation is to specify the regional level of development, yet by taking into account a larger number of indicators than GDP per capita. This study was carried out in NUTS-3 lower level subregional units for more details.

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In a compilation, the level of the socioeconomic development is presented based on 60 indicators categorized within the four constituents (factors) of regional development: material capital, human capital, natural environment, and both innovativeness and entrepreneurship (analysed together). The main assumption of the article is to present the variation in the level of socio-economic development in Poland in terms of the arrangement of subregions, that is, the third level of classification of territorial units for statistical purposes used by Eurostat ("NUTS-3"). The level of socio-economic development is presented based on a synthetic gap representing the taxonomic distance of each subregion from the established pattern of development.

In the article, a hypothesis was tested according to which the socioeconomic development of the subregions in Poland is highly varied, with its highest level registered in the largest regional cities: Warsaw, Cracow, Wrocław and Poznań, and its lowest in the subregions distant from these major cities constituting the centers of development. All NUTS-3 subregions in Poland were included in the research – 73 units in total. Statistical data on the level of subregion development have been retrieved from the Local Data Bank of the Statistics Poland.

The first part of the study discusses the four stages of the research procedure. The results from this were categorized in the form of charts and presented in the form of choropleth maps representing spatial differentiation of the level of socio-economic development of the NUTS-3 subregions. The final part of the study presents the initial conclusions based on the research work regarding the respective growth constituents, as well as the characterization of the general levels of socioeconomic development in the NUTS-3 subregions.

## STAGES OF THE RESEARCH PROCEDURE

In order to specify the level of socio-economic development of the NUTS-3 units, a synthetic gap of the distance from the role model was used. Parallel examinations were carried out in the static dimension (based on the values of indicators from 2019) and the dynamic dimension (based on the changes in the gaps values in the years of 2010–2019). The research work consisted of four stages:

1. adjustment of variables – by constructing a geographical information matrix,
2. reduction of the free space,
3. indication of the level of socioeconomic development,
4. classification of the subregions based on the scale of socio-economic development.

A matrix of geographical information was first created, based on 60 indicators (Table 1), which defined the level of development of NUTS-3 units in 2019 as

well as changes in the years 2010–2019 in relation to material capital, human capital, natural environment, and both innovativeness and entrepreneurship (the latter two considered together). Based on a review of the literature comprising the concept of regional development, the most important subcomponents, i.e., the factors of regional development, were specified. A factor of development may be a component, a property of the region, or an occurrence which exerts an influence over the socio-economic development (Churski, 2008). In the subject literature, many reviews of theories and concepts of regional development have been compiled. Some of them undertook to systematize them from different perspectives (Grosse, 2004). A review of the concepts of regional development was made of the factors of development based on two main trends in economic thought: neoclassical (e.g. the concept of convergence as formulated by Jan Tinbergen, a new theory of growth, a new economic geography) and neokeynesian (e.g. the demand theories which have emerged related to the doctrine of John Maynard Keynes, theories of Austrian school). Consequently, Pearson's correlation coefficients were calculated separately between the baseline indicators for 2019 and for their change over the years 2010–2019. This is extremely important in order for the selected indicators used for the synthetic gap of distance from the pattern to be weakly correlated with each other. As a result, the information capacity of each of these variables differed (Dattorro, 2005).

**Table 1. Indicators taken into account in the analysis specifying the constituents of regional development**

| Constituent of the development | Indicators |
|---|---|
| *1* | *2* |
| Material capital (18 variables) | Proportion of people using the gas network in the total number of inhabitants; proportion of people using a water sewage network in the total number of inhabitants; proportion of people using the sewage network in the total number of inhabitants; length of local roads and provincial roads per 100 $km^2$ ; length of bike routes per 10 000 inhabitants; length of bike routes per 100 $km^2$; road accidents per 100,000 inhabitants; fatalities per 100,000 inhabitants; number of people visiting per 10,000 inhabitants; book collection of state bookstores per 1000 inhabitants; number of doctors per 10,000 inhabitants; proportion of children under the age of three under the care of creches; proportion of children in kindergarten institutions; average usable area of 1 dwelling; average usable area of 1 dwelling or 1 person; number of dwellings per 1000 inhabitants; number of sports facilities per 10,000 inhabitants. |

| *1* | *2* |
|---|---|
| Human capital (17 variables) | Level of the registered unemployment rate; proportion of the unemployed with higher education to the number of the unemployed in total; proportion of the unemployed under the age of 25 to the number of the unemployed in total; balance sheet of migration per 1000 inhabitants; feminization coefficient in total; share of people of production age in the total number of people; proportion of people of post-production age in the total number of people; proportion of people of pre-production age in the total number of people; number of people of non-production age per 100 people of production age; number of people of post-production age per 100 people of pre-production age; number of students per 1000 inhabitants; passability of final exams in high schools in the general education profile; net scholarization coefficient for elementary schools; number of people regularly exercising per 1000 inhabitants; number of marriages entered into per 1000 inhabitants; number of divorces concluded per 1000 inhabitants. |
| Natural environment (10 variables) | Share of legally protected areas in the total area; share of people using the sewage systems in the total number of inhabitants; input directed towards the environmental protection per 1 inhabitant; input directed towards water management per 1 inhabitant; emission of particular pollutants per 1 $km^2$ of the area; water use per 1 inhabitant; electricity use per 1 inhabitant; share of parks, green spaces and residential estate green areas in the total space; number of tourists staying overnight per 1000 inhabitants; accommodation offered per 1000 inhabitants. |
| Innovativeness and entrepreneurship (15 variables) | Share of foreign entities in the total number of entities; share of private entities in the total number of entities; number of private individuals conducting an economic activity per 1,000 inhabitants; number of microentities per 1000 inhabitants; reports of inventions at the Polish Patent Office per 1 million inhabitants; patents accepted by the Polish Patent Office per 1 million inhabitants; share of entities conducting a service activity in the total number of economic entities; share of entities conducting educational activity in the total number of economic entities; share of entities conducting a financial activity in the total number of economic entities; share of newly registered entities of the creative sector in the number of newly registered entities in total; proportion of people working in the sales sector in the total number of the employed population; average monthly remuneration gross; average price per 1 $m^2$ of residential premises; GDP per 1 inhabitant; people injured in industrial accidents per 1000 inhabitants. |

Source: own compilation based on the research conducted.

Pearson's correlation coefficients formed the basis for the reduction indeparture indicators using the Hellwig method, namely the seclusion of diagnostic features, that is, those variables that should be taken into account later in the procedure (Spychała, 2020b). In Hellwig's feature reduction method, the diagnostic feature is the indicator whose sum total of the absolute values of correlation coefficients with other variables is the highest. In the next step, those variables with the calculated correlation coefficients with the diagnostic feature higher than the critical value, established based on the formula below, were eliminated (Hellwig, 1990):

$$r^* = \sqrt{\frac{(t^*)^2}{n - 2 + (t^*)^2}}$$

where:
$r^*$ – critical value of Pearson's linear correlation coefficient
$t^*$– value of the t-student statistic (at the relevance level of relevance of p=0.05)
$n$ – number of departure indicators (variables)

As a result of the reduction conducted using the Hellwig method, any statistically relevant variables correlated with a diagnostic feature were eliminated. This reduction was repeated by obtaining new reduced correlation matrices, until a collection of indicators was exhausted or isolating features were secluded (Nowak, 1990). The reduction of variables procedure was conducted four times: separately for the level of development of each of the four capitals constituting the factors of the development.

In the next step, a pattern and an antipattern of regional development were indicated. Maximum standardized values of the respective diagnostic feature were considered to be the pattern (Hartigan, 1975). In the next stage, the taxonomic distance of each subregion based on the formula presented below was calculated (Spychała, 2020a):

$$d_{i0} = \sqrt{\sum_{j=1}^{m} (z_{ij} - z_{0j})^2}$$

where:
$d_{i0}$ – taxonomic distance of subregion $i$ from the accepted pattern of development
$z_{ij}$ – standardised value of the indicator (feature) $j$ for subregion $i$
$z_{0j}$ – standardised value of the indicator (feature) $j$ for the development pattern

For the last stage in each NUTS-3 subregion, a synthetic gap was created, which was an indicator of the level of development of a particular subregion. The value of the synthetic gap was calculated for each of the four subcomponents of socioeconomic development, and the value of the gap for the general level of socioeconomic development was stated as the average of the value for each subcomponent. The synthetic gap was calculated based on the following pattern (Kordos, Paradysz, 1999):

$$v_i = 1 - \frac{d_{i0}}{d_0}$$

where:

$v_i$ – synthetic gap of the level of development of a region

$d_{i0}$ – taxonomic distance of the *i*-subregion from the accepted pattern of development

$d_0$ – taxonomic distance of the pattern and antipattern of development

The synthetic gap for the level of development assumed values from 0 to 1. The lower the value, the lower the level of development of the phenomenon under consideration. Based on the calculated indicators, a ranking of 73 NUTS-3 subregions in Poland was established, and subsequently divided into five groups: very high (20% of the subregions with the highest synthetic gap value – group 1 – placed 1–15 in the ranking), high (the next 20% of the subregions – group 2 – placed 16–30 in the ranking), average (group 3 – subregions placed 31–43 in the ranking), low (group 4 – subregions placed 44–58 in the ranking) and very low (20% of the subregions with the lowest value of synthetic gap – group 5 – placed 59–73 in the ranking). Taking into account the dynamic dimension, the subregions for which the indicator assumed the highest values (20% of the subregions) were classified as a group featuring a very large change in the level of development of the phenomenon, while the units for which the gap assumed the lowest values (20% of the subregions) were classified as a group featuring a relatively low change in the level of development of a particular phenomenon.

**Table 2. Extreme values of the synthetic gap within the respective subcomponents of socio-economic development in 2019**

| Highest values of the synthetic indicator **(2019)** | | | Lowest values of the synthetic indicator **(2019)** | | |
|---|---|---|---|---|---|
| No. | NUTS-3 subregion | $v_i$ | No. | NUTS-3 subregion | $v_i$ |
| **Material capital** | | | | | |
| 1 | Warsaw | 0.563 | 73 | Nowosądecki | 0.261 |
| 2 | Wrocław | 0.499 | 72 | Ełcki | 0.263 |
| 3 | Cracow | 0.487 | 71 | Radomski | 0.270 |
| 4 | Poznań | 0.460 | 70 | Ciechanowski | 0.273 |
| 5 | Katowicki | 0.429 | 69 | Nowotarski | 0.274 |
| **Human capital** | | | | | |
| 1 | Cracow | 0.555 | 73 | Łódź | 0.224 |
| 2 | Rzeszowski | 0.552 | 72 | Sosnowiecki | 0.267 |
| 3 | Wrocławski | 0.552 | 71 | Wałbrzyski | 0.293 |
| 4 | Krakowski | 0.539 | 70 | Szczecinecko-Pyrzycki | 0.311 |
| 5 | Warszawski Wschodni | 0.526 | 69 | Sandomiersko-Jędrzejowski | 0.314 |
| **Natural environment** | | | | | |
| 1 | Rybnicki | 0.385 | 73 | Radomski | 0.143 |
| 2 | Nowotarski | 0.377 | 72 | Sandomiersko-Jędrzejowski | 0.163 |
| 3 | Warsaw | 0.371 | 71 | Tarnowski | 0.190 |
| 4 | Koszaliński | 0.357 | 70 | Chełmsko-Zamojski | 0.191 |
| 5 | Gdański | 0.342 | 69 | Ostrołęcki | 0.192 |
| **Innovativeness and entrepreneurship** | | | | | |
| 1 | Warsaw | 0.691 | 73 | Świecki | 0.159 |
| 2 | Cracow | 0.651 | 72 | Chojnicki | 0.163 |
| 3 | Poznań | 0.610 | 71 | Krośnieński | 0.172 |
| 4 | Wrocław | 0.578 | 70 | Sandomiersko-Jędrzejowski | 0.174 |
| 5 | Trójmiejski | 0.562 | 69 | Nowosądecki | 0.178 |
| **Level of socioeconomic development** | | | | | |
| 1 | Warsaw | 0.522 | 73 | Sandomiersko-Jędrzejowski | 0.237 |
| 2 | Cracow | 0.501 | 72 | Szczecinecko-Pyrzycki | 0.254 |
| 3 | Wrocław | 0.466 | 71 | Chełmsko-Zamojski | 0.259 |
| 4 | Poznań | 0.456 | 70 | Radomski | 0.261 |
| 5 | Trójmiejski | 0.435 | 69 | Inowrocławski | 0.265 |
| 6 | Warszawski Zachodni | 0.431 | 68 | Puławski | 0.270 |
| 7 | Szczecin | 0.395 | 67 | Łomżyński | 0.271 |
| 8 | Rzeszowski | 0.385 | 66 | Świecki | 0.271 |
| 9 | Warszawski Wschodni | 0.384 | 65 | Grudziądzki | 0.271 |
| 10 | Bielski | 0.378 | 64 | Ełcki | 0.273 |

Source: own compilation based on the research conducted.

**Table 3. The highest and lowest values of the synthetic gap within the respective subcomponents of the socioeconomic level of development in the years 2010–2019**

| Highest values of the synthetic indicator (2010–2019 period) | | | Lowest values of the synthetic indicator (2010–2019 period) | | |
|---|---|---|---|---|---|
| No. | NUTS-3 subregion | $v_i$ | No. | NUTS-3 subregion | $v_i$ |
| **Material capital** | | | | | |
| 1 | Warszawski Zachodni | 0.460 | 73 | Szczecin | 0.271 |
| 2 | Warszawski Wschodni | 0.455 | 72 | Nyski | 0.292 |
| 3 | Wrocławski | 0.447 | 71 | Inowrocławski | 0.310 |
| 4 | Lubelski | 0.439 | 70 | Szczecinecko-Pyrzycki | 0.316 |
| 5 | Krakowski | 0.438 | 69 | Szczeciński | 0.316 |
| **Human capital** | | | | | |
| 1 | Gdański | 0.459 | 73 | Szczecinecko-Pyrzycki | 0.224 |
| 2 | Krakowski | 0.458 | 72 | Koszaliński | 0.265 |
| 3 | Białostocki | 0.443 | 71 | Chełmsko-Zamojski | 0.269 |
| 4 | Warszawski Zachodni | 0.443 | 70 | Jeleniogórski | 0.275 |
| 5 | Trójmiejski | 0.440 | 69 | Bialski | 0.281 |
| **Natural environment** | | | | | |
| 1 | Warsaw | 0.443 | 73 | Wrocław | 0.214 |
| 2 | Nowotarski | 0.438 | 72 | Szczecin | 0.265 |
| 3 | Szczeciński | 0.434 | 71 | Kaliski | 0.267 |
| 4 | Cracow | 0.423 | 70 | Starogardzki | 0.268 |
| 5 | Gdański | 0.421 | 69 | Radomski | 0.270 |
| **Innovativeness and entrepreneurship** | | | | | |
| 1 | Warsaw | 0.638 | 73 | Wałbrzyski | 0.221 |
| 2 | Trójmiejski | 0.560 | 72 | Szczecinecko-Pyrzycki | 0.278 |
| 3 | Wrocław | 0.559 | 71 | Gorzowski | 0.280 |
| 4 | Warszawski Zachodni | 0.537 | 70 | Sosnowiecki | 0.296 |
| 5 | Cracow | 0.528 | 69 | Nyski | 0.297 |
| **Level of socioeconomic development** | | | | | |
| 1 | Warsaw | 0.482 | 73 | Szczecinecko-Pyrzycki | 0.282 |
| 2 | Cracow | 0.455 | 72 | Nyski (2006) | 0.230 |
| 3 | Trójmiejski | 0.451 | 71 | Wałbrzyski | 0.310 |
| 4 | Warszawski Zachodni | 0.445 | 70 | Inowrocławski | 0.312 |
| 5 | Krakowski | 0.435 | 69 | Chełmsko-Zamojski | 0.316 |
| 6 | Gdański | 0.433 | 68 | Sosnowiecki | 0.322 |
| 7 | Wrocławski | 0.424 | 67 | Krośnieński | 0.324 |
| 8 | Warszawski Wschodni | 0.420 | 66 | Jeleniogórski | 0.326 |
| 9 | Poznański | 0.416 | 65 | Świecki | 0.327 |
| 10 | Poznań | 0.405 | 64 | Gorzowski | 0.328 |

Source: own compilation based on the research conducted.

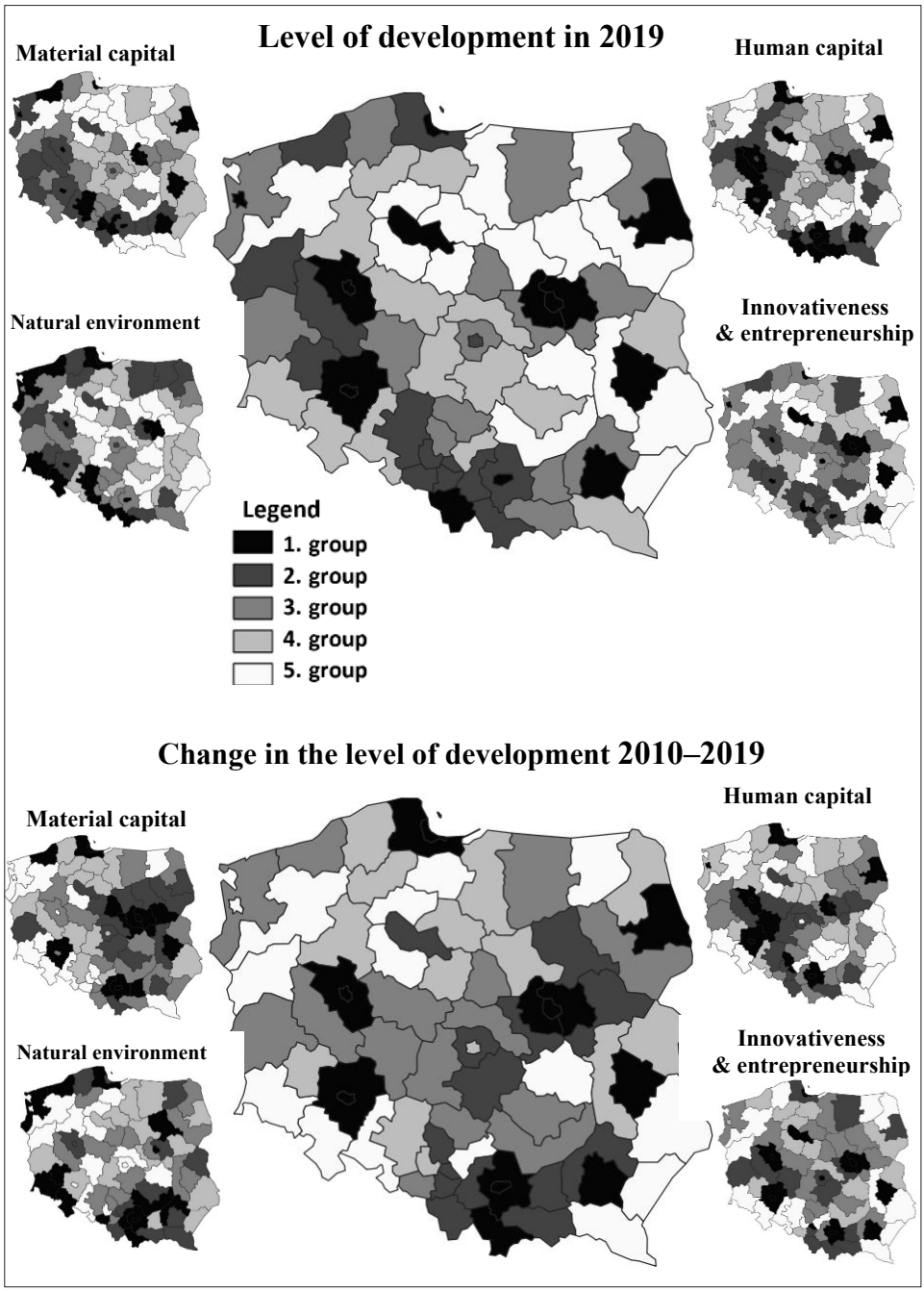


**Figure 1. Variation in the level of socioeconomic development in the subregions of Poland**

Source: own compilation based on the research conducted.

Figure 1 and Tables 2 and 3 present the results of the research work. Table 2 shows the NUTS-3 units with the highest and lowest synthetic gap values within the respective components of the socioeconomic development calculated separately for 2019. Table 3 shows the NUTS-3 subregions with extreme synthetic gap values calculated for changes in the years 2010–2019. Figure 1 contains choropleths exhibiting spatial differentiation in the level of socioeconomic development of NUTS-3 subregions in Poland for 2019, as well as changes in the level of development for the years 2010–2019.

## Conclusions based on research conducted on the respective factors of development

Spatial differentiation of the 73 subregions of the NUTS-3 level in Poland has been presented, based on the level of socioeconomic development and the four major cities, as constituting the factors of development (Figure 1). The value of the synthetic gap representing the level of socioeconomic development in 2019 ranged from 0.24 to 0.52 (Table 2). The value of the gap that represents the change in the level of socioeconomic development of the subregions in the years 2010–2019 ranged from 0.28 to 0.48 (Table 3). A similar differentiation was observed in the case of material capital (0.26–0.56 for 2019 and 0.27–0.46 for the period 2010–2019), human capital (0.22–0.56 and 0.22–0.46, respectively), natural environment (0.14–0.39 and 0.21–0.44, respectively) and both innovativeness and entrepreneurship (0.16–0.69 and 0.22–0.64, respectively).

Based on the level of development of material capital, the highest value of the synthetic gap in 2019 occurred for the NUTS-3 units that comprise the major cities: Warsaw, Wrocław, Cracow and Poznań, and the lowest for the subregions: Nowosądecki, Ełcki, Radomski, and Ciechanowski. The decisive elements in shaping a high position for a NUTS-3 unit were the length of roads and bike routes per 100 km$^2$, very well-developed technical network infrastructure, average usable area of a dwelling per person, as well as the accessibility of creches and kindergartens. The decisive elements in shaping a low position were the following: low proportion of children under the age of three in the care of creches, inadequacies in the development of the technical network infrastructure, and low level of healthcare. From another angle, related to the analysis of the dynamic dimension, the greatest changes in the level of development of material capital in the years 2010–2019 were observed in the Warszawski Zachodni, Warszawski Wschodni and Wrocławski subregions, whereas the lowest in Szczecin and the Nyski and Inowrocławski subregions. The decisive factors in terms of the high positions in the ranking of the NUTS-3 units were: improvement in the state of the network and road infrastructures, decrease in the number of road accidents, and

child care by kindergartens and creches. The decisive factors in terms of the low positions in the ranking were the lack of improvement in access to doctors and the lack of development of the technical infrastructure.

Taking into account the level of human capital development, the highest synthetic gap value was observed in 2019 for Cracow as well as for the Rzeszowski and Wroclaw subregions, while the lowest was observed for Łódź and for the Sosnowiecki and Wałbrzyski subregions. The high position for the units was due to: proportion of students per 1000 inhabitants, low level of unemployment, and high level of the passability of final school exams. The low position for the units was due to very high share of people of post-production age in the total population (29% in Łódź, and 26% in the Sosnowiecki subregion) and a relatively high proportion of the unemployed with higher education in the total population. Taking into account the analysis in the dynamic dimension, the largest change in the level of human capital development in the years 2010–2019 was observed in the Gdański, Krakowski and Białostocki subregions, and the lowest in the Szczecinecko-Pyrzycki, Koszaliński and Chełmsko-Zamojski subregions. What played a decisive role in the establishment of a weaker position in the NUTS-3 units in terms of the change in the development of human capital were: increase in the share of the unemployed with higher education in the total number of the unemployed, decrease in the passability of final school exams and increase in the indicator of age dependency. A high position in the ranking of the subregions was shaped by: high positive balance of migration, high increase in the passability of final school exams, increase in the share of people doing physical activity, and relatively high decrease in the share of the unemployed under the age of 25 in the total number of the unemployed.

For the state of the natural environment, the highest value of the synthetic gap in 2019 was registered in the Rybnicki and Nowotarski subregions as well as in Warsaw, and the lowest in the Radomski, Sandomiersko-Jędrzejowski and Tarnowski subregions. The high position of the NUTS-3 units was due to: the high input directed towards water management per inhabitant (the highest registered in the Rybnicki subregion was over four times higher than in the second subregion, the Wałbrzyski subregion) as well as the input directed towards environmental protection per inhabitant. A low position in the ranking of the subregions was due to: significant emission of particular pollutants and high water use (the highest was registered in the Sandomiersko-Jędrzejowski subregion). Taking into account the analysis carried out in the dynamic dimension, the greatest improvement in the condition of the natural environment in the years 2010–2019 was observed in Warsaw, as well as in the Nowotarski anSzczeciński subregions, and the lowest in Wrocław, Szczecin and the Kaliski subregion. A weaker position of the units was due to the highest increase in water and electricity per capita, as well as an increase in the emission of pollution. A stronger position of the units in the ranking

was due to a relatively high increase in the share of the entities of water sewage, as well as the highest increase in the input directed towards environmental protection in the researched period.

For the level of the development of innovativeness and entrepreneurship, the highest synthetic gap value in 2019 was registered in Warsaw, Cracow and Poznań (these cities had the highest share of entities conducting a financial activity in the total number of economic entities, the highest share of microentities per 1000 inhabitants, as well as the highest share of newly registered entities in the creative sector in the number of newly registered entities in total), and the lowest in the Świecki, Chojnicki and Krośnieński subregions (with the lowest number of microentities per 1000 inhabitants, as well as the lowest share of private entities in the total number of enterprises). For the analysis conducted in the dynamic dimension, the greatest progress in the level of development in innovativeness and entrepreneurship in the years 2010–2019 was observed in Warsaw, Wrocław and Trójmiasto, and the lowest in the Wałbrzyski, Szczecinecko-Pyrzycki, and Gorzowski subregions. The factors that were decisive in the case of the position of the NUTS-3 units in the dynamic dimension were: proportion of economic entities conducting a financial or educational activity in the total number of economic entities, share of entities conducting a service activity in the total number of economic entities as well as GDP per capita (for all three indicators the highest growth was registered in Warsaw), as well as registration of inventions at the Polish Patent Office per million inhabitants (the highest growth in Wrocław) as well as changes in the structure of the size of enterprises.

## Concluding remarks – General level of socioeconomic development of the NUTS-3 subregions in Poland

In summarizing the research results on the level of socioeconomic development of the 73 NUTS-3 subregions in Poland, one may draw the following conclusions. The level of general development of the subregions in 2019 was stated based on 60 indicators subcategorised within four factors of development: material capital, human capital, natural environment, and innovative entrepreneurship.

The highest value of the synthetic gap was registered in major provincial cities: Warsaw, Cracow, Wrocław and Poznań as well as in the Trójmiejski subregion (comprising Gdańsk, Gdynia and Sopot). The hypothesis stated at the beginning of the article has been positively verified. Furthermore, among the 6 subregions being single cities (Warsaw, Cracow, Wrocław, Poznań, Szczecin and Łódź), 5 were classified as a group of units with a very high level of socioeconomic development (10% of the most developed regions). Łódź was classified in the 26th position for the ranking of the best-developed NUTS-3 units in Poland. For

the analysis conducted in the dynamic dimension, the highest change in the level of socio-economic development in the years 2010–2019 was observed in Warsaw, Cracow and Trójmiasto. Poznań and Wrocław were also high in the ranking (10th and 13th positions, respectively). Łódź, in turn, was placed in 45th position among the 73 subregions with the highest change in socioeconomic development in the years 2010–2019, with Szczecin in the 61st position. It is worth noting that the subregions with a very high level of socioeconomic development were, in principle, those units where the greatest change was recorded in the level of this development in the years 2010–2019 (and vice versa). Apart from the major cities, the group also included the subregions surrounding the capitals of voivodeships, such as: Gdański, Poznański, Wrocławski, Warszawski Wschodni, Warszawski Zachodni, Krakowski, Rzeszowski, and Bydgosko-Toruński. On the other hand, the subregions with the weakest level of socio-economic development were the NUTS-3 units located on the periphery of as well as far away from the strongest regions, e.g. the Sandomiersko-Jędrzejowski, Szczecinecko-Pyrzycki, Chełmsko-Zamojski, Radomski, and Inowrocławski subregions. One may thus conclude that to a large extent the activities taken within the last ten years played a major role in shaping the current level of development of the respective subregions in Poland, the latter period representing one of full participation in the EU cohesion policy, while increasing developmental disparities at the level of NUTS-3 units were observed, to the largest extent, where the level of socioeconomic development increased in the strongest subregions in economic terms (in Warsaw and in the capitals of the provinces), and to the least extent in the relatively lower developed subregions (e.g. those located on the northern, north-eastern and south-western border of Poland). Substantial developmental disparities can also be observed at the region level. Within almost all of them, there are subregions at a very high level of socioeconomic development, as well as those categorised in the group of the 20% least developed NUTS-3 units in Poland.

The research procedure was unique, as in the subject literature it is not possible to find a different compilation in which the level of regional development of the Polish regions was determined using the synthetic development gap created based on Hellwig's reduction method. The conclusions of other authors researching regional development who use different methods are, however, similar. They also specify the highest level of development occurring in the regional capitals, and the level thereof usually decreasing with increasing distance from the central units. Similarly, the analyses conducted by Eurostat based on GDP per capita, the richest regions include the capital units. The comparison mentioned above therefore confirms the correctness of the results obtained, irrespective of the method selected, and that the classification of a particular region into the group of better or worse developed regions was appropriate.

In considering the above-mentioned, the research process as well as the results may thus constitute both an impulse towards conducting deeper analyses in this direction, as well as being potential inspiration for those Polish organs within the scope of the manner of specifying the richest and the poorest regions with the purpose of securing the effective management of the cohesion policy in terms of spatial concentration.

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*Summary*

The compilation involved an analysis of the level of socioeconomic development at the NUTS-3 subregion level in Poland, based on 60 indicators classified within 4 subcomponents (factors) of regional development: material capital, human capital, natural environment and both innovativeness and entrepreneurship. The purpose of the article is to present the varied nature of the socio-economic level of development in Poland based on the NUTS-3 subregion concept. The level of socio-economic development, as well as the level of its shaping factors, is presented based on a synthetic gap exhibiting the taxonomic distance of a particular subregion in terms of the established pattern of development. The examination was carried out in the static dimension (based on the values of the indicators in 2019) as well as in parallel with the dynamic dimension (based on changes in the values of the gaps in the years 2010–2019). In the compilation, a hypothesis which was tested according to which the socio-economic development of the subregions in Poland is highly varied, and its highest level is registered in the largest provincial cities: Warsaw, Cracow, Wrocław and Poznań, and the lowest in the subregions far away from these major cities, which constitute the centers of development.

*Keywords*: synthetic gap, provinces, distance from the role model, Hellwig reduction.

## Zmiany poziomu rozwoju społeczno-gospodarczego w Polsce w ujęciu subregionalnym

*Streszczenie*

W opracowaniu dokonano analizy poziomu rozwoju społeczno-gospodarczego subregionów (NUTS-3) w Polsce na podstawie 60 wskaźników ujętych w ramach czterech składowych (czynników) rozwoju regionalnego: kapitału materialnego, kapitału ludzkiego, środowiska naturalnego oraz innowacyjności i przedsiębiorczości. Celem artykułu jest określenie zróżnicowania poziomu rozwoju społeczno-gospodarczego Polski w układzie jednostek NUTS-3. Poziom rozwoju społeczno-gospodarczego, a także poziom rozwoju jego czynników przedstawiono na podstawie syntetycznego miernika ukazującego odległość taksonomiczną danego subregionu od ustalonego wzorca rozwoju. Badanie równolegle przeprowadzono w ujęciu statycznym (na podstawie wartości wskaźników w 2019 roku) oraz w ujęciu dynamicznym (na podstawie zmian wartości wskaźników w latach 2010–2019).

W opracowaniu weryfikacji poddano hipotezę, według której rozwój społeczno-gospodarczy subregionów w Polsce jest mocno zróżnicowany, a najwyższy jego poziom odnotowuje się w naj-

większych miastach wojewódzkich: Warszawie, Krakowie, Wrocławiu, czy Poznaniu, natomiast najniższy – w subregionach oddalonych od wskazanych dużych miast stanowiących centra rozwoju. Na podstawie przeprowadzonych badań można stwierdzić, iż – z jednej strony – o bieżącym poziomie rozwoju poszczególnych subregionów w Polsce w znacznej mierze decydują działania podejmowane w ostatnim dziesięcioleciu, czyli w okresie pełnego uczestnictwa w polityce spójności Unii Europejskiej, a z drugiej strony – obserwuje się coraz większe dysproporcje rozwojowe na poziomie jednostek NUTS-3, gdyż w największym stopniu zwiększył się poziom rozwoju społeczno-gospodarczego w najsilniejszych gospodarczo subregionach, a w najmniejszym stopniu – w relatywnie słabiej rozwiniętych subregionach (np. w tych, które położone są przy północnej, północno-wschodniej i południowo-zachodniej granicy Polski).

*Słowa kluczowe:* miernik syntetyczny, powiaty, odległość od wzorca, redukcja Hellwiga.

JEL: O11, O20, O47.

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# Household income inequality in Poland between 2005 and 2019: A decomposition of the Gini coefficient by income sources

## Introduction

The decomposition of income inequality by income sources is an important part of the analysis of income disparities, since it helps to assess the contribution of individual factor components to total income inequality. The decomposition of income disparities may also be used as a preliminary analysis of income inequality determinants.

Several years before Poland's entry into the EU, the issues surrounding the economic and social consequences of this decision were a subject of considerable debate. Some people argued that one of the effects of Poland's accession to the EU would be a considerable increase in income inequality. More than a decade after entry into the EU, this unfounded fear is not supported by official data, regardless of their source. Another interesting issue is the structure of income inequality and the question whether and to what extent it has changed after 2004.

This paper empirically analyses the decomposition of the Gini coefficient by factor components in Poland from 2005 to 2019 based on non-identifiable, individual data from household budget surveys (Poland's Central Statistical Office). The decomposition was used to assess the contribution of individual income components to overall income inequality in Poland. The method of decomposition by income components applied in this study was the approach of Lerman and Yitzhaki (1985). The following structure of the study was applied to the aim of this study. The first part presents the decomposition method used in the empirical

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analysis. The second part contains a description of the data used in this study. The results of the Gini decomposition by income sources in Poland from 2005 to 2019 are presented in part three. The analysis is preceded by an overview of the trends in income inequality in Poland during the analysed period. The fourth part concludes the report.

## ANALYTICAL FRAMEWORK

The method of Gini decomposition by income sources applied in this empirical analysis was taken from the study of Lerman and Yitzhaki (1985). This approach has been widely used in the literature on income inequality decomposition and may be presented as follows (Lerman, Yitzhaki, 1985; Stark, Taylor, Yitzhaki, 1986). The point of departure is one of the Gini coefficient formulas:

$$(1) \quad G_0 = \frac{2cov[y_0,F(y_0)]}{\mu_0} \ ,$$

where $G_0$ represents the Gini coefficient of overall income, and $y_0$, $\mu_0$, and $F(y_0)$ denote income, mean income, and the cumulative distribution of total income, respectively. It is assumed that household income can be divided into $K$ income components: $y_0 = \sum_{k=1}^{K} y_k$, where $y_1$, …, $y_k$ are income sources. Thus, we can write and transform equation (1) as follows:

$$(2) \quad G_0 = \frac{2\sum_{k=1}^{K} cov[y_k,F(y_0)]}{\mu_0} =$$

$$(3) \quad = \sum_{k=1}^{K} \left(\frac{cov[y_k,F(y_0)]}{cov[y_k,F(y_k)]}\right) \times \left(\frac{2cov[y_k,F(y_k)]}{\mu_k}\right) \times \left(\frac{\mu_k}{\mu_0}\right) =$$

$$(4) \quad = \sum_{k=1}^{K} R_k G_k S_k$$

where $S_k$ is the share of source $k$ of household incomes in the total income, $G_k$ is the Gini coefficient corresponding to income component $k$, and $R_k$ is the Gini correlation of component $k$ with the total income:

$$(5) \quad R_k = \frac{cov[y_k,F(y_0)]}{cov[y_k,F(y_k)]} \ .$$

The Gini correlation takes on values between -1 and 1, i.e. 1) if $R_k$ is equal to -1, then $y_k$ is a decreasing function of total income, 2) if $R_k$ is equal to *0*, then $y_k$ and $y_0$ are independent, and 3) if $R_k$ is equal to 1, then $y_k$ is an increasing function of overall income.

Stark, Taylor and Yitzhaki (1986) show that the effect of a marginal change in individual income sources on overall income inequality may be calculated as follows[2]. If we consider an exogenous change in the income of each household of component $k$ equal to $e_k y_k$, where $e_k$ is close to 1, then:

$$\frac{\partial G_0}{\partial e_k} = S_k(R_k G_k - G_0)\,, \tag{6}$$

$$\frac{\partial G_0 / \partial e_k}{G_0} = \frac{S_k\, R_k G_k}{G_0} - S_k \tag{7}$$

The decomposition approach of Lerman and Yitzhaki (1985) is similar to the method of Fei *et al*. (1978), but both methods differ in their derivation and somewhat in their interpretation (Lerman, 1999). However, adding a part of the decomposition of Fei *et al*. (1978) may facilitate and be helpful in the interpretation of the contribution of individual income sources to overall income. The components of their Gini decomposition are the following (cf. Fei et al., 1978), pp. 47–48):

$$G_0 = \sum_{k=1}^{K} S_k \overline{G_k}, \tag{8}$$

where $\overline{G_k}$ is the so-called pseudo-Gini, which is simply the product of the Gini correlation of income source $k$ and the Gini coefficient corresponding to income component $k$. The term *pseudo-Gini* is sometimes substituted by *puppet Gini coefficient*, "centralising rate of the income source $k$" or "concentration ratio of income source $k$" in the literature on income inequality (Giorgi, 2011; Chen, Zhou, 2005). The difference between the pseudo-Gini of the income source $k$ and the Gini coefficient corresponding to the income component $k$ consists of the ordering of the income source $k$. $G_k$ is calculated by the order of source $k$ itself, whereas $\overline{G_k}$ is calculated for source $k$, when the ranking is based on total income. Thus, both inequality measures are identical only if the ranking of the income component $k$ corresponds to the ranking of overall income.

Comparing the values of the pseudo-Gini for each income source $k$ and the Gini coefficient for overall income allows us to easily and directly assess the impact of each income component on overall income inequality:

(1) if $\overline{G_k} < 0$, then income source $k$ necessarily reduces overall income inequality,

(2) if $\overline{G_k} > G_0$, then income source $k$ enhances total income inequality,

[2] A detailed derivation can be found in Stark, Taylor and Yitzhaki (1986).

(3) if $0 < \overline{G_k} < G_0$, then the contribution of income source $k$ to overall income inequality is positive, although the source reduces income inequality to some extent[3].

The economic literature yields numerous empirical studies on the decomposition by income components. Part of this research is dedicated to the decomposition of inequality measured by the Gini coefficient and some of it to the method of Lerman and Yitzhaki (1985). Among the empirical studies that used their approach for decomposing income inequality in individual countries or in groups of countries, we can mention Stark, Taylor, Yitzhaki (1986), Karoly, Burtless (1995), Achdut (1996), Garner, Terrell (1998), Brandolini, Smeeding (2009), Azam, Shariff (2011), Jędrzejczak (2008) and (2010), García-Peñalosa, Orgiazzi (2013), Amarante (2016), Rani, Furrer (2016), González Pandiella, Gabriel (2017), Černiauskas, Čiginas (2020), and Wołoszyn (2020). All of these studies use different databases and data adjustments, so their results are not directly comparable (or a general comparison has to be made with great caution), however this research allows for a better understanding of the determinants of income inequality in the analysed countries.

## DATA

The decomposition of the Gini coefficient by income sources in Poland from 2005 to 2019 was based on non-identifiable, individual data from household budget surveys (HBS) collected by Poland's Central Statistical Office (GUS)[4]. GUS conducts the HBS every year and the data are one of the main sources of information on Poles' expenditures, living conditions and incomes. The surveys are based on the monthly rotation method and on the representative method. From 2005 to 2019, the HBS covered approximately 37,500 households, which is equivalent to slightly fewer than 110,000 persons (with the exception of 2005, when almost 35,000 households were surveyed).

Since 2005, only one significant change has been made in the methodological system of the HBS: different weightings of household data were used in 2005–2012 and 2013–2019. A part of the households selected by GUS refuse to participate in the survey; thus, the structure of the surveyed sample and the

[3] Stark, Taylor and Yitzhaki (1986, p. 731) use a very enlightening illustration of the positive impact of the pseudo-Gini on income inequality in point (3). They use the example of a chemical experiment where a highly concentrated solution (overall income inequality minus source *k*) is being diluted by a less concentrated solution (income source *k* with the property of $0 < \overline{G_k} < G_0$), but one that is still concentrated (!). The effect is a mixture of both solutions where the less concentrated one contributes (positively) to the overall concentration of the mixture.

[4] The results of the empirical analysis presented in this study are the author's own calculations based on data made available by GUS. GUS is not responsible for the conclusions contained in this paper.

selected one differ in regard of socioeconomic traits. Therefore, the survey results must be weighted with the national census data broken down by the number of people living in urban and rural areas (GUS, 2014, p. 31) to allow for the generalisation of the results to the whole population of Polish households. For the years 2005–2012, the 2002 National Census was applied and for 2013–2019, the 2011 National Census. However, apart from this exception, minor methodological changes that occurred during the analysed period did not have any noticeable impact on the results of this empirical study (e.g. other income). Thus, the results HBS data and the obtained for individual years from 2005 to 2012 and, separately, from 2013 to 2019 are directly comparable.

For the purpose of this study, income was defined as follows. Overall income is the sum of the income components that constitute available income according to the definition of GUS. The following income sources were taken into account:

1. income from employment,
2. income from a private farm,
3. income from self-employment,
4. income from ownership,
5. income from property rental,
6. social security benefits,
7. other social benefits,
8. other income (including gifts and alimony payments).

In this study, the household was chosen as the unit of analysis. Household income was adjusted using the modified equivalence scale, which assigns a weight of 1 to the head of the household, 0.5 to each person aged 14 and over, and 0.3 to each child.

Income from a private farm in agriculture requires a comment. Throughout the period analysed, about 20–25% of households that recorded income from this source reported negative income in this category. Since the calculation of the Gini coefficient requires income to be non-negative, negative incomes from a private farm in agriculture were substituted by 0. Therefore, this adjustment could have had some impact on the real contribution of income from this category to overall income.

The calculations were performed using Excel and DAD 4.6. – software for distributive analysis (Jean-Yves Duclos, Abdelkrim Araar and Carl Fortin, "DAD: A Software for Distributive Analysis/Analyse Distributive", MIMAP programme, International Development Research Centre, Government of Canada, and CIRPÉE, Université Laval).

## Empirical results

Before we analyse the components of the Gini coefficient decomposition, it is important to take a look at overall income inequality in Poland between 2005 and

2019. Figure 1 presents four time series of income disparities measured by the Gini coefficient. The differences between the data are clearly visible, especially if we compare, for example, the trends in inequality based on Eurostat (EU-SILC) and GUS (HBS) data[5]. We must bear in mind that the differences in income inequality shown by individual data result from different income distributions being taken into account. In particular, the differences result from the choice of the unit of analysis (EU-SILC – a person, HBS – a household), the definition of income (EU-SILC – disposable income, HBS – available income) and the applied equivalence scale (EU-SILC – modified OECD equivalence scale, HBS – per capita income). In addition, methodological issues related to collection of the data (EU-SILC and HBS are two different databases) is a very important problem; e.g. the EU-SILC are annual data and the HBS are collected on a monthly basis.

Figure 1 shows changes in income inequality that occurred in Poland over the analysed period. Eurostat data show the most significant decrease in income disparities, while the authors' calculations based on HBS data (PGG) indicate that this decrease was rather moderate. Apart from the interpretation of this change in income inequality, which is the result of the adoption of different assumptions underlying the calculations (see: the paragraph above), an interesting research problem is the structure of income disparities and the drivers of their decline. The Gini coefficient decomposition carried out below is intended to answer this question.

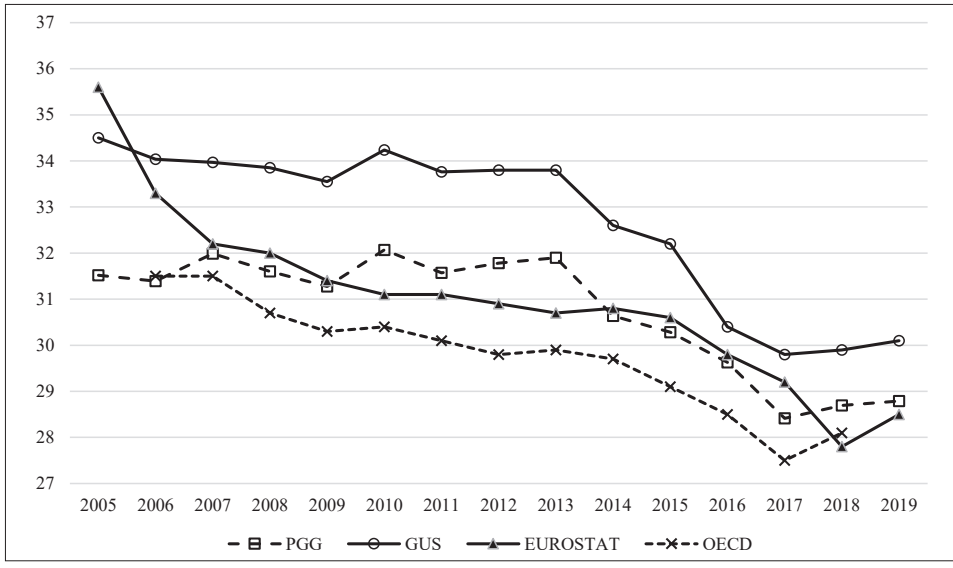


**Figure 1. Income inequality (Gini, in %) in Poland from 2005 to 2019**

Source: Eurostat; OECD; GUS; own calculation based on HBS (PGG) data.

[5] To be precise, both EU-SILC as well as HBS data are collected by GUS.

Figure 2 shows the relative contribution to the overall income inequality in Poland of the eight income sources analysed. It is clearly seen that income from employment played the most significant role in explaining income disparities from 2005 to 2019. This impact was continuously growing from 2005 to 2011 and then became variable, reaching a 12 percentage point higher value in 2019 compared to 2005. Such a considerable contribution to total income inequality (more than 50% at the beginning and about 64% at the end of the analysed period) resulted mainly from the increasing share of income from employment in overall income and – to a lesser extent – from the growing correlation of this income source with total income. The distribution of income from employment became more equal during the analysed period.

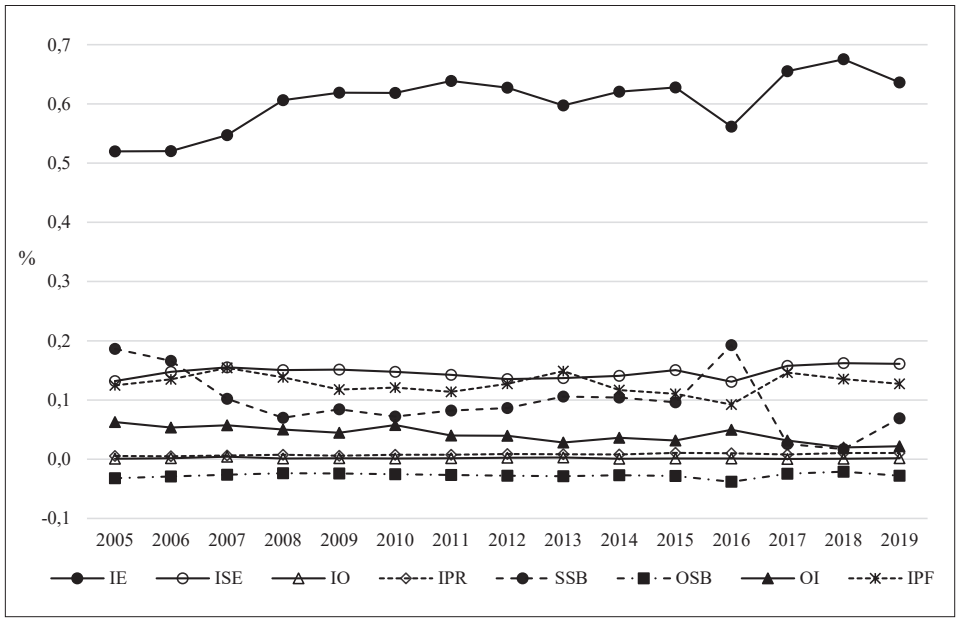


**Figure 2. Relative contribution to the overall income inequality of individual income components in Poland – 2005–2019**

Note: IE – income from employment; ISE – income from self-employment; IO – income from ownership; IPR – income from property rental; SSB – social security benefits; OSB – other social benefits; OI – other income (including gifts and alimony payments); IPF – income from a private farm.

Source: Own calculation based on HBS data.

Three other sources of income – from self-employment, from private farms, and from social security benefits – contributed to overall income inequality to a much lesser extent, however, still having a noticeable impact. The significance

of social security benefits in explaining income inequality changed in an almost contrary direction to the contribution of income from employment (Figure 2). The relative contribution of this source of income to the income disparities was the most variable during the analysed period. The role of social security benefits in explaining income inequality decreased visibly between 2005 and 2008 (from about 18.5% to about 7%), remained stable over the next seven years, then increased to over 19% in 2016, and then its significance declined (to about 7% in 2019). Changes in the contribution of this income source were consistent with the variability (direction) of all three Gini decomposition components. Comparing 2019 with 2005, we can observe a slight decrease in the share of social security benefits in overall income, a small increase in the Gini coefficient of this income source, and a significant drop in the Gini correlation, which, however, remained positive. This means that social security benefits were a positive function of total income, but this relationship weakened considerably over time.

The contribution of income from self-employment to income inequality in Poland was relatively stable over the analysed period, at about 14–16%; however, it increased slightly between 2005 and 2019. The distribution of this income source was very unequal and highly correlated with overall income, and its increasing role in explaining income disparities resulted mainly from its increasing share in overall income, which was still small (about 8% in 2019) compared to income from employment or social insurance benefits (about 47% and 30%, respectively).

The share of income from private farms in total income was somewhat smaller than that from self-employment income and decreased from 7% (2005) to 5% (2019). On the other hand, farm income became more unequal during this period. The role of income from agriculture in explaining income inequality in Poland varied between 2005 and 2019 and was about the same at the beginning and at the end of the analysed period. The variability in the contribution of this source of income was mainly due to changes in the Gini correlation term.

As has already been mentioned, income from a private farm in agriculture gives rise to some problems in interpreting its contribution to overall income inequality because this source of income was subject to the adjustment of negative incomes. The issue of negative incomes in this category of income source probably results from the fact that the HBS data are collected on a monthly basis. Since income from a private farm in agriculture "is measured as a difference between the farm output (including natural consumption), the supplement related to the use of a private farm in agriculture and the current investment in the farming production and farm-related taxes" (GUS, 2014, p. 33), income in this category may be negative in some months. However, the calculation of income inequality and the contribution of farm income to income inequality would probably be more precise if income from this source was calculated on an annual basis to avoid the bias related to negative income.

Income from ownership and income from property rental had a negligible impact on explaining income disparities in Poland between 2005 and 2019. Both income sources were the most unequally distributed and highly positively correlated with overall income. Their share was increasing slightly over the analysed period.

Other social benefits were the only income source that was negatively correlated with overall income, thus it was the only income source that necessarily contributed to reducing overall income inequality ( $\overline{G_k} < 0$ ). This means that not only was the share of other social benefits declining with overall income, but the absolute value of those benefits was decreasing with total income.

The contribution of other income (including gifts and alimonies) to income inequality decreased from year to year during the analysed period. This income source was unequally distributed, however, its correlation with overall income was low, which explains why this income component was reducing income inequality between 2005 and 2019. Nevertheless the share of other income in overall income was decreasing, which resulted in a diminishing contribution of this income source to total income inequality.

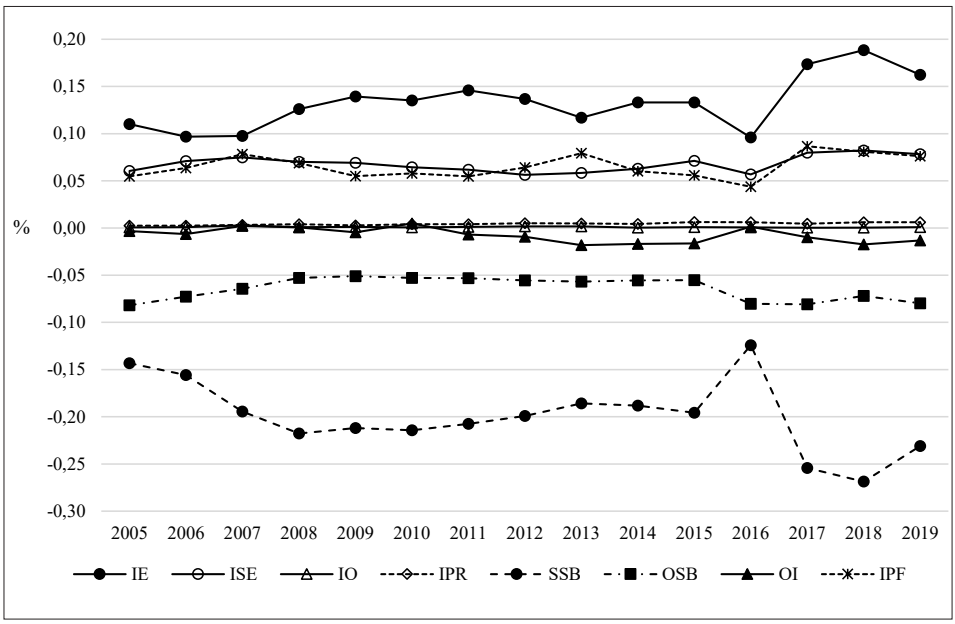


**Figure 3. Effect of a marginal percentage change in income sources on overall income inequality in Poland – 2005–2019**

Note: Abbreviations as in Figure 2.

Source: Own calculation based on HBS data.

Three income sources were characterised by a concentration coefficient with a value lower than the Gini coefficient for overall income. This means that these income sources had an equalising effect on overall income inequality in Poland. Among these three sources, only other social benefits had an absolute reducing effect on income inequality. As mentioned above, other social benefits were the only source with a negative Gini correlation and a negative concentration coefficient. Figure 3 presents the effect of a small percentage change in individual income sources on overall income inequality. As can be seen, a marginal change in three categories of income – social insurance benefits, other social benefits, and other income – had the effect of reducing total income inequality over the analysed period. The largest response to a marginal percentage change in income source $k$ on the overall income inequality was recorded in the case of income from employment (a positive impact between approximately 0.10% and 0.19%) and social security benefits (a negative impact between approximately 0.13% and 0.27%). The effect of a marginal percentage change of property income and income from rental of a property or land on total income inequality was very small, although it was increasing for property rental. A relatively small marginal effect on overall income inequality was observed in the case of income from agriculture, however, as has already been pointed out, this income component has to be treated with caution.

## CONCLUSIONS

The Gini coefficient decomposition by income components carried out in this study revealed that income from employment explained the overall income inequality in Poland to the greatest extent among all income sources throughout the period 2005–2019. The contribution of income from employment to total income inequality increased by 12 percentage points between 2005 and 2019, reaching almost 68% at its peak in 2018. On the other hand, the input of social security benefits to overall income inequality was the most variable throughout the analysis period, eventually decreasing its role in explaining inequality. The rest of the income sources did not show such great variability in their contribution to total income inequality. Income components that were distributed most unequally and were highly correlated with total income, income from property, and income from property rental, had a marginal contribution to overall income inequality because of their very small share in total income. Other social benefits revealed an absolute reduction impact on total income inequality. The importance of other income decreased significantly between 2005 and 2019.

The greatest impact of a marginal change in income components on overall income inequality was observed in the case of income from employment (positive

effect) and social security benefits (negative effect). Among all of the analysed income sources, social security benefits, other social benefits, and other income revealed a negative effect of a marginal change upon total income disparities throughout the analysed period.

Overall, the results of the Gini decomposition obtained in this empirical study are consistent with the inequality structure in other developed countries. For example, in developed countries, income from hired work usually explains the bulk of overall income disparities, while social benefits such as unemployment benefits and housing subsidies typically contribute to a reduction in income inequality.

Some research has been published to date on inequality decomposition in Poland based on the method of Lerman and Yitzhaki (1985), among them Brandolini, Smeeding (2009), Jędrzejczak (2008) and (2010) and Wołoszyn (2020). The mentioned studies analyse the income inequality decomposition over different time spans or single years, whereas this study takes into account 15 consecutive years, making a more detailed analysis possible. The research listed above also differs in the data adjustment or database applied (Brandolini, Smeeding, 2009). However, in general, the conclusions on the structure of income inequality drawn from these studies are in line with our research.

As Lea Achdut emphasises in the comment in the chapter of Robert I. Lerman (1999), the decomposition of income inequality by income sources is only one way to explain trends in income inequality. A useful extension of this analysis would be the decomposition of income inequality by subgroups or a time series model explaining the relationship between income inequality (components) and its potential determinants. Such a comprehensive analysis would make it possible to identify the main factors influencing inequality and their change over time. Furthermore, this empirical study could be extended by several years. However, a problem of data comparability would arise, as significant methodological changes occurred in HBS in the years prior to 2005.

It should be emphasised that the assumptions adopted in this empirical study determine the results obtained and their interpretation. These assumptions concern mainly the unit of analysis, the definition of income, and the equivalence scale. Thus, a very important remark is that the results obtained have to be interpreted carefully, especially because any modification of the assumptions may change the results.

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*Summary*

The aim of this paper is the empirical analysis of the Gini coefficient decomposition by income sources in Poland between 2005 and 2013. The decomposition was used to assess the contribution of income components to the overall income inequality in Poland.

The empirical analysis was based on non-identifiable, individual household budget survey data collected by the Central Statistical Office of Poland. The method of decomposition by income components applied in this study was the approach of Lerman and Yitzhaki (1985).

The study revealed that employment income contributed to the greatest extent to overall income inequality in Poland during the analysis period. At the same time, this income source showed a significant increase in explaining inequality, reaching almost 64% in 2019. Apart from employment, among all of the income sources analysed, only the contribution of social security benefits to income disparities changed significantly, dropping from almost 19% in 2005 to 7% in 2019. Income from self-employment explained about 15% of inequality in Poland throughout the analysed period. The contribution of the rest of income sources to income inequality was also relatively stable, though less significant. The only income category that contributed negatively to inequality was the other social benefits component.

The largest impact of a marginal change in income components on overall inequality was due to income from employment (positive effect) and social security benefits (negative effect). A negative impact of a marginal change in specific income sources on inequality was observed in the case of social security benefits, other social benefits, and other income.

*Keywords:* income distribution, income inequality, decomposition.

## Nierówności dochodów gospodarstw domowych w Polsce w latach 2005–2019 – dekompozycja współczynnika Giniego ze względu na źródła dochodów

*Streszczenie*

Celem niniejszego artykułu jest przeprowadzenie dekompozycji współczynnika Giniego ze względu na źródła dochodów w Polsce w latach 2005–2019. Dekompozycja pozwoliła na ocenę tego, w jaki stopniu poszczególne źródła dochodów wyjaśniają kształtowanie się nierówności dochodów ogółem w Polsce w badanym okresie.

Analiza empiryczna została wykonana na nieidentyfikowalnych, jednostkowych danych z Badań Budżetów Gospodarstw Domowych przeprowadzonych przez Główny Urząd Statystyczny. Posłużono się metodą dekompozycji zaproponowaną przez Lermana i Yitzhakiego (1985).

Badanie ujawniło, że dochody z pracy najemnej w największym stopniu wyjaśniały zróżnicowanie dochodów w Polsce między 2005 a 2019 rokiem. W badanym okresie wkład tego źródła dochodów w nierównościach dochodów wyraźnie wzrastał, osiągając niemalże 64% w 2019 roku. Poza dochodami z pracy najemnej, jedynym źródłem, które wykazywało znaczącą zmienność w wyjaśnianiu zróżnicowania dochodów były świadczenia z ubezpieczeń społecznych, których wkład

zmalał z niemal 19% w 2005 r. do 7% w 2019 r. Dochód z pracy na własny rachunek wyjaśniał około 15% nierówności dochodów ogółem w ciągu całego badanego okresu. Wkład reszty źródeł dochodów był także względnie stabilny, mimo iż mniej znaczący. Jedynym źródłem dochodów, które w ujęciu absolutnym, jednoznacznie przyczyniało się do zmniejszenia nierówności dochodów była kategoria „pozostałe świadczenia społeczne".

Największy wpływ krańcowej zmiany źródła dochodów na nierówności dochodów ogółem w badanym okresie obserwowano w przypadku dochodów z pracy najemnej (dodatni wpływ) oraz świadczeń z ubezpieczeń społecznych (ujemny wpływ). Ujemne oddziaływanie niewielkiej względnej zmiany źródła dochodów na zróżnicowanie dochodów występowało w przypadku świadczeń z ubezpieczeń społecznych, pozostałych świadczeń społecznych i pozostałego dochodu.

*Słowa kluczowe:* rozkład dochodów, nierówności dochodów, dekompozycja.

JEL: D30, D33.

## Appendix

**Table 1A. Composition of income inequality in Poland – 2005–2019**

| Income source | Year | $S_k$ – share of component $k$ in total income | $G_k$ – Gini coefficient corresponding to income component $k$ | $R_k$ – Gini correlation of component $k$ with total income | $G_kR_k$ – concentration coefficient |
|---|---|---|---|---|---|
| *1* | *2* | *3* | *4* | *5* | *6* |
| Income from employment | 2005 | 0.4096 | 0.6780 | 0.5899 | 0.4000 |
| | 2006 | 0.4233 | 0.6599 | 0.5845 | 0.3857 |
| | 2007 | 0.4499 | 0.6386 | 0.6095 | 0.3892 |
| | 2008 | 0.4804 | 0.6233 | 0.6399 | 0.3988 |
| | 2009 | 0.4794 | 0.6284 | 0.6424 | 0.4037 |
| | 2010 | 0.4836 | 0.6270 | 0.6543 | 0.4103 |
| | 2011 | 0.4926 | 0.6251 | 0.6548 | 0.4093 |
| | 2012 | 0.4907 | 0.6263 | 0.6490 | 0.4065 |
| | 2013 | 0.4804 | 0.6274 | 0.6321 | 0.3966 |
| | 2014 | 0.4877 | 0.6199 | 0.6310 | 0.3912 |
| | 2015 | 0.4950 | 0.6095 | 0.6311 | 0.3846 |
| | 2016 | 0.4655 | 0.6272 | 0.5673 | 0.3558 |
| | 2017 | 0.4815 | 0.6037 | 0.6489 | 0.3917 |
| | 2018 | 0.4868 | 0.6065 | 0.6648 | 0.4032 |
| | 2019 | 0.4738 | 0.6086 | 0.6436 | 0.3917 |
| Income from self-employment | 2005 | 0.0717 | 0.9519 | 0.6098 | 0.5805 |
| | 2006 | 0.0767 | 0.9526 | 0.6344 | 0.6043 |
| | 2007 | 0.0803 | 0.9494 | 0.6511 | 0.6182 |
| | 2008 | 0.0801 | 0.9465 | 0.6266 | 0.5931 |
| | 2009 | 0.0821 | 0.9434 | 0.6102 | 0.5757 |
| | 2010 | 0.0829 | 0.9407 | 0.6060 | 0.5701 |
| | 2011 | 0.0807 | 0.9415 | 0.5926 | 0.5579 |
| | 2012 | 0.0791 | 0.9426 | 0.5775 | 0.5443 |
| | 2013 | 0.0785 | 0.9427 | 0.5893 | 0.5555 |
| | 2014 | 0.0779 | 0.9442 | 0.5876 | 0.5548 |
| | 2015 | 0.0795 | 0.9443 | 0.6080 | 0.5741 |
| | 2016 | 0.0741 | 0.9446 | 0.5515 | 0.5209 |
| | 2017 | 0.0778 | 0.9410 | 0.6197 | 0.5831 |
| | 2018 | 0.0800 | 0.9406 | 0.6263 | 0.5891 |
| | 2019 | 0.0827 | 0.9378 | 0.6054 | 0.5677 |

| *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|
| Income from ownership | 2005 | 0.0004 | 0.9995 | 0.8117 | 0.8113 |
| | 2006 | 0.0006 | 0.9995 | 0.8023 | 0.8020 |
| | 2007 | 0.0015 | 0.9995 | 0.9318 | 0.9314 |
| | 2008 | 0.0005 | 0.9996 | 0.8183 | 0.8180 |
| | 2009 | 0.0006 | 0.9994 | 0.8657 | 0.8652 |
| | 2010 | 0.0004 | 0.9997 | 0.8708 | 0.8705 |
| | 2011 | 0.0007 | 0.9996 | 0.8378 | 0.8375 |
| | 2012 | 0.0009 | 0.9998 | 0.8968 | 0.8967 |
| | 2013 | 0.0010 | 0.9996 | 0.8502 | 0.8499 |
| | 2014 | 0.0003 | 0.9996 | 0.6611 | 0.6609 |
| | 2015 | 0.0005 | 0.9997 | 0.8581 | 0.8578 |
| | 2016 | 0.0004 | 0.9996 | 0.7065 | 0.7062 |
| | 2017 | 0.0002 | 0.9997 | 0.7178 | 0.7176 |
| | 2018 | 0.0003 | 0.9996 | 0.7056 | 0.7053 |
| | 2019 | 0.0006 | 0.9996 | 0.7916 | 0.7914 |
| Income from property rental | 2005 | 0.0030 | 0.9956 | 0.5758 | 0.5733 |
| | 2006 | 0.0025 | 0.9965 | 0.6293 | 0.6271 |
| | 2007 | 0.0029 | 0.9962 | 0.6666 | 0.6641 |
| | 2008 | 0.0032 | 0.9965 | 0.7214 | 0.7189 |
| | 2009 | 0.0028 | 0.9956 | 0.6280 | 0.6253 |
| | 2010 | 0.0035 | 0.9955 | 0.6844 | 0.6813 |
| | 2011 | 0.0037 | 0.9950 | 0.6584 | 0.6551 |
| | 2012 | 0.0039 | 0.9955 | 0.7327 | 0.7294 |
| | 2013 | 0.0039 | 0.9947 | 0.7146 | 0.7109 |
| | 2014 | 0.0035 | 0.9948 | 0.6970 | 0.6934 |
| | 2015 | 0.0044 | 0.9950 | 0.7428 | 0.7391 |
| | 2016 | 0.0040 | 0.9952 | 0.7469 | 0.7433 |
| | 2017 | 0.0033 | 0.9945 | 0.6851 | 0.6813 |
| | 2018 | 0.0043 | 0.9942 | 0.7028 | 0.6988 |
| | 2019 | 0.0044 | 0.9939 | 0.7075 | 0.7032 |

| *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|
| Social security benefits | 2005 | 0.3295 | 0.6456 | 0.2758 | 0.1781 |
| | 2006 | 0.3219 | 0.6468 | 0.2504 | 0.1620 |
| | 2007 | 0.2963 | 0.6502 | 0.1692 | 0.1100 |
| | 2008 | 0.2877 | 0.6507 | 0.1184 | 0.0770 |
| | 2009 | 0.2962 | 0.6520 | 0.1366 | 0.0891 |
| | 2010 | 0.2863 | 0.6582 | 0.1226 | 0.0807 |
| | 2011 | 0.2896 | 0.6611 | 0.1354 | 0.0895 |
| | 2012 | 0.2858 | 0.6685 | 0.1440 | 0.0963 |
| | 2013 | 0.2917 | 0.6712 | 0.1726 | 0.1158 |
| | 2014 | 0.2925 | 0.6709 | 0.1633 | 0.1096 |
| | 2015 | 0.2915 | 0.6687 | 0.1491 | 0.0997 |
| | 2016 | 0.3167 | 0.6758 | 0.2654 | 0.1794 |
| | 2017 | 0.2799 | 0.6626 | 0.0399 | 0.0265 |
| | 2018 | 0.2858 | 0.6539 | 0.0266 | 0.0174 |
| | 2019 | 0.3000 | 0.6575 | 0.1021 | 0.0671 |
| Other social benefits | 2005 | 0.0500 | 0.8217 | -0.2450 | -0.2013 |
| | 2006 | 0.0437 | 0.8289 | -0.2513 | -0.2083 |
| | 2007 | 0.0381 | 0.8373 | -0.2628 | -0.2201 |
| | 2008 | 0.0291 | 0.8555 | -0.3022 | -0.2585 |
| | 2009 | 0.0270 | 0.8598 | -0.3221 | -0.2769 |
| | 2010 | 0.0275 | 0.8639 | -0.3421 | -0.2955 |
| | 2011 | 0.0266 | 0.8683 | -0.3637 | -0.3158 |
| | 2012 | 0.0275 | 0.8671 | -0.3718 | -0.3224 |
| | 2013 | 0.0281 | 0.8742 | -0.3729 | -0.3260 |
| | 2014 | 0.0283 | 0.8859 | -0.3339 | -0.2958 |
| | 2015 | 0.0268 | 0.8913 | -0.3606 | -0.3214 |
| | 2016 | 0.0422 | 0.8467 | -0.3149 | -0.2666 |
| | 2017 | 0.0564 | 0.8028 | -0.1546 | -0.1241 |
| | 2018 | 0.0508 | 0.8146 | -0.1479 | -0.1205 |
| | 2019 | 0.0518 | 0.7725 | -0.2035 | -0.1572 |

| *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|
| Other income (including gifts and alimony payments) | 2005 | 0.0659 | 0.8590 | 0.3493 | 0.3001 |
| | 2006 | 0.0600 | 0.8668 | 0.3235 | 0.2804 |
| | 2007 | 0.0551 | 0.8857 | 0.3753 | 0.3324 |
| | 2008 | 0.0495 | 0.8920 | 0.3582 | 0.3196 |
| | 2009 | 0.0490 | 0.8906 | 0.3192 | 0.2843 |
| | 2010 | 0.0529 | 0.9038 | 0.3876 | 0.3503 |
| | 2011 | 0.0471 | 0.8928 | 0.3013 | 0.2690 |
| | 2012 | 0.0489 | 0.8856 | 0.2906 | 0.2574 |
| | 2013 | 0.0465 | 0.8888 | 0.2189 | 0.1945 |
| | 2014 | 0.0530 | 0.8550 | 0.2447 | 0.2092 |
| | 2015 | 0.0478 | 0.8604 | 0.2327 | 0.2003 |
| | 2016 | 0.0484 | 0.8692 | 0.3493 | 0.3036 |
| | 2017 | 0.0412 | 0.8721 | 0.2512 | 0.2191 |
| | 2018 | 0.0374 | 0.8619 | 0.1794 | 0.1546 |
| | 2019 | 0.0353 | 0.8781 | 0.2074 | 0.1821 |
| Income from a private farm | 2005 | 0.0699 | 0.9517 | 0.5903 | 0.5618 |
| | 2006 | 0.0713 | 0.9549 | 0.6220 | 0.5939 |
| | 2007 | 0.0759 | 0.9606 | 0.6765 | 0.6499 |
| | 2008 | 0.0695 | 0.9624 | 0.6532 | 0.6286 |
| | 2009 | 0.0628 | 0.9613 | 0.6095 | 0.5860 |
| | 2010 | 0.0628 | 0.9658 | 0.6386 | 0.6167 |
| | 2011 | 0.0590 | 0.9672 | 0.6297 | 0.6091 |
| | 2012 | 0.0632 | 0.9679 | 0.6614 | 0.6401 |
| | 2013 | 0.0697 | 0.9714 | 0.7012 | 0.6812 |
| | 2014 | 0.0567 | 0.9699 | 0.6526 | 0.6330 |
| | 2015 | 0.0545 | 0.9711 | 0.6322 | 0.6139 |
| | 2016 | 0.0486 | 0.9698 | 0.5780 | 0.5605 |
| | 2017 | 0.0597 | 0.9747 | 0.7244 | 0.7060 |
| | 2018 | 0.0545 | 0.9798 | 0.7371 | 0.7222 |
| | 2019 | 0.0514 | 0.9821 | 0.7360 | 0.7228 |

Note: The $G_k$ values are much higher than compared with the Gini coefficient ($G_0$) for overall income presented in Figure 1 since they show how particular income sources are distributed among the population (obviously, not every household receives income from every income source, however, those households not receiving income from a particular income source are counted in the calculations and are assigned a value of *0* from this income source).

Source: own calculation based on HBS data.

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# Regional differentiation of human capital – analysis based on the Mincer wage equation

## Introduction

Human capital has been an important field of research for economists for decades. Its level and quality seem to be crucial for societal development from the endogenous growth theory point of view. An analysis conducted by Acemoglu and Dell (2010) shows that approximately half of between-country and between-municipality differences could be explained by differences in human capital. Those disparities significantly affect the adoption and creation rates of innovations. The results obtained by Diebolt and Hippe (2019) suggest that human capital is the most significant historical factor of current prosperity in European regions. In that context, this type of capital has persistent positive long-term effects on regional development. This underlines the importance of analyses that concern the problems of regional diversification of human capital.

The purpose of this study was to capture the regional disparities in human capital. Based on previous studies (e.g., Roszkowska, 2013), we expected to find significant differences between regions, which suggests that those disparities have been maintained (or even growing) over a period of time. This may be one of the factors behind the process of real global-to-regional convergence not being achieved, as reported by most studies (see e.g., Dańska-Borsiak, 2011; Wójcik, 2018). For that purpose, we used the modified Mincer-based human capital index presented in Florczak (2011). The analysis was conducted at the NUTS-2 territorial-disaggregation level. Estimates of the Mincer wage regression parameters for every region were obtained with the use of non-identifiable microdata from the

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Central Statistical Office (CSO) – structure of wages and salaries by occupations – in the October survey (Z-12, 2016-year revision). These estimates were combined with a CSO Labour Force Survey (LFS) and life expectancy data to calculate final estimates of human capital indices (for the years 2016 and 2019). The results of the analysis will help identify the regions with the highest and lowest levels of human capital, as well as education-level premiums.

## METHODS DESCRIPTION

Human capital is a very broad term. In a narrow sense, one can define it as the knowledge embodied within a human being (e.g., level of education, skills, etc.). Taking into account a broad definition, human capital incorporates factors such as health and vital energy, psychophysical and cultural characteristics (e.g., creativity, entrepreneurship), and social-economic activity or worldview (Becker, 1993; Domański, 1993; Florczak, 2011; Roszkowska, 2013; Schultz, 1961). In this context, this multidimensionality has created an opportunity for various approaches to analyse human capital levels[2].

In this study, we use the following extended Mincer wage equation as a base for further research (Kot, 2004; Kurkiewicz, Podolec, Sokołowski, 1999; Lemieux, 2006; Mincer, 1974):

$$\ln wage_i = \beta_0 + \beta_1 age_i + \beta_2 age_i^2 + \beta_3 edc_{m_i} + \beta_4 edc_{h_i} + \beta_5 gen_i + \\ + \boldsymbol{X}^T \boldsymbol{\alpha} + \varepsilon_i \qquad (1)$$

where:

$\ln wage_i$ – logarithm of the monthly wage for the *i*-th employee,
$age_i$ – age of the *i*-th employee,
$edc_{m_i}$ – dummy variable that takes the value "1" if the employee achieved a secondary education level and "0" otherwise,
$edc_{h_i}$ – dummy variable that takes the value "1" if the employee achieved a tertiary education level and "0" otherwise,
$gen_i$ – dummy variable that takes the value "1" for men and "0" for women,
$\boldsymbol{X}^T \boldsymbol{\alpha}$ – observation matrix of control variables and vector of parameters related to them, and
$\varepsilon_i$ – random components.

In Equation (1), the variable age of the employee is an approximation of their level of experience and refers to the "on-the-job training" cycle that enhances the

[2] Overviews of the theoretical models and measurement concepts of human capital can be found, e.g., in: Domański (1993), Mačerinskienė and Viržintaitė (2003), Roszkowska (2013), and Woźniak, Jabłoński, Soszyńska, Firszt, Bal-Woźniak (2015).

employees' human capital level (Kot, 2004, p. 316). This variable is also included in the model in the second power, so the concavity of the relation between age and wage is achieved (Mincer, 1974). The "formal" part of the human capital level in the following model is reflected by the achieved educational level dummy variables grouped into three categories. The first category encompasses employees that are at the basic vocational, lower secondary, primary, or lower educational level. The second category covers employees that graduated from general secondary school. This group also includes post-secondary and vocational secondary education. The third category refers to the tertiary educational level.[3] In our model, we have included only the second and third groups, so we can interpret parameter estimates as a wage premium of the consequent education level in reference to primary education or lower (i.e., the first category). We also included a gender dummy variable to capture the effect of the gender pay gap.

The control variables set contains the following variables:

- sections for the main groups of the PKD 2007 classification for the enterprise in which a person is employed,
- the profession of employees using classification of occupations (so-called 'major' groups of occupations),
- ownership of enterprises (public or private), and
- size of the enterprise (measured by the number of people employed and grouped into three categories – small, medium, and large).

Parameter estimates of model (1) will be used as weights for the following human capital index construction (Florczak, 2011):

$$HLEXP_{t,j} = \left[(\exp(\beta_{5,j}) * NM_{t,j} * LEXPM_{t,j} + NK_{t,j} * LEXPK_{t,j}) * \right. \\ \left. * HCND_{t,j} * NDAGE_{t,j}\right]/ND_{t,j} \quad (2)$$

where:

j – region subscript (j = 1, …, 16);

t – time subscript (t = 2016, 2019);

$LEXPK_{t,j}$ – women's life expectancy (in years);

$LEXPM_{t,j}$ – men's life expectancy (in years);

$NK_{t,j}$ – number of employed women;

$NM_{t,j}$ – number of employed men;

$ND_{t,j}$ – total number of employed persons;

$HCND_{t,j}$ – human capital level per employee that takes into account education level:

[3] We tested this grouping via model selection procedures and it was also found to be consistent with previous literature findings (e.g., Kurkiewicz, Podolec, Sokołowski, 1999).

$$HCND_{t,j} = \frac{\exp(\beta_{4,j}) * NWYZ_{t,j} + \exp(\beta_{3,j}) * NSR_{t,j} + NPO_{t,j}}{ND_{t,j}} \quad (3)$$

where:

$NWYZ_{t,j}$ – number of employees with a tertiary degree,[4]

$NSR_{t,j}$ – number of employees with a secondary degree,

$NPO_{t,j}$ – number of employees with a primary degree or lower; and

$NDAGE_{t,j}$ – age (job experience) index:

$$NDAGE_{t,j} = \sum_{k=15} [\frac{N_{kt,j}}{ND_{t,j}} * \frac{\exp(\beta_{1,j} * k + \beta_{2,j} * k^2)}{\exp(\beta_{1,j} * 15 + \beta_{2,j} * 15^2)}] \quad (4)$$

Florczak (2011) proposed the above index, which encompasses three key components of widely understood human capital: education, experience, and health condition (approximated by life expectancy for women and men).

Estimation of the Mincer equation is not new in Polish studies. Most of them focus on educational wage premiums (e.g., Majchrowska, Roszkowska, 2013; 2014; Strawiński, 2006) and gender pay gap (e.g., Majchrowska, Strawiński, 2018). In the case of synthetic human capital index computations, Florczak (2011) and Szafrański (2006) use the Mincer equation estimation results from Kurkiewicz, Podolec, Sokołowski (1999). In contrast, our studies use our own estimate results to obtain the human capital index for each region.

## DATA USED

In order to estimate the parameters of the Mincer wage equation for each voivodeship, we used non-identifiable microdata from the Z-12 survey addressing the structure of wages and salaries by occupations in October 2016 (CSO, 2018).[5] The survey is conducted every two years and covers national entities with employment exceeding nine people.[6] The database contains information on full- and part-time employees (without converting part-time employees into full-time ones) who worked the whole month of October 2016. The sample contains information on 795,900 employees. In our analysis, we excluded part-time employees in order

[4] We used the same three categories of aggregated education levels as in the Mincer equation.

[5] We used microdata for 2016 due to unavailability of newer data. Accessing microdata for the Z-12 survey requires the CSO's permission.

[6] Every revision of the survey is published in the form of a report with a 2-year delay. The newest revision contains data on wages and salaries from 2018.

to avoid Mincer equation estimate bias (that is, we excluded 7.6% of the whole sample). Obviously, the mentioned database is, of course, not the only one that contains information useful for estimating the Mincer equation. A cross-comparison of popular Polish databases can be found in Strawiński (2015). The most important advantage of using the Z-12 survey microdata is that the information comes from an accounting system of the entities surveyed. They are not declared by individuals, as in the Household Budget Survey (HBS). Another important aspect is that the Z-12 survey focuses on distributing the characteristics of individual employees (in contrast to the HBS, where the family is the main unit of interest).

The second source of data that we used is the CSO Labour Force Survey database. It contains information on the employment structure by educational level, gender, and age. Additionally, we also used data on life expectancy. The data were downloaded from the CSO Local Data Bank (CSO, 2021) for the years 2016 and 2019.

## Results

The following section provides a short analysis of the diversity of the level of human capital by Polish voivodeships in 2016 and 2019. We will also provide some basic interpretation of the wage regression results that concern the educational premiums and gender pay gap.[7] Table 1 presents the estimated values of parameters of interest for Equation (1).[8]

**Table 1. Mincer wage equation estimation results (NUTS-2 level)**

| Voivodeship | $\hat{\beta}_{1,j}$ | $\hat{\beta}_{2,j}$ | $\hat{\beta}_{3,j}$ | $\hat{\beta}_{4,j}$ | $\hat{\beta}_{5,j}$ |
|---|---|---|---|---|---|
| *1* | *2* | *3* | *4* | *5* | *6* |
| Dolnośląskie | 0.03691 | -0.00037 | 0.10220 | 0.28852 | 0.18777 |
| Kujawsko-Pomorskie | 0.02953 | -0.00027 | 0.10494 | 0.28883 | 0.15952 |
| Lubelskie | 0.02793 | -0.00023 | 0.07581 | 0.25406 | 0.13681 |
| Lubuskie | 0.03439 | -0.00035 | 0.04437 | 0.20636 | 0.17525 |
| Łódzkie | 0.02643 | -0.00025 | 0.07529 | 0.23626 | 0.16140 |
| Małopolskie | 0.03705 | -0.00035 | 0.12135 | 0.31930 | 0.17199 |
| Mazowieckie | 0.04591 | -0.00045 | 0.11186 | 0.38597 | 0.17710 |

[7] The relation of age and wage is non-linear; thus, the proper interpretation requires at least that wage-age profiles (for each region) be presented. Instead, we will concentrate on interpreting the synthetic human capital index.

[8] We are not presenting the estimates for the control variables due to their large number (multiplied by the number of regions) and the fact that we do not use them in the further analysis. Full estimation results are available on request.

| *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|
| Opolskie | 0.02910 | -0.00027 | 0.07785 | 0.27719 | 0.21009 |
| Podkarpackie | 0.02241 | -0.00019 | 0.07236 | 0.23399 | 0.14846 |
| Podlaskie | 0.02651 | -0.00023 | 0.04447 | 0.19391 | 0.12105 |
| Pomorskie | 0.03788 | -0.00036 | 0.12559 | 0.32772 | 0.16921 |
| Śląskie | 0.03190 | -0.00031 | 0.06644 | 0.25082 | 0.20599 |
| Świętokrzyskie | 0.02453 | -0.00019 | 0.08457 | 0.25379 | 0.13440 |
| Warmińsko-Mazurskie | 0.02454 | -0.00022 | 0.08069 | 0.24847 | 0.15103 |
| Wielkopolskie | 0.03251 | -0.00032 | 0.06488 | 0.28408 | 0.19879 |
| Zachodniopomorskie | 0.03186 | -0.00030 | 0.06126 | 0.23170 | 0.17977 |

Source: own estimates based on Z-12 2016 data, sample weights have been applied.

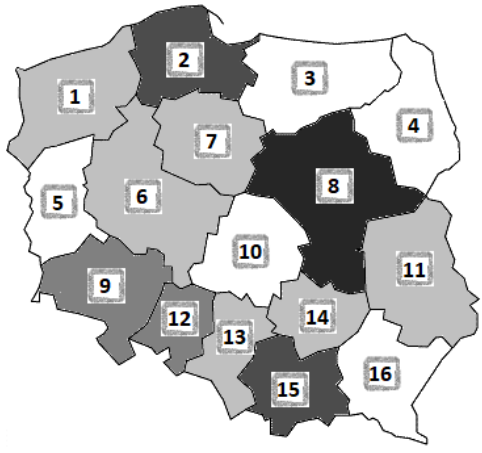
Regarding the gender pay gap estimates ($\hat{\beta}_{5,j}$), we draw the following conclusions:

- The highest disparities were observed in Opolskie. On average, men's wages were about 21% higher than women's (holding all other factors constant).
- A relatively high gender pay gap was also observed in Śląskie (approximately 20.6%) and Wielkopolskie (approximately 19.9%).
- The lowest disparities were observed in Podlaskie. On average, men's wages were about 12.1% higher than women's (holding all other factors constant).
- Relatively low gender pay gaps were also observed in Świętokrzyskie (approximately 13.4%) and Podkarpackie (approximately 14.8%).

The following conclusions were reached regarding the diversification of regional educational premiums ($\hat{\beta}_{3,j}$, $\hat{\beta}_{4,j}$):

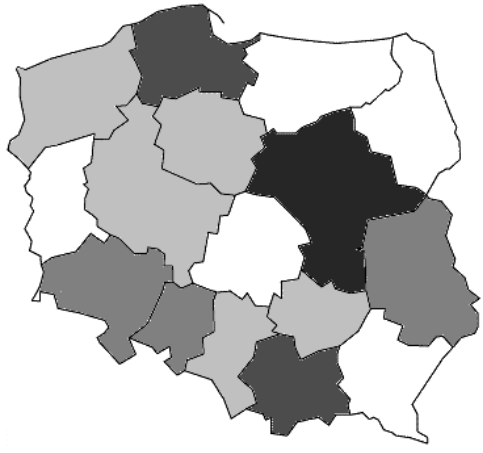
- Considering tertiary education levels, the highest premiums were observed in Mazowieckie. On average, wages were about 38.6% higher than for employees with primary education or lower (keeping all other factors constant).
- Relatively high tertiary educational premiums were also observed in Pomorskie (approximately 32.8%) and Małopolskie (approximately 31.9%).
- The lowest tertiary educational premiums were observed in Podlaskie (appro-ximately 19.4%) and Lubuskie (approximately 20.6%).
- As expected, the overall secondary education level premiums were relatively low. Similarly to the tertiary level, the highest education premiums were observed in Pomorskie, Małopolskie, and Mazowieckie (approximately from 11.2% to 12.6%).
- The lowest secondary educational premiums were observed in Podlaskie and Lubuskie (approximately 4.4%).

Figure 1 presents the regional diversification of human capital levels computed using formula (2). The same weights (estimated values of parameters from the Mincer wage regression) were applied to the Labour Force Survey and demographic data from 2016 and 2019. The following conclusions were drawn:




1. Zachodniopomorskie
2. Pomorskie
3. Warmińsko-Mazurskie
4. Podlaskie
5. Lubuskie
6. Wielkopolskie
7. Kujawsko-Pomorskie
8. Mazowieckie
9. Dolnośląskie
10. Łódzkie
11. Lubelskie
12. Opolskie
13. Śląskie
14. Świętokrzyskie
15. Małopolskie
16. Podkarpackie

| FROM: | TO: |
|---|---|
| 100 | 105 |
| 105 | 110 |
| 110 | 115 |
| 115 | 120 |
| 120 | 128 |



| FROM: | TO: |
|---|---|
| 100 | 105 |
| 105 | 110 |
| 110 | 115 |
| 115 | 120 |
| 120 | 130 |

**Figure 1. Regional diversification of human capital based on the HLEXP index for years 2016 (upper) and 2019 (lower), Lubuskie voivodeship = 100**

Source: own work based on CSO data and own estimates.

- The lowest human capital level for both years was observed in Lubuskie (this region serves as a reference region).
- We can also assign Warmińsko-Mazurskie, Podlaskie, Podkarpackie, and Łódzkie (all regions below 105% of the human capital level for Lubuskie) to the class of regions with very low human capital.
- The highest level of human capital for both years was observed in Mazowieckie and was approximately 128% and 130% of the level of Lubuskie for 2016 and 2019, respectively.
- We can also assign Pomorskie and Małopolskie (from 115% to 120% of the human capital level for Lubuskie) to the class of regions with relatively high human capital levels.
- The highest "between years" human capital dynamic from the lower level regions was noted in Lubelskie (for the class changes between the years 2016 and 2019, see Figure 1).
- The highest overall "between years" dynamic was noted in Mazowieckie (the HLEXP index was approximately 2.25% higher in 2019 than in 2016).
- A high dynamic was also observed in Pomorskie, Małopolskie and Dolnośląskie (approximately 1.4%).
- The lowest overall "between years" dynamic was observed in Kujawsko-Pomorskie (approximately 0.20%).
- A lower dynamic was also observed in Warmińsko-Mazurskie and Lubuskie (approximately 0.62% and 0.75%, respectively).

## CONCLUSIONS

The estimation results of the Mincer wage model for Polish voivodeships reveal significant differences in terms of the returns for schooling and experience, as well as in the gender pay gap. However, one should be aware of the limitation of the Mincer equation (see e.g., Lemieux, 2006). An unambiguous advantage of the presented approach is that we can use those estimates as a weight in computing the human capital index. In many cases, during synthetic index construction, researchers use arbitrary weights for partial characteristics. In this case, our weight is more 'data and theory' driven.

We found that, in the period analysed, Mazowieckie, Pomorskie, and Małopolskie show the highest level of human capital. On the other side were Lubuskie, Warmińsko-Mazurskie, Podkarpackie, Podlaskie, and Łódzkie. A similar ranking could be obtained for the dynamics of the human capital index. We noted that regions with a lower index value also have the lowest change rate of that index between the analysed years. In fact, we only analysed two years, but these results may premise that regions in Poland are characterised by divergence in

human capital (also, the variance of the HLEXP index was higher in 2019). The one exception is Lubelskie, in which the human capital dynamic was significantly greater among lower class regions. The result could be partially explained by the fact that big academic centers are often located in Polish regions and by the unequally distributed high-tech industry. The latter often requires a significant level of financial capital and good infrastructure that can only be fulfilled by higher-developed regions. This will most likely lead to a human capital drain effect from one region (less developed) to another (higher developed).

Finally, it is worth mentioning that the silent assumption about the constant parameters of the Mincer equation across years could be violated, although, as is likely in this analysis, they could remain stable for a reasonably short period of time. Of course, the presented approach also does not encompass all aspects of human capital, so it would be very interesting to extend the analysis through a wider set of characteristics (and a broader time span). Further research will also involve efficiency wage hypothesis testing. In that analysis, we will try to combine the results of the Mincer wage equation with regional estimates of the total factor productivity.

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*Summary*

The main objective of this paper was an attempt to assess the differentiation of human capital at the level of Polish regions (voivodeships, NUTS-2 level). For this purpose, we used unidentifiable unit data from a survey the Central Statistical Office conducted on the structure of wages and salaries in October 2016 (Z-12), data from the Labour Force Survey (LFS), and data on the life expectancy of women and men. The GUS microdata from the Z-12 study was used to estimate the parameters of

the Mincer-type extended wage regression, separately for each voivodeship. In the next step, these estimates were used as weights to calculate the human capital index, taking into account the health condition, education, and professional experience of employees. The values of the aforementioned measure were estimated for 2016 and 2019 (the assumption of weight stability over a short time period was made).

The analysis conducted made it possible to determine which regions are characterised by the highest and lowest levels of human capital. The highest levels of human capital were found in Mazowieckie, Pomorskie, and Małopolskie. The voivodeships with the lowest level of the considered measures were Lubuskie, Warmińsko-Mazurskie, Podlaskie, Podkarpackie, and Łódzkie. When comparing the values of the human capital index between 2016 and 2019, it can be concluded that the regions with the lowest value of this measure were also characterised by lower dynamics (the only exception was Lubelskie). Such a situation will probably favor the divergence of human capital between regions. This may, therefore, translate into the persistence (or deepening) of differences in the levels of development of these voivodeships, compared to more developed regions.

*Keywords:* human capital, Mincer wage equation, regional analysis.

## Regionalne zróżnicowanie kapitału ludzkiego – analiza na podstawie równania płac Mincera

*Streszczenie*

Głównym celem niniejszego artykułu była próba oceny zróżnicowania kapitału ludzkiego na poziomie polskich regionów (województwa, poziom NUTS-2). W tym celu wykorzystano nieidentyfikowalne dane jednostkowe pochodzące z badania przeprowadzonego przez Główny Urząd Statystyczny dotyczącego struktury wynagrodzeń w październiku 2016 roku (Z-12), dane pochodzące z badania aktywności ekonomicznej ludności (BAEL) oraz dane o oczekiwanej długości życia kobiet oraz mężczyzn. Mikrodane GUS z badania Z-12 posłużyły do oszacowania parametrów rozszerzonej regresji płac typu Mincera, osobno dla każdego województwa. W kolejnym kroku oszacowania te zostały wykorzystane jako wagi do obliczenia indeksu kapitału ludzkiego uwzględniającego stan zdrowia, poziom wykształcenia oraz doświadczenie zawodowe pracowników. Wartości wspomnianej miary oszacowano dla lat 2016 oraz 2019 (przyjęto założenie o stałości wag w krótkim czasie).

Przeprowadzona analiza pozwoliła na ustalenie, które regiony cechują się najwyższym, a które najniższym poziomem kapitału ludzkiego. Zdecydowanie najwyższy poziom kapitału ludzkiego odnotowano w województwach mazowieckim, pomorskim oraz małopolskim. Do województw o najniższym poziomie rozważanej miary zaliczono lubuskie, warmińsko-mazurskie, podlaskie, podkarpackie oraz łódzkie. Porównując wartości indeksu kapitału ludzkiego pomiędzy latami 2016 oraz 2019 można stwierdzić, że regiony o najniższej wartości tej miary cechowały się również niższą jej dynamiką (wyjątek stanowiło województwo lubelskie). Taki stan rzeczy będzie prawdopodobnie sprzyjał dywergencji kapitał ludzkiego pomiędzy regionami. Przełożyć się to może tym samym na utrzymywanie się (bądź pogłębianie) różnic w poziomach rozwoju tych województw, względem regionów lepiej rozwiniętych.

*Słowa kluczowe:* kapitał ludzki, równanie płac Mincera, analizy regionalne.

JEL: C20, C43, C51, C55, J24, J31.

## APPENDIX

**Table 2. Basic description of the sample used**

| Voivodeship | No. of men | No. of women | No. of employees with primary degree | No. of employees with secondary degree | No. of employees with tertiary degree | Total |
|---|---|---|---|---|---|---|
| Dolnośląskie | 30,007 | 29,936 | 15,446 | 20,625 | 23,872 | 59,943 |
| Kujawsko--Pomorskie | 17,219 | 16,284 | 9,770 | 11,359 | 12,374 | 33,503 |
| Lubelskie | 14,917 | 16,197 | 6,409 | 10,449 | 14,256 | 31,114 |
| Lubuskie | 8,087 | 7,894 | 4,721 | 5,728 | 5,532 | 15,981 |
| Łódzkie | 21,995 | 22,802 | 10,766 | 16,239 | 17,792 | 44,797 |
| Małopolskie | 29,265 | 30,231 | 13,384 | 19,468 | 26,644 | 59,496 |
| Mazowieckie | 75,112 | 73,461 | 23,045 | 48,021 | 77,507 | 148,573 |
| Opolskie | 7,962 | 8,102 | 4,262 | 5,371 | 6,431 | 16,064 |
| Podkarpackie | 21,138 | 18,408 | 10,861 | 13,889 | 14,796 | 39,546 |
| Podlaskie | 7,597 | 8,005 | 3,670 | 5,024 | 6,908 | 15,602 |
| Pomorskie | 19,710 | 19,590 | 9,817 | 12,536 | 16,947 | 39,300 |
| Śląskie | 52,286 | 42,130 | 25,087 | 34,602 | 34,727 | 94,416 |
| Świętokrzyskie | 8,650 | 8,915 | 4,086 | 5,830 | 7,649 | 17,565 |
| Warmińsko--Mazurskie | 9,054 | 10,653 | 5,654 | 6,167 | 7,886 | 19,707 |
| Wielkopolskie | 38,245 | 36,513 | 22,223 | 26,136 | 26,399 | 74,758 |
| Zachodnio-pomorskie | 11,736 | 13,479 | 6,274 | 8,100 | 10,841 | 25,215 |

Source: own calculations based on Z-12 2016 data.

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# Transformation of the energy sector and its impact on the European Union's external trade in energy raw materials in 2000–2020

## Introduction

An analysis of the development and structural changes in the energy sector, as well as energy raw materials markets, makes it possible to distinguish five energy transformations. The first included the change of the economy from one based on wood and coal to the production and distribution of electricity. Nevertheless, the primary source of energy was still coal. Consequently, at the beginning of the 1890s, the power of the economy (developmental potential) was based on the excavation of coal (Hugill, 1995, p. 31). The second transformation began at the turn of the 20th century as a result of the increasing extraction of oil which was replacing coal and caused revolutionary changes in transportation (development of motorisation and aviation).

The third energy transformation began in the 1950s and was characterised by a large decrease in the role of coal which was being replaced by oil and diversification of energy sources. There was an increase in the share of water and nuclear power plants in the total production of electricity. However, despite the diversification of energy sources, oil became the strategic material. It contributed to the growth of the economic and geostrategic position of oil-rich countries, mainly

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the Arabic ones. What deserves particular emphasis is the impact on the increase in the role of the energy sector in consumer demand for fuels and electricity since consumption patterns changed in highly developed countries (development of private motorisation, equipping households with electromechanical devices and development of business transportation). For the first time, consumption demand grew in significance as a source of economic growth. Low oil prices were conducive to high economic growth dynamism until the early 1970s. During the late 1960s, the price of crude oil was around 3 USD per barrel (Newton, 2004, p. 107).

Long-term economic consequences stemmed from the fourth energy transformation in the 1970s, which was a consequence of the energy and economic crisis, resulting in increases in the prices of oil and other natural resources. Rising inflation and switching to floating exchange rates contributed to increased currency risk (Mucha-Leszko, Kąkol, 2012, p. 315). Recession in industrial economies, inflation, currency destabilisation, growing unemployment, and the lack of a lasting recovery all obliged companies to work on energy-saving technologies and alternative sources of energy. In 1974, more than 70% of investment in research was directed to nuclear power (Kuzemko, Lawrence, Watson, 2019, p. 5). The 1970s revealed the impact that the oil market has on the world economic situation, which was unable to regain the capacity for economic growth for a dozen years. The situation also constituted a warning on how dangerous the dependence on a dominant energy resource and price policy of oil monopolies was (Rynarzewski, 1982). Economic stabilisation did not return until the mid-1980s.

The truly revolutionary fifth transformation of the energy sector started in the last decade of the 20th century. It was caused by a number of factors, with the major ones being: 1) technological progress allowing access to new deposits of natural gas and oil as well as utilisation of renewable energy resources which leads to greater diversification, 2) fast-paced industrialisation of some developing countries and growing population contributed to a noticeable increase in energy demand, and the highest impact on the upturn in energy consumption originated in China, India, the Republic of Korea and Brazil, 3) rise in demand, production and consumption of energy are not without an impact on the environment and climate due to greenhouse gas emissions. Transformation of the energy sector remains one of the major global issues of contemporary development. It aims at reconciling economic growth with energy security, as well as environmental and climate security. This is related to the need to increase the role of alternative energy sources. Both the supply and demand changes in the energy markets, intensified competition and diversification of the supplier markets constitute a huge challenge for everyone – producers, exporters and importers of oil. The European Union is a leader in the transformation of the energy sector that is leading to the shift to

low-emission energy sources. The EU is also (as a grouping) the largest global importer of energy and one of the top 3 of the world's largest exporters, second behind Russia and followed by the United States (2018).

The transformation of the energy sector and the diversification of the markets affect trade relations and result in certain changes in the geographical structure of exports and imports of energy commodities. Exporters of conventional energy sources, such as Russia, aspire to maintain their shares in the main markets. Russia's energy resources and position in fuel trade remain its main source of economic power, and the EU is the largest destination market for its oil and natural gas. Therefore, the question arises regarding the impact of the transformation of the energy sector on the new balance in the energy market.

The objective of the paper is to evaluate changes in 2000–2019/2020 of: 1) the level of energy consumption and the share of the main energy sources used in consumption in the world, in the EU and the 15 largest consumer countries, 2) energy import structure by sources, and 3) energy export structure by sources. Structural changes in the imports and exports of EU energy resources are treated as a consequence of the energy policy conducted at the group level and in individual member states.

The paper includes the following sections: method, review of the literature, analysis of energy consumption in the EU compared to other major consumers, analysis of the EU's external trade in energy resources, as well as discussion of the results with reference to other researchers, and conclusion.

## Method

The theoretical analysis of the energy sector transformation is carried out using an interdisciplinary approach based on the methods used by representatives of the International Political Economy. The authors adopt their methods of ontological analysis of reality, meaning phenomena, processes, and results of interdependence in international economic and political relations, as well as their causality. The empirical analysis conducted in the paper uses the following indicators: growth rates of energy consumption, shares of selected countries and the EU in the global energy consumption, shares of major energy sources in the consumption of energy in the selected economies, shares of major energy sources in exports and imports of the EU and its member states, indicators of dependency in the EU and member states on energy imports. The data used in the paper were derived from the databases of the International Energy Agency, OECD, and Eurostat, as well as reports prepared by British Petroleum (BP) and Enerdata. The analysis covered the period 2000–2020 when data availability allowed. In some cases, the latest available statistics were used.

## Literature review – conceptualisation of energy, transformation of the energy sector, and policy in terms of research assumptions of international political economy

Dynamic internationalisation and globalisation of economic processes added to the intensification of research and theoretical debate, which, since the 1990s, have been dominated by disputes between neoliberals and neorealists. Many partial theories were developed within the two main paradigms, including transnational approach, security theory, constructivism, postmodernism, critical theory, and others (Zięba, Bieleń, Zając, 2015, p. 8–11). Although the development of the international political economy (IPE) was closely related to the internationalisation of the economic activity of enterprises and the increased investment activity of transnational corporations, initially, the IPE authors focused on researching the political implications of economic interdependence in an analytically arbitrary manner (Keohane, 2009, p. 43).

The origins of energy conceptualisation are associated with the energy crises of the 1970s, and definitions of energy security were formulated then as well. It can be considered from a national point of view but also in a regional and global dimension. In the first instance, the approach to security is a consequence of the resources of energy materials available in the country as well as the degree of dependence on their imports. For economies reliant on imports, energy security means ensuring supplies at reasonable prices, and for countries rich in energy resources, they become sources of high income from exports and means to strengthen their geopolitical position. The contemporary understanding of energy security remains closely connected with global warming resulting from the growing consumption of energy obtained from fossil resources, in particular coal, and this issue can only be solved on a global scale.

Representatives of the current IPE, mainly during the past decade, have conducted a lively discussion justifying the need to transform the energy sector and move towards a low-carbon economy, thus developing the theoretical foundations of the new approach to energy and its economic and political importance.

The multifaceted definition of energy facilitates the conceptualisation of energy policy. Considering the use of energy, the concentration of energy resources in some regions of the world and a few countries, the effects on the environment and taking the issue as a whole, certain matters should be emphasised (Herrenz-Surralles, 2015, p. 2): 1) its importance from a technological perspective as a factor conditioning the development of production, and from a commercial perspective as a normal commodity; 2) due to the limited access to resources, as a strategic product; and 3) due to the wide application in households, as a service for the population. On the other hand, the negative effects of growing energy

consumption make it a factor of environmental degradation and serious climate changes, which pose a threat to civilization.

A. Herrenz-Surralles, referring to the works of Goldthau, Witt and Lesage, presents a proposal for the conceptualisation of the EU's external energy policy based on three factors that characterise it from an empirical perspective. The factors are (Herrenz-Surralles, 2015, p. 2): 1) common energy regulatory space liberalising the internal energy market and defining clear competition rules for its external participants, 2) diversification of energy sources and the use of rescue projects in crisis situations, 3) inconsistency of the goals of the energy policy from the group's perspective with the goals of the member states, inconsistency with the other goals of the EU's foreign policy, and the need to achieve greater alignment of the goals in the energy policy implemented at the global level (defined in the Paris Agreement signed in 2015).

A. Goldthau and N. Sitter believe that the large, liberalised internal market of the EU and clearly defined competition rules oblige external participants to abide by them (Goldthau, Sitter, 2015, p. 1456). Failure to comply with EU antitrust law exposes market participants to sanctions and even to elimination from the market. Due to the strength of the EU market and the competencies of the European Commission in enforcing competition law (Kąkol, 2007, pp. 136–160), the EU is strengthening its position as a regulatory power. This leads to an increase in its capacity to shape international market rules according to its preferences (Bach, Newman, 2007, pp. 830–832). To achieve this goal, the EU uses the concept of "wider Europe", which consists of expanding influence by offering institutional cooperation to countries in the immediate vicinity, opening up greater opportunities to influence global politics (Lavenex, 2004). Liberalists are supporters of such argumentation, increasing the possibility of shaping the functioning of the global economic system by the EU. One of the best-known authors of publications exposing the normative power of the European Union by means of which it influences external relations and the world political and economic system is I. Manners, who has extensive scientific achievements in this field (Manners, 2006; Manners, 2002). A. Moravcsik and J. Nye emphasise that the EU pursues its foreign policy goals by promoting the idea of openness and initiating the development of multilateral institutions on a regional and global scale. They believe that the Union strengthens its superpower using 'soft power' (Moravcsik, 2019; Nye, 2005).

The transformation of the energy sector means the creation of a new, sustainable global economic order that ensures the maintenance of ecological and climate security, energy security, and fair use and management of global, regional and local common resources (Heinrich Boll Foundation, 2009, p. 26; Newell, 2009, p. 26). Therefore, changes in the energy sector have a wider dimension than ensuring production from low-carbon and renewable sources. They include

adjustments in the structures of national economies, geopolitical changes, and changes in international economic interdependence on a regional and global scale. Therefore, a question arises about the impact of the transformation of the energy sector on changes in the position of exporters and importers on regional and global markets for energy resources. An eminent expert in the field of energy, D. Yergin, claims that the existing system of entities and interests, which makes it possible to achieve large profits from the economy based on fossil fuels, will not easily give up its benefits (Yergin, 2008).

## Energy consumption – EU compared to other major consumer economies

Compared to the EU, global energy consumption in the 21st century continued to grow exponentially (Figure 1). The average growth rate was 1.76% in 2001–2020 with declines in consumption only in 2009 (global financial and economic crisis) and in 2020 (Covid-19 crisis), when the decrease was the deepest (-4.28%). In the case of the European Union, energy consumption was, for the most part, stagnant or declining; thus, the average for the analysed period was -0.18%. The declines in consumption in 2009 (-5.41%) and 2020 (-6.61%) were much deeper than the global average. Looking at the leading energy consumers in the world (Table 1), the share of the EU decreased over time (by 6.79 pp) and fell from the second largest consumer in 2000 to the third position in 2020. Generally, the shares of developed countries continued to fall in the 21st century and were replaced by developing and emerging economies. China became the largest economy in terms of energy consumption, surpassing both the US and the EU. Its share in 2020 reached 26.1% and China was the only member of the G20 with an increase in energy consumption in 2020 (2.2%). The decrease in consumption is forecast to be short-lived, and consumption is expected to return to the 2019 levels in 2021. For the EU, the growth rate is expected to be 3.6% (Enerdata, 2021). Other countries that experienced growth of the global energy consumption shares are India, Iran and Korea. In 2000, the share of all Asian countries in the top 15 was 25.3%, while in 2020 it surged to 42.2%. These changes can be attributed to economic growth rates which were, on average, higher in Asia, particularly in emerging economies, as well as commonly used cheaper technologies, which increase the demand for energy and result in harming the environment and climate. On the other hand, in the developed world, noticeably the EU and the US, economic growth was slower, and, especially in the EU, efforts were intensified to improve the efficiency of energy resources and increase the use of renewable energies, which was reflected in the structure of consumption as well as external trade by source of energy.

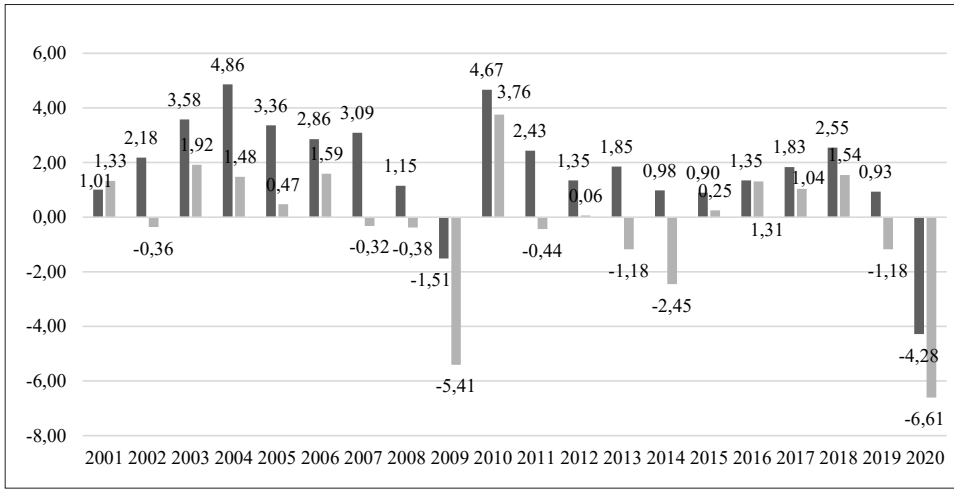


**Figure 1. Growth in energy consumption in 2001–2020 globally and in the EU (in %)**

Source: (BP, 2021).

From the point of view of sustainability and preventing unfavourable climate change, the most important trends should include the decrease in the use of fossil fuels and decarbonisation in particular, which means reducing the use of coal and, in exchange, increasing the use of renewable energy sources such as wind, solar, biofuels, etc. On a global scale, oil remains the main source of energy, although its share fell from 44.2% to 40.6% in 2018 (Table 2). A similar trend was observed in the EU – a drop from 45.8% to 41.1%, which is still above the global average. When it comes to decarbonisation, there were no positive changes on a global scale, since the share of coal actually increased in the period 2000–2018 (from 7.7% to 10%), while in the EU, the consumption of coal was limited – with a decrease from 4.4% to 3% – but was still higher than in the US (1.1%). Coal continues to be the major source of energy for China. Some decline was achieved in the analysed period, but it was still over 30% in 2018. The leading culprits for the growth in global coal consumption were: India, Indonesia and Japan (to a lesser extent).

**Table 1. Leading energy consumers in the world in 2000, 2018 and 2020 (share in %)**

| 2000 | | 2018 | | 2020 | |
|---|---|---|---|---|---|
| Country | share | Country | share | Country | share |
| *1* | *2* | *3* | *4* | *5* | *6* |
| USA | 22.00 | China | 20.70 | China | 26.10 |
| EU-28 | 16.80 | USA | 16.00 | USA | 15.80 |
| China | 11.10 | EU-28 | 11.60 | EU-27 | 10.01 |

| *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|
| Russia | 5.90 | India | 6.10 | India | 5.70 |
| Japan | 4.80 | Russia | 5.20 | Russia | 5.10 |
| India | 4.50 | Japan | 2.90 | Japan | 3.10 |
| Germany | 3.30 | Brazil | 2.30 | Canada | 2.40 |
| Canada | 2.70 | Germany | 2.20 | Germany | 2.20 |
| France | 2.30 | Canada | 2.10 | Iran | 2.20 |
| Brazil | 2.20 | Iran | 2.00 | Brazil | 2.20 |
| UK | 2.10 | Korea | 1.80 | Korea | 2.10 |
| Italy | 1.80 | Indonesia | 1.60 | Saudi Arabia | 1.90 |
| Korea | 1.80 | France | 1.50 | France | 1.60 |
| Indonesia | 1.70 | Saudi Arabia | 1.50 | Indonesia | 1.40 |
| Mexico | 1.40 | Nigeria | 1.40 | UK | 1.20 |
| Iran | 1.40 | UK | 1.30 | Mexico | 1.20 |

Source: (OECD, 2021; BP, 2021).

Regarding the use of renewable energy sources, the global share decreased during the analysed period (Table 2). This was mostly due to declines in renewables in China, India and Indonesia. The economies leading the pack in terms of renewable energy shares in their total energy consumption in 2018 were: Nigeria (with a share of 78.5%), Brazil (28.2%), and India (25.8%), of which the bulk majority were biofuels. The use of other renewables was scarce. The EU experienced progress in the utilisation of renewables, with the share growing from 4.3% in 2000 to 8.4% in 2018.

Preliminary data for 2020 (IEA, 2021), appear to be more favorable as the use of renewable energy in the world increased by 3% while demand for all other fuels decreased. This was mainly due to an almost 7% growth in electricity generation from renewable sources. All the problems that stemmed from the Covid-19 crisis were mitigated by long-term contracts, priority access to the grid, and continuous installation of new plants. Consequently, the share of renewables in global electricity generation jumped to 29% in 2020, up from 27% in 2019. Bioenergy use in the industry increased by 3%, but was largely offset by a decline in biofuels resulting from lower oil demand that limited the use of blended biofuels.

**Table 2. Energy consumption structure by main sources in selected economies in 2000 and 2018 (in %)**

| 2000 | | | | | | | 2018 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economy | Coal | Oil products | Natural gas | Renewables and waste | Electricity | Heat | Economy | Coal | Oil products | Natural gas | Renewables and waste | Electricity | Heat |
| World | 7.7 | 44.2 | 15.9 | 13 | 15.5 | 3.5 | World | 10 | 40.6 | 16.2 | 10.7 | 19.3 | 3 |
| USA | 2.1 | 51.3 | 23.3 | 3.5 | 19.5 | 0.3 | China | 30.9 | 26 | 7.5 | 5.5 | 19.3 | 5 |
| EU-28 | 4.4 | 45.8 | 23.1 | 4.3 | 18.4 | 3.9 | USA | 1.1 | 47.6 | 23.9 | 5.6 | 25.1 | 0.4 |
| China | 35.1 | 22.8 | 1.6 | 25.5 | 11.4 | 3.3 | EU-28 | 3 | 41.1 | 22.3 | 8.4 | 21 | 4.1 |
| Russia | 4.3 | 21.5 | 28 | 0.7 | 12.5 | 32.7 | India | 17.6 | 34.2 | 5.3 | 25.8 | 21 | 0 |
| Japan | 6.2 | 60.8 | 6.3 | 1.3 | 24.8 | 0.2 | Russia | 5.3 | 24.2 | 36.1 | 0.8 | 17 | 20.8 |
| India | 10.5 | 30 | 3.7 | 45.8 | 10.1 | 0 | Japan | 7.5 | 50.9 | 10.3 | 2.3 | 12.7 | 0.2 |
| Germany | 3.9 | 49.3 | 23.8 | 2.1 | 18 | 3 | Brazil | 3.5 | 42.9 | 5.9 | 28.2 | 28.7 | 0 |
| Canada | 1.9 | 40.7 | 28.5 | 6.3 | 22.1 | 0.4 | Germany | 3 | 40.2 | 25.6 | 7.1 | 19.4 | 4.3 |
| France | 2.1 | 50.1 | 19.8 | 5.6 | 20.4 | 2 | Canada | 1.3 | 46.1 | 25.1 | 5.3 | 21.9 | 0.3 |
| Brazil | 3.7 | 52.5 | 3.3 | 22.9 | 18 | 0 | Iran | 0.4 | 35.6 | 52.6 | 0.3 | 11.2 | 0 |
| UK | 2.9 | 41.5 | 34.8 | 0.4 | 18.8 | 1.6 | Korea | 5.2 | 52 | 12.3 | 2.5 | 25.1 | 3 |
| Italy | 2.1 | 48.4 | 30 | 1.4 | 18.2 | 0 | Indonesia | 9.4 | 47.3 | 10.7 | 17.3 | 14.1 | 0 |
| Korea | 7.1 | 62.8 | 8.6 | 1 | 17.8 | 2.6 | France | 1.3 | 43.7 | 19.3 | 8.3 | 25 | 2.4 |
| Indonesia | 3.8 | 38.2 | 9.6 | 41 | 5.7 | 0 | S. Arabia | 0 | 64.3 | 17.4 | 0 | 17.9 | 0 |
| Mexico | 0.9 | 64.1 | 13.2 | 8.6 | 13.1 | 0 | Nigeria | 0 | 17.1 | 2.8 | 78.5 | 1.6 | 0 |
| Iran | 0.4 | 60.1 | 30.8 | 0.1 | 8.6 | 0 | UK | 1.6 | 42.8 | 30.9 | 3.7 | 20 | 1 |

Source: (OECD, 2020; IEA, 2020).

## EU's external trade in energy sources

The changes in the energy sector in the EU resulted in some shifts in the share of the European Union in world trade in energy commodities in 2000–2018. In the case of exports, the EU lost its leading position, with the share decreasing from 11.41% to 9.15%. Russia took over as the main exporter of energy resources (IEA, 2020). With the exception of the Netherlands and Spain, all other major EU economies (Table 3) had lower shares in total exports in 2018. In imports, the share of the EU increased considerably – from 25.8% in 2000 to 33.29% in 2018. However, most of the 'big players' experienced declines in their shares in world energy imports. Only the shares of the Netherlands and the UK grew slightly. The reason behind the increase in the share of the EU was Eastern enlargement followed by an economic boom in the new CEE member states, which also had much more energy-intensive industrial sectors.

**Table 3. Share of the EU and selected member states in world exports and imports of energy resources in 2000 and 2019 (in %)**

| | Exports | | Imports | |
|---|---|---|---|---|
| | 2000 | 2018 | 2000 | 2018 |
| EU | 11.41 | 9.15 | 25.8 | 33.29 |
| Germany | 0.8 | 0.56 | 6.23 | 4.04 |
| UK | 3.39 | 1.29 | 2.35 | 2.47 |
| France | 0.79 | 0.56 | 4.3 | 2.64 |
| Italy | 0.58 | 0.52 | 4.61 | 2.64 |
| The Netherlands | 2.42 | 2.6 | 3.36 | 3.56 |
| Spain | 0.23 | 0.53 | 2.86 | 2.29 |

Source: (IEA, 2020).

When it comes to EU imports of energy resources, oil products remained the main category in 2019 with a share of more than 63%. However, some progress has been made because in 2000 the share was higher by nearly 5 pp. (Table 4). A similar trend can be seen in fossil fuel imports, which decreased their share from 9.40% in 2000 to 6.42% in 2019. The categories that increased their share in EU imports were as follows: natural gas (the highest increase – from 20.5% to 26.6%), renewables (from 0.1% to 1.4%) and electricity (from 1.8% to 2.3%). Improvement in the share of renewables is commendable; nevertheless, they remain the category with the lowest share of all of the analysed energy sources. In 2019, Scandinavian countries had the highest shares of renewables in their energy imports, Denmark (10.2%), Sweden (5.7%). In addition to that, high contributions of renewables to energy imports occurred in Latvia (8.9%). The UK share was

also well above the EU average (3.42%). On the other hand, the lowest shares pertained to Portugal (0.29%), Greece (0.36%), and the Netherlands (0.4%). Other large EU economies were situated in the middle of the pack, some slightly above or equalling the EU average – Italy (1.8%), Poland (1.7%), and France (1.4%) while others were below – Spain (1.3%) and Germany (1%). For the most part, all of them experienced growth in the share of renewables.

In terms of importing solid fossil fuels, they were still the most noticeable in CEE countries such as Poland (15.9%), Slovakia (15.8%), Czechia (12.6%), and also Germany (11.8%). Despite the positive changes on average in the EU, some member states actually increased the share of solid fossil fuels in their imports, most noticeably: Poland, Czechia, and Germany. The largest decarbonisation of their energy imports was made by: Denmark, the UK, Belgium, Portugal, and Romania. Other major EU economies halved their shares of solid fossil fuels (France, Italy, the Netherlands), reaching levels well below the EU average.

In the case of EU exports (Table 5), the main category, with a share of more than 70%, was oil and oil products. A slight increase in the share of this category occurred between 2000 and 2019. What can be considered to be positive changes are an increase in the share of renewables and biofuels (from 0.16% to 3.21%) and a decrease in the share of solid fossil fuels (from 8.77% to 2.83%). The most impressive shares of renewable energy in exports in 2019 were in the Baltics, in particular Latvia (62.5%) and Estonia (28.1%). When it comes to the 'big players', Germany and Spain also had above-average shares (8.4% and 7.2%), while the others had much lower percentages of renewables in their energy exports: France (2.8%), Sweden (2.6%), the Netherlands (1.1%), Italy (1.0%), and the UK (0.47%). Countries with the highest shares of solid fossil fuels were: Poland (50.6%) and Czechia (25.9%). However, in both cases, these shares were significantly lower compared to 2000. The third largest share in the EU of coal and other solid fossil fuels was in Germany (4.7% in 2019) and in this case, there was an increase in the analysed period (from 1.7% in 2000). Spain in 2019 reached a share of 3.4% (below the 2000 level) while the UK, the Netherlands, France, and Italy had less than 1% of their energy exports consisting of solid fossil fuels.

**Table 4. Energy import structure in the EU in 2000 and 2019**

| Economy | 2000 | | | | | 2019 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Solid fossil fuels | Natural gas | Oil and petroleum products | Renewables and biofuels | Electricity | Solid fossil fuels | Natural gas | Oil and petroleum products | Renewables and biofuels | Electricity |
| EU | 9.4 | 20.5 | 68.2 | 0.1 | 1.8 | 6.4 | 26.6 | 63.2 | 1.4 | 2.3 |
| Belgium | 11.1 | 17.5 | 69.9 | 0.1 | 1.3 | 3.7 | 21.9 | 71.8 | 1.3 | 1.2 |
| Bulgaria | 21.1 | 24.2 | 54.0 | 0.0 | 0.7 | 3.2 | 19.6 | 74.2 | 0.9 | 2.1 |
| Czechia | 5.8 | 41.9 | 48.1 | 0.0 | 4.2 | 12.3 | 32.7 | 49.3 | 1.7 | 3.9 |
| Denmark | 26.5 | 0.0 | 68.1 | 0.4 | 5.0 | 7.6 | 5.7 | 68.5 | 10.2 | 7.6 |
| Germany | 9.4 | 26.0 | 63.0 | 0.0 | 1.6 | 11.8 | 31.6 | 54.3 | 1.0 | 1.4 |
| Estonia | 3.4 | 34.1 | 47.4 | 0.0 | 1.7 | 1.1 | 14.6 | 66.7 | 2.2 | 15.2 |
| Ireland | 12.3 | 17.9 | 69.7 | 0.0 | 0.1 | 1.7 | 20.1 | 75.1 | 1.5 | 1.6 |
| Greece | 3.1 | 6.5 | 89.9 | 0.0 | 0.6 | 0.5 | 11.7 | 84.9 | 0.4 | 2.5 |
| Spain | 12.3 | 14.2 | 72.5 | 0.0 | 1.0 | 4.3 | 24.9 | 68.3 | 1.3 | 1.2 |
| France | 8.2 | 22.4 | 69.2 | 0.0 | 0.2 | 4.7 | 31.6 | 61.5 | 1.4 | 0.9 |
| Croatia | 8.0 | 15.2 | 70.5 | 0.0 | 6.3 | 5.6 | 20.6 | 60.2 | 1.4 | 12.2 |
| Italy | 7.6 | 27.0 | 62.9 | 0.3 | 2.2 | 4.3 | 38.3 | 53.1 | 1.8 | 2.5 |
| Latvia | 2.3 | 41.1 | 49.9 | 0.0 | 6.7 | 1.1 | 25.7 | 54.3 | 8.9 | 9.2 |
| Lithuania | 1.0 | 25.6 | 67.8 | 0.0 | 5.5 | 1.3 | 15.7 | 73.8 | 1.3 | 7.8 |
| Luxembourg | 2.9 | 18.0 | 64.2 | 0.0 | 14.9 | 1.0 | 15.5 | 67.1 | 3.2 | 13.3 |
| Hungary | 7.4 | 44.9 | 42.7 | 0.0 | 5.0 | 3.7 | 53.5 | 35.8 | 0.9 | 5.9 |
| The Netherlands | 6.4 | 9.8 | 82.2 | 0.0 | 1.6 | 3.3 | 21.2 | 74.1 | 0.4 | 0.9 |
| Austria | 13.8 | 24.0 | 56.2 | 0.6 | 5.4 | 8.4 | 35.8 | 46.3 | 2.6 | 6.8 |
| Poland | 3.4 | 22.3 | 73.3 | 0.0 | 1.0 | 15.9 | 23.1 | 56.9 | 1.7 | 2.4 |
| Portugal | 16.5 | 8.5 | 73.3 | 0.0 | 1.7 | 6.3 | 22.0 | 68.4 | 0.3 | 2.9 |
| Romania | 17.3 | 24.5 | 57.5 | 0.0 | 0.6 | 6.7 | 13.5 | 75.3 | 1.5 | 2.9 |
| Slovenia | 6.0 | 19.9 | 65.3 | 0.0 | 8.8 | 3.2 | 10.8 | 73.2 | 1.3 | 11.5 |
| Slovakia | 22.7 | 37.4 | 36.5 | 0.0 | 3.4 | 15.8 | 33.9 | 42.6 | 0.7 | 7.1 |
| Finland | 15.0 | 14.5 | 66.1 | 0.0 | 4.4 | 9.1 | 8.6 | 73.1 | 0.7 | 8.3 |
| Sweden | 7.5 | 2.5 | 84.9 | 0.0 | 5.0 | 6.3 | 3.2 | 81.9 | 5.7 | 2.5 |
| UK | 17.04 | 2.25 | 79.33 | 0.9 | 1.38 | 3.44 | 28.57 | 63.07 | 3.42 | 1.5 |

Source: (Eurostat, 2021b).

**Table 5. Energy export structure in the EU in 2000 and 2019**

| | 2000 | | | | | 2019 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Solid fossil fuels | Natural gas | Oil and petroleum products | Renewables and biofuels | Electricity | Solid fossil fuels | Natural gas | Oil and petroleum products | Renewables and biofuels | Electricity |
| European Union | 8.8 | 12.3 | 71.9 | 0.2 | 6.8 | 2.8 | 13.3 | 73.5 | 3.2 | 7.1 |
| Belgium | 4.4 | 0.0 | 93.1 | 0.0 | 2.5 | 0.2 | 9.8 | 85.5 | 1.2 | 3.3 |
| Bulgaria | 4.7 | 0.0 | 76.9 | 0.1 | 18.3 | 0.4 | 0.1 | 81.7 | 3.5 | 14.3 |
| Czechia | 68.2 | 0.0 | 12.8 | 0.0 | 19.0 | 25.9 | 0.0 | 34.6 | 7.3 | 32.1 |
| Denmark | 0.3 | 13.1 | 83.6 | 0.0 | 3.0 | 0.2 | 10.7 | 80.9 | 0.3 | 7.9 |
| Germany | 1.7 | 13.8 | 72.5 | 0.0 | 11.9 | 4.7 | 0.0 | 67.5 | 8.4 | 19.4 |
| Estonia | 4.5 | 0.0 | 45.1 | 1.5 | 36.3 | 0.6 | 0.0 | 62.1 | 28.1 | 9.3 |
| Ireland | 0.5 | 0.0 | 98.5 | 0.0 | 0.4 | 0.0 | 0.0 | 91.4 | 0.4 | 7.9 |
| Greece | 1.0 | 0.0 | 95.6 | 0.0 | 3.5 | 0.0 | 0.1 | 99.3 | 0.1 | 0.5 |
| Spain | 5.8 | 0.0 | 86.5 | 0.0 | 7.7 | 3.4 | 3.3 | 82.6 | 7.2 | 3.5 |
| France | 1.8 | 2.2 | 75.3 | 0.0 | 20.7 | 0.01 | 28.1 | 50.8 | 2.8 | 18.3 |
| Croatia | 0.0 | 0.0 | 95.6 | 0.0 | 4.4 | 0.0 | 1.9 | 75.4 | 8.1 | 14.6 |
| Italy | 0.4 | 0.2 | 99.2 | 0.0 | 0.2 | 0.7 | 0.9 | 95.7 | 1.0 | 1.7 |
| Latvia | 0.0 | 0.0 | 33.2 | 58.5 | 8.0 | 0.1 | 0.0 | 23.2 | 62.5 | 14.2 |
| Lithuania | 0.0 | 0.0 | 84.9 | 0.2 | 14.9 | 0.0 | 5.0 | 87.8 | 3.2 | 3.9 |
| Luxembourg | 0.0 | 0.0 | 24.4 | 0.0 | 75.6 | 0.0 | 0.0 | 4.5 | 14.3 | 81.1 |
| Hungary | 5.2 | 2.6 | 71.4 | 0.0 | 20.9 | 2.2 | 55.5 | 31.9 | 4.5 | 5.9 |
| The Netherlands | 0.4 | 32.2 | 66.9 | 0.1 | 0.4 | 0.1 | 23.8 | 73.8 | 1.1 | 1.2 |
| Austria | 1.5 | 0.5 | 48.9 | 5.4 | 43.8 | 0.4 | 29.4 | 35.7 | 9.7 | 24.8 |
| Poland | 86.1 | 0.2 | 9.6 | 0.0 | 4.1 | 50.6 | 3.9 | 36.9 | 4.3 | 4.2 |
| Portugal | 3.0 | 0.0 | 79.2 | 0.0 | 17.8 | 0.0 | 0.0 | 85.8 | 7.1 | 7.1 |
| Romania | 0.4 | 0.0 | 95.4 | 0.0 | 4.2 | 0.0 | 0.2 | 93.5 | 0.6 | 5.7 |
| Slovenia | 0.0 | 0.0 | 33.2 | 0.0 | 66.7 | 0.0 | 0.0 | 74.5 | 0.0 | 25.4 |
| Slovakia | 1.1 | 0.0 | 78.8 | 0.0 | 20.1 | 1.8 | 0.0 | 73.1 | 3.0 | 22.0 |
| Finland | 0.4 | 0.0 | 98.8 | 0.0 | 0.5 | 1.5 | 0.0 | 94.7 | 0.5 | 3.3 |
| Sweden | 0.2 | 0.0 | 90.3 | 0.0 | 9.5 | 0.2 | 0.1 | 77.1 | 2.6 | 20.0 |
| UK | 0.6 | 8.73 | 90.66 | 0.0 | 0.1 | 0.62 | 8.92 | 89.6 | 0.47 | 0.38 |

Source: (Eurostat, 2021b).

Energy import dependency measures how the share of total energy needs of a country are met by imports from other countries. A negative value indicates a net exporter. As can be concluded from Table 6, the dependence on energy imports in the EU did not improve in the period 2000–2019. The share of imported energy surpassed 60% in 2019, while in 2000 it was a little more than 56%. These data differ between member states, with the smallest economies naturally being the most reliant on imports (Malta, Luxembourg, Cyprus). Apart from these, others at the top of the list were: Italy, Belgium and Lithuania with over ¾ of energy consumption coming from overseas. On the other hand, Estonia was almost self-sufficient when it comes to its energy needs with only a 4.8% dependency on imports. Other countries with relative energy interdependence were: Sweden, Romania, Bulgaria, the UK and Denmark. Germany (67.6%), the Netherlands (64.5%) and France (47.6%) were situated in the middle of the pack in terms of import dependency, but the first two regressed in this respect in comparison with the year 2000, while France became slightly more import independent.

**Table 6. Dependence of energy imports in the EU in 2000 and 2019 (% of total energy demand)**

| Economy | 2000 | 2019 |
|---|---|---|
| *1* | *2* | *3* |
| European Union | 56.28 | 60.70 |
| Malta | 100 | 97.17 |
| Luxembourg | 99.60 | 95.13 |
| Cyprus | 98.63 | 92.81 |
| Italy | 86.52 | 77.48 |
| Belgium | 78.16 | 76.68 |
| Lithuania | 57.78 | 75.22 |
| Spain | 76.80 | 74.96 |
| Greece | 69.06 | 74.11 |
| Portugal | 85.29 | 73.85 |
| Austria | 65.54 | 71.73 |
| Slovakia | 65.07 | 69.76 |
| Hungary | 54.98 | 69.70 |
| Ireland | 85.43 | 68.4 |
| Germany | 59.44 | 67.61 |
| The Netherlands | 38.27 | 64.72 |
| Croatia | 48.45 | 56.22 |
| Slovenia | 51.85 | 52.14 |
| France | 51.25 | 47.60 |
| Poland | 10.72 | 46.82 |

| *1* | *2* | *3* |
|---|---|---|
| Latvia | 61.01 | 43.96 |
| Finland | 55.48 | 42.09 |
| Czechia | 22.7 | 40.89 |
| Denmark | -35.92 | 38.78 |
| Bulgaria | 46.41 | 38.10 |
| UK | -17.13 | 34.83 |
| Romania | 21.88 | 30.37 |
| Sweden | 39.32 | 30.24 |
| Estonia | 33.77 | 4.83 |

Source: (Eurostat, 2021a).

Looking at other changes between 2000 and 2019, some member states improved their dependence on imports, most notably: Estonia, Italy, Ireland, Latvia, Finland, Bulgaria, and Sweden. But in the majority of cases, the energy imports dependence deepened. Denmark and the UK turned from net energy exporters into net importers. Other countries with the highest increases in energy import dependency were: Poland, the Netherlands, Czechia, Lithuania, and Hungary.

## Discussion

The negative consequences of increasing energy consumption have resulted in intensified discussion of IPE representatives, which highlight the need for energy transformation. Thus, they see a need for a new conceptualisation of both the economic and political roles of energy. They provide the grounds for the new definition, for the sake of the contemporary energy policy, of the essence of what energy is, the kind of product it is, and what sort of needs it meets as well as how energy security should be understood under the current conditions. The discussion often focuses on the conceptualisation of energy policy, whose efficiency depends on the degree of its internationalisation since this is a prerequisite for solving the global issue of climate change. In this respect, what attracts a lot of attention is the external policy of the EU, the role of the common energy market, and clear rules of competition law that oblige external participants on the market to comply with them as well. The power of the EU market and the concept of a 'wider Europe' increase the opportunities of the EU to impact global energy policy. IPE theorists emphasise that current changes in the energy sector do not provide production based on low-emission and renewable sources. Therefore, the authors formed a question regarding the impact of energy sector transformation on changes in the position of exporters and importers on regional and global energy markets.

The predominant opinions in the empirical literature say that the transition of the energy sector and preventing climate change and environmental degradation are possible through communication between major producers and consumers of energy. It requires careful consideration of whether the contemporary system of international institutions and the G20 countries have enough decision-making authority to broker a consensus under the crisis political conditions and the immense diversity of economic goals. To date, prevalent views stated that the economic potential and market power of the EU constituted the greatest opportunity to revolutionise energy policy and achieve a transition to renewables, provided that the plan to create an energy union was fulfilled, which would eliminate any ability to carry out autonomous energy policy at the level of the member states.

Why then was the European Commission not able to make progress with the concentration of energy policy at the supranational level? The first of the main reasons was the vertical integration of energy companies favouring dialogue and implementation of their business goals relying on the support of national authorities, at a bilateral level (Talseth, 2017, p. 256). Another obstacle in accomplishing the EU-wide community of goals in energy policy was the varied dependence of member states on natural gas and oil imports from Russia, as A. Schmidt-Felzman emphasised (Schmidt-Felzman, 2019, p. 143). A considerable stumbling block in the implementation of the energy union originated from the conflict around Nord Stream 2 and the differentiation of the position of the member states in this matter. Germany, Austria and France highlighted the benefits of the project for the energy security of the entire EU (Schmidt-Felzman, 2019, p. 143; Mucha-Leszko, Białowąs, 2020, p. 275).

E. Molendowski makes a profoundly interesting remark pointing to the fact that EU trade with Russia is based on an inter-industry division of labour, while it is the intra-industry trade that incorporates the market participants into international value chains (Molendowski, 2017, p. 73).

A group of researchers can also be recognised in the scientific literature that believes that the capacity to carry out a global transformation of the energy sector lies within the greater commitment of the European Union to the development of the common external energy policy. They take into consideration the potential and impact of the EU energy market on the external environment. Representatives of liberals point to the market and trade as major powers of influence on outside markets (Damro, 2012, pp. 682–699; Meunier, Nicolaidis, 2006, pp. 906–925). A different approach points to the normative power of the EU which entails diffusion of norms and institutions of the integrated EU market by example rather than by the traditional coercive power (Hardwick, 2011). The concept of a wider Europe could be seen as an attempt at materialising this approach. It includes offering institutional cooperation to countries outside of the EU in order to expand territorial interdependence and create new opportunities for the implementation of

the global policy (Lavenex, 2004, pp. 680–700), which also pertains to the global energy transition. The precondition for making that a reality is to establish the energy union within the EU.

The authors believe that in the current situation, the objectives of the transition of the energy sector of the EU can only be achieved under the conditions of reducing the dependence on Russian energy commodities and in close cooperation with the United States.

## Conclusions

Addressing the objective of the paper and the delineated research questions, first, we will answer the question of whether the EU as a leader in the transformation of the energy sector managed to achieve any progress in 2000–2020 in reducing energy consumption and transitioning to renewable energy sources, directly reducing the threat of further climate and environmental changes. According to the research carried out in the paper, over the past 20 years, energy consumption in the EU continued to decline – by 0.18% per annum, which was a considerable improvement against the backdrop of the global increase in energy consumption by 1.76% per year. The following factors had a significant impact on the level of energy consumption: economic growth and investments that reduced the energy intensity of the economies of the member states. Global consumption kept rising mostly due to high economic dynamism in China, India and the transition economies, as well as their low efficiency of energy technologies. As a result, in the analysed period, the EU28's share of global energy consumption dropped from 16.8% to 10.01%, the USA – from 22.0% to 15.8% and it increased in Chinafrom11.1% to 26.1% while in India from 4.5% to 5.7% (Table 1).

In the case of energy consumption structure by sources, it should be noted how the composition of energy sources changed (Table 2). Decarbonisation was not an issue by the end of the second decade, neither in the EU nor in the USA, nor even on a global scale, although the share of coal as an energy source grew from 7.7% (2000) to 10.0% (2018). Coal-based energetics is predominant in China. Asia contributed in a noticeable way to the deterioration of the coal share in energy production worldwide and the situation worsened in the analysed period 2000–2018. The share of Asia in coal-based energy increased from 63.1% to 71%. Other contributors to this increase were India, Indonesia, and even Japan (Mucha-Leszko, Kąkol, Angowska, 2022, p. 10). Admittedly, China managed to reduce the share of coal as an energy source by 4.2 %, but it still remained relatively high (30.9%) compared to India, Indonesia and Japan.

The goal of the paper is also to to evaluate the transformation of the EU energy sector towards a wider use of renewable energy sources. An increase of

4.3% to 8.4% over a period of 19 years does not allow this change to be considered a significant achievement in terms of decreasing the use of traditional energy sources. Thus, the EU energy sector transition is still in its initial stage. However, another trend appears to be worse. In 2000–2019, there was an expansion of the EU's dependence on imports of energy resources as a whole, and in particular, this pertained to the economies of considerable significance such as Germany, the Netherlands, Poland and Austria. The high dependence on imports of traditional energy commodities was also characteristic of Italy and Spain, as well as some smaller economies (Belgium, Portugal, Slovakia, Hungary and Ireland). In this sense, the question of the impact of energy sector on the changes in the structure of EU energy exports and imports by source is raised and considered the top 10 largest exporters and importers of energy commodities. The composition of energy sources in both exports and imports consists mostly of traditional energy sources: natural gas, crude oil, and oil products. On the other hand, some changes occurred in the largest exporter ranking. Russia became the largest exporter of energy sources, surpassing the EU. Some changes can be noticed in the group of top importers, but the EU remains the largest energy source importer in the world.

Due to the concentration of traditional energy sources in a limited number of countries and the specifics of the contemporary balance of economic powers, which includes several centres that make up the global centre of trade and investment flows, the concentration of imports and exports of energy sources remains high as well. In the first two decades of the 21st century, Russia reinforced its position as an exporter of energy commodities. It became the world's leading exporter and the main supplier of natural gas, crude oil, oil products, and coal to the EU (OECD, 2020). The major predicament of the EU is the high dependence on energy deliveries from Russia. This was strongly emphasised in 2014 after the annexation of Crimea. But some time has passed and, despite the publication of the energy union package and roadmap by the European Commission, the implementation of the concept of the energy union has not been stepped up. Until Russia's military attack on Ukraine on February 24, 2022, the EU countries had not reached a consensus on the matter of future energy relations with Russia. Fragmentation of the EU market was convenient for Russia both in economic and political terms. The ability to sign bilateral agreements, which was particularly supported by Germany and France, but also by large European corporations, offered Russia additional opportunities for economic and political gains. Under the conditions of high volatility of energy commodity prices, European companies signed long-term contracts on natural gas deliveries from Russia up to 2035 (Belyi, 2015, p. 112). For Russia, this meant stable demand and income from exports.

Implementing the concept of the energy union remains a crucial action from the point of view of the European Union that will help stabilise the situation on the energy markets, both in Europe and globally. In recent years, Russia's position in

oil and gas exports, as well as its established transportation network toward Asia and the new pipeline projects bypassing Ukraine, offered new opportunities for it to demonstrate geopolitical power and diversify its oil and gas export markets (Siddi, 2018, pp. 1559–1562). Putin's regime has been actively positioning Russia as an antagonist of the West, Europe and the United States at both the domestic and international levels (Kuteleva, 2020, p. 88). The direction towards destabilisation of political relations in the world was confirmed by the attacks in Ukraine. Well-known energy expert D. Yergin (Yergin, 2006, pp. 1012–1016) claims that actors and stakeholders who profit from an economy based on fossil fuels (states and participants in the energy market participants) will not easily give up their benefits.

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*Summary*

The purpose of the paper is to investigate the multifaceted impact of the transformation of the energy sector on domestic economies and international economic relations under the conditions of growing global interdependence. The authors formulate the following research question: What were the changes in the consumption and structure of generating energy, as well as the structure of exports and imports of energy sources, resulting from the transformation of the energy sector in the EU?

The following methods were used. The theoretical analysis of the energy sector transformation is based on an interdisciplinary approach proposed by representatives of the International Political Economy. The empirical analysis uses the following indicators: growth rates of energy consumption, shares of selected countries and the EU in the global energy consumption, shares of major sources in the consumption of energy in selected economies, shares of major energy sources in exports and imports of the EU and its member states.

Considering the achievements of the EU's energy policy focused on decreasing the consumption of energy and departing from traditional sources (especially coal) to renewables, the authors concentrate on the results and consequences of the energy policy in the EU. It revealed that the EU had better results on the global scale in limiting energy consumption in 2000–2020. However, the transformation of the energy sector that leads to greater use of renewables is still in the initial stages. Oil and natural gas remain the main sources of energy consumption.

When evaluating the impact of transformation on EU energy trade, the dependence on high energy imports in the EU is notable, which actually increased in 2000–2019 from 56.3% to 60.7%. The structure of the imports remained basically the same. The share of oil and natural gas increased slightly, from 88.7% to 89.8%, and the share of renewables climbed from 0.1% to 1.4%. An unfavourable change from the point of view of EU energy policy is the growing share of solid fossil fuels, which was, for the most part, caused by imports to Poland, Slovakia, Czechia and Germany. The structure of exports was quite stable, with oil and natural gas as dominant sources (73.5% and 13.3%, respectively). However, the share of solid fossil fuels in EU exports decreased from 8.8% to 2.8% (2000–2019), which is a positive trend.

*Keywords:* energy consumption, diversification of energy sources, changes in EU exports and imports.

## Transformacja sektora energii i jej wpływ na handel zewnętrzny Unii Europejskiej surowcami energetycznymi w latach 2000–2020

*Streszczenie*

Celem pracy jest przedstawienie wieloaspektowego wpływu transformacji sektora energetycznego na gospodarki krajowe i międzynarodowe stosunki gospodarcze w warunkach rosnącej współzależności globalnej. Autorki sformułowały następujące pytanie badawcze: Jakie zmiany transformacja sektora energetycznego UE spowodowała w konsumpcji i strukturze źródeł pozyskiwania energii oraz w strukturze importu i eksportu surowców energetycznych?

W pracy zostały wykorzystane następujące metody badawcze. W analizie teoretycznej problemu transformacji sektora energii zostało zastosowane podejście interdyscyplinarne oparte na metodach stosowanych w międzynarodowej ekonomii politycznej. W analizie empirycznej wykorzystano wskaźniki wzrostu konsumpcji energii, wskaźniki udziału krajów i UE w globalnej konsumpcji energii, wskaźniki udziału źródeł energii w konsumpcji energii w wybranych krajach i UE, wskaźniki udziału głównych surowców energetycznych w imporcie i eksporcie UE i jej krajów.

Ze względu na osiągnięcia Unii Europejskiej w polityce energetycznej zorientowanej na obniżanie konsumpcji energii i odchodzenie od tradycyjnych źródeł energii (zwłaszcza węgla) na rzecz źródeł odnawialnych, autorki skoncentrowały analizę na wynikach polityki energetycznej i jej następstwach w UE. Wynika z niej, że UE osiągnęła najlepsze rezultaty w skali globalnej w latach 2000–2020 w obniżaniu konsumpcji energii, natomiast transformacja sektora energii w kierunku wzrostu udziału surowców odnawialnych jest w początkowym stadium. Nadal głównymi źródłami konsumpcji energii pozostają ropa naftowa i gaz ziemny.

W ocenie wpływu transformacji sektora energetycznego na handel UE podkreślono wysoką zależność krajów UE od importu surowców energetycznych i w latach 2000–2019 ona wzrosła z 56,3% do 60,7%. Struktura importu surowców energetycznych w UE w zasadzie nie zmieniła się. Udział ropy naftowej i gazu ziemnego wzrósł z 88,7% do 89,8%, a udział odnawialnych źródeł energii wzrósł z 0,1% do 1,4%. Zmiana niekorzystna z punktu widzenia polityki energetycznej UE to wzrost importu stałych paliw kopalnych, na co istotny wpływ miał wzrost importu Polski, Słowacji, Czech i Niemiec. Nie zmieniła się też istotnie struktura eksportu UE – dominuje ropa naftowa i gaz (73,5% i 13,3%). Pozytywną zmianę stanowi spadek udziału w eksporcie stałych paliw kopalnych z 8,8% do 2,8% (2000–2019).

*Słowa kluczowe:* konsumpcja energii, dywersyfikacja źródeł energii, zmiany w eksporcie i imporcie UE.

JEL: O13, Q01, Q43, F02, F10.

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# E-commerce development opportunities and limitations from the Generation Z perspective of Poland and Albania[3]

## Introduction

The Gemius report for Poland, titled 'E-Commerce *w Polsce 2020',* shows that 73% of its 38 million population made regular purchases on the Internet. The Polish e-commerce market exceeded 100 billion PLN in 2021, and in five years the revenue is predicted to amount to over 160 billion PLN. In Poland, a 31.5% growth rate was recorded in this sector in 2020 compared to 2019 (*E-commerce w Polsce, 2020*). However, according to forecasts (e.g., Dobroszek, 2021), the pace of development will slow down over time.

The situation of e-commerce differs in Albania. There are over 1 million e-commerce users (the population of Albania is 2.83 million). The World Bank Enterprise Survey (*www.enterprisesurveys.org*) reports that among the ventures that were established in 2020 in Albania, a fifth are companies that sell or operate only online. The annual growth rate of the e-commerce market in Albania is

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11.2%. According to the World Bank Findex Data (www.globalfindex.worldbank.org), revenue in the Albanian e-commerce market is expected to reach 819 million PLN in five years.

The study aims to identify challenges for the development of the e-commerce industry and explore its direction and limitations in the opinion of young people. The research was based on the source data from Poland and Albania and the opinions of young adults (students) from two different universities. The main idea was to find the common points of challenges, opportunities and limitations of e-commerce development, and indicate the benefits of running one's own online business from the perspective of young, future-oriented people.

The topic is very relevant, and the growing importance of online trading was the main reason the authors undertook this research. E-commerce has been developing at an intensive pace in recent years. The value of some companies operating and trading on the Internet has even quadrupled in Poland (*E-commerce w Polsce, 2020*). The leap in the value of these companies is even higher than that of businesses in industries such as gaming and biotechnology (Kowalik, 2021). An additional stimulus that has accelerated the introduction of technical and technological improvements, in addition to the migration of many companies to the Internet, is the pandemic. The changes that have occurred in the last two years in the world e-commerce market and in consumer habits can be regarded as a breakthrough (Bilan, 2021). More people are getting used to shopping online, guided primarily by convenience and time-saving. This is made more favourable by an increasingly well-developed infrastructure (e.g., friendly shopping portals, parcel machine networks, cooperation with distribution companies, etc.). The rapid development of e-commerce drives the search for ever-newer solutions dedicated to the clients and all entities engaged in the process of production, sale and delivery of the final product.

Although it is also true that the pandemic also accelerated the development of this industry in Albania, there are still severe barriers to the development of Internet sales in this country. World Bank Findex data for 2017 (*www.globalfindex.worldbank.org*) indicated that only 7% of Albanians make regular purchases on the Internet, but the increase that has occurred in recent years is substantial (primarily due to the pandemic). Almost 55% of the country's inhabitants have expressed a willingness to make online purchases to offset the expense of traditional purchases. Albanians, like Poles, make domestic purchases on social media most often, and prefer local online shops (domestic sellers that use their own websites, apps, etc.). According to data from the World Bank Group 2020 (*Albania E-commerce Diagnostic*, 2020), tourism is the fastest growing industry in Albania, the growing tourism sector in the Balkan state is adopting online sales channels very fast.

## Methodology

The work consists of the theoretical part that covers the determinants and conditions for running an e-business and the results of the research of the authors. The first research stage was to assess the position of companies trading on the Internet, based on reports from Gemius, Forbes, and the World Bank. Then a survey was conducted among students from the economics and management faculties of the University of Agriculture in Krakow (Poland) and the University of Aleksandër Moisiu in Durres, Albania.

The empirical stage was conducted from June to October 2021. The study was targeted, not representative. Snowball sampling was used, consisting of a non-random selection of study participants. The survey included students aged 18–30 who participated in full- and part-time courses. A total of 145 respondents participated.

The questionnaire was limited to 9 questions: either dichotomous (closed answers 'yes', 'no') or cafeteria in nature (with a list of options to choose). In addition, there were four questions regarding respondents' backgrounds. The survey form included enquiries about the following issues:

- The most important barriers to setting up and running one's own business;
- The most important benefits of running a business online;
- Purchases preferred by respondents;
- Factors likely to determine success in the e-commerce industry;
- Motivations to make purchases on the Internet.

Given that all the respondents were 18–30 years old (Generation Z, Internet demographic), it was reasonable to assume a high use of the Internet and social networks in their daily lives. Previous research results, conducted by Vieira et al. (2020), indicate that these respondents are mobile, very open-minded and creative. They are more tech-savvy compared to other demographic groups; therefore, they can become both the consumer of e-offers and sellers in the near future. They are more willing to launch this type of company due to the digital skills they possess (Rogers, 2014).

The work uses descriptive methods and the results are presented graphically. The conclusions can be useful for young people planning to run their own business on the Internet or those already operating in the e-commerce industry. However, there are some research limitations (i.e., the lack of previous research studies on the topic, especially in Albania), limited access to data, as well as issues with samples and selections. Another important problem is the comparison of the Polish population with the population of Albania; hence, inference on the entire population or a comparative analysis is exceptionally difficult.

## OUTLINE OF THE ISSUE

E-commerce is defined as selling on the Internet. It is a crucial element of e-business (Figure 1). According to Dobosz (2012, p. 1), e-commerce can be defined as '*all aspects of commercial transactions concluded with the use of electronic devices and their software*'. Business intelligence and technological capabilities are vital in such a market, as these factors largely determine the success of e-business. They are now relevant elements of the business and marketing strategy.

As shown in Figure 1, e-commerce is one of the elements of what is called e-business, which is the core part of a virtual company. Its primary purpose is the sale of goods, products, and services via the Internet.

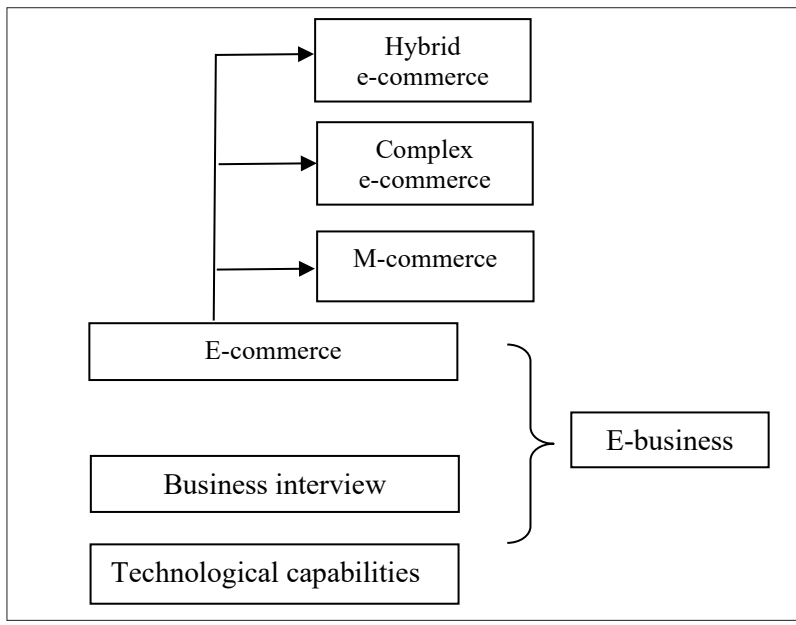


**Figure 1. E-business and its basic elements**

Source: own study based on (Chaffey, 2007; Norris, West, 2001).

Within e-commerce, we can distinguish between complex (comprehensive) and hybrid trade. The comprehensive one covers the entire sales transaction, while the latter, hybrid, takes stages in a traditional way (Chaffey, 2007; Norris, West, 2001). Many companies selling on the Internet started their activities in a hybrid form and then, very often, switched to a comprehensive virtual-only service. Turning to 'm-commerce', the use of mobile devices for purchases and sales is gaining importance (Rogers, Yen, Chou, 2002).

The basis for the operation of a company trading on the Internet is the choice of a professional sales tool and a well-designed website that facilitates contact with the customer and enables them to shop quickly and easily. To this end, it is necessary to develop a supply chain and provide customers with a secure payment system (Laudon, Traver, 2020).

When selling online, additional costs and new consumer expectations should be taken into account. As Szpringer (2000, p. 23) points out, '*the Internet changes the balance of power in favour of the recipient, who may demand much more from suppliers, easily compare their offers, and change the source of purchase*'. Therefore, competition seems to be the most important issue. When browsing the Internet, people see a multitude and variety of goods and services. Currently, most industry leaders trade on the Internet, and the range of products, goods, and services is extensive (Dobosz, 2012). Entrepreneurs newly entering the market face the challenge of what to sell, how to do it, how to stand out, what to name the store, where to get intelligence about the competitors, etc. (Mohapatra, 2013).

As practice shows, setting up a company website is only the beginning. The next step is to attract customers and establish mutual trust relationships and pay attention to their security, especially when caring for their safety, including when paying for goods and services. From the outset, it is worth undertaking an economic analysis of the project and identifying proximate and distant opportunities and competitors (F. Damanpour, J. A. Damanpour, 2001).

E-commerce brings many benefits to both customers and entrepreneurs running their businesses exclusively on the Internet. There are many benefits for business owners. Companies operating in the network can generally increase their revenues by reducing customer service costs (Molla, Heeks, 2007). The greatest opportunities and benefits of creating an online business are available primarily to companies for which the cost of traditional sales is high and those that offer a niche or scarce product. Entrepreneurs whose distributors only sell online are induced to move their operations online (Gregor, Stawiszyński, 2002). An important advantage for the entrepreneur is the possibility of reaching the consumer more easily and preparing a more precise offer (specialisation and personalisation) (Kaptein, Parvinen, 2015). Additionally, it offers more regular and more interactive contact with customers and flexibility to both the needs of the market in general and recipients in particular (Daniel, Wilson, 2002).

There are also many benefits for customers. First and foremost, online shopping saves time. It is also a very convenient form for many social and professional groups: young people, students, people working remotely, young mothers, etc. Subsequently, the consumer experiences greater ease in comparing offers and even negotiating and choosing the product that best meets their needs (Sanwal, Avasthi, Saxena, 2016).

Of course, there are different consumption habits in the young generation. What distinguishes this group from others is freedom, integrity, collaboration, entertainment, speed, and innovation (Vieira et al., 2020). However, the key stimulus is still lower prices compared to traditional stores, as well as the availability of discounts for online purchases. Therefore, it is evident that lack of pressure and greater freedom to use the Internet are the basic criteria for consumers in selecting an online offer.

Online buyers are primarily younger people living in larger cities who are positive about their financial situation. According to the World Bank Enterprise Survey report, the smallest group of customers are people over 60 years of age. The most frequently purchased product categories are clothing (69%), footwear (58%), cosmetics and perfumes (57%), books, CDs, films (56%), cinema and theatre tickets (51%), home electronics, and household appliances (48%) (www.enterprisesurveys.org).

## Research results

All in all, the research sample counted 145 respondents – 70% from Poland (83 students from the University of Agriculture in Krakow, Poland) and 30% from Albania (62 students from the University of Aleksandër Moisiu in Durres, Albania). The students from Krakow were studying economics, and those from Durres were attending a business administration course. Most of the respondents were 19–24 years of age (74.5%), with a predominance of women (65%). In the sample studied, one third of young people had taken up a job in addition to their studies, usually during the summer break.

### 1. The attitude of students as consumers

The data obtained show that almost a quarter of the respondents (both from Poland and Albania) had made online purchases for several years to varying degrees. The research carried out showed that the respondents bought gifts most often for friends and family, clothes, cosmetics, shoes, and accessories.

The main motives for online shopping for both surveyed groups were *time-saving* (41.2% of the responses) and *convenience* (33.5%). In other words, skipping queries in traditional stores, no need to visit stores far from home, etc. In addition, a significant motivator for the respondents was the *lower prices* of many products (25.3%). According to the respondents, many products are offered at preferential prices or with additional bonuses (freebies). For young people, price is a significant driver of purchasing decisions.

Apart from the many benefits of online shopping, there are some drawbacks. Polish respondents have reported having experienced problems or disadvantages in shopping online, as cited:

1. Difficulties in verifying products before purchasing (32.3%);
2. Receiving intrusive advertisements or unwanted emails (27.5%);
3. Long waiting times for the delivery of products (21.7%);
4. High delivery costs (18.5%).

Albanian students (e-commerce buyers) have identified other problems. Over 70% do not trust online purchases. Those barriers were identified as:

1. The risk of non-compliance with the ordered and delivered product (36.0%);
2. A lack of a payment method accepted by the seller (27.5%);
3. fear of financial fraud (22.9%);
4. The higher cost of online shopping (incl. delivery, fees, taxes, etc.) (13.6%).

Additionally, according to data from the World Bank Group (*Albania E-commerce Diagnostic*, 2020) and information published in Forbes Magazine Poland, both Poles and Albanians use domestic websites most often (70%). Poles still prefer domestic online shops; however, shopping on the foreign e-market is gaining popularity. The domestic companies with the most significant increases in value recorded in the last two years (2020 and 2021) were in Poland – Eobuwie, Oponeo, TIM, Dadelo, Superauto24.com. And in Albania – Aladini, Gjejevete, Baboon, Gjirafa50.com. A large proportion of clients also use international websites, and this number is constantly growing. Allegro, AliExpress, Amazon, eBay, Facebook, Asos, Booking.com are among the most frequently identified.

## 2. The students' vision of the future of commerce

As the study group included young people (aged 18–30), it is safe to assume that they reflect the main target group of regular e-commerce customers. Most of the respondents (96 out of 145) believed that online sales and services will develop faster than traditional sales and services. Definitely, fewer students surveyed anticipate the development of traditional sales and services (Figure 2). As shown in Figure 2, far more Albanian students than Polish students rely on traditional forms of shopping.

The Polish respondents cited examples of the fastest-changing industries; notably, the IT, cosmetics, and clothing industries. In turn, the respondents from Albania indicated tourism, electronic equipment, and clothing.

In summary, it is clear that for those surveyed the future lies in sales and services delivered to customers on the Internet. Traditional shopping is going to lose importance, especially among young consumers who have already switched their buying habits to the Internet. As a result, they predict a continuous and pronounced increase in the importance of online sales in the future.

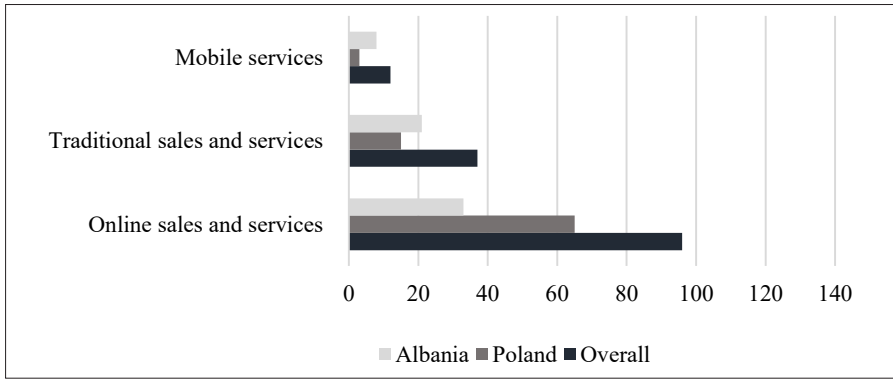


**Figure 2. Future development of sales methods, according to the respondents (number of responses, total number = 145)**

Source: own study based on survey research.

## 3. The respondents' perception of running an e-business

The research also included an analysis of the potential benefits of running one's own e-commerce company and factors hindering the development of such a venture. Figures 3 and 4 present the most significant barriers and benefits of running a business online, as indicated by the respondents.

In terms of the benefits of selling on the Internet, the opinions were primarily similar (Figure 3). Respondents from both groups indicated the convenience of managing such a company. They agreed that this business can be managed from any place and at any time (convenience and mobility). The respondents also referred to the ease and flexibility of communicating with clients. It is easier to establish direct contact, and entrepreneurs can adjust offers to the needs and expectations of clients.

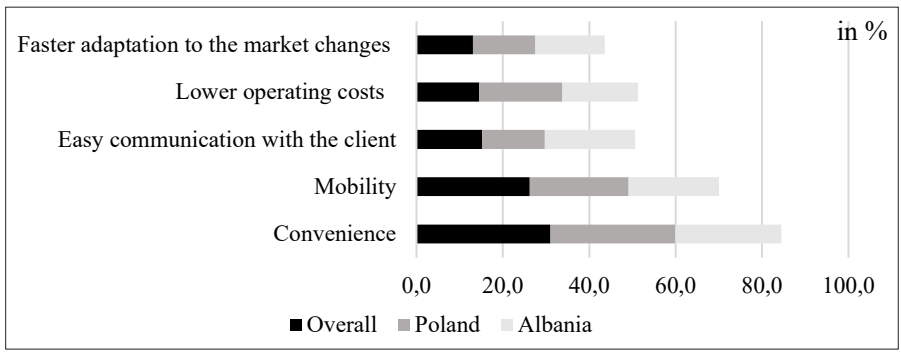


**Figure 3. Benefits of running e-commerce in the opinion of the respondents (in %)**

Source: own study based on survey research.

As consumers, young people are more eager to test new solutions compared to other groups. Over 25% of Polish and 45% of Albanian respondents considered starting an e-business after graduation. In the case of Albanian students, this activity is mainly related to tourism and recreation (70%), while Polish respondents were attracted to selling products (63%) such as cosmetics, clothing, footwear, accessories, etc.

Respondents selected several of the most important factors which, in their opinion, significantly influence the success of an e-commerce business. According to the respondents, success is primarily determined by:

1. A winning idea (71.2%);
2. A professional website (54.0%);
3. A good business plan (39.6%);
4. Access to funds to invest in the launch of one's own company (36.0%).

The feedback obtained shows that young people have a positive attitude towards online selling. However, according to the respondents, the key element of success is a winning idea that will allow the entrepreneur to break through in a highly competitive market.

Despite positive reviews about e-commerce and the increasing use of this form of shopping, respondents expressed reticence about starting a business on their own, especially towards online sales and the need to use new technologies.


**Figure 4. Barriers to conducting e-commerce in the opinion of the respondents (in %)**

Source: own study based on survey research.

As shown in Figure 4, the main fear and drawback of running an e-commerce company was, in the opinion of the students, high competition and the sense of being unable to beat existing competitors in the marketplace. The next cited obstacle is a lack of new and innovative ideas or a lack of solutions for improving existing products and services. With that in mind, an innovative product stands out from the crowd and eliminates the risk of a ruthless price war between competitors.

Another major concern for both groups of respondents was the general fear of being self-employed, especially in uncertain times such as a pandemic or war.

Respondents expressed reservations mainly about the need to "breakthrough" the market. Strong competition and a multitude of well-known brands with an established position effectively impede the entry of new, unknown companies on the market. Therefore, external and internal conditions that determine the success of an online business are just as important.

## Summary and conclusions

E-Commerce meets the needs of modern consumers precisely. It provides convenience and shopping comfort, especially for younger generations. They spend a lot of time on the Internet and browse for potential purchases.

When analysing the e-commerce environment in Poland and Albania, one can observe a number of differences that make comparative analysis unquantifiable. Comparing to other European countries, the e-commerce market in Albania is very small and focuses especially on the tourism sector. The online commerce market in Albania is 13 times smaller than in Poland and has different obstacles. Therefore, this scientific problem should be viewed holistically, taking into account macroeconomic as well as non-economic factors. The development of the e-commerce industry in each country is largely influenced by cultural factors (social norms, cognitive and perceptual patterns, personal values, tradition, religion, knowledge resources, consumption habits), as well as historical and economic conditions. Putting these factors to one side for the purposes of studying the e-commerce situation and assessing practical activity may well lead to invalid conclusions.

When analysing the situation in Poland and Albania, the economic profile and demographic structure should certainly be taken into account (i.e., the population of Albania is 2.8 million and that of Poland is 38 million), as well as the geopolitical situation such as Poland's EU membership and the availability of structural funds, which Albania does not have access to.

E-commerce in Albania is in an earlier stage of development. The problems related to the development of the e-commerce industry in Albania, according to the report from the World Bank Group 2020 (*Albania E-commerce Diagnostic*, 2020), can be addressed primarily by:

1. Strengthening public trust in Albania's e-commerce companies;
2. Creating a business environment that is suitable for the digital economy;
3. Bolstering targeted support programs for e-entrepreneurs;
4. Broadening access to high-speed Internet;
5. Expanding access to secure online payment systems;
6. Simplifying cross-border taxes and customs procedures;
7. Harmonising regional regulatory conditions for e-commerce development.

The encouraging degree of foreign direct investment that can promote the growth of the Albanian e-commerce system is also an important factor for its development.

In Poland, companies in this industry have increased sales. The dynamics of e-commerce development in these two countries can be expected to be much higher than in other European countries. The trends visible in the market indicate that e-commerce will play a dominant role in most markets in the future, and a significant percentage of young people will work in this sector.

Based on the analysis of reports on e-commerce in Poland and Albania, the main barriers to the development of the sector can be identified. They are mainly:

1. An imperfect technical and technological infrastructure;
2. A lack of confidence surrounding online purchases.

The first obstacle can be countered relatively easily thanks to the rapid development of new technologies and the expansion of technical infrastructure. It is much more difficult to overcome the barrier of consumer mistrust. As with any company, those that conduct business exclusively on the Internet need to pay special attention to building relationships with the client and building trust with payments and product quality. The country, which creates the legislative system and thus can legally protect the consumer, also plays an essential role in this regard. The legal protection of the online consumer is the main criterion for building trust in e-commerce.

The survey of the authors among young people also allows observers to draw conclusions on how to address barriers to entrepreneurship. Despite the great interest in online shopping, the surveyed students from Poland and Albania expressed significant concerns about the running of a business online. To curtail anxiety and encourage the use of new technical and technological solutions, in the opinion of the authors, it is necessary to:

1. Focus on the education of professional teachers and academic staff;
2. Provide young people and students with an understanding of entrepreneurship and e-business by introducing the subject into the curriculum;
3. Provide greater access to professional consulting in the field of e-business;
4. Introduce new legislative solutions for this type of business and facilitate setting up and running an e-company in a given country.

It is clear that in addition to expanding technical and technological infrastructures, enhanced knowledge and understanding are key to the development of the e-commerce business. This is even more important, as, according to the experts' predictions cited in the text, most young people will find employment in this industry in the future or will decide to start their own e-businesses.

Due to the significant research limitations, further research is necessary in this area. First of all, with regard to the research methodology and the possibility

of comparing the e-business situation in different countries. It is also important to indicate the importance of the barriers identified to the development of the e-commerce industry in different countries. Critical aspects are also historical and cultural conditions, which certainly have a significant impact on the development of the e-commerce industry and should be stressed in further research.

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*Summary*

The aim of the study was to identify challenges for the development of the e-commerce industry in Poland and Albania and to explore their directions and limitations in the opinion of young people. The study was formed by a literature review for qualitative research purposes and took an analysis approach through a survey method among students from the economic and management faculties. Respondents aged 18–30 participated in the survey from the reputedly more tech-savvy 'Generation Z' demographic group. The data obtained shows that the e-commerce industry, both in Poland and Albania, is undergoing significant changes and that the pandemic has accelerated these. Many established companies were those that trade on the Internet or offer e-services. Respondents indicated many benefits of running a business on the web; notably, the convenience of selling and lower operating costs. This form of running a business is attractive to younger people. However, they acknowledge some limitations. The most important barrier is high competition in the market and a lack of innovative ideas that would otherwise allow them to break into the market. Significantly, Albania has seen the development of its technological infrastructure, as well as the building of consumer confidence in this type of transaction. Taking into account the forecasts for e-commerce development for Poland and Albania, there is a need for up-to-date information on ways of setting up and running e-businesses. Expertise in this field is needed, as are qualified teaching and academic staff with sufficient knowledge of the evolving e-business environment.

*Keywords:* e-commerce, young people, Internet, opportunities, limitations, benefits.

## Bariery i możliwości rozwoju e-commerce z perspektywy „Pokolenia Z" z Polski i Albanii

*Streszczenie*

Celem pracy jest identyfikacja wyzwań stojących przed branżą e-commerce, a także wskazanie barier i możliwości rozwoju tego sektora z perspektywy młodych ludzi. Z analizy raportów anali-

zowanych w pracy wynika, iż zarówno w Polsce, jak i w Albanii, nastąpił w ostatnich kilku latach gwałtowny wzrost liczby oraz wartości firm z branży e-commerce. Badania własne przeprowadzono w grupie studentów kierunków ekonomia i zarządzanie na Uniwersytecie Rolniczym w Krakowie (Polska) oraz na Uniwersytecie im. Aleksandër Moisiu w Durres (Albania). Badania ankietowe miały na celu pozyskanie opinii młodych ludzi dotyczących zakupów online z punktu widzenia klienta, a także opinii dotyczącej prowadzenia własnej firmy w obszarze e-commerce. Łącznie uzyskano 145 odpowiedzi ankietowych. Respondenci z obu krajów wskazali wiele korzyści prowadzenia e-firmy, w tym przede wszystkim wygodę i niższe koszty działalności. Ta forma prowadzenia biznesu jest dla wielu ludzi z tzw. „Pokolenia Z" bardzo kusząca. Ankietowani dostrzegają jednak pewne ograniczenia. Najważniejsza według nich bariera to duża konkurencja, a także brak innowacyjnych pomysłów, które pozwoliłyby przebić się na rynku. Jeśli chodzi o Albanię, istotnym problemem jest nadal niedoskonała infrastruktura techniczna i technologiczna oraz niski poziom zaufania konsumentów do tego typu transakcji (np. brak ochrony prawnej kupujących w sieci). Innym niezmiernie istotnym aspektem, wskazanym przez obie grupy ankietowanych, jest wiedza na temat prowadzenia biznesu w sieci. Dlatego też, biorąc po uwagę prognozy rozwoju e-commerce dla Polski i Albanii, istnieje potrzeba dostarczania aktualnej wiedzy i informacji z obszaru zakładania i prowadzenia e-biznesu. Potrzebni są eksperci w tej dziedzinie, a także wykwalifikowana kadra nauczycielska i akademicka.

*Słowa kluczowe:* e-commerce, młodzi ludzie, Internet, możliwości rozwoju, bariery i korzyści.

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# Housing security as an indicator of the living environment

## Introduction

In the context of the innovative development of the economy of the Republic of Belarus and the increasing role of the human factor in the development of all spheres of the economy, the requirements for the social reproduction of a person as a creative, active person, and in general for the quality of life, are changing. Solving the housing problem has become the most important task of managing the development of the housing sector and an integral part of general structural transformations, one of the priorities of the state socio-economic policy, of which housing policy is a part.

The object of the research is a statistical study of the housing security for the population of the Republic of Belarus as an indicator of the living environment and the social policy of the state.

The ultimate goal of the study is to analyse the dynamics and regional characteristics of housing security for the population, both within the country and between countries, including the study of the development of the living environment and the factors affecting it.

## Theoretical and methodological approaches to research

The term 'quality of life' was introduced into scientific circulation by J. Galbraith (Galbraith, 2008) in the middle of the twentieth century and has since become one of the key concepts of the entire complex of sciences that study

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various aspects and conditions of human life, the most important integral indicator of comparative socio-economic research.

In the study of the 'quality of life' category, there are several approaches: objectivist and subjectivist, individual and institutional (Bestuzhev-Lada, Batygin, Grishaeva, 1978).

T. Parsons and N. Smelzer adhered to an objectivist approach to understanding the quality of life (Babosova, Mamedov, Panich, 2015), A. Campbell, F. Converse, W. Rogers, F. Andrews, S. Whitney adhered to the subjectivist approach (Campbell, Converce, Rodgers, 1976; Levy, Anderson, 1979).

Representatives of the individualist school in understanding the quality of life: L. Anderson, A. Campbell, F. Converse, L. Levy, and W. Rogers (Campbell, Converce, Rodgers, 1976; Levy, Anderson, 1979) believed that this concept reflects the satisfaction level of individual needs.

At the same time, within the framework of the institutional approach (W. Bell, J. Galbraith, A. Toffler, and J. Forrester), the quality of life acts as an indicator of the efficiency and stability of the development of a local, territorial community, or society as a whole (Bell, 1973; Toffler, 1990; Galbraith, 2008).

We believe that it is advisable to adhere to the integral approach, which is also adhered to by several researchers. In domestic science, this point of view is represented by the works of B. M. Genkin, A. A. Davydov, E. V. Davydova, G. P. Petropavlova, E. V. Fakhrutdinova, and others. (Genkin, 2008; Davydov, 2008; Petropavlova, 2011)

The study of the living environment and housing policy issues is based on the scientific work of many foreign and domestic scientists. The focus of research extends to many components of the housing sector: the housing market, housing and communal services, housing construction financing, and others.

Studies by foreign scientists D. Daniel, R.J. Strike reveal the functioning of the housing sector economy as part of a developed market system (Struyk, Damon, Haddaway, 2010; Daniell, Puzanov, Struyk, 1993).

The assessment of the formational characteristics of the housing market and a comprehensive solution to the housing problem was carried out by Russian scientists: A.S. Puzanov, N.B. Kosareva, V.V. Buzyrev and several others (Kosareva, Polidi, Puzanov, 2015).

In modern economic literature, no well-established terminological apparatus uniquely defines the totality of processes that provide a solution to the housing problem (Moroz, Kuznetsov, Shashko, 2006).

In the housing sector, there are economic actors: consumers and households, producers, and the government, and they all have multidirectional interests. Housing policy ensures the interests of economic entities in the housing sector (*Housing Code of the Republic of Belarus*… 2012).

Under market conditions, each economic entity builds its own policy of behaviour, based on its own economic goals and interests. At the same time, they

are within the state's economic policy framework. The degree of government influence is not the same in different periods of time.

In modern European literature, the idea of three different types of state housing policies has developed.

These are liberal, social-democratic, and corporatist models; they reflect the differences in the main directions of housing policy (*Delivering stability*…, 2004; Holmans et al., 2010).

The social-democratic model is characterised by a rather strong state intervention in housing policy issues. Housing security is carried out on a general basis, and not based on the results of a means test.

Under the liberal model, the market plays a decisive role, while social benefits and services are used to provide social protection for the most vulnerable population groups. Social subsidies are provided to the most socially vulnerable families (Green, Malpezzi, 2003).

The corporatist model assumes that social security in the housing sector is carried out based on an agreement between the social partners and the state. This model is characterised by the "translation" of the social hierarchy into the hierarchy in the housing sector, while the position in the hierarchy is determined by belonging to a certain group (corporation): trade unions or other professional corporations (Hoekstra, 2003; Hoekstra, 2010).

Housing needs and interests have not been legally enshrined in international legal acts and national legislation. The Universal Declaration of Human Rights (Universal Declaration ..., 1948, http) provides for humans to freely choose their place of residence within each state and the inviolability of the home. But this freedom is not associated with the presence or absence of a person's home. Under the International Covenant on Economic, Social and Cultural Rights (International Covenant, 1964), States parties recognise the rights of everyone to an adequate standard of living for him and his family, including adequate food, clothing, and housing. In this case, only the three most important natural human needs are declared without determining the mechanisms for their provision. The Constitution of the Republic of Belarus (Article 48) defines the right to housing, which is ensured by the development of public and private housing stock (Constitution of the Republic of Belarus, 1994).

At the same time, improving the living environment of citizens is one of the most important constitutional tasks of the state, including in terms of its international obligations. In the UNECE Housing Policy Principles (UNECE, http), the right to adequate housing is one of the most important human rights.

The sufficiency is determined, first of all, by the social, economic, cultural, climatic, ecological, and other factors of each particular country. The interaction of government, business and science in managing the development of the living environment is of particular importance. This area covers a group of economic

sectors, including the design of construction and reconstruction of housing, structures and elements of engineering and social infrastructure, the creation of the living environment in general, housing serving the housing stock, its maintenance and repair, as well as the housing market.

General scientific methods were used to achieve the study objectives: synthesis, analysis, deduction, a systematic approach, study of a series of dynamics, analysis of the influence of factors on the result using the index method, and analysis of the population using cluster analysis.

As a result of clustering, a dendrogram was obtained that depicts a hierarchical structure. It is generated by the similarity matrix and the rule for combining objects into clusters.

It was assumed that the analysed group of countries forms two natural clusters. This assumption was tested using the K-means method, while the significance of the difference between the obtained groups was examined. Clustering using the K-means method showed significant differences for each factor ($p < 0.05$).

The first cluster included countries with a lower standard of living. The second cluster is distinguished by the presence of countries with a higher overall level of indicators characterising the standard of living, among which is the provision of housing for the population.

The study was carried out on the basis of the data from the Belarus Statistical National Committee and Eurostat for 1995–2020.

## Statistical analysis of factors that determine the level of housing security

The transition to sustainable economic recovery in the Republic of Belarus is largely determined by the active participation of the regions in this process. The solution to the socio-economic problems of the country as a whole and its individual structural subdivisions is inextricably linked with the implementation by the state of a scientifically grounded regional policy, aimed at improving the living environment.

One of indicators of the quality of life, which characterises the total area of living quarters per inhabitant, is the housing security of the population, according to the Belstat methodology.

The dynamics of housing security of the population of the Republic of Belarus for the period 1995 to 2019 is presented in Figure 1. On the basis of the data presented, one can see the positive dynamics of this indicator. The housing security of the population of Belarus in 2019 increased 1.4 times compared to 1995, reaching 27.8 square meters per person.

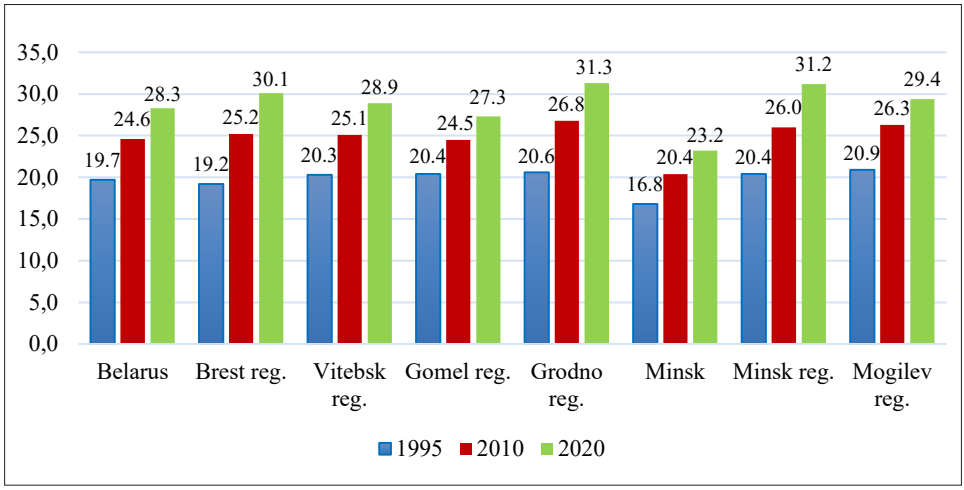


**Figure 1. Dynamics of the housing security for the population of the Republic of Belarus by regions and the city of Minsk for 1995, 2010 and 2020, sq. m. per person**

Source: own development based on (National Statistical Committee. Official statistics, 2021; World development indicators, 2021; Statistical Yearbook, 2021).

The housing security for the population in the regions of Belarus was studied. The highest dynamics can be noted in the Grodno region; moreover, for the entire studied period, it increased to 31.3 sq. m. per person or increased by 52% compared to 1995. Second is the Minsk region, where the supply increased to 31.2 sq. m per person, or 52.9%. At the same time, it turns out that the value of this indicator varies in regions of the country from 20.2 square meters of total area per inhabitant to 44.8 square meters (Glusky district).

The lowest security indicators are observed in the capital, the city of Minsk. In 2020, security amounted to 23.2 sq. m per person, or an increase of 38.1%. This is due to the fact that the population in Minsk increased from 1,669.5 thousand people to 2,009.8 thousand people for 1995–2020, or 20.4%. This leads, first of all, to an increase in the number of residents who do not have their own housing. In other regions, as well as in Belarus as a whole, the population size decreased during the period under study. A decrease in population was observed across the country from 10,177.3 to 9,349.6 thousand people, or 8.1%. The largest decrease in the regions occurred in the Vitebsk region, by 20.9%, in the Mogilev region, by 18%.

Analysis of changes in the provision of the population with housing using indices of variable composition, constant composition, and structural changes allows us to identify the influence of factors on the dynamics of provision for 1995–2020 in the regional context (Table 1).

**Table 1. Contribution of factors to the change in the average housing security, 1995–2020,%**

| Contribution of factors to change | Years | |
|---|---|---|
| | 1995–2020 | 2010–2020 |
| The overall change in the average security is due to: | 43.6 | 15.0 |
| – changes in the housing security of certain regions | 46.5 | 15.6 |
| – changes in the structure of the population of certain regions | -2.0 | - 0.5 |

Source: own development based on (National Statistical Committee. Official statistics, 2021; World development indicators, 2021).

As can be seen in the table, the growth in the average housing supply of the population of Belarus was positively influenced by the growth in the level of housing in certain regions of the republic (over the past 25 years, a growth of 46.5%, over the past 10 years, by 15.6%), at the same time, the change in the structure of the population had a negative impact on the average value of security in the republic. This is due to the fact that the proportion of the population of the city of Minsk with the lowest level of security has grown significantly (for 1995–2020, it increased by 5.1 percentage points, for 2010–2020 by 2.1 percentage points). At the same time, the share of regions with the highest level of provision decreased: Grodno, by 0.9 percentage points, Minsk, by 0.15 percentage points.

The dynamics of housing security of the population is influenced by many economic factors, including a study of the impact on this indicator of the level of GDP per capita and the level of housing stock per monetary unit of GDP.

This ratio can be represented as the following formula:

$$H = \frac{S}{GDP} \cdot \frac{GDP}{P},$$

where H – housing security,
GDP – gross domestic product,
S – housing stock (fund),
P – population.

The change in housing security was analysed in the study using the index method, and the role of each of the factors was revealed.

The results of the analysis of the influence of factors on housing security for 1995, 2005, 2010 and 2019, are presented in Table 2.

**Table 2. Analysis of the influence of factors on the dynamics of housing security in the Republic of Belarus for 1995–2019**

| Factors | Increase (+), decrease (-) in housing security due to factors | | |
|---|---|---|---|
| | 1995–2019 | 2005–2019 | 2010–2019 |
| Housing stock level per unit of GDP, sq. m for 1 thousand US dollars | -68.7 | -21.3 | 0.4 |
| GDP per capita, thousand US dollars per person | 76.8 | 26.2 | 2.8 |
| Housing security, sq. m per person | 8.1 | 4.9 | 3.2 |

Source: own development based on (National Statistical Committee. Official statistics, 2021; World development indicators, 2021).

The table shows that during all the periods under study, the increase in the level of housing security for the population was most influenced by the increase in GDP per capita. Moreover, both during the past 25 years (1995–2019) and over 15 years (2005–2019), this was the only positive factor. Moreover, only in the period 2010-2019, the second factor began to have a positive impact, the level of housing stock per unit of GDP (expressed in sq. m. per 1,000 US dollars). The contribution of the first factor (GDP per capita) amounted to 87.5% of the increase in the security of the population with housing, and the share of the second factor accounted for 12.5%.

As a result of study of the housing security for the population of Belarus, it was revealed that its level is affected by the influence of a number of regional differences (social, economic, natural, environmental, etc.):

- the difference in the economic and geographical position of agricultural regions in terms of soil fertility for the cultivation of certain agricultural crops;
- radioactive contamination of a significant part of the territory of the Gomel, Mogilev and some areas of the Brest, Minsk and Grodno regions;
- a higher level of development of energy- and metal-intensive industries in the Gomel, Vitebsk and Mogilev regions.

## Statistical study of the dynamics of housing security in the Republic of Belarus and the CIS countries using cluster analysis

For a statistical study of the housing security of the population of the Republic of Belarus in territorial context (CIS countries), a cluster analysis was carried out between CIS countries, including the Republic of Belarus. It will allow assessing the similarities between the CIS countries.

For the cluster analysis, the following indicators were taken (Table 3): housing security; the amount of the minimum wage; population size; gross domestic product per capita.

**Table 3. Indicators of the quality of life of the CIS countries, including housing security, 2019**

| N/N | Country | Housing security, sq. m per capita | Minimum salary, US dollars | Population, thousand people | GDP per capita, thousand US dollars per capita |
|---|---|---|---|---|---|
| 1 | Tajikistan | 10.9 | 41 | 9127.0 | 0.887 |
| 2 | Kyrgyzstan | 13.0 | 25 | 6389.4 | 1.33 |
| 3 | Uzbekistan | 15.8 | 24 | 33905.8 | 1.708 |
| 4 | Azerbaijan | 19.4 | 147 | 9981.5 | 4.809 |
| 5 | Armenia | 31.7 | 115 | 2965.3 | 4.621 |
| 6 | Moldova | 33.5 | 58 | 2681.7 | 4.475 |
| 7 | Turkmenistan | 19.9 | 226 | 6031.2 | 6.765 |
| 8 | Kazakhstan | 22.2 | 111 | 18395.7 | 9.796 |
| 9 | Ukraine | 24.2 | 177 | 41732.8 | 3.685 |
| 10 | Russia | 26.3 | 179 | 146780.7 | 11.581 |
| 11 | Belarus | 27.8 | 157 | 9475.2 | 6.67 |

Source: own development based on (*Housing stock and housing conditions…*, http).

As a result of clustering, the following was obtained: a dendrogram (Fig. 2), which graphically depicts the hierarchical structure generated by the similarity matrix and the rule for combining objects into clusters.

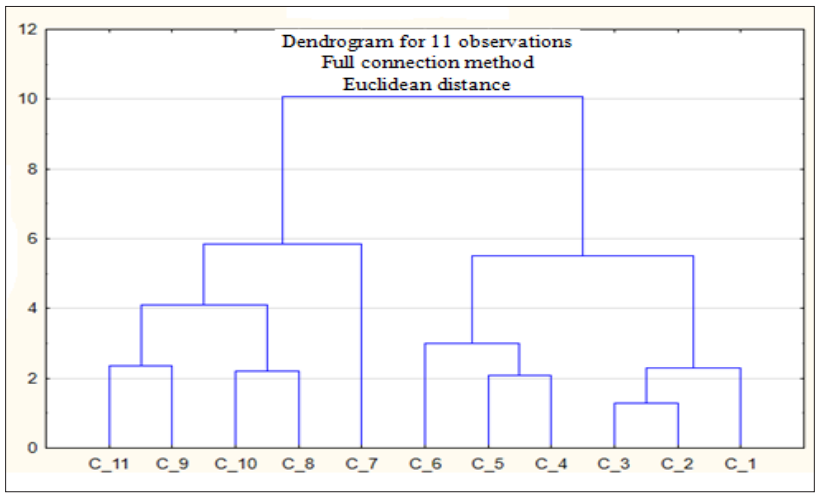


**Figure 2. Dendrogram of combining observations into clusters, 2019**

Source: own development based on (*Housing stock and housing conditions…*, http).

The horizontal axis represents observations and the vertical axis represents the union distance in this dendrogram. On the basis of the visual presentation

of the results, it can be assumed that the analysed group of countries forms two natural clusters.

This assumption was verified by the K-means method, while the significance of the difference between the resulting groups was investigated. Clustering by the K-means method showed significant differences for each factor ($p < 0.05$).

The first cluster included the following countries: Azerbaijan, Armenia, Moldova, Kyrgyzstan, Tajikistan, Uzbekistan, and the second – Belarus, Russia, Kazakhstan, Turkmenistan, Ukraine.

The second cluster is distinguished by the presence of countries with a higher level of indicators in the aggregate that characterise the standard of living, among which is the provision of the population with housing.

## Housing conditions as an indicator of the Social Progress Index

The Social Progress Index is defined as the ability of a society to meet the basic human needs of its citizens.

This indicator measures social progress directly, without an economic component. It is based on real-life outcomes in the following areas: housing and food, rights, and education. 54 social and environmental indicators characterising the lives of ordinary people are measured for this. These indicators are divided into three main aspects of social progress:

- basic human needs – characterise how the basic needs of their people are met, their access to food, basic health care, drinking water, basic utilities, security;
- the basics of well-being – show citizens' access to basic education, knowledge and information, the possibility of a healthy lifestyle, and protection of the natural environment, which are important for existing and future well-being;
- opportunities – measures the accessibility of citizens to advanced forms of education, personal rights and freedoms necessary for the realisation of personal opportunities.

The Social Progress Index is an average of more than three dimensions.

This indicator allows not only to obtain a cumulative rating of countries and to rank them, but also to identify strong and weak areas for solving urgent problems of social development of countries.

Housing security is one of the characteristics of the social progress index.

The ranking of countries according to the indicator of social progress is shown in Figure 3. For 12 consecutive years, Norway has been ranked first in the ranking, followed by countries such as Denmark, Finland, New Zealand, and Sweden.

Western neighbouring countries ranked higher in the ranking than Belarus as follows: Poland is in 31st place, Lithuania is 32nd, and Latvia is 35th. However, among the CIS countries, Belarus has the highest rating in terms of the social

progress index (47th place). The next, 50th place, is occupied by Armenia, Ukraine – 63rd place, Russia – 69th place. Tajikistan is in the last, 116th place in this rating (Social Progress Index rankings, http).

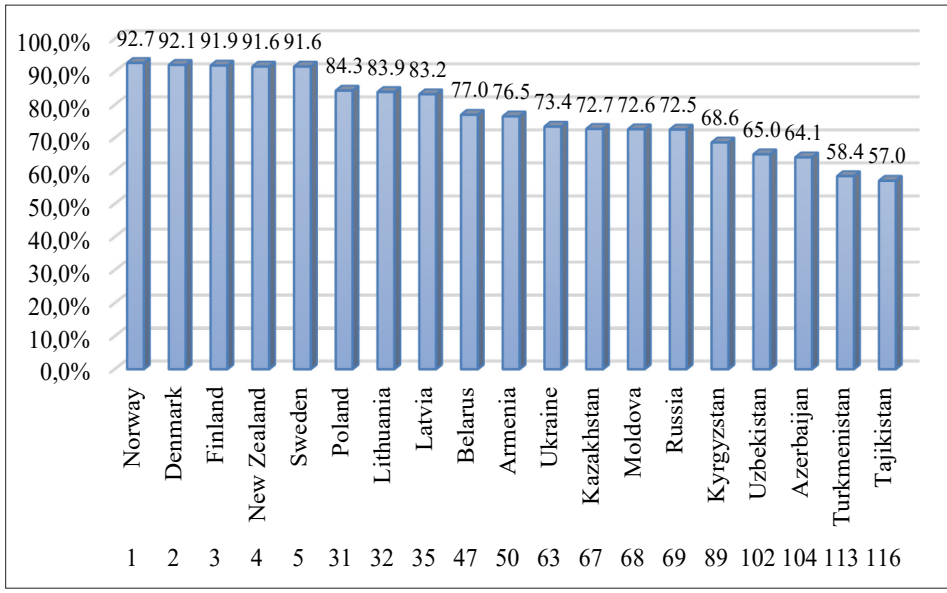


**Figure 3. Ranking of countries according to the index of social progress, 2020**

Source: own development based on (*Belarus and the countries* …, 2020).

The system of indicators reveals the relative strengths and weaknesses of the country in comparison with 15 similar countries with similar GDP per capita (for Belarus, these are the Maldives, Mexico, Serbia, Barbados, Uruguay, Thailand, etc.).

The indicator of housing conditions is one of the indicators of the first group: "Basic human needs (Section: Shelter)". For Belarus, the average level of this indicator among the members of its group was revealed, 65th place in the world ranking.

Compare the ranking of the CIS countries (Fig. 3) with the level of housing provision of their population (Table 3). Obviously, the housing problem is the most pressing for the countries that are the last in the ranking of the index of social progress: Kyrgyzstan, Uzbekistan, Azerbaijan, Turkmenistan, and Tajikistan.

## CONCLUSIONS

The identified regional differences are due to the fact that the regions of the Republic of Belarus have a number of socio-economic, natural-geographical, and ecological features, which include:

- the difference in the economic and geographical position of agricultural regions in terms of soil fertility for the cultivation of certain agricultural crops;
- radioactive contamination of a significant part of the territory of the Gomel, Mogilev, and some areas of the Brest, Minsk, and Grodno regions;
- a higher level of development of energy- and metal-intensive industries in the Gomel, Vitebsk, and Mogilev regions.

The positive dynamics of housing security of the population in Belarus are associated with a number of social, economic, financial, and demographic factors:

- improving the standard of living of the population as a whole, increasing salaries;
- state support for citizens in the construction of housing, including the provision of gratuitous subsidies at the expense of the budget, soft bank loans, loans from organisations at the place of work for the construction of housing;
- provision of social living quarters;
- an increase in the creditworthiness of citizens,
- improvement of the housing construction lending system and etc.

The following factors and housing security have a negative impact on the dynamics of housing provision:

- housing shortage, including the lack of affordable and comfortable housing;
- inconsistency of the existing housing stock with the requirements for the consumer qualities of housing;
- a structural and regional problem associated with the uneven density of the distribution of citizens across the regions of the country and individual territories;
- imperfection of financial mechanisms, such as the system of housing construction savings and mortgages;
- the problem of the level of costs for housing and communal services.

Taking into account the peculiarities of the studied regions must be taken into account when developing the regional policy of the state. Regional policy is carried out in order to ensure sustainable development using a differentiated approach to the development of regions; it will be aimed at improving the socio-economic development of the living environment.

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*Summary*

Housing is one of the core values that provide citizens with a sense of economic stability and security, as well as stimulate them to work productively. Housing is an important element of the quality of the living environment in Belarus. There is a problem in the republic of providing the population with comfortable and affordable housing.

The identified regional differences in housing security, both between countries and between regions within the country, are due to the fact that different territories have a number of socio-economic, natural-geographical and ecological characteristics, which include:

– within the country, this is the difference in the economic and geographical position of agricultural regions in terms of soil fertility for the cultivation of certain agricultural crops; radioactive contamination of certain territories of Belarus, the level of their development;
– the difference between the countries is explained by different levels of social and economic development of territories, living standards of the population, differences in the development of the banking and financial and credit spheres, the industry of the regions, information transparency of the housing sector, and a number of other factors.

This was confirmed using the index analysis of housing security of the population of the regions of Belarus and the cluster analysis of the aggregate of the CIS countries.

*Keywords:* housing security, quality of life, living environment, regional differences.

## Bezpieczeństwo mieszkaniowe jako wskaźnik środowiska życia

*Streszczenie*

Mieszkanie jest jedną z podstawowych wartości, które zapewniają obywatelom poczucie stabilności i bezpieczeństwa ekonomicznego, a także stymulują ich do produktywnej pracy. Mieszkanie jest ważnym elementem jakości środowiska życia na Białorusi. W Republice istnieje jednak problem z zapewnieniem ludności wygodnych i niedrogich mieszkań.

Regionalne różnice w bezpieczeństwie mieszkaniowym zidentyfikowane zarówno pomiędzy krajami, jak i pomiędzy regionami w kraju, wynikają z faktu, że różne terytoria mają szereg wyróżniających cech społeczno-ekonomicznych, przyrodniczo-geograficznych i ekologicznych. Różnice te obejmują:

– w kraju jest to różnica w położeniu gospodarczym i geograficznym regionów rolniczych pod względem żyzności gleb pod uprawę niektórych roślin rolniczych; skażenie radioaktywne niektórych terytoriów Białorusi, poziom ich rozwoju;
– różnicę między krajami tłumaczy się różnym poziomem rozwoju społeczno-gospodarczego terytoriów, poziomem życia ludności, różnicami w rozwoju sfery bankowej i finansowej oraz kredytowej, przemysłem regionów, przejrzystością informacji w sektorze mieszkaniowym oraz szeregiem innych czynników.

Powyższe obserwacje potwierdziła analiza wskaźnikowa bezpieczeństwa mieszkaniowego ludności regionów Białorusi oraz analiza skupień agregatu krajów WNP.

*Słowa kluczowe:* bezpieczeństwo mieszkaniowe, jakość życia, środowisko życia, zróżnicowanie regionalne.

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# The role of the state during the Covid-19 pandemic in Poland and the Czech Republic. A comparative analysis

## Introduction

The role of the state in the economy is changing, as the history of economics shows. The state has a coercive apparatus (taxes) and is the provider of public goods and legal norms, as the market economy of democratic European countries is regulated. The state is at once a producer, a consumer, a regulator, and a redistributor of public resources, a tax collector, and an innovator. It must be flexible and adapt to changes in the environment. Looking through the prism of history, the state as an entity with decision-making powers changes significantly following civilizational changes, technological development, and expectations of societies. In terms of state functions and tasks, this is not only quantitative but above all qualitative. Hyperglobalisation, whose shift to a stage called deglobalisation was observed with the great financial crisis of 2007–2008, primarily brought about the development of regional integration. In this dimension, states have had to adapt to linkages with economic organisations and adjust their functions to their requirements. In the case of EU member states, one should first take into account the different types of competence of the organisation and member states developed in primary law. This includes exclusive EU competences (monetary policy, competition rules, common trade policy), shared competences (internal market), supportive competences, coordinating competences, and complementary competences (culture).

The Treaty of Lisbon leaves no doubt that the EU is not the state. It only has the powers that have been entrusted to it by the founding of the state. The limits of the EU competences are determined by the principle of conferral of competences. The exercise of competences is subject to the principles of subsidiarity and pro-

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portionality, Article 5 of the TEU. All competences not conferred on the EU in the treaties, therefore, belong to the member states (Barcz, Górka, Wyrozumska, 2020, pp. 104–116).

This changes the position of the state in a major way. Thus, countries had to learn to defend the economic interests of their citizens and the interests of an integrating group such as the EU externally (protectionism under the EU's common trade policy). Although it is important to remember that their decisions and actions are not the sum of members' expectations, but rather the result of them. Although the regulatory role of the state is changing, in connection with sanctions (law enforcement), it is still strongest at the level of the nation-state. While the activity of the state in crisis situations seems to be justified, there is a dispute about the methods, instruments, and scope of this interference.

Since the twentieth century, economic orthodoxy has included the Keynesian and the monetarist view (more broadly antistatist, e.g., supply-side economics or the concepts of F. A. von Hayek). These two perspectives have always perceived the sources of crises, ways to counter them, and model economic settlements differently. Today, economics has developed a theory of market, state, and third-sector errors. However, it is important to remember that all economic concepts are implemented into the system through policy.

The 2007–2008 crisis was seen as an effect of the influence of neoliberalism (Godłów Legiędź, 2014, pp. 11–29). During this period, it was the state that in many cases was the 'last resort' to save private business institutions (Dobrzanski, 2015, pp. 34–35). The dispute between market fundamentalists and antistatists has a long history and seems to be unresolvable (Flejterski, Solarz, 2015, p. 89). The contemporary crisis differs in the nature of the impulses that triggered it having a non-economic dimension. In terms of the role of the state in the economy, the Covid-19 pandemic has brought significant concerns, primarily about the rise of populism and excessive state interventionism and the construction of a system of so-called zombie companies. However, during the Covid-19 pandemic, states generally did not ask the question: Should we help? But what kind of help should be given and to which sector(s) should it be directed?

The activity of the state during the crisis, as a rule, shows vulnerable areas, ones that are weaker or for a long time unreformed, representing the 'weaknesses' of a given economy. The aim of this paper is to compare areas requiring particular state aid in Poland and the Czech Republic in the context of the impact of the Covid-19 pandemic, taking into account their historical development. This article refers to two Central and Eastern European countries: Poland and the Czech Republic. A research method called comparatism was used, which today plays an important role in economic research. The development of comparatism represents a kind of initial response to the new challenges of economic theory

and practice. The Covid-19 pandemic represents a new challenge, as will be demonstrated below. The historical method has been used (a brief historical evolution of the two economic systems). Data and reports from organisations such as the International Monetary Fund, the Organisation for European Economic Cooperation, the European Commission, and the United Nations World Tourism Organization were used.

## A look at the Czech Republic and Poland – preliminary issues

Both the Czech Republic and Poland represent post-socialist bloc countries, represented planned economies after World War II, and underwent socio-economic transformation. Additionally, the division of the country into the Czech Republic and Slovakia (1993) was a major challenge for the Czech economy. The symbol of the changes in Poland was the 'Round Table', in the Czech Republic, the 'velvet revolution'. Economic transformation is understood as the transition from a centrally administered economy to a market economy. It was associated with the crisis and subsequent collapse of the centrally planned economy in the USSR and its dependent countries. The starting position at the beginning of the transition period was better in Czechoslovakia than in Poland. It is worth noting that when in the 1950s the United States took the first place in the world in terms of GDP per capita, then Czechoslovakia was ranked 21st as the first country of the socialist bloc. This is because in addition to industrialisation, Czechoslovakia had invested in such fields as electronics, the automobile industry, and chemistry. In Poland, on the other hand, huge outlays went to support the mining and metallurgical industries, as the goal was to expand the fuel and energy base, which is now a significant burden on the economy (Matera, Skodlarski, 2021 pp. 235, 260, 299).

In the face of the macroeconomic destabilisation of the Polish economy, the neoliberal transformation strategy and the formation of economic institutions conducive to it was chosen. It was pointed out that T. Mazowiecki recognised L. Balcerowicz's role in Poland is symbolically similar to the position of the father of the success of the German economy, L. Ehard. A social market economy model was adopted. To this day, Article 20 of the Polish Constitution is still debated in the context of differences with respect to the German economy and its ordoliberal roots. Despite the prominence of the term 'social', the theoretical basis of the economic policy pursued in Poland in 1990–1991 was neoliberalism and monetarist economics (Przybyciński, 2021, p. 12). This was done under the Washington Consensus doctrine. For many years, the study of J. Williamson was a kind of model, a set of necessary conditions for liberal market reforms (Kowalski, 2009, p. 256). In the Czech Republic, however, the direction was

the opposite, as S. Swadźba points out, namely, a transition from Klaus's liberal vision (the Czech version of democratic capitalism with the predominance of free market characteristics) to the socio-economic model prevailing in continental Europe with elements of the welfare state and a tendency towards regulation (Swadźba, 2021, p. 72). This is because in the Czech Republic, policymakers after 1989 made social policy an important part of their transformation project. Both countries have adopted different strategies for radical economic reform: shock therapy in Poland and a social-liberal or social-market approach in the Czech Republic. The priority in the Czech Republic was to create a welfare state based on liberal principles in accordance with the market economy and political democracy (Orenstein, 1995, pp. 179, 180, 193). The Czech Republic has its own traditions in this regard. It is worth mentioning that in the interwar period, Czechoslovakia enacted advanced social legislation that became a model for many countries, including Greece. Moreover, it is characterised by a system with so-called insurance inspired by the Bismarckian system. According to the principle "Czechs like to be liberals with a state wind blowing at their backs" (Potůček, 2009, pp. 34–35). The Czech Republic, therefore, exhibits the typical characteristics of a strong adherence to the Bismarckian, corporatist idea of the welfare state. Therefore, the social aspects of the state (unemployment, social inequality) are not a key problem in the contemporary Czech economy. Interestingly, according to A. A. Davidescu, the Czech Republic is currently in the group of countries at the middle level of the social market economy along with, for example, the economies of Cyprus and Austria. Poland represents the high level of social market economy along with Germany and the Netherlands (Davidescu, 2017, p. 52). Poland, due to its complex history, including the influence of the solutions of the partitioning states, etc., according to S. Golinowska's thesis pursued a non-model and difficult to define social policy, the symbol of which was the so-called 'kuroniówka' (Golinowska, 2009, p. 241). Historically, the Czech Republic has always been an industrial state. It is one of the European countries with the highest share of industrial production in GDP at 47.3% in 2015. The Czech industry focuses mainly on the automotive, electrical machinery, electrical engineering, metallurgy, and chemical sectors. In contrast, the light industry and the agricultural sector have the lowest contribution to GDP and less importance in the economy (PAIH, 2018, p. 8). The agricultural sector of this economy accounts for more than 2%, while in Poland agriculture accounts for about 3% of the GDP. Unlike the Czech Republic, it is an important sector in the national economy and the primary source of livelihood for a large part of the population. The Polish economy is in a state in which manufacturing and service activities coexist side by side, condition their development, and intermingle (Szczukocka, 2018, p. 276). The Czech Republic is a relatively self-sufficient country in terms of food, which was extremely important at the time

of the Covid-19 pandemic. Poland is a surplus country in food production. It has good natural conditions for agricultural production and is capable of producing more food than it requires (Mikuła, 2012, p. 295).

Poland and the Czech Republic joined the EU in 2004, which involved a symbolic entry into the so-called European social model and the adoption by both countries of the entire acquis communautaire. Both countries had to meet the Copenhagen criteria (1993). In terms of the labour market, Poland and the Czech Republic stood out within the EU due to their cheap labour force. Poland has acquired the status of a country with a derogation (euro area), i.e., it has committed itself to adopt the euro at a later stage. Similarly, the Czech Republic does not belong to the Eurozone today, unlike Slovakia (Przybyciński, 2021, p.17). Analysing the development of both countries in the EU through the lens of GDP per capita in 2004–2011, it should be noted that its level in both countries clearly increased (except for 2009, which can be explained by the impact of the crisis in Europe) – a positive impact of integration. There are large disproportions between Poland and the Czech Republic in favour of the latter.

**Table 1. GDP per capita of the Czech Republic and Poland in the years 2004–2011 (euro/citizen)**

| Country/year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| Czech Republic | 9,000 | 10,200 | 11,500 | 12,800 | 14,800 | 13,600 | 14,300 | 14,800 |
| Poland | 5,300 | 6,400 | 7,100 | 8,200 | 9,500 | 8,100 | 9,200 | 9,600 |

Source: (Kowalewska, 2015, p. 224).

An important test for both economies was the recent financial crisis that affected most countries of the market economy. Poland emerged from the crisis unharmed, as it did not belong to the Eurozone. The largest decline in industrial production in 2007–2009 was recorded in Ukraine, falling by 30%, while in the Czech Republic it was as much as 24%, which is associated with its close ties with the economies of western European countries, a problem of trade (Matera, Skodlarski, 2021, pp. 356, 416). The Czech Republic is a small, open economy, heavily dependent on foreign cooperation and trade relations and foreign investment (PAIH, 2018, p. 8). Indeed, it is landlocked and highly integrated into European value chains. The pandemic has shown the harm of dependence on supply chains in sensitive sectors, e.g., access to equipment and drugs. The Czech Republic, unlike Poland, still has a more centralised administrative system (speed of decision-making). It is hierarchical, despite the spontaneous decentralisation processes of 2001–2002 (Graziano, Winkler, 2012, pp. 340–352). Both countries belong to the same international and regional organisations, for example, the Visegrád Group (V4) Table 2.

**Table 2. Multidimensional comparison of the Czech Republic and Poland**

| Similarities | Criteria | Differences | |
|---|---|---|---|
| Organisations | | Czech Republic | Poland |
| – membership in the Visegrád Group (creation of CEFTA in 1992)<br>– membership in NATO<br>– membership in the Three Seas Initiative,<br>In the EU since 2004 (Schengen zone, no participation in the Euro zone),<br>Other participations:<br>– Organisation for Economic Co-operation and Development (OECD)<br>– World Trade Organization (WTO)<br>– International Monetary Fund | Area | 78,866 km$^2$ | 312,679 km$^2$ |
| | – determinants of trade | – landlocked (impact on supply chains) | – access to the Baltic Sea |
| | – administration system | Unitary state<br>'The so-called joined model of public administration was chosen in the Czech Republic, where municipalities and regions carry out, in addition to self-governmental powers, also state administration through delegated competence'. | Unitary state with local self-government limited to development planning, municipal and partly social matters. |
| | Health care system | Unified centralised system | Unified system for social security, decentralised due to the so-called ownership responsibility of health care facilities |
| | Legal Approach to Covid-19 | State of emergency | Statutory approach |

Source: (Metelska-Szaniawska, 2008, p. 44; Golinowska, 2009, pp. 5, 9; PAIH, 2018, p. 20; European Union, European Social Found, Ministry of Interior of the Czech Republic, 2018, p. 7).

## Covid-19 pandemic

The World Health Organization (WHO) defined the new disease on 11 February 2020 as Covid-19 and declared it a pandemic. Around the beginning of April, more than 90 countries worldwide introduced numerous restrictions in the form of lockdowns, quarantines, curfews (as in France), etc. During the pandemic, the question was not whether it was justified for the state to help the economy, but what instruments should be used taking into account the condition of the public finances of the individual states.

We can interpret the pandemic as:

- a butterfly effect, a black swan, when precise prediction and prevention of problems becomes impossible due to increasing instability and chaos (Kielczewski, 2021, p. 6),
- a global crisis with local implications, sudden and deep compared to previous crises,
- a state interference in the economy, which is present in most states around the world; a huge increase in public spending (health, testing, vaccines, personnel protection), in addition to the interference of the state into the private sphere, such as hygiene habits,
- concerning not only economic risk but also uncertainty (dominance of economic forecasts by OECD, IMF, etc.),
- variation in sectors, states, regions (industrial versus agricultural), time periods (easing restrictions typically in May–September). It is now clear (September 2021) that the pandemic is creating its own cycle (increase in infections – lockdown, loosening of restrictions, slow recovery, increase in infections again) (Barrett et al., 2021). It represents an unanticipated exogenous factor. Unlike all known economic crises so far, this macroeconomic shock contains as many as four disruptions: demand shock, supply shock, falling expectations, and rising uncertainty; and shock caused by the restrictions (Čavrak, 2021, p. 85). Analysing the first two channels of demand and supply, it should be noted that in the case of the first, the Covid-19 pandemic negatively affected the economy in the form of a decrease in consumption due to restrictions and a decrease in trust (social capital),
- an increase in transaction costs, a decline in private investment due to the deterioration of the financial situation of companies, a strong slump in selected sectors (such as transport and tourism). In the case of the supply channel, shortages of workers due to disease, quarantine, or other state-imposed restrictions, lack of resources for production (e.g., components) due to broken supply chains (PIE, 2021b).

Thus, the time of social isolation and quarantine, and freezing of the economy, motivated by the desire to flatten the contagion curve, reduced the level

of consumer spending and household income (in Poland by as much as 50%). Through its multiplier, the pandemic hit the flows between individual sectors (Solarz, Waliszewski, 2020, p. 44). The role of the state during this period should be viewed in two ways:

a) introduction of measures to protect health (primarily life),
b) introduction of relief measures for market actors and society as a whole in response to the lockdown.

The Czech Republic was among the EU countries that were the quickest to introduce restrictions and the quickest to lift them. Strict adherence to wearing face masks became their symbol. Both countries responded as early as March 2020. In Poland, against the background of discussions on the nature of the necessary legal instrument, so-called statutory solutions were introduced, while in the Czech Republic, a state of emergency was introduced on March 12, 2020 (repeatedly extended). The precautionary measures taken by the Czech Republic affected nearly 80% of Czech companies, greatly affecting the state of the country's economy. The Czech economy, which was previously on a growth path, has suffered significant financial losses (Czarnecki, 2020b).

In Poland, on 4 March, the Minister of Health announced the detection of the first case of Covid-19. On the same day, a meeting of the Government Crisis Management Team (GCMT) was held. The Polish Prime Minister also met with the heads of government of the Visegrád Group countries in Prague, where the coronavirus situation in Europe was primarily discussed (PARP, 2020, p. 10).

**Table 3. Economic situation of the Czech Republic and Poland before the Covid-19 pandemic (2010–2019) based on OECD data**

| Criterion | Czech Republic | Poland |
|---|---|---|
| GDP PPP per capita | 27% lower than the best OECD economies | 40% lower than the best OECD economies |
| Production | 35% lower than the best OECD economies | 30% lower than the best OECD economies |
| Inequalities<br>Gini coefficient | lower than the most advanced OECD economies and equal to 24.9<br>(range 23.6–62) | lower than the most advanced OECD economies and equal to 28.1<br>(range 23.6–62) |
| Salaries | The poorest 20% of the population earns 9.9% of total income | The poorest 20% of the population earns 8.5% of total income |

Source: (OECD, 2021, pp. 108–109, 203–204).

The nature of the economic policies pursued by both countries is presented in Table 4.

**Table 4. Selected aspects of the economic policies of Poland and the Czech Republic during the Covid-19 pandemic**

| Country | Fiscal policies (various forms of benefits, extra expenses, allowances) | Reduction in interest rates | Macrofinancial tools | Monetary tools | Trade exchange (exchange rate interventions). |
|---|---|---|---|---|---|
| Poland | yes | yes | no | yes | no |
| Czech Republic | yes | yes | no | yes | no |

Source: (PIE, 2021a).

The health care system became a key issue during the pandemic. The ancient Roman saying "health is the greatest wealth" has never been more relevant (Tarricone, Rognoni, 2020, p. 275). In the course of the epidemic, it became clear, to paraphrase the words of the father of economics, A. Smith, that public health is a condition for 'the wealth of nations'. Those states that invested more in health care found it easier to recover from the crisis. In addition, the crisis has taught the public that increased spending and digitisation in this sector is necessary. In 2020, the Council of Ministers in Poland passed a bill raising health care spending to 7% of GDP (Druk numer 145, 2021). The EU countries are estimated to have spent an average of 8.3% of their GDP on healthcare in 2019. Poland had the lowest share of GDP allocated to health care (6.2%). The Czech Republic was well ahead of it with 7.8% of GDP (including higher levels of public spending on health per capita) (OECD, 2021; Morgan, Astolfi, 2014, p. 125). After World War II, the dominant model on the basis of which the Polish and Czech health care systems functioned was the Siemaszko model. In terms of health system structure, the Czech health care system is based on mandatory public health insurance, which provides universal access to a broad package of benefits (Nemec, Maly, Hubarova, 2021, p. 284). The 1993 reform in the Czech Republic resulted in the establishment of 27 health insurance funds to support the public sector without the possibility of making a profit. Since 2008, so-called regulatory fees have been in force in the Czech Republic, which are paid by each patient from their own funds (Wielicka, 2014, p. 498). In July 2013, the Constitutional Court decided that the system was unfair to vulnerable groups and all fees were abolished. The government abolished all fees in January 2015, except the fees for emergency services (evening/weekend) – a fee of CZK 90 (Fall, Gloker, 2018, p. 4; Alexa et al., 2015, p.108; Health insurance system in cz, 2021).

In 1999, a major health reform was introduced in Poland, introducing a new system called the insurance-budget system. The state was tasked with supporting the health care system, but to a much lesser extent. Local governments also played a role in reforming health care. The primary source of funding for the health care

system in Poland is the health insurance premium (a tax on the insured's income) (Rogalski, 2016, pp. 449–451).

A September 2020 INTERREG study found that trust in the health care system in Poland on a scale of 1 (low) to 10 (high) is low, hovering around 4.6 points. Moreover, it is lower than the EU average of 6.4 and the Czech trust level above 7 points (Rőmisch, 2020, pp. 2–3). The Covid-19 crisis in Poland revealed long-standing problems in the health care sector, including the population's susceptibility to respiratory diseases associated with high air pollution (the smog problem in Poland).

The crisis primarily affects the labour market. The phenomenon of the Czech Republic is that it consistently ranks among the countries with the lowest unemployment. The average annual unemployment rate in the Czech Republic in 2001 was 8.1%, while in Poland it was as high as 18.1%. The Czech Republic in 2001–2012 was characterised by the most stable situation on the labour market (on average throughout the period studied, the unemployment rate was 7%). This is due to the social policy model, cheap labour (the hourly labour cost in the Czech Republic in 2019 was €13.5, while the EU average was €27.7) but also the relatively high distribution of labour in the manufacturing industry (Grabia, 2014, p. 39). From March to June 2020, the unemployment rate in the Czech Republic increased by approximately 0.7% to 3.7%. This number is 1.1% higher compared to the same period in 2019 (Czarnecki, 2020a, p. 41). According to INTERREG research, when comparing the unemployment rate in Poland in June 2020 with the previous year, it is observed, first of all, that the unemployment rate was lower in the year 2020, which is key to these considerations, compared to 2019. The Czech Republic, in turn, also maintained one of the lowest inequality and poverty rates in the OECD. This is because the labour market in both countries was developing positively until Covid-19 broke out. The relatively mild labour market response to the health crisis was largely due to state measures supporting the so-called kurzarbeit. Restrictions on working hours affected women primarily. This is because Covid-19 affected sectors with a higher percentage of female employment, such as retail, more than male-dominated industries (Rőmisch, 2020, pp. 2–3).

According to EU guidelines, the demand for digital skills upgrading, the impact of the pandemic on youth, argues for increased public spending on active labour market policies, especially training. The Czech Republic is among the least developed member states in terms of using digital public services (EC, 2020). The shortage of skilled labour is an obstacle to the sustainable development of the Czech economy. It has a negative effect on the digitisation and greening of the economy where new skills will be needed. A serious problem in the Czech Republic that was exacerbated by the Covid-19 pandemic is the wage disparity affecting women (OECD, 2021).

Analysing the pandemic through the prism of the banking sector, it is worth pointing out that the balance sheet structure of the Czech Central Bank's increased 4.4 times from 2007 to 2021, but its structure did not change significantly. At the beginning of the Covid-19 crisis, the Czech Republic announced a large anticrisis program in the range of 12.3% of GDP (described later in this article). Public guarantees accounted for 70% of this. However, the program was not supported by the CNB because the bank decided that it could only be used as a last resort in terms of loosening monetary policy. Unlike the Czech Republic, Poland has involved its National Bank of Poland (NBP) in the Covid-19 antirecession program. Bold redistributive measures (expansionary fiscal policy) probably could not have been implemented without the support of the central bank. This support was up to 10% of GDP. In addition, the central bank lowered interest rates and made direct purchases of government securities. (Lovrinović, 2021, p. 141). However, interest rates were lowered for both countries. The Czech National Bank lowered rates from 2.25% to 0.25% from March to May 2020 (OECD, 2020). The NBP lowered interest rates at the Monetary Policy Council (MPC) meetings held on March 5, 2020, April 17, 2020 and May 28, 2020 (Solarz, Waliszewski, 2020, p. 43).

Looking through the lens of regional vulnerability, it is worth noting that industrial regions are more likely to be impacted by the Covid-19 pandemic. In March 2020, the United States stopped production of its entire auto industry for the first time in more than 100 years, something not even experienced as part of the crisis in the 1930s- Great Depression (Adamczyk, Surdykowska, 2020, p. 9). In the Czech Republic, Škoda, in agreement with the Volkswagen Group and the KOVO trade union, closed its factories in March 2020. Škoda is the largest Czech company by sales, the largest Czech exporter and one of the largest Czech employers. The Czech Republic is one of the most industry-dependent countries in the European Union (second place in the EU, 30.5% of value added in the whole economy), including dependence on the automotive industry. Automobile manufacturers and suppliers make up 23% of the industry, responsible for 9% of GDP. The Czech Republic is the world's second largest automobile producer by population and is also heavily dependent on the Chinese economy. In light of the importance of the automotive industry for the Czech economy, the strong procyclical nature, export orientation, and dependence on supply chains of the sector pose a significant threat (NRPoCR, 2020, p. 46; Prust et al., 1990, p. 1).

Moreover Czech carmaker Škoda Auto, part of Volkswagen Group, halted production at two domestic plants for a week due to chip shortages. Škoda had thousands of cars unfinished as it waited for chips.

Car makers around the world were struggling with a shortage of semiconductor chips amid a post-pandemic increase in demand, and the disruption was hampering the Czech economy and others in central Europe reliant on the auto industry (Reuters, 2021; The Irish Times, 2021).

The Czech automotive sector was under pressure before the pandemic due to regulatory changes ($CO_2$ emission targets for new cars) and digital transformation that required structural changes and investments in new technologies and external competitiveness, for example, electric cars (OECD, 2020). Based on research conducted by the Czech Republic Association of Industry and Transport and presented by the Institute of East-Central Europe, more than a third of the 347 industrial companies in the Czech Republic have problems with procurement, transport, and logistics as a result of the pandemic (NRPoCR, 2020, p. 46; Czarnecki, 2020b). In 2020, the Ministry of Industry and Trade in the Czech Republic prepared the document SME Support Strategy in the Czech Republic for 2021–2027. It will be a key document supporting small and medium enterprises through business development measures and initiatives, which should help SMEs face the numerous challenges of the digital age, the growing importance of services, climate and energy change, and major demographic changes that can reduce the competitiveness of Czech SMEs. Important strategic documents in this area include: Economic Strategy of the Czech Republic 2020–2030, and Innovation Strategy of the Czech Republic 2019–2030 (GoCR).

Poland and the Czech Republic face similar decarbonisation challenges in the coal sector as part of their energy policy (Turów mine conflict). The process of transition from a fossil fuel-based economy to a low-carbon, sustainable and green economy concerns both the Czech Republic and Poland. This transformation is also forcing policymakers in both countries to change tax laws. Green growth is a detailed treatment of the concept of sustainability by considering environmental and economic aspects.

Key to the Czech economy is the inclusion of nuclear energy among sustainable sources. The National Development Plan for Nuclear Energy from June 2015 anticipates the construction of new nuclear generation capacity to maintain the current level of self-sufficiency in energy and to advance energy transitions towards a low-carbon energy sector. A revised State Environment Policy was adopted in January 2021 and includes a long-term vision for reaching carbon neutrality by 2050. Nuclear energy will replace coal and other solid non-renewable fuels as the largest fuel in total primary energy supply. The share of renewables and secondary energy sources and that of gas will also increase, while the share of oil will decrease (International Energy Agency, Czech Republic 2021, pp. 23–24).

Among the stimulants that have a positive impact on Poland's green growth is employment in the sector of environmental goods and services (full-time equivalent). In turn, destimulants in the case of Poland are mainly the dependence of the country on energy. The Czech Republic has a higher share of renewable electricity in total electricity consumption (14.9%) and lower values than Poland for the following factors: green house gas emissions index, sulfur oxide emission. Therefore, an

important challenge for both countries is the EU climate and energy policy (aiming for climate neutrality by 2050) in accordance with the Paris Agreement (MKIŚ, 2021; Sulich, Grudzinski, Kulhánek, 2020, pp. 1998–199). Coal continues to dominate the energy sector and remains an important driver of economic activity in three Czech regions and the Silesia region in Poland. This sector in the Czech Republic does not receive financial incentives and lacks an adequate legal and institutional framework to support its further development. Transportation taxes are low and do not depend on $CO_2$ emissions. The Czech Republic is among the countries that are particularly affected by technological change (e-government) and that need significant investment in this area (EC, 2020).

Tourism is the third largest global export, behind fuels and chemicals (PIE, 2020). The imposed administrative restrictions limiting the possibility of travelling, and in particular travelling abroad, mean direct losses for the tourism industry and indirect losses for other sectors of the economy, in particular those providing products, components, and services for enterprises operating in the tourism industry (trade, transport, agriculture). As K. Obłąkowska points out, the introduction of limiting the scope of travel and the freezing of the tourism sector were important in this area. A comparison of the direct contribution of tourism to the GDP of European OECD member states and Poland shows that in Poland this impact is one of the lowest, amounting to 1.3% in relation to such economies as Cyprus and Croatia. In the Czech Republic, it accounts for nearly 3% (Obłąkowska, 2021, p. 196). For example, in 2018 in terms of accommodation places, of 32.2 million available in the EU, the figure was 800,000 in Poland, 740,000 in the Czech Republic, while in Italy it was 5.1 million. However, it is worth pointing out that international tourist traffic is extremely important from the perspective of Prague (there are separate programs for Prague). In Poland, Tarcza 5.0 (Shield 5.0) was addressed directly to tourism. Additionally, the Act of 15 July 2020 on the Polish Tourism Voucher was adopted. The anti-crisis shields allowed state interference in tourism, hotel, and transportation operations. In Poland, the withdrawal of a traveller from an agreement or the termination of an agreement for participation in a tourist event by a tour operator grants the right to return payments made to the Tourist Guarantee Fund. Entities managing airports and railroad stations will not be liable for damage caused in connection with proceedings (actions) of the public authorities aimed at counteracting the Covid-19 pandemic, and primarily for the lack of transport (Kudełko et al., 2020, pp. 78–79).

In the Czech Republic, the law 'Lex voucher' (Act No. 185/2020) was adopted to assist tour operators and stipulated that, with a few exceptions (so-called protected persons), they do not have to return financial amounts to customers for cancelled trips or trips that will not take place. This law allows tour operators to convert a monetary debt to the customer into a travel voucher. And after this time,

if the customer does not use up the voucher, they are entitled to a refund. Thus, tour operators have customers' funds at their disposal for a certain period. These vouchers, like package tours, are covered by compulsory insolvency insurance. The Lex voucher system allowed tour operators to not refund customers' payments for travel services in the protection period (from 20 February 2020 to 31 August 2020) if the original obligation under the tour contract ceased due to the Covid-19 pandemic. In lieu of a payment refund, the tour operator was allowed to provide the customer with a voucher for a tour of at least the value of the original tour. The 10% vouchers offered by the private travel agencies expired after a year (Eurofound, 2020; Veverková, 2020; Kvítková, Petru, 2021, p. 67; Government of the Czech Republic, 2020).

The Czech Republic and Poland were among the UNWTO countries that introduced the following measures for tourism:

- exemption, deferral (up to six months) and reduction (up to 50%) of tourism-related taxes for companies in the tourism industry, hotel industry, and other tourism-related operations such as the environmental protection fee, tourism licenses, tourism marketing, taxes, visa fees, capital gains taxes;
- economic assistance to SMEs in tourism;
- cash flow assistance to travel agencies (UNWTO, 2020, p. 18).

One of the industries most affected by the Covid-19 pandemic was air transportation.

At the beginning of 2020, LOT Polish Airlines (PLL LOT) and the Polish Aviation Group (PGL) were in good economic shape and arranged the acquisition of Condor Airlines. The restrictions introduced in Poland contributed to the listing of Warsaw Chopin Airport in the 10th position on the list of 40 airports most affected by the SARS-Cov-2 pandemic, as published by Eurocontrol (Wąsowska, Wincewicz-Bosy, Dymyt, 2021, pp. 524–528). As a result of the declared state of emergency and the emergency measures implemented in connection with the spread of the pandemic, Czech Airlines (CSA) suffered a loss of CZK 1.57 billion and an unprecedented decrease in company revenue to approximately 20%. CSA and Smartwings pointed out that despite recommendations from the European Commission and the International Air Transport Association (IATA), CSA did not receive any financial support from the government, unlike in other European countries (Czech Arlines, 2021).

In response to the far-reaching restrictions on the economic freedom of market entities and as a secondary effect of weakening household incomes, states have prepared a package of crisis solutions.

In March 2020, the Polish Parliament adopted a package of laws called the Anti-Crisis Shield. Due to the fact that the shield is an evolving package of laws, the numbering of shields from 1 to 6 was adopted. In the article, the term 'Anti-Crisis Shield' is used, while in the Appendix bibliography its legal basis is listed

in chronological order. It included broad support for worker safety, financing of businesses, the health care system, the financial system, and public investment (KPR, 2020, p.13)

The Law of March 2, 2020 on special solutions related to the prevention, counteraction and combating of Covid-19, other infectious diseases and crisis situations caused by them introduced a number of significant changes in the form of the following instruments: the possibility of issuing orders to entrepreneurs by public authorities, necessary for the time, exemptions from public procurement law and construction law, in order to protect public health, obligations of entrepreneurs in the field of state defence. In the changes concerning employees and employers, the employer obtained the legal possibility of ordering remote work, and the insured employee, exempted from performing work in connection with the care of a child under 8 years of age, obtained the right to additional care allowance (Kudełko et al., 2020, pp. 78–79; PARP, 2020, p. 2.). Shield 1.0 highlighted flexibilities in state budget management and public finance systems at different levels (from local to central), which was necessary due to increased public spending. An interesting solution in Poland was the downtime benefit paid to certain individuals from the state budget. This benefit, subject to a number of exclusions and conditions, applies to those entrepreneurs who, as a result of the occurrence of Covid-19, will record a decline in turnover, and entitled them to introduce economic downtime in the workplace or reduce working hours for employees. This, in turn, makes it possible to apply for a subsidy from the Guaranteed Employment Benefits Fund for the salaries of these people and for funds intended for paying social insurance contributions due from the employer on these salaries. Thus, if, following the occurrence of Covid-19, there has been a shutdown in the conduct of business, either by a non-employed person or by a principal or contracting entity with whom a civil law contract has been entered into, lasting for a continuous period of at least 30 calendar days, one becomes entitled to a downtime benefit, which is revenue for income tax purposes. After all, according to special provisions introduced by the special act to the personal income tax act, this benefit is exempt from income tax (Bartosiewicz, 2020, p. 42, 55). The flexibilisation of working time, which has been implied in the Polish labour market, has become an important element. The employer affected by Covid-19 may shorten the uninterrupted day and weekly rest time for the employee; in consultation with the trade unions or employee representatives, the employer will also be able to lengthen the daily working time and the settlement period. Since the Great Recession, kurzarbeit (short-time work) programs have been used across Europe to help employers retain workers during the sharp transitional drop in demand. In April 2020, a kurzarbeit was launched as part of the Antivirus program, which is best known as an employment promotion program, in the Czech Republic, as discussed in more detail below. The essence of this program is the partial compensation of the wage cost during the Covid-19 pandemic. The economic rationale for the

kurzarbeit policy is that an effective policy to respond to temporary drops in demand (e.g., financial crises) or temporary suspensions of economic activity (pandemics) should minimise economic operations (Kudełko et al., 2020, p. 82; Jurajda, Doleželová, 2021, pp. 2–4).

In Shield 2.0, changes were made to exempt entities that report between 10 and 49 insured persons from social security contributions. In addition, it is further stipulated that the number of insured persons shall be calculated excluding insured persons who are young workers (Kudełko et al., 2020, p. 84). This was significant in the context of two groups that were particularly affected by the pandemic: women and young people. Among the key solutions of the act, commonly referred to as Shield 4.0, were: temporary anti-takeover regulations to protect Polish companies from being bought out by investors from outside Europe and the OECD; subsidies from the budget to cover bank loan interest rates for companies; credit vacations for those who lost their jobs or main source of income after March 13, 2020 (PARP, 2020, p. 23). Shield 6.0 (also referred to as the Industry Shield) is considered to be a form of support for entrepreneurs in approximately 40 industries. Due to the predominance of so-called microenterprises in Poland, in the issue of loans for them, a favourable decision had already been made in Shield 3.0 to change the conditions for granting a microloan by extending the catalog of microentrepreneurs eligible for a low-interest loan (Kudełko et al., 2020, p. 87).

Antivirus (A, B, C) has become the key anti-Covid-19 program in the Czech Republic. It provided support for entrepreneurs and the self-employed. This is because the Czech tax system is not conducive to economic growth. It has been emphasised for many years that it has an impact on the lowest income groups. The high tax burden on labour is not optimal. On the other hand, the use of environmental and property taxes, which are less distortive to growth, is low. Taxes and contributions of the self-employed remain lower than for employees, leading to the dominance of self-employment (OECD, 2020). The scheme applies to those companies where employees have an employment relationship and must be covered by sickness and pension insurance. The employee, in turn, cannot be on notice and cannot receive notice of termination (Ministry of Labour and Social Affairs, 2020).

The program is designed to protect jobs at employers directly affected by government restrictions related to Covid-19. The wage allowance was to be granted by the Czech Republic Labour Office on the basis of an application submitted by the employer. In mode A, in the case of quarantine, the employee is compensated at 80% calculated on the average reduced income. If a company closes due to a government order, the employee receives 100% of their average salary (the cause of the problem lies with the employer). Mode A supported companies primarily in the hotel and cultural industries that had to shut down their operations due to the pandemic lockdown. Under mode B, aid was provided in the

form of a compensation allowance to the self-employed (due to their large market share) and small limited liability companies. Reduced availability of the workforce on the part of the employer due to quarantine orders or employees' involuntary childcare leave became the basis for the right to compensation equal to 100% of one's average salary. Mode B was a kind of kurzarbeit policy for companies facing declining demand (Czech Republic, 2020; Jurajda, Doleželová, 2021, pp. 2–4). Non-wage labour costs were covered by program C. This involves the compensation of social security contributions paid by the employer. The program called 'Pětadvacítka' gained importance, under which self-employed persons forced to suspend or significantly reduce their economic activity due to public health risks or crisis measures implemented by public authorities are entitled to a tax bonus of CZK 500 per person (EC, 2020). In addition, 3 Blockade programs were launched, mainly in the form of loans with government guarantees. The Czech Republic also as a state did not impose penalties for late filing of personal and corporate income tax returns, for late payment of a tax claim, and for late filing of control tax returns (Government of The Czech Republic 2020). In Poland and the Czech Republic, public procurement procedures have been simplified, systemic changes have been introduced in the form of various tax solutions, a longer period for settlements, e.g. in Poland in the case of PIT returns, and in relation to market entities in the case of loss of liquidity. In the case of the Czech Republic, many public programs highlight the role of Prague as the largest Czech agglomeration, e.g. COVID PRAGUE.

As of 1 January 2021, the Czech Republic was abandoning the concept of the super-gross salary as a unique way of determining the tax base. At the same time, this change is associated with the abolition of the flat tax rate, the abolition of the solidarity surcharge and the reintroduction of progressive taxation with a marginal rate of 23% for income over CZK 1.7m annually. Furthermore, a special tax base with a rate of 15% is introduced for selected types of non-Czech investment income (e.g. dividends and interest from abroad). This results in an impact on public finances (reduction of revenues to the state budget) and an increase in inflation in 2022. The Czech state budget deficit swelled to a new record in 2021. The 2021 budget deficit was approximately twice the deficit posted during the 2008–2009 global financial crisis and higher than in the initial year of the 2020 pandemic. The economic fallout from Covid-19 resulted in the Czech Republic having a state budget deficit of 367 billion crowns ($16.7 billion) in 2020, but the budget gap in 2021 has reached a record 420 billion crowns (Insights from Global Mobility Services, 2021; Muller, Hovet, 2021; 2021 Investment Climate Statements: Czech Republic, 2021).

Both the Czech Republic and Poland are members of the EU, which significantly changes the methods of state interference (horizontal and vertical connections). As a result, some aid programs require the involvement of the

European Commission. Due to the common market and competition rules, there are strict rules for state aid in the EU. In March 2020, the EC adopted a State Aid Temporary Framework (EC, 2021b; EC 2020) allowing Member States to use the full flexibility provided by state aid rules. In order to support economies with anticrisis measures, the EU has made the application of EU state aid rules for business and workers, as well as fiscal policy and public finance rules, as flexible as possible. This legislation allowed member states to support those companies most affected by the pandemic (Kudełko et al., 2020), allowing them to stay in business or be able to temporarily suspend operations without adversely affecting their long-term growth prospects. From 2020 to 2021, on the basis of Article 107 of the TFEU, the EC approved aid schemes for the damage caused by the Covid-19 pandemic for Poland and the Czech Republic. In the case of Poland, this mainly involved €32 million in compensation for damages to airports, and in the case of the Czech Republic – €37.6 million in compensation to non-profit sports organisations. In turn, under Article 107(3)b of the TFEU, this concerned support for Czech ski resort operators affected by the pandemic. Regarding Section 107(3) c of the TFEU, for both states, this involved the financing of a wide variety of assistance programs. Regarding the Czech Republic, there was €1.9 billion in aid to support companies in the country; €11.6 million to support travel agencies; €1.9 billion to support uncovered fixed costs for companies affected by the epidemic, €268 million to support accommodation operators, €3 million to support Czech tour operators, and €110 million to support agricultural firms.

In addition, the European Commission approved a €1.2 billion program to support the self-employed and two Czech employment programs to support companies affected by the coronavirus outbreak. In the same period, the EC approved Polish programs concerning: €1 billion to further support companies affected by the coronavirus; also support for micro, small, and medium-sized enterprises that are key to Poland's economic development in the amount of €2.9 billion. A special role should be given to strategic support in the amount of €650 million for Polish Airlines; also €40 million to support the producers of chrysanthemums; moreover €193 million to support companies operating in the tourism and cultural sector; also €95 million to support companies operating in the agricultural sector (EC, 2021a). In addition, the Czech Republic has requested financial assistance from the Union under the SURE Regulation (pursuant to Article 6(2) of the SURE Regulation). Both countries have prepared national reform programs necessary for the cohesion policy (accepted by the European Commission only in the case of the Czech Republic). In addition, the so-called EU escape clause is important for the conduct of fiscal policy in both countries.

As indicated above, the relationship between the state and the EU currently forms a complex system of links. The future prospects for the Czech Republic and Poland are similar. The OECD predicts that in 2022, GDP is expected to grow by

4.9% in the Czech Republic and by 4.7% in Poland. The European Commission indicates a growth of 4.5% for the Czech Republic and 5.2% for Poland in 2022 (EC, 2021b).

## Conclusions

The paper analyses the endogenous factors and takes into account the economic peculiarities of the two countries and the impact of external factors affecting these economies, especially those brought about by the Covid-19 pandemic. The Czech Republic and Poland are considered to have similar economic and social levels. It is worth noting that, as a rule, the Czech Republic occupies a higher position in the rankings than Poland, which should be of interest to policymakers in Poland. The Covid-19 pandemic became a barometer of the weaknesses of both economies as it brought out the pre-existing problems and the backwardness of a socio-economic nature and areas of so-called development challenges. In addition, it highlighted the resilience and strengths of both economies. Comparing them with the OECD recommendations for both countries (OECD, 2021), it should be stated that in the case of the Czech Republic, in the area of the labour market, it is not about quantitative changes, but about the quality of this market, i.e., strengthening the professional position of women and active labour market policies to facilitate employment transitions (new professions and skills). The problem in the Czech Republic is the apparent relatively inadequate activation of the unemployed to meet the needs of the labor market. During the 2009 crisis, youth unemployment doubled and remained high for several years. This is a particularly vulnerable group during the Covid-19 pandemic. In the case of Poland, it is the rate of participation in the labour force of older workers and women.

In both cases, the challenge to growth is investment in research and development. Moreover, due to the domination of micro and medium enterprises in Poland and the self-employed sector in the Czech Republic, it is necessary to simplify business regulations and streamline bankruptcy proceedings (shortening the time and number of procedures, legal costs) and the tax system in the Czech Republic. Although $CO_2$ emissions declined during the pandemic, sustainability concerns remain in both countries. Environmental policy is about state support for energy efficiency and renewable energy, as well as investments in upgrading electricity grids and district heating networks that help reduce emissions. The problem for both countries is the so-called coal regions. Another problem in Poland is the high air pollution associated with the use of poor quality coal and biomass in the residential sector. In the case of the Czech Republic, improving the efficiency of the public sector through consolidation of local government

services and e-government. In the case of Poland, a long-term view of health care and social inequality. Both countries need to invest in the development of their key market sectors. In addition, they should increase the digital development that enables microentrepreneurs to transition to remote work. Both the Czech Republic and Poland are food-secure countries. In both countries, the decline in trust characteristic of this type of crisis is evident, implying a recourse to legal regulations and a decline in transaction costs. Thus, it can be seen that it is necessary to target a long-term economic policy because someday the Covid-19 pandemic will be over. The paper does not cover all the issues in the indicated area. It paves the way for further research on the indicated policies in the context of the endemisation of economies. This requires a detailed and in-depth analysis of each of the public policies.

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*Summary*

The activity of the state during the crisis, as a rule, shows vulnerable areas, ones that are weaker or for a long time unreformed, representing the 'weaknesses' of a given economy. The aim of this paper is to compare areas requiring particular state aid in Poland and the Czech Republic in the context of the impact of the Covid-19 pandemic, taking into account their historical development. The choice of the countries is the deliberate methodological procedure due to the fact that both represent one of the key regions in Europe. The indicated countries are EU members, which determines the approach of the Czech Republic and Poland in the field of economic policy, including trade, social policy, food security, energy, and health protection (taking into account the competences of the member states in relation to the EU in this area). It was pointed out that both countries did not join the euro area. Tax concepts in the public finance of both countries were taken into account. Moreover, these countries are faced with similar ecological challenges such as the Green Deal which influences the necessary economic changes. Comparative analysis was used as a research method, taking into account not

only the differences and similarities between the countries analysed. Both countries face civilization and development challenges, for example, digital changes, which determine the effectiveness of other public policies.

*Keywords:* state, Covid-19 pandemic, comparative analysis.

## Rola państwa podczas pandemii Covid-19 w Polsce i Czechach – analiza porównawcza

*Streszczenie*

Aktywność państwa w okresie kryzysu z reguły ukazuje obszary wrażliwe, słabsze lub od dawna niezreformowane, reprezentujące „słabości" danej gospodarki. Celem artykułu jest porównanie obszarów wymagających szczególnej pomocy publicznej w Polsce i Czechach w kontekście wpływu pandemii Covid-19, z uwzględnieniem ich historycznego rozwoju. Wybór państw jest celowym zabiegiem metodologicznym ze względu na to, że oba reprezentują jeden z kluczowych regionów Europy. Wskazane państwa są członkami UE, co warunkuje podejście Czech i Polski w zakresie polityki gospodarczej w tym handlowej, społecznej, bezpieczeństwa żywnościowego, energetycznej, ochrony zdrowia (z uwzględnieniem kompetencji państw członkowskich w relacji do UE w tym zakresie). Zwrócono uwagę na fakt, że obydwa państwa nie przystąpiły do strefy euro. Uwzględniono koncepcje podatkowe w ramach finansów publicznych obydwu państw. Ponadto państwa te współcześnie stanęły przed podobnymi wyzwaniami ekologicznymi np. Green Deal, co wpływa na konieczne przemiany gospodarcze. Jako metodę badawczą wykorzystano analizę komparatystyczną uwzględniając nie tylko różnice, ale i podobieństwa pomiędzy analizowanymi państwami. Przed obydwoma państwami stoją wyzwania cywilizacyjne i rozwojowe, np. zmiany cyfrowe, które będą determinowały efektywność pozostałych polityk publicznych.

*Słowa kluczowe:* państwo, pandemia Covid-19, komparatystyka.

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# Corporate social responsibility (CSR) and sustainable development during the Covid-19 pandemic

## Introduction

The outbreak of the Covid-19 pandemic was unexpected and placed the world in a state of constant uncertainty. None of the groups of entities were prepared for a pandemic due to its sudden and unpredictable development. National governments have been faced with the task of conducting activities aimed at reducing the dynamics of the spread of the virus and thus counteracting the effects of the pandemic. The activities of many enterprises have been disturbed, which has resulted in the necessity to seek new forms of activity, including virtualization of what they offer, as well as the search for new sales markets. People have also had to adjust their behaviour due to the recommendations from health agencies (i.e. health ministries or international health organizations such as WHO), such as avoiding crowded places, wearing masks and maintaining social distance.

The Covid-19 pandemic has redefined the values of society. Citizens began to take better care of their health and safety and some of them reduced the number of times they left home as much as possible. There was an increase in the number of people who helped those people particularly exposed to infection, such as the elderly (Daoust, 2020). Therefore, it should be stated that social openness to

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others (in particular the most needy) has increased, leading to an amelioration of social solidarity.

Even businesses that were formerly focused on earning money have begun to regard socially acceptable ideals. They support those in need, especially those individuals who personally care for public health, either by purchasing coronavirus detection tests or just by donating funds to fight the pandemic. Czajkowska (2020) believes that the Covid-19 pandemic can be treated as a determinant of its corporate social responsibility (CSR) activities.

Countless initiatives have been undertaken during the pandemic to assist those most impacted and threatened by the disease. Because infection with the SARS-CoV-2 virus can pose a serious threat to human health and life (individual and public), several measures were taken to increase awareness of health and climate, which is consistent with the United Nations Sustainable Development Goals (SDGs) adopted in 2015 (Tonne, 2021). The UN SDGs comprise 17 elements that aim to improve the quality of life in all regions of the world and to protect the common good, which is Planet Earth (United Nations). Goal 3 of the SDGs states 'Good health and well-being', which is essential in the context of combating the Covid-19 pandemic, particularly due to the difficulties of its implementation immediately after a violent outbreak (Bhatia, Khetrapal, 2020). The coronavirus influenced the implementation of all the SDGs, although counteracting the spread of the pandemic and limiting its effects in the context of implementing Goal 3 brings with it complementarity in meeting other goals, such as 'preventing poverty', 'no hunger', 'quality of education' and 'gender equality' (Bhatia, Khetrapal, 2020). Mukarram (2020) believes that in the course of the pandemic it is also crucial to focus on Goal 17 "partnership to achieve the Goals", because only through the unanimous cooperation of national governments and international organizations is it possible to increase the likelihood of a faster achievement of the SDGs that have been suppressed by the outbreak of the pandemic.

Therefore, a broader study of CSR and sustainability during the Covid-19 pandemic is justified. The research gap was defined as the lack of studies treating the issues of CSR and sustainable development (SD) in a joint manner (in particular in the context of the prevailing epidemic threat). The purpose of this paper is to delineate the scope and degree of implementing the CSR commitment policy and the implementation of the SDGs during the first year of the Covid-19 pandemic. In order to achieve this, the following research questions were posed:

- *RQ1*: How has the pandemic influenced the number of CSR initiatives?
- *RQ2:* In which sectors can a particular commitment to CSR be observed?
- *RQ3:* To what extent does the Covid-19 pandemic affect the implementation of individual UN SDGs?
- *RQ4:* In what aspects was SD most visible during the pandemic and where were the greatest shortcomings?

The article is exploratory in nature. The utilization of exploration as a research method allows the multidimensional presentation of the phenomena, especially when it is of a practical nature. Furthermore, the multitude of sources used in the study increases its value as a source of knowledge on the general scope of CSR policy, as well as the implementation of the SDGs during the first year of the Covid-19 pandemic. The paper also includes references to the studies by other researchers that address the issue of CSR and SD in the pandemic era.

This paper consists of two basic axes. The first focuses on the concept of CSR, with particular emphasis on the quantitative presentation and analysis of individual CSR initiatives during a pandemic. The second deals with the concept of SD, with a focus on the effects of the Covid-19 pandemic on the implementation of individual SDGs. The summary includes conclusions resulting from the research process.

## Corporate social responsibility (CSR) – the concept

Over the years, the concept of CSR has been the subject of many areas of scientific research. The constantly upgrading implications of CSR policy naturally create new applications of it and, therefore, their further exploration and analysis are required in order to explore the topic more deeply or to fill the research gaps.

Since the first use of the term 'corporate social responsibility' by Bowen (1953), the concept has acquired many dimensions and definitions. This is evidenced by the work of Sarkar and Searcy (2016), who distinguished 110 definitions of CSR in their research. These definitions describe a reality, but they fail to offer any advice on how to deal with the issues that arise as a result of it. As a consequence, the difficulty for businesses is understanding how CSR is socially built into a particular situation and how to account for this when developing a business strategy (Dahlsrud, 2008).

There is a lot of overlap between the different authors' definitions of CSR and their understanding of this term. First, CSR typically refers to a company's commitments to protect and enhance the welfare of society as a whole and the company's own best interests (Davis, Blomstrom, 1975). The term refers to a company's policy of improving its decision-making process to align it with prevalent norms, values and social expectations (Lys et al., 2015). Furthermore, being socially responsible does not only entails going above and beyond both economic and legal requirements to act responsibly, but also attempting to improve society's benefits (Farooq et al., 2017).

Despite the differences, some researchers try to distinguish areas of CSR activity. According to Dahlsrud (2008), these definitions focus on five dimensions:

environmental, social, economic, stakeholder, and charity. In turn, Rahman (2011), while analyzing the approaches to CSR, distinguished 10 major dimensions that they deal with:

- Obligation to society.
- Stakeholders' involvement.
- Improving the quality of life.
- Economic development.
- Ethical business practice.
- Law abidance.
- Voluntariness.
- Human rights.
- Protection of the environment.
- Transparency & accountability.

The most popular in the literature is the concept of Carroll's social responsibility (1979)[3], which states that "social responsibility of business encompasses the economic, legal, ethical and discretionary expectations that society has of organizations at a given time". This theory presupposes that the enterprise is responsible for making revenues for stakeholders according to the legal requirements, participating in activities as a member of society (excluding those legally required), and engaging in philanthropic activities (Carroll, 1998). The concept can be pictured as a pyramid, as shown in Figure 1.

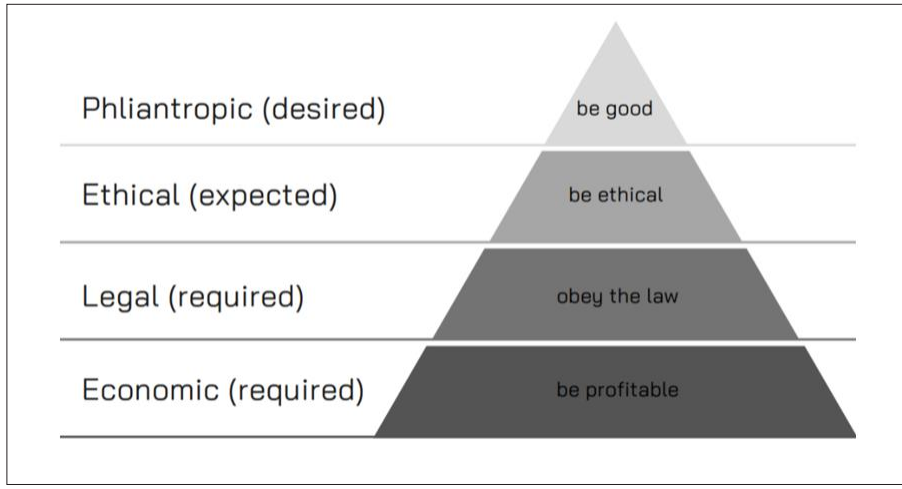


**Figure 1. The 4-dimensional Carroll's Concept**

Source: own study based on (Carroll, 1991).

[3] This article is referred to in over a dozen thousand other works, as confirmed by statistics from the Google Scholar database (as of March 2022).

The economic dimension of the company's activity is the basis of the pyramid, as it must be profitable (Carroll, Laasch, 2020). It should be noted that state-owned enterprises do not necessarily have to be profitable, and often they are not. Regardless of this dimension, the enterprise must act within the framework established by law and only then examine the ethical considerations of its activities.

Czubała (2011) claims that society expects companies to be responsible for their economic activity and the externalities resulting from it, including leaving the environment in a non-deteriorated state. In the event of a negative impact on the environment, compensation is expected for the damage caused. When considering the concept of CSR, actions, along with consumer expectations, force entrepreneurs to support social initiatives. Consumers are increasingly being seen as 'part of sociocultural tissue' by businesses, rather than just as recipients of their products (Maciejewski, 2015). In a competitive market environment, CSR plays an increasingly important role (Luo, Bhattacharya, 2006).

## CSR initiatives during the coronavirus pandemic

Countless businesses have suffered financial losses as a result of the Covid-19 pandemic, regardless of their industry (Rizvi et al., 2020). A tumultuous environment forces business owners to reflect on themselves and their operations. In line with Carroll (1979), it can be claimed that there has been a shift and more attention to the core economic activity within the law. Entrepreneurs have used a variety of strategies to mitigate the effects of pandemics (Marom, Lussier, 2020). One of the basic of these is to focus on searching for new sales markets (Dyduch et al., 2021). As a result, in the event of a pandemic and the economic slump created by it, businesses would be unable to participate in activities and volunteering under CSR because their resources would be shifted to ensure their survival on the market.

On the other hand, He and Harris (2020), as well as Czajkowska (2020), believe that the Covid-19 pandemic has provided businesses with opportunities to successfully implement CSR initiatives that will greatly benefit the local community. In Poland, the most comprehensive source of information on CSR activities is the annual report *Odpowiedzialny biznes w Polsce. Dobre praktyki* prepared by Forum Odpowiedzialnego Biznesu. In the 2021 edition, 1,958 examples of good practices were reported by 225 companies. The dynamics in the number of initiatives and companies operating in the field of CSR is presented in Figure 2.

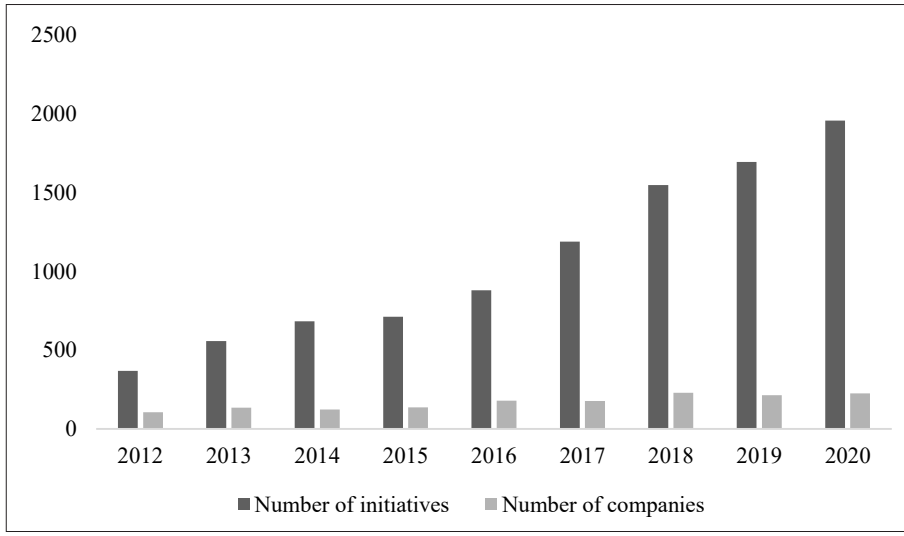


**Figure 2. Number of initiatives and companies operating in the field of CSR in 2012–2020**

Source: own study based on the Forum Odpowiedzialnego Biznesu reports.

Both the number of initiatives and the number of companies operating in the field of CSR show a general upward trend. The number of good practices increased by over 15% compared to the previous year, and by over 432% compared to 2012. The number of companies that implemented a CSR policy increased by 5.1% compared to the previous year and by 112% compared to 2012. In the 2021 report, 7 areas of CSR activity were distinguished in accordance with the applicable ISO 26000 standard, as seen in Table 1.

**Table 1. Good practices in Poland (2020)**

| Field | Number of good practices | Description |
|---|---|---|
| *1* | *2* | *3* |
| Involvement and development of the local community | 631 | Health service support; assistance for teachers and students in the transition to distance learning; surroundings with the care of seniors. |
| Work placements | 525 | Support for employees and their protection against coronavirus infection; concern for the mental health of its employees during the lockdown; maintaining a balance between work and personal life; involvement in aid actions for local communities. |
| Environment | 382 | Support for the implementation of the 13th SDG, which is related to climate in various forms. |

| *1* | *2* | *3* |
|---|---|---|
| Human rights | 110 | Women's development and combining work with caring roles. |
| Consumer issues | 107 | Concern for the health and safety of consumers; the use of new technologies in the form of, for example, facilitating online shopping. |
| Fair Operating Practices | 106 | Focusing on adjusting the business to new conditions; supporting suppliers and business partners, including by promoting their products and services, and by sharing knowledge. |
| Organizational order | 97 | Caring for the workplace, as illustrated by the more frequent assignment of these initiatives to the 8th SDG, relating to economic growth and decent work. |

Source: Forum Odpowiedzialnego Biznesu (2021). Report „Odpowiedzialny biznes w Polsce 2020. Dobre praktyki".

The number of initiatives presented in Table 1 is so great that it would be extremely difficult to describe each of them in detail and define their consequences for the initiator.

First of all, enterprises made shifts in their budgets towards strengthening both the internal and external environment during the crisis: the purchase of protective equipment and respirators, but also support for schools that have switched to remote work (Strzelczak, 2020). It should be noted that public sector institutions were particularly involved in CSR. They were involved in supporting the local environment by sewing masks or raising money for local hospitals, among other things (Kubiczek, 2021).

Sports clubs were particularly involved in activities for the local community. Activities in the field of CSR carried out by Zagłębie Sosnowiec (a football club in Poland) focused partly on supporting medical staff and children in orphanages. Research by Li *et al.* (2021) showed that they not only engaged themselves but also encouraged enterprises.

Cultural institutions formed another group, which prior to the pandemic were the beneficiaries of initiatives in the field of CSR (Kantor, Kubiczek, 2020). Culture institution ventures were divided into two categories during government limitations and lockdown: concentrating on their main activities (virtualization of existing activities and extension of activities through new initiatives) and launching CSR projects. The initiators of these actions were mainly the employees of these institutions (Kantor, Kubiczek, 2021).

According to Wachowiak (2021), an important aspect of CSR during a pandemic is cooperation with the environment within and outside of the company. These relationships must be based on mutual support. A predominant element is supporting the employees in performing their tasks and providing help.

Joniewicz (2021) noticed that employers supported employees in their initiatives and provided safety and security measures in their normal work.

Wachowiak (2021) emphasized that during a pandemic, the integrity of institutions, understood as transparent and fair behaviour in accordance with generally accepted principles in society, is vital. The complex situation caused by the pandemic has influenced interest in the lives of others. However, it is not known whether the pandemic will strengthen the trends of responsible and sustainable development of businesses, economies, and societies in the long term. Strzelczak (2020) fears that enthusiasm and commitment to supporting others, and especially the sense of community and solidarity in the face of the threat caused by the pandemic, will weaken after the pandemic ends.

However, research shows that an increasing number of companies are implementing CSR policies and existing initiatives are becoming more flexible (Joniewicz, 2021). Overall, enterprises in a stable situation were more likely to participate in CSR activities. This indicates that the number of good practices is continuing to increase. Furthermore, it is reasonable to assume that the outbreak of the pandemic has accelerated CSR initiatives in Poland (Kubiczek, 2021).

## Sustainable development – the concept

Sustainable development, defined as 'intergenerational solidarity consisting of finding such solutions guaranteeing further growth that allow active inclusion of all social groups in development processes, while giving them the opportunity to benefit from economic growth' (Ministerstwo Rozwoju, Pracy i Technologii), as a concept finds its beginnings already at the beginning of the 18th century. It was then that Hans Carl von Carlowitz (1713), in a work on forest management, for the first time used the term "sustainable development" as "a method of forest management in which only as many trees as can be grown there are cut down, so it was never liquidated to an extent that it could not be rebuilt". At that time, this term was used only in a narrow branch of forestry, and not in relation to the responsible management of limited resources in various fields.

In its current meaning, the term 'sustainable development' already appears in the first sentence of the 1987 Report of the World Commission on Environment and Development (the Brundtland Commission) entitled 'Our common future' (United Nations, 1987), which defines it as 'such a development in which the needs of the present generation can be met without diminishing the chances of future generations to meet them.' This term is explicitly expressed, among other things, in Article 5 of the Constitution of the Republic of Poland (Journal of Laws 1997, No. 78, item 483 with changes) and in art. 3 sec. 3 of the Treaty on the European Union (Journal of Laws C 326 from 26.10.2012), where the approach

to it is treated as a long-term goal and as the overriding basis for the functioning of a state or international organization. SD as a concept finds expression not only in European agendas, but also in work of the United Nations (UN), including the "Global Program of Action – Agenda 21" and the Aarhus Convention, as well as the United Nations Environment and Development Programs. The UN developed this issue extensively in the Rio Declaration of 1992, translating it into the creation of the 17 SDGs of 2015, which is covered in further depth later in the article.

The idea of SD (based on the report 'Our Common Future") is based on two mainstays: the concept of basic needs and the idea of limited opportunities (Brochacka, 2013). For the former, it is important to define the most fundamental needs of the population of the regions in the world suffering from the highest poverty (not only economic). The latter requires strictly defined environmental possibilities (abilities) to meet the present and future needs of society through the state of technology and the organization of society. Rutkowska-Podołowska and Pakulska (2011) define the three pillars on which SD is based:

- *Pillar I*: Economic efficiency – profit for the community, taking into account social and environmental costs,
- *Pillar II*: Concern for the environment – protection of natural non-renewable resources, minimizing the negative impact on the environment,
- *Pillar III*: Social balance – creation of new jobs and active measures to improve the quality of life.

In view of the present explanation of SD as an idea, it can be concluded (using economic language) that society, wishing to live in accordance with the assumptions of this concept, should take into account the calculated cost of its decisions. As a result, the choice of long-term strategies can be a great challenge for institutions dealing with the setting and implementation of the SDGs.

In 2015, at the New York Summit, the United Nations adopted the 17 SDGs, which form the axis of the 2030 Agenda for Sustainable Development adopted by all 193 member states. This agenda sets out 169 tasks to be achieved by 2030 in order to ensure better quality of life for communities from all regions of the world. The goals develop the challenges of the UN Millennium Development Goals (originating from 2000) and also relate to areas such as poverty, hunger, health, peace and social justice, as well as to an even greater extent the issues of climate change, social inequalities, international partnership, and so forth.

## Sustainable development vs. pandemic situation

The SDGs (also known as the "Global Goals"; DeWit, Shaw, Djalante, 2020) are substantial in the context of this paper due to the fact that the possibilities of their implementation are now constrained due to the rapid and unexpected

emergence of the Covid-19 pandemic in early 2020. Naidoo and Fisher (2020) expect 10% to have a negative impact on future pandemics. However, Ottersen and Engebretsen (2020) indicate that pessimism and resignation from the positive influences of the implementation of the SDGs may even threaten future global crisis situations, which undoubtedly includes any pandemic. Naidoo and Fisher (2020) also noted that the coronavirus pandemic had a significant and negative impact on all SDGs, affecting the limited ability to perform the individual tasks listed in Table 2.

**Table 2. The impact of the Covid-19 pandemic situation on particular SDGs**

| SDG | Status | Example of target(s) affected |
|---|---|---|
| *1* | *2* | *3* |
| Goal 1: No poverty | Threatened* and mitigated† | Target 1.2: halve proportion of people living in poverty by 2030<br>Target 1.4: provide equal access to basic services |
| Goal 2: Zero hunger | Threatened | Target 2.3: double agricultural productivity and income of small-scale food producers |
| Goal 3: Good health and well-being | Threatened and mitigated | Target 3.8: achieve universal health coverage |
| Goal 4: Quality education | Threatened | Target 4.1: provide free, equitable and quality education to all children |
| Goal 5: Gender equality | Partially threatened‡ | Target 5.4: value unpaid care and domestic work by providing public services and policies |
| Goal 6: Clean water and sanitation | Threatened | Target 6.1: give access to safe and affordable drinking water for all |
| Goal 7: Affordable and clean energy | Threatened | Target 7.3: double global rate of improvement in energy efficiency |
| Goal 8: Decent work and economic growth | Threatened | Target 8.1: sustain per capita economic growth |
| Goal 9: Industry, innovation and infrastructure | Threatened and aggravated§ | Target 9.4: upgrade infrastructure and retrofit industries to make them sustainable |
| Goal 10: Reduced inequalities | Threatened | Target 10.1: sustain above-average income growth of the bottom 40% of the population |
| Goal 11: Sustainable cities and communities | Threatened | Target 11.2: give access to safe, affordable and sustainable transport systems for all |
| Goal 12: Responsible consumption and production | Partially threatened | Target 12.5: reduce waste generation through prevention, reduction, recycling and reuse |
| Goal 13: Climate action | Threatened | Target 13.A: mobilize US$100 billion annually by 2020 for the Green Climate Fund to address the needs of developing countries |

| *1* | *2* | *3* |
|---|---|---|
| Goal 14: Life under water | Partially threatened | Target 14.1: by 2025, prevent marine pollution of all kinds |
| Goal 15: Life on land | Threatened and mitigated | Target 15.7: end poaching and trafficking of protected species and address demand and supply of illegal wildlife products |
| Goal 16: Peace, justice and strong institutions | Partially threatened | Target 16.1: reduce all forms of violence and related deaths everywhere |
| Goal 17: Partnerships for the goals | Partially threatened | Target 17.2: developed countries should commit at least 0.7% of their gross national income in overseas aid for developing and 0.15% to least-developed countries |

*Most targets unachievable. †Attaining some targets would have helped prevent the impacts of the pandemic. ‡Some targets affected. §Achieving the target would have made the impacts of the pandemic worse.

Source: (Naidoo, Fisher, 2020).

DeWit, Shaw and Djalante (2020) indicate that, in the context of the implementation of the SDGs, the coronavirus pandemic will highlight four important issues: increasing inequality, higher opportunity costs, greater complexity of problems and increased risk (systemic and in the context of caring for the planet and globalism). However, the report by the European Academies Science Advisory School (2020) identifies the priorities and challenges to achieve sustainable development in the post-pandemic period.

Furthermore, there are several activities that can be carried out to improve the global quality of life. It is noticeable that many companies in the clothing sector currently contribute to the production of more sustainable and 'climate-responsible' clothes (Perry, 2017; Sandin et al., 2019), thus implementing Goal 13. It is still evident that in production plants (such as those in the clothing sector) located in underdeveloped and developing countries, there is a gender imbalance (women in the lowest positions) and unequal wages (Sakamoto, Begum, Ahmed, 2020), which adversely affects Goals 5 and 8, for example. The Covid-19 pandemic, especially in the early stages of development, forced national governments to introduce strict epidemiological restrictions, which caused downtime in many industries and thus significantly reduced the possibility of achieving the SDGs. Many food industry businesses have shut down and tremendous amounts of food have been wasted (Fleetwood, 2020). However, even before the outbreak of the pandemic, the shortcomings in progress toward some of the SDGs were noticeable (Barbier, Burgess, 2020).

In countries with a lower level of economic development, such as Bangladesh[4], the situation has shown that if at least some of the SDGs were at least partially achieved before the outbreak of the pandemic, the situation would not be as dramatic as it is now and the population would feel less fear and anxiety about pandemic-related unemployment and hunger (Meija, Hotez, Bottazzi, 2020; Sakamoto, Begum, Ahmed, 2020).

Current trends indicate that the process of achieving the Global Goals will be significantly delayed by the effects caused by the rapid and unpredictable spread of the SARS-CoV-2 virus (Leal Filho et al., 2020). It is noted that proportional and rapid vaccination against Covid-19 in all regions of the world (the poorest countries in particular) will not only help counter the effects of the pandemic, but also accelerate the implementation of the SDGs (Meija et al., 2020). Equal access to the vaccine can be considered to achieve Goal 3 and Goal 17, as it is the 'partnership' of nations, mutual solidarity and subsidiarity that are pivotal for countries with lower levels of prosperity and to mitigate the effects of the coronavirus pandemic, which should be a goal for society as a whole. Ahmed *et al.* (2020) argue that the increasing phenomenon of social inequality (as well as other broadly understood inequalities) may contribute to the growth of the pandemic. Therefore, it is necessary to implement the goals of sustainable development, especially those that reduce unequal access to education (Goal 4), gender inequality (Goal 5), or reduce widely understood disproportions in human dignity (Goal 10). The literature emphasizes the exorbitant impact of the Covid-19 pandemic on all spheres of life, which has changed ways of teaching about sustainable development and the content related to it, with a greater emphasis on information integrity (Sá, Serpa, 2020; Acuto et al., 2021; Leal Filho et al., 2021).

It is also worth noting that, despite the circumstances surrounding the pandemic, corporations are taking steps to implement the SDGs, which increased in particular during the Covid-19 pandemic. They are also in line with the CSR approach described in the previous chapters.

## Conclusions

The coronavirus pandemic meant that many industries had to adapt to a new reality, often closing their service premises and virtualizing (partially or completely) their activities. Some enterprises have completely stopped their ventures, introducing uncertainty about their future. However, financially sound

[4] Currently, Bangladesh records relatively high rates of economic development (GDP around 7.5% y/y), but the World Bank still considers that country's income to be "medium low" (World Bank; ObserwatorFinansowy.pl, 2019). For the purposes of this article, it was assumed that this is a country with a "lower" level of economic development.

companies have become committed to helping the population groups most affected by the Covid-19 pandemic. Furthermore, the initiators were often the employees themselves. In turn, the beneficiaries of the first wave were medical personnel, uniformed services, and seniors.

Exploratory analysis of reports and review of CSR initiatives indicated that their number has increased since the outbreak of the Covid-19 pandemic. This dynamic and hardly predictable epidemic situation encouraged companies to engage in social activities. There is also a visible change in the forms of CSR activity towards ongoing assistance in counteracting the effects of the pandemic. CSR activities during the pandemic focused on purchasing tests, disinfectants, and personal protection, as well as delivering purchases to people in quarantine. The social commitment of enterprises is noticed on various levels and in various sectors: from sports and culture to banking. For socially engaged companies, cooperation with the external environment is of high importance, as well as broad integration between companies.

Research has shown that the violent outbreak of the pandemic (as a whole) has significantly distanced companies from achieving their long-term Global Goals, and that the spreading Covid-19 disease has a significant (mostly negative) impact on the sustainable development of the world. However, there are corporations that want to support sustainable development from the bottom up, for the welfare of the planet and society. It has also been shown that, especially during a pandemic, CSR plays a key role in counteracting its effects. Nevertheless, despite the positive effect of increasing the number of corporate social initiatives during the Covid-19 pandemic to deliver value for the common good, the pandemic itself postponed the implementation of the UN's Core SDGs. It has also been confirmed that caring for the image of a company that cares about the environment and thus sustainable development is also an element of CSR and an extremely important one during the Covid-19 pandemic.

The direction of future research on the relationship between SD and the concept of CSR should be the study of post-pandemic reality in terms of changes in the concept of CSR and the degree of implementation of individual SDGs. Also, it is important to note whether the trend in the number of CSR activities will continue at an exponentially growing pace. It is also vital to conduct an investigation of the best practices in the restoration of businesses from post-crisis situations, as well as research into lucrative domains of operation, in order to achieve the UN SDGs. Conducting such research may also be helpful in preparing for other possible random crises in the future. As the pandemic itself is a dynamically developing phenomenon, it is recommended that, despite the difficulties it causes in achieving the SDGs, corporations should still strive to implement them, taking care not only of their good image, but also, above all, of the future of the Earth as a common good.

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*Summary*

The coronavirus pandemic affected all areas of social life and changed the conditions in which most industries operate. The current forms of profitable business activities were suspended in many sectors of the market, which forced entrepreneurs to adapt to the new market conditions. During the Covid-19 pandemic, particular attention should be paid to the activities of enterprises in two so far closely related areas: corporate social responsibility (CSR) and sustainable development (SD). Enterprises typically pursued sustainable development goals (SDGs) and supported them as part of their CSR.

The paper is exploratory in nature and it aims to determine the degree of CSR commitment and the implementation of the SDGs during the first year of the Covid-19 pandemic. The results show that the sudden outbreak of the pandemic and the equally dynamic response of governments left some enterprises in uncertainty as going concerns. However, financially sound companies have become committed to helping the population groups most affected by the Covid-19 pandemic. Moreover, the pandemic situation has significantly distanced companies from achieving the intended long-term Global Goals, and the spread of the Covid-19 disease has a significant (mostly negative) impact on the sustainable development of the world. Furthermore, it is impossible to determine the long-term impact of a pandemic on CSR activities and on the implementation of the SDGs.

*Keywords:* corporate social responsibility, CSR, sustainable development, Covid-19, sustainable development goals.

## Społeczna odpowiedzialność biznesu (CSR) i zrównoważony rozwój w trakcie pandemii Covid-19

*Streszczenie*

Pandemia koronawirusa wpłynęła na wszystkie dziedziny życia społecznego, a także zmieniła uwarunkowania funkcjonowania większości branż. Przynosząca zyski dotychczasowa forma działalności została w wielu gałęziach gospodarki wstrzymana, co wymusiło na przedsiębiorcach dostosowania do nowych uwarunkowań rynkowych. Podczas pandemii Covid-19 szczególną uwagę należy zwrócić na działalność przedsiębiorstw w dwóch do tej pory ściśle ze sobą powiązanych obszarach: społeczna odpowiedzialność biznesu oraz zrównoważony rozwój. Przedsiębiorstwa zazwyczaj realizowały cele zrównoważonego rozwoju oraz wspierały je w ramach społecznej odpowiedzialności biznesu.

Artykuł ma charakter przeglądowy, a jego celem jest określenie stopnia zaangażowania przedsiębiorstw w społeczną odpowiedzialność biznesu oraz realizacje celów zrównoważonego rozwoju podczas pierwszego roku trwania pandemii Covid-19. Wyniki pokazują, że gwałtowny wybuch pandemii i równie dynamiczna reakcja rządów spowodowały, że część przedsiębiorstw znalazło się w niepewności kontynuacji działalności. Jednak przedsiębiorstwa o stabilnej sytuacji finansowej zaangażowały się w pomoc najbardziej dotkniętym przez pandemię Covid-19 grupom społecznym. Co więcej, pandemia znacząco oddaliła przedsiębiorstwa od realizacji zamierzonych długoterminowych Globalnych Celów, a rozprzestrzeniająca się choroba Covid-19 istotnie wpływa (w największej mierze negatywnie) na zrównoważony rozwój świata. Ponadto, niemożliwe jest długookresowe określenie wpływu pandemii na działalność z zakresu CSR oraz realizacji celów zrównoważonego rozwoju.

*Słowa kluczowe:* społeczna odpowiedzialność biznesu, zrównoważony rozwój, Covid-19, cele zrównoważonego rozwoju.

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# Customs handling and sustainable development of enterprises

## Introduction

Environmental protection trends are noticeable throughout the business space, but they are of particular concern to entities operating in the international trade of goods. An expression of this trend is the sustainable development of companies, which is associated with the implementation of economic and social objectives by companies while caring for the environment. Such a development is determined by various factors, both internal and external. One such external determinant is customs clearance handling, and more specifically quality. This is because for participants of the international trade in goods, dealing with customs authorities is almost an everyday occurrence: every economic operator (importer or exporter) must complete formalities defined by customs regulations in the course of a given transaction. The handling of customs clearance encompasses a variety of services in the form of customs operations performed by various parties, including administrative customs services performed by customs authorities in connection with international trade in goods. The development of information technology has created many new opportunities for customs handling. Transferring selected elements of customs clearance from traditional processing to the model that takes advantage of modern information and communication technologies helps companies implement the idea of sustainable development.

The main aim of this paper is to present the essence of administrative processing in customs in the context of sustainable development of companies as well as to discuss its selected instruments of a pro-ecological nature, i.e. e-customs services. Therefore, to achieve this objective, the research hypothesis has been formulated as follows: The so-called "green" solutions for handling customs administrative

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procedures, being familiar with them and their practical application, not only influence the facilitation of export and import transactions, but can also stimulate the management of sustainable development of companies.

Mixed-methods research was conducted to achieve this goal. The research was based on descriptive and comparative analysis, preceded by a review of sources from the subject literature. Literature studies were used to recognise the theoretical background. The author used monographic methods along with an evaluation of the documents. Data were collected from both primary and secondary sources.

The paper includes a theoretical part, as well as a practical one, in which examples of e-customs services offered in customs handling and benefits resulting from their use are presented. The findings of the considerations of the paper are presented in the conclusion.

The problem of customs handling concerns a wide spectrum of regulations and solutions applied to economic operators doing business in the area of international trade, which, due to its complexity, exceeds the framework of the considerations presented. With this in view, the author consciously chose only those solutions which are pro-ecological in nature and encourage enterprises to implement the strategy of sustainable development. The subject area of the paper is topical and relevant. The state of research on the relationship between customs handling and sustainable development of enterprises has not been known to a wider audience. The conclusions presented here are substantive and cognitive in nature, thus constituting an attempt to address the existing research gap.

## IMPORTANCE OF CUSTOMS HANDLING FOR SUSTAINABLE DEVELOPMENT OF ENTERPRISES

The concept of sustainable development means economically justified, socially acceptable, and environmentally friendly use of resources to sustain its development in the long term (Golinska, 2014, p. 17). The concept originally derived from forest management and was first introduced by Hans Carl von Carlowitz and referred to managing the forest in such a way that every tree that is cut down is replaced by a new seedling (Mazur-Wierzbicka, 2005). The term gained wide acceptance in the late 1980s when the World Commission on Environment and Development (WCED), in its publication, recognised that sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). The concept of sustainable development is, therefore, a model of global civilisation development aimed at eliminating threats limiting the prospects for human development (Sadowski, 2003, p.13), which assumes that the continuation of the pattern of economic development based on extensive use of the environment

must lead to disaster on a global scale in the economic, ecological, and social spheres (Bohdanowicz, 2001, pp. 155–158). In the field of economic sciences, D. Pearce and R.K. Turner defined sustainable development as maximisation of net benefits from economic development, which protects and ensures the reproduction of utility and quality of natural resources in the long term (Pearce, Turner, 1990). An enterprise that is committed to all aspects of sustainable development is referred to as a sustainable enterprise. Sustainable enterprise development can be defined as: 'achieving success today without compromising the needs of the future' (Boudreau, Ramstad, 2005, pp. 129–130); 'satisfying the needs of direct and indirect stakeholders of the company (…) without compromising its ability to satisfy the needs of future stakehold'rs' (Dyllick, Hockerts, 2002, p. 131); "sustainable development that is consistent with environmental requirements and in which the needs of the present generation can be met without compromising the ability of future generations to meet their needs" (Doś, 2012). Sustainable development of a company exists when it cares for both its external environment so that its support capabilities are reproduced and increased, as well as actively takes care of its internal subsystems so that they are constantly sustained and increased (Mirski, 2015, p. 263). The sustainable development of the enterprise, identified with the green development of the economy, is a path of socio-economic development that more effectively realises the objectives of sustainable development. Attention is paid to the modernisation of production, leading to optimisation of processes, reduction of energy and materials, as well as to effective dialogue between entrepreneurs and state authorities (Gryga, 2016, p. 231).

The modern point of view of sustainable development allows economic operators to see how important for the enterprise is the overall quality of functioning of the external environment, in particular its macro-environment, especially its economic, political, legislative, social, demographic, technological, and ecological dimensions (Mirski, 2015, p. 264). Another element of this environment is customs handling, to which enterprises participating in international trade are parties.

Customs handling includes various customs services which are part of broadly understood logistics services. According to E. Gołembska, a logistic service is a logistic product constituting a set of customer wishes and expectations (Gołembska, 1999, p. 231), among which she distinguishes: mass services (e.g. transport, education, insurance), personal services (banking, medical) and specialist services (e.g. legal, customs, architecture) (Gołembska, 1999, pp. 241–242). According to E. Gwardzińska, customs services include administrative customs services, which are performed by the customs administration, and customs services related to the clearance of goods, which can be carried out directly by the economic operator (they are not customs brokerage services) or a customs representative, becoming a customs brokerage service (Gwardzińska, 2018, p. 141). In a broad sense, a customs service is any customs formality performed in connection with international trade in goods by

economic operators before customs authorities, in accordance with applicable laws and regulations. The catalogue of customs services performed by customs authorities is very broad and is constantly expanding. It includes, among others, services in the area of handling and control of trade in goods and registration of entrepreneurs; the area of integrated handling of excise goods or in the area of collection of dues and settlements with the EU and the national budget (Świerczyńska, 2019, p. 187). The quality of customs handling requires a comprehensive approach and dynamic adaptation to the expectations of the business environment; it is determined by the adopted service standards and the level of their implementation. It should be treated as a commitment that customs services will ensure that the expectations set by entrepreneurs are fully met, including those resulting from their implementation of the concept of sustainable development. It is essential for entrepreneurs that the services correspond to the modern conditions of doing business in international trade in goods, which is also directly related to the requirements of sustainable development. This model is supported by the modern environment of international trade in goods associated with the electronic economy and the widespread use of modern information and communication technologies (ICT) in operations of companies and government institutions (Czyżowicz, 2009, p. 12). The main idea of creating and developing e-government is to enable citizens and entrepreneurs to make faster transactions by means of public services and more efficient processes of communicating with public organisations (Kaczorowska, 2008, p. 525). The catalogue of customs services contains tools that contribute to the streamline of procedures and thus perfectly fit the concepts of the 'green' office of sustainable enterprises. 'Green Office' is a form of environmental office management system based on the systematic introduction of pro-ecological functions of the office through measures such as the elimination of paper documents wherever possible; electronic document circulation; waste minimisation; promotion of modern technological solutions that are environmentally friendly, etc. Of course, it is indisputable that the main goal of introducing such solutions by customs authorities is, first and foremost, to facilitate business processes; nevertheless, their connection with the sustainable development of enterprises is not without significance.

## E-CUSTOMS – BENEFITS FOR THE SUSTAINABLE DEVELOPMENT OF ENTERPRISES

Information technology plays a key role in reducing the negative impact on the environment, and its development has created numerous new opportunities for handling customs procedures of economic operators involved in international trade in goods. These possibilities are used by customs authorities and, in practice, they translate into concrete solutions.

According to the EU Customs Code, any exchange of information (i.e. declarations, requests, or decisions) between traders and customs, as well as the storage of this information, should be carried out using electronic data processing techniques (Regulation 952/2013, Article 6). The implementation of customs services based on the use of the potential of digital tools is in line with the concepts of sustainable development. The origins of e-facilitation in customs go back to 2003, when the Council, in its Resolution on creating a simple and paperless environment for customs and trade (Council Resolution of 5 December 2003, p.1), following the European Commission's Communication on a simple and paperless environment for customs and trade, called on the Commission to develop, in close cooperation with the Member States, a multi-annual strategic plan for the creation of coherent and interoperable electronic customs systems, the so-called paperless environment for customs. The document, called *Multi-Annual Strategic Plan* (MASP, 2004), was developed by the Commission and became the basis of computerisation for the European Customs Union. A key influence on the simplification of customs was the decision of the European Parliament and the Council to introduce a pan-European electronic customs service (Decision No. 70/2008/EC), which was made possible through the e-Customs programme. The concept of e-customs simplification in a broader context is intertwined with the e-Europe electronic system (European Commission, 2000), in particular, e-Government (Communication, 2003/452). The 2004 Decision of the European Parliament and the Council on the inter-operable delivery of pan-European e-Government services to public administrations, businesses and citizens stressed that the removal of barriers to electronic communication between public administrations and with businesses and citizens would contribute to improving the quality of the business environment in Europe while reducing administrative burdens and red tape (Decision 2004/387/EC).

The e-Customs initiative, which has been implemented by all member states since 2009, concerns a paperless environment for customs, and its aim is to create a legislative, organisational, and IT framework within the European customs union that will improve and enhance the friendliness of business services in the areas of customs, trade, and the security of international trade. In practical terms, this meant replacing paper-based customs procedures with electronic operations, i.e., sending information relating to customs clearance to the relevant customs authorities in electronic form (in the form of electronic customs declarations) and using IT systems to secure the collection of customs duties and to control the movement of goods to and from EU Member States.

It became a priority for customs authorities to employ information systems wherever possible. It has resulted in the emergence of 'e-services', which are defined as a new form of providing services via the Internet, from the moment

a company contacts the customer to present an offer, through ordering the service, its delivery, and contact with the customer after the service has been rendered (Dąbrowska, Janoś-Kresło, Wódkowski, 2009, p. 41). For Polish entrepreneurs, access to and use of e-services provided as part of customs services is enabled by the Customs Service Electronic Services Platform (PUESC). It is a service portal through which economic operators participating in trade in goods are required to fulfil customs and tax obligations. Information is exchanged primarily in the following areas: import, export, and transit of goods; trade in excise goods; transport of goods covered by the monitoring system and statistics of trade in goods between EU member states (Table 1).

**Table 1. Selected e-Customs Services**

| e-Service | Description |
|---|---|
| *1* | *2* |
| e-Transit | The service within the NCTS2 IT system (Transit Control System – New Computerized Transit System) gives the possibility to submit transit procedure declarations and monitoring of transit operations. |
| e-Intrastat | This service is a part of AIS/INTRASTAT (Sub-system INTRASTAT of the Automatic Import System). It enables submission of INTRASTAT declarations (Intrastat is a system of statistics of trade in goods between Member States of the Union, which enables collection of data used for the provision of statistical information on exports and imports of goods within the Union). |
| e-Export | A service provided as part of the Automated Export System (AES). It allows for electronic handling of export operations – sending declarations and exchanging information between particular offices in the EU. |
| e-Status | It offers traders a possibility to confirm the EU customs status of goods. |
| e-ICS | A service within the AIS information system. It allows for electronic handling of import operations – submission of customs declarations. |
| e-Carriage | A service provided using the ECIP/SEAP system. It enables consignors, consignees, carriers and drivers to fulfil their obligation of declaring the transport of the so-called 'sensitive' goods to the electronic register, as well as completing and updating it. |
| e-Booking TRUCK | It allows international road transport operators to make reservations for border processing of exports (applies to selected customs offices). |
| e-BTI | It enables the comprehensive electronic handling of the application process for the issuance of binding tariff information (BTI) and the issuance of a BTI decision based on the application. |
| e-AEO | It offers an entrepreneur a way to electronically apply for an Authorised Economic Operator (AEO) permit and electronically communicate throughout the AEO permit issuance and management process (revocation, modification, suspension of the permit, and re-evaluation). |

| *1* | *2* |
|---|---|
| CDS | The Customs Decisions System (CDS) enables changing authorisations as well as supports the consultation process for each authorisation in force in more than one member state. Applications may concern, e.g. the use of simplifications for the determination of amounts representing a part of the customs value; the lodging of a comprehensive guarantee; the deferment of the payment of customs duties; the use of regular shipping services; the use of centralised clearance; customs self-service; the outward and inward processing procedure, the temporary admission procedure, the end-use procedure; the use of an electronic transport document as a customs declaration. |
| INF | The EU central system UCC INF SP is designed to handle electronic Information Sheets (INF) for special procedures. It provides the electronic exchange of information on the execution of special procedures between economic operators and customs authorities as well as between customs offices involved in the procedure (entry, closure, control, exit, etc.). |
| REX | The EU portal for REX applications (electronic application for registered exporter status). |

Source: Based on the information available on the Customs Service Electronic Services Portal (PUESC).

Through PUESC, traders transfer information and documents, particularly declarations and electronic declarations. Currently, in almost all European Union countries, the electronic form has fully replaced the traditional way of submitting customs declarations (Table 2).

**Table 2. Number of customs declarations in 2020 in European Union countries**

| Country | Number of customs declarations | | Electronic declarations rate (%) |
|---|---|---|---|
| | Imports | Exports | |
| *1* | *2* | *3* | *4* |
| Austria | x | x | x |
| Belgium | 7 808 106 | 10 508 225 | 100 |
| Bulgaria | 408 229 | 309 958 | 100 |
| Croatia | 284 878 | 279 527 | 100 |
| Cyprus | 108 829 | 32 994 | 99 |
| Czech Republic | 1 222 246 | 1 292 098 | 99 |
| Denmark | 1 724 170 | 1 514 005 | 100 |
| Estonia | 177 779 | 123 730 | 100 |
| Finland | 598 521 | 1 007 259 | 99 |
| France | 3 295 972 | 5 083 540 | 100 |
| Germany | 79 800 000 | 65 000 000 | x |
| Greece | 377 169 | 461 483 | 100 |
| Italy | 1 164 827 | 4 958 328 | 100 |

| *1* | *2* | *3* | *4* |
|---|---|---|---|
| Ireland | 1 034 585 | 373 114 | 100 |
| Latvia | 202 868 | 187 879 | 100 |
| Lithuania | 329 218 | 505 099 | 100 |
| Luxembourg | 210 420 | 207 294 | 100 |
| Hungary | x | x | x |
| Malta | 111 490 | 19 331 | 100 |
| The Netherlands | 2 882 058 | 6 996 721 | 100 |
| Poland | 5 610 397 | 8 193 829 | 100 |
| Portugal | 609 692 | 974 264 | 100 |
| Romania | 690 455 | 441 769 | 100 |
| Slovenia | 387 353 | 399 808 | 100 |
| Slovakia | 338 154 | 427 804 | 100 |
| Spain | 3 655 163 | 830 874 | 100 |
| Sweden | 3 837 783 | 3 815 698 | 100 |

*Notes:* x – no data.

Source: Author's own elaboration, based on (WCO, 2021, pp. 58–80).

Corporate sustainability means taking action to achieve a company's primary economic objective and complementing it with consideration of the social and environmental aspects of its operations. The implementation of "the financial objectives of the company must take into account social and environmental aspects as the main areas of sustainable development" (Trojanowski, 2015, p. 240). Offering customs e-services as part of customs handling is part of not only the environmental aspect, but also the economic aspect. The quality of customs services has an impact on the number of transaction costs incurred by businesses. Transaction costs include transaction expenses, often referred to as decision-making costs (Barro, 1997, p. 125). They include both *ex-post* costs (costs incurred before the transaction is concluded) and *ex-ante* costs (after the contract is concluded). They are influenced by a variety of factors, including the cost of customs clearance, which is an important part of customs handling. The possibility of using electronic services in customs processing allows for the reduction of transaction costs, e.g., in terms of the cost of access to information (free information on regulations, customs rates, etc.; efficient, safe and effective exchange of information with customs authorities, the cost of resources needed for operations, costs and time as a result of the paperless environment ("paper in case of failure", possibility to complete formalities using e-services from any place in the EU), the possibility of rational planning of deliveries and shipments, faster access to goods, earlier completion of operations, higher efficiency of customs clearance.

It is also worth noting that companies participating in international trade in goods are involved in supply chains. The international supply chain is a set of many cooperating elements: entrepreneurs (producer, exporter, forwarder, warehouse and storage facility operator, customs agent, carrier, importer), product streams, information, and financial resources that flow between them (Świerczyńska, 2017, p. 276). Most often, supply chain strategies are built, taking into account modern concepts of balanced development. The goal of a sustainable supply chain is to create, protect and grow long-term value for all stakeholders involved in the presence of products and services in the market (Sisco, Chorn, Pruzan-Jorgensen, 2010, p. 5). Applying sustainability principles to supply chains contributes to the long-term continuity of doing business with all stakeholder groups. Stakeholder relations are an important aspect of this, as they determine the shape and nature of sustainability in business. For supply chains managed with ecological strategies in mind, the term green supply chain is used. The green supply chain concept combines sustainability with logistics, marketing, and measurement practices. Green chains are facilitated by the progress in technology, and the benefits for the participants of such chains include: reduction of costs of operations of individual links of the chain, customer service costs, optimal use of resources in the entire supply chain, reduction of waste; increase in revenues of chain participants thanks to the creation of the green supply chain image – an environmentally responsible chain or strengthening the image of a responsible organisation in the supply chain. Implementation of modern technological solutions in customs handling allows for faster flow of goods in supply chains, and thus contributes to fulfilling one of the core objectives of the supply chain, which is to ensure an efficient flow of materials, products and services, starting from the place of origin of a given good and finishing with the end-user. In the 'traditional customs handling', inconvenience and time consumption of individual activities frequently caused numerous complications in the relationships between supply chain participants, e.g., in the form of delivery delays, additional costs, loss of trust of partners. Currently, the use of e-services has minimised such problems.

## Conclusions

Companies involved in international trade operate in a rapidly changing reality. The complexity and dynamics of their environment, new areas of activity, new knowledge, new opportunities, combined with the existing conditions of doing business, form the basis of challenges for their existence and development. To meet these challenges, companies implement the concept of sustainable development. An important component of the sustainable development of

organisations is modern information technologies that affect the efficiency of business operations. The success of the implementation of the set goals is influenced by the strength of the external environment. A significant element of this environment for exporters and importers is the handling of customs procedures that they have to deal with in their day-to-day operations. The use of IT tools in customs allows for increased transparency of processes and tasks, evaluation of their progress, analysis of acquired data, and streamlining the flow of information between the company and the customs authority.

The main aim of this paper, which was to present the essence of administrative processing in customs in the context of sustainable development of companies, as well as discuss its selected instruments of a pro-ecological nature, has been achieved. The research hypothesis: 'Green''Green' solutions for handling customs administrative procedures, being familiar with them and their practical application, not only influence the facilitation of export and import transactions, but can also stimulate sustainable development of companies, has been positively verified. The electronic customs services offered to handle custom administrative procedures are evidence of a modern economy in which companies follow a path of sustainable development. They can be boldly described as pro-ecological 'green' solutions. Being familiar with them and their practical application have influence not only on facilitating export and import transactions, but can also stimulate sustainable development management of enterprises. Certainly, among entities participating in international trade, there are economic operators who consciously choose the path of sustainable development and, therefore, adjust their methods and are willing to bear the costs necessary to achieve sustainable development goals, and e-customs services offered as part of customs handling help them achieve these objectives. There are, however, also those for whom economic goals are most important and creating pro-ecological culture is associated primarily with incurring additional costs. For such companies, environmental responsibility is of the lowest priority; it is limited to complying with the necessary and imposed regulations and standards related to the environmental aspects of doing business. In the case of such entities, the obligation to use 'pro-environmental' customs handling solutions may contribute to raising environmental awareness and reflecting on the need to introduce other pro-ecological solutions in other areas of activity.

It is important that over the coming years, the development of e-services for customs handling is continued, thus contributing to an improvement of the quality of business services as a result of streamlining the procedures and shortening the time needed to complete the formalities, but also the implementation of other aspects, crucial from the point of view of sustainable development of not only enterprises, but also the entire economy. The consideration presented in this article is to be regarded as a starting point for a further in-depth analysis of the

indicated problem. The article does not mention, among others, the evaluation of entrepreneurs regarding the impact of customs e-services on the sustainable development of enterprises. Getting to know such opinions requires further detailed analyses and empirical research (questionnaires, possibly interviews).

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*Summary*

The aim of the paper is to present the essence of customs handling in the context of sustainable development of enterprises and to discuss its selected instruments of a pro-ecological nature, i.e., e-customs services. Thus, with a view to achieving this objective, the research hypothesis has been formulated as follows: the so-called pro-ecological solutions for handling customs administrative procedures, being familiar with them and their practical application, not only influence the facilitation of export and import transactions, but can also stimulate sustainable development management of enterprises. The article includes a theoretical part, as well as a practical one, in which examples of e-customs services offered in customs handling and benefits resulting from their use are indicated. The findings of the considerations of the paper are presented in the conclusion. The research was based on descriptive and comparative analysis, preceded by a review of sources from the subject literature.

In the author's opinion, transferring selected elements of customs handling from traditional processing to the model which takes advantage of modern information and communication technologies (ICT) helps companies to implement the idea of sustainable development. Information technologies play a key role in reducing the negative impact on the environment, and their development has created numerous new opportunities for customs handling, which are used by customs authorities with increasing success. It is important that over the coming years, the development of e-services for customs handling is continued, thus not only contributing to an improvement of the quality of business services but also the implementation of other aspects that are also crucial from the point of view of sustainable development of enterprises.

*Keywords:* sustainable development, customs handling, customs authorities, e-services, enterprise.

## Obsługa celna a zrównoważony rozwój przedsiębiorstw

*Streszczenie*

Celem artykułu jest charakterystyka istoty obsługi celnej w kontekście zrównoważonego rozwoju przedsiębiorstw, a także omówienie jej wybranych instrumentów mających charakter proekologicznych rozwiązań, tj. e-usług celnych. Weryfikacji poddano hipotezę badawczą zakładającą, że tzw. proekologiczne rozwiązania w zakresie administracyjnej obsługi celnej, ich znajomość i praktyczne zastosowanie mają nie tylko wpływ na ułatwianie działalności w zakresie prowadzenia transakcji eksportowych i importowych, ale mogą także stymulować zarządzanie zrównoważonym rozwojem przedsiębiorstw. Artykuł obejmuje część teoretyczno-definicyjną, jak również praktyczną, w której wskazano przykłady e-usług celnych oferowanych w ramach obsługi celnej oraz korzyści płynące z ich stosowania. W podsumowaniu przedstawiono wnioski płynące z podjętych rozważań. W badaniach wykorzystano analizę opisowo-porównawczą, poprzedzoną przeglądem źródeł literaturowych.

Zdaniem Autora, przeniesienie wybranych procesów obsługi celnej z tradycyjnej płaszczyzny na płaszczyznę wykorzystującą technologię ICT (*Information and Communication Technologies*) powoduje poprawę jej efektywności, pomagając przedsiębiorstwom realizować cele zrównoważonego rozwoju. Technologie informatyczne odgrywają kluczową rolę w zmniejszaniu negatywnego wpływu na środowisko naturalne, a ich rozwój stworzył wiele nowych możliwości dla obsługi celnej, co jest z coraz większym powodzeniem wykorzystywane przez organy celne. Ważne jest, aby w najbliższych latach rozwój e-usług w ramach obsługi celnej był nadal kontynuowany, wpływając

tym samym pozytywnie nie tylko na podniesienie jakości usług biznesowych, ale także na realizacje innych aspektów, w tym także tych istotnych z punktu widzenia zrównoważonego rozwoju przedsiębiorstw.

*Słowa kluczowe:* zrównoważony rozwój, obsługa celna, organy celne, e-usługi, przedsiębiorstwo.

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