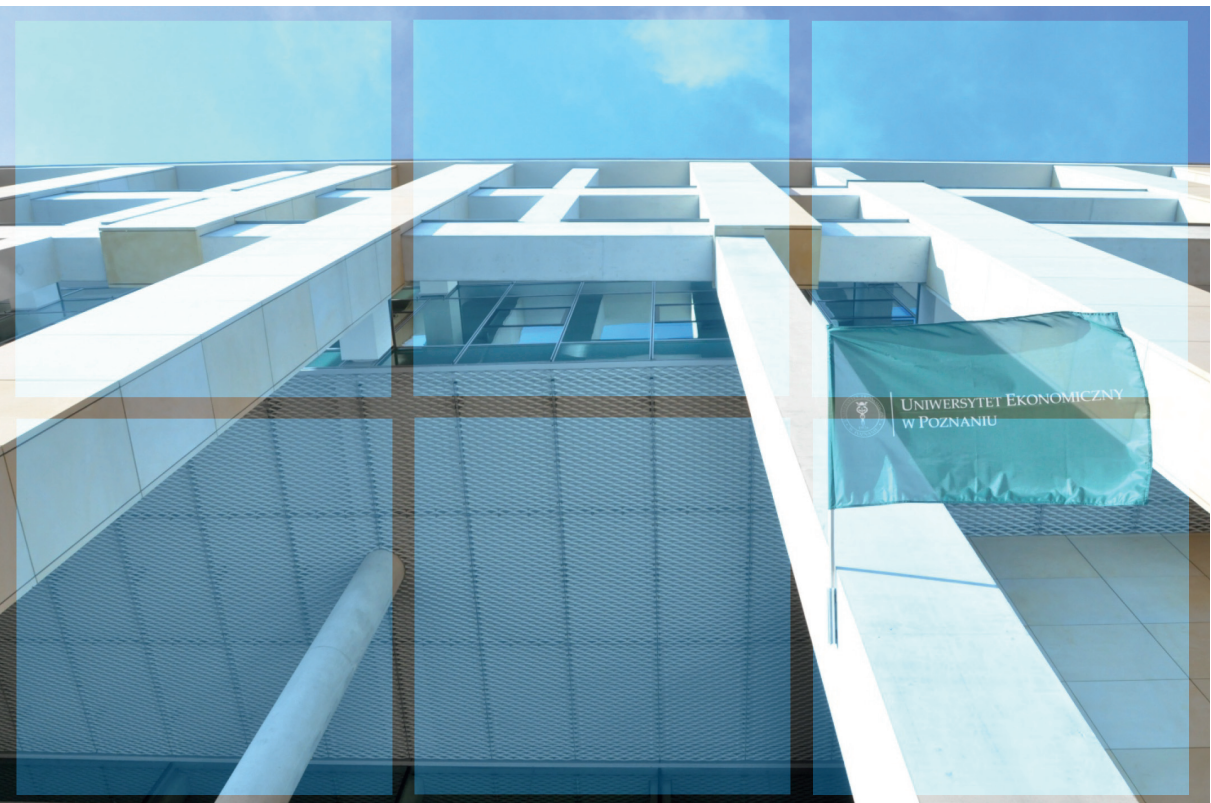


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Significance of the EU funds in regional development on the example of NUTS-3 units in Poland

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Abstract: Within the EU cohesion policy, better and worse developed regions are sub-categorised, taking account of the GDP value per capita. Based on that, areas qualifying for obtaining support from aid programs from the EU budget are established. The purpose of the article is an attempt at specifying the co-dependencies between the EU fund absorption and the changes in the level of the socio-economic development in the regional dimension. The research was conducted at the level of 73 NUTS-3 units in Poland in three stages. At the first one, the level of the development of the subregions in Poland is exhibited, subcategorising the factors of that development: human capital, material capital, natural environment as well as entrepreneurship and innovativeness. At the second stage, variation in the EU fund absorption in the researched units is presented. At the third stage, interdependencies between the extent of the absorption and the changes in the level of development within the arrangement of the factors of that development are taken up.

Keywords: EU funds, socio-economic development, synthetic measure.

Introduction

The basic financial instruments of the EU cohesion policy are the Structural Funds as well as the Cohesion Fund, both of which are often termed as “the EU funds” in the subject literature as well as in the economic practice. The main assumption of spending the EU funds is achieving economic, social and territorial cohesion, above all, through supporting development as well as creating new workplaces in the weakest developed states and regions (Nistor & Glodeanu, 2014). In relation to the abovementioned, mainly regions at the NUTS II level are qualified for financial support, i.e. regions whose GDP per capita in the case of Structural Funds is lower than 75% of the whole EU aver-

age. In the case of the Cohesion Fund it concerns the states with GDP per capita amounting to less than 90% of the average for the whole European Union, which had a program directed at meeting the economic convergence criteria (Beugelsdijk et al., 2018).

The means from the general budget of the EU were to contribute to the increase in the regional dynamism, thanks to which there were high hopes linked with that, not infrequently ascribing them the role of the *capo di tutti capi*¹ of the socio-economic changes of the EU regions, especially in its poorer part, i.e. Central-Eastern Europe. The first empirical research conducted suggested that their influence on the economy will be significant² (Florida, 2002). Further compilations have revealed, however, that the impact of the EU funds on the increase in GDP is significantly lower than it was originally expected³ (Shikverdiev et al., 2019).

In light of the abovementioned, the portrayal of the significance of the EU absorption on the socio-economic development has become the basis for taking up the research subject matter at hand. The purpose of the article is an attempt at stating the correlations between the variation in structural fund absorption and the Cohesion Fund in Poland and the changes in the socio-economic level in the regional dimension. The level of regional development was specified within the dimension of the factors of development, subcategorising: the human capital, material capital, natural environment as well as innovativeness and entrepreneurship (treated as a whole). In the article, the notion of “absorption” is understood as an amount of funds actually spent in projects co-funded from the EU funds, realised within the EU cohesion policy in Poland, and used interchangeably with the notions of “commitment” and “use”. In the research, projects co-funded from the EU funds realised within the years 2007-2017 were taken into account. The change in the level of the development was established for the years 2010-2019. Certain time displacement of the results of the EU projects on economic development was taken into account. The authors of other research most often indicate a two- or three-year delay in the impact of the EU funds on the economy (Grosse, 2018). In the article, a hypothesis has been verified, according to which the EU fund absorption to the largest extent impacted the development of innovativeness and entrepreneurship.

The research procedure was conducted in three stages. In the first one, the level of the socio-economic development in Poland in the subregional dimension was specified—at the level of the NUTS-3 units. For that purpose, an original synthetic gauge of the level of the development based on the data from

¹ From Italian: a person highest in the ranking, the most significant factor, boss of all bosses.

² For example, the first analyses using the HERMIN and MaMoR3 models conducted by the Institute of Research on the Market Economy as well as the Wrocław Agency of the Regional Development indicated that the EU funds shall impact the GDP level to as high an extent as 11.2%.

³ Most often it was indicated that the EU funds impacted the GDP level at around 2.5%.

the Local Data Bank at the Main Statistical Office was used. The research was conducted at the level of subregions, on one hand for the purpose of achieving the greatest possible detail, and on the other—with respect to the accessibility of empirical data.

At the second stage, spatial variation in the EU fund absorption in the NUTS-3 units in Poland is presented, taking advantage of the data from the teleinformatic systems of the Ministry of Funds and the Regional Policy. At the third stage, interdependencies between the extent of the absorption and the changes in the level of development within the arrangement of the factors of that development based on the analysis of regression are stated.

1. Review of subject literature in the area of regional development

In the article, a review of the concepts of regional development shall be conducted in terms of the factors of that development, taking account of two main trends of the economic thought: the neoclassical and neo-Keynesian economics.

The concept of regional development of the neoclassical trend is, among others, the concept of convergence compiled by a Nobel Prize laureate Jan Tinbergen. The concept is in a direct relation with the theory of comparative cost, according to which the trade exchange between better and worse developed countries may with time lead to a decrease in the differences in their level of development, and even rendering equal the level of income in both those groups. Apart from the international exchange, other factors of development in that concept are also capital and technological progress (Illeris, 1993).

As opposed to the neoclassical concepts, in the first part of the twentieth century there appeared theories relating to John Maynard Keynes' doctrine. Prior concepts focused on the supply aspect, while Keynes and his followers focused on the demand analysis. The theories demand different administrative activities, directed at creating factors of development, such as: investment in infrastructure, promoting exports, increasing workforce qualifications, supporting the development of entrepreneurship or creating innovativeness (compare with: Florida, 2002).

The significance of innovativeness in the process of regional development was emphasised by Joseph Schumpeter—a representative of the Austrian school. In his opinion, development resembles the process of creative destruction (Emami-Langroodi, 2018). Innovation ensures change and development on one hand, and on the other—it destroys prior economic and social structures. Not all entities are prepared for such changes. Sometimes they are forced to self-destruct and introduce new technological solutions. Otherwise, they stop being economically competitive.

A new theory of development initiated by Paul Romer assumes the possibility of accumulating the factors of development, which equals the possibility of obtaining durable development, as well as maintaining economic differences between regions. The main factors generating development in this theory are: human capital and physical capital, as well as technological innovativeness. Poor regions may not make up for the developmental differences in a manner different than by improving their technological level as well as by investing in human qualifications (Arranz et al., 2019).

Against the background of the neoclassical trend, a contemporary model of the so-called economic geography emerges, which links three elements: the agglomeration costs, transport costs and the cost of means of production flows (compare with: Krugman, 1998; Eshugova, 2018). The model assumes the possibility of occurring, and even deepening, the interregional differences, which according to Grosse, is a result of the tendency to accumulate the factors of development in the most developed metropolitan regions, similar to Johann Heinrich von Thünen's theory of location (Grosse, 2018).

The regional policy is related to the occurrence of variations in the level of development of the respective regions. Discrepancies in regional development, resulting from investors' decisions, the underpinnings of the market mechanism or geographical factors, lead to variation in the level of income, as well as the conditions of life of the population. The main task of the regional policy is thus the necessity of limiting the scale of those variations (compare with: Fongwa & Marais, 2016).

2. Variation in the level of development of the NUTS-3 units in Poland in the years 2010-2019

Variation in the level of socio-economic development is a natural phenomenon, which results from uneven access to the means of production, such as: capital, labour or natural resources (Khasanova et al., 2020). The differences in the potential of regions are convergent with the majority of the theories of regional development (Yun et al., 2017). However, theories stemming from different scientific orientations explain variation in economic processes in a different manner. The first group of theories, stemming from the neoliberal trend, assumes minimising state interventionism, and the free market is treated as a regulatory mechanism (Krugman 1998). The second group of theories, representing the neo-Keynesian economic thought, considers interventionism to be an indispensable regulatory mechanism of regional development (Grosse 2018).

In order to state the variation in the level of the socio-economic development of the NUTS-3 units in Poland, a synthetic gauge of distance from the role model was used. The research procedure consisted of four subsequent steps: selection of variables, reduction of multi-feature space, indicating the level of

the socio-economic development as well as classification of all 73 NUTS-3 units on the scale of regional development.

In the first part of the research, a matrix of geographical information was created based on 60 indicators, which specified the level of development of the NUTS-3 units in the years 2010-2019 in reference to: the human capital (17 variables), material capital (18), natural environment (10) as well as innovativeness and entrepreneurship (15) (taken as a whole). The hereinabove mentioned factors of the development were identified based on the accessible review of literature. Next, Pearson's correlation coefficients between the indicators researched were calculated for their change in 2010-2019. The indicators selected for a synthetic gauge should thus be weakly correlated between each other, in order for their information capacity to vary (Balcerzak, 2016). The correlation coefficient matrices constructed constituted the basis for conducting the departure variable reduction using Z. Hellwig's method (i.e. separating those indicators which shall be considered in further procedure). The procedure of variable reduction was conducted fivefold: separately for the general level of socio-economic development and separately for the level of development of each of the four capitals being factors of that development.

At the next step of the research, a pattern and an antipattern of development were established, and subsequently, a taxonomic distance of each subregion researched from the assumed pattern of development was established (Yun et al.,

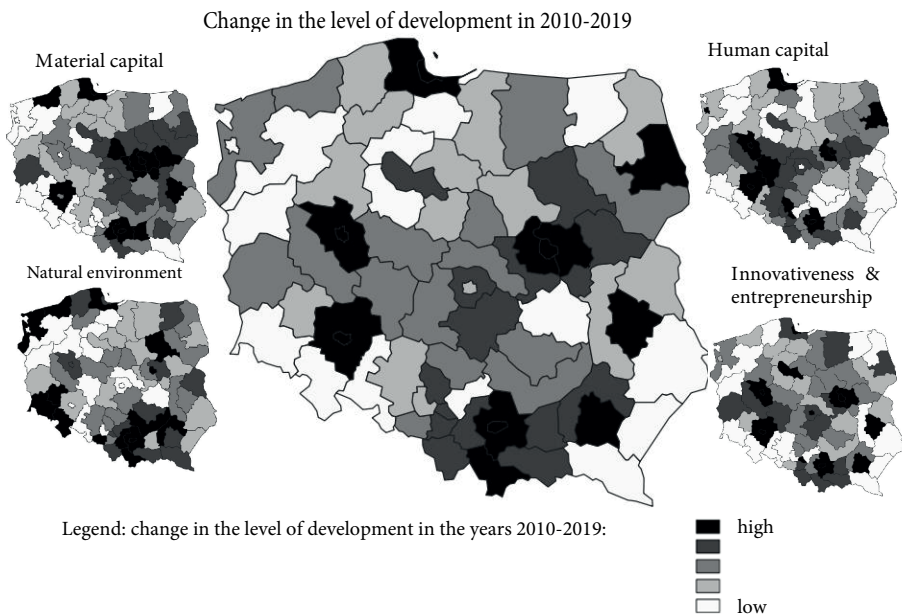


Figure 1. Spatial variation of socio-economic development and its aspects in Poland within the arrangement of provinces

Source: Own compilation based on the research conducted.

2017). In the last part of the research conducted for each NUTS-3 unit, a synthetic gauge being an indicator of the socio-economic development was stated.

A synthetic gauge of the level of development assumes values from 0 to 1. The higher the value, the higher level of development of the phenomenon considered. Based on the indicators calculated, 73 NUTS-3 units in Poland were divided into five groups: very high, high, average, low and very low change in the level of socio-economic development in the years 2010-2019.

Figure 1 presents the results of the research conducted. It contains choropleths representing spatial variation of the changes in the socio-economic development of the 73 subregions in Poland in the period of 2010-2019.

3. EU fund absorption in Polish subregions

In the second stage of the research, the extent and structure of the EU fund absorption in Poland at the level of the NUTS-3 units is specified. An analysis of the use of the EU funds is conducted based on the "List of beneficiaries of the operational programs" database, generated for the SIMIK National IT System 2007-2013 as well as from SL2014 central tele-IT system and one published by the Polish Ministry of Funds and the Regional Policy on the European Fund website.

The basis for implementing the EU cohesion policy in Poland is composed of: the National Strategic Frameworks (National Cohesion Strategy) for the financial perspective of 2007-2013 as well as the Partnership Agreement for the programming period of 2014-2020. Strategic documents stated the priorities and activities for the regional policy. In the hereinabove mentioned documents, an assumption is made that the means from the Structural Funds (among which the following are to be found: the European Fund of the Regional Development as well as the European Social Fund), as well as the Cohesion Fund, constituted the main sources of funding of the regional policy in Poland (Spychała, 2016).

In the programming period of 2007-2013, the EU cohesion policy was implemented in Poland based on 16 Regional Operational Programs as well as 5 National Operational Programs: the Infrastructure and Environment, Innovative Economy, Human Capital, Development of Eastern Poland as well as Technical Aid. Within the financial perspective of 2014-2020, apart from 16 Regional Programs, within which the EU cohesion policy is to be found, also 6 National Operational Programs were realised: Infrastructure and the Environment, Intelligent Development, Digital Poland, Knowledge Education Development, Eastern Poland and Technical Aid.

Within the years 2007-2017, over 180,000 projects co-funded from the EU funds under the EU cohesion policy were realised in Poland, and the total value of funding obtained by the beneficiaries for the realisation of those projects was PLN 289.6 bn (i.e. around EUR 68.9 bn). In each of the 73 Polish

Table 1. Subregions of the highest and lowest values of the EU fund absorption per capita calculated for the respective factors of development

The highest values of the EU fund absorption (in PLN per capita)			The lowest values of the EU fund absorption per capita (in PLN per capita)		
No.	Subregion NUTS-3	Value	No.	Subregion NUTS-3	Value
Material capital					
1	Elblaski	10,857.34	73	Nowotarski	1,347.00
2	Trojmiejski	10,507.38	72	Pilski	1,392.25
3	Miasto Warszawa	10,069.84	71	Elcki	1,442.51
4	Wroclawski	8,409.39	70	Plocki	1,452.72
Human capital					
1	Olsztynski	6,322.35	73	Miasto Warszawa	1,255.04
2	Lubelski	5,488.38	72	Warszawski wschodni	1,573.04
3	Bialostocki	4,960.93	71	Zyrdowski	1,622.90
4	Rzeszowski	4,892.38	70	Trojmiejski	1,684.48
Natural environment					
1	Olsztynski	5,362.09	73	Koninski	1,210.80
2	Rzeszowski	4,773.59	72	Plocki	1,370.71
3	Elblaski	4,702.76	71	Pilski	1,378.32
4	Lubelski	4,576.79	70	Nowotarski	1,390.11
Innovativeness and entrepreneurship					
1	Miasto Wroclaw	5,512.82	73	Rybnicki	1,042.14
2	Miasto Kraków	5,491.64	72	Koninski	1,169.18
3	Lubelski	5,171.88	71	Zyrdowski	1,201.54
4	Miasto Poznan	4,882.99	70	Ciechanowski	1,271.75
Total absorption					
1	Olsztynski	23,311.34	73	Nowotarski	6,518.82
2	Elblaski	22,757.05	72	Koninski	6,521.94
3	Rzeszowski	22,608.17	71	Pilski	6,761.24
4	Lubelski	21,116.90	70	Plocki	7,448.57

Source: Own compilation based on the research conducted.

subregions, projects co-financed from the EU funds were realised. On average, in one NUTS-3 unit, 2,465 of such undertakings were realised. The smallest number of projects were realised in Szczecin (1,065), and the biggest number in the olsztyński subregion (12,691), the elbląski subregion (9,940) and the

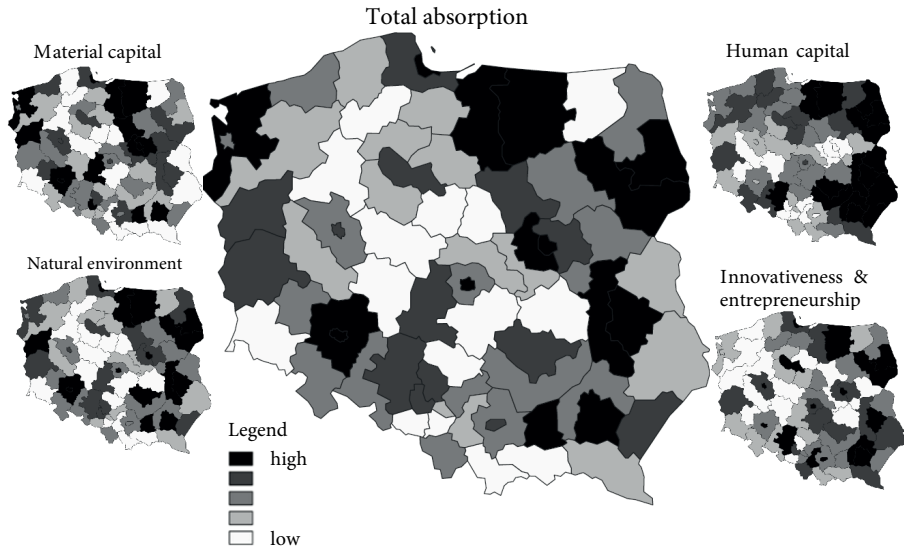


Figure 2. The EU fund absorption per capita in Poland within the arrangement of NUTS-3 units

Source: Own compilation based on the research conducted.

koniński subregion (8,297). The highest amount of the EU funds was involved in the realisation of projects in the capital city of Warsaw (PLN 32.1 bn—EUR 7.6 bn) and the lubelski subregion (PLN 15.0 bn—EUR 3,6 bn), and the average value of the total funding paid out in one NUTS-3 unit subregion was PLN 6.56 bn (EUR 1,56 bn).

The comparison of the size and structure of the EU fund absorption in the interregional arrangement required the introduction of data relativisation. For that purpose, the number of people was used, and the respective data was calculated in the per capita dimension. Most EU projects per 10,000 inhabitants were realised in the subregions of the warmińsko-mazurskie province: olsztyński (247) as well as elbląski (204), and the smallest number of projects—in Szczecin (26) and Warsaw (29). It is well worth noting the fact that most of the subregions of the biggest number of projects per 10 000 inhabitants are located in North-East Poland—within the area of the warmińsko-mazurski province. The abovementioned situation is an offshoot of a few factors: first—the regional authorities assumed the rule of preferring a bigger number of projects of relatively lower values; second—within the area of the province in the researched years, a relatively high unemployment was registered, therefore more projects concerning human capital and the job market were realised in that area; third—the beneficiaries from the warmińsko-mazurskie province were able to apply for funding also from the operational programs concerning the development of Eastern Poland; fourth—the province is one of a few which

were allowed access to means from the so-called initiative to the benefit of the employment of young people.

The next scope of the analysis was specifying the spatial variation of the EU fund absorption according to the structure of intervention in relation to the factors of socio-economic development: human capital, material capital, natural environment as well as innovativeness and entrepreneurship. The results of the research conducted formed the basis for specifying the correlations between the EU fund absorption and the change in the level of socio-economic development. The means from the European Social Fund were directed towards the development of the human capital, funds which were made accessible within the Operational Programs: Human Capital, Knowledge Education Development, as well as partly each Regional Operational Program. The means from the Regional Operational Programs were also in part devised towards the environmental protection as well as the development of innovativeness and improvement in the state of the material capital. The selected Infrastructure and Environment Operational Programs Activities supported the development of the material capital and the environmental protection. The support of innovativeness and entrepreneurship, i.e. means from the Operational Programs, were devised: Innovative Economy, Digital Poland and Intelligent Development. Based on the research conducted, it was established that in Poland in the years 2007-2017, the most means—38.8%—were directed towards the development of the material capital. The following 21.4% of the value of the EU funds were used to the benefit of development of the human capital, 20.0% of the means made available were used to the benefit of supporting innovativeness and entrepreneurship, and 19.8%—to the benefit of the environmental protection.

The results of the research conducted are presented in Figure 2 as well as Table 1. Table 1 presents the NUTS-3 units of the highest and lowest values of the EU fund absorption per capita. Figure 2 contains choropleths representing spatial variation in absorption in Poland in the subregional dimension.

4. Size of absorption and the level of development within the arrangement of NUTS-3 units

At the last stage of the research procedure conducted, a correlation between the extent of the EU fund absorption and the level of socio-economic development in 73 NUTS-3 units in Poland was specified. The hereinabove relations were researched separately for each subcategorised factor of development as well as for the socio-economic development as a whole. Based on the average value of the synthetic gauge characterising the change in the level of development as well as the average value of the EU fund absorption supporting the development of particular capital per capital, the subregions researched were divided into four groups (Figure 3 and Figure 4):

- group 1, in which the NUTS-3 subregions were subcategorized and an above-the-average change in the level of development of a particular factor was registered as well as above-the-average EU fund absorption;
- group 2 in which the units were subcategorized and a change in the level of development of a particular factor was registered as well as the EU fund absorption below the average calculated;
- group 3, in which the units were subcategorized and a change in the level of development of a particular factor below average was registered, as well as the EU fund absorption below average;
- group 4, in which the NUTS-3 subregions were categorized and a change in the level of development of a particular factor below average was noted as well as an above-the-average EU fund absorption.

Group 1 thus contains those NUTS-3 units in which the biggest change in the level of a particular factor was noted in the years 2010-2019 and, at the same time, high EU fund absorption devoted to the development of the capital researched. Group 2 included those subregions in which a high change in the level of development of the capital researched was included with relatively low EU fund absorption devoted to the development of a particular factor. Group 3 is composed of the subregions of relatively low EU fund absorption

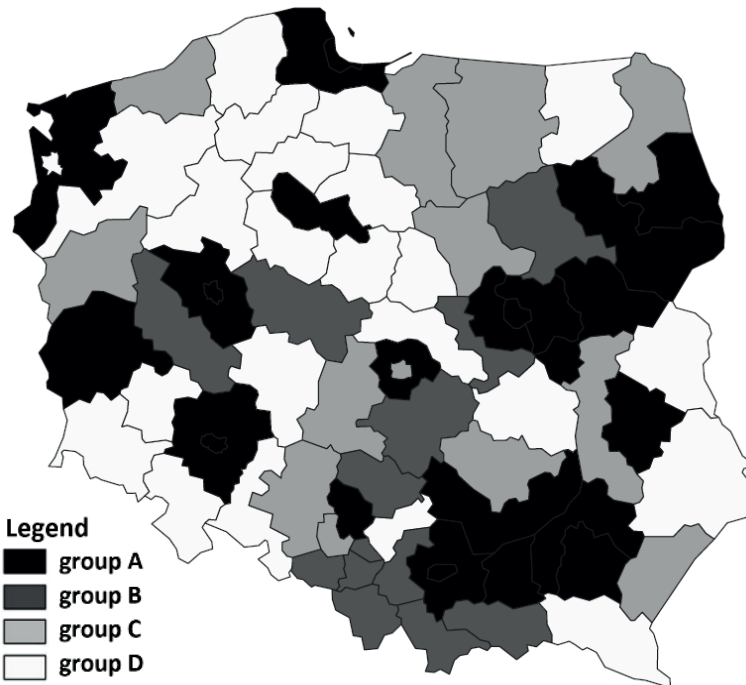


Figure 3. Classification of subregions based on the absorption of EU funds and the change in the level of development

Source: Own compilation based on the research conducted.

in the case of funds supporting the development of the researched capital as well as a relatively low value of the synthetic gauge. Group 4 includes units of the lowest efficiency of the Community funds—despite the above-the-average EU fund absorption, the development of a particular capital in the years 2010-2019 was done to the low extent.

The subregions of the biggest change in the level of the socio-economic development as well as high EU fund absorption, include, above all, the follow-

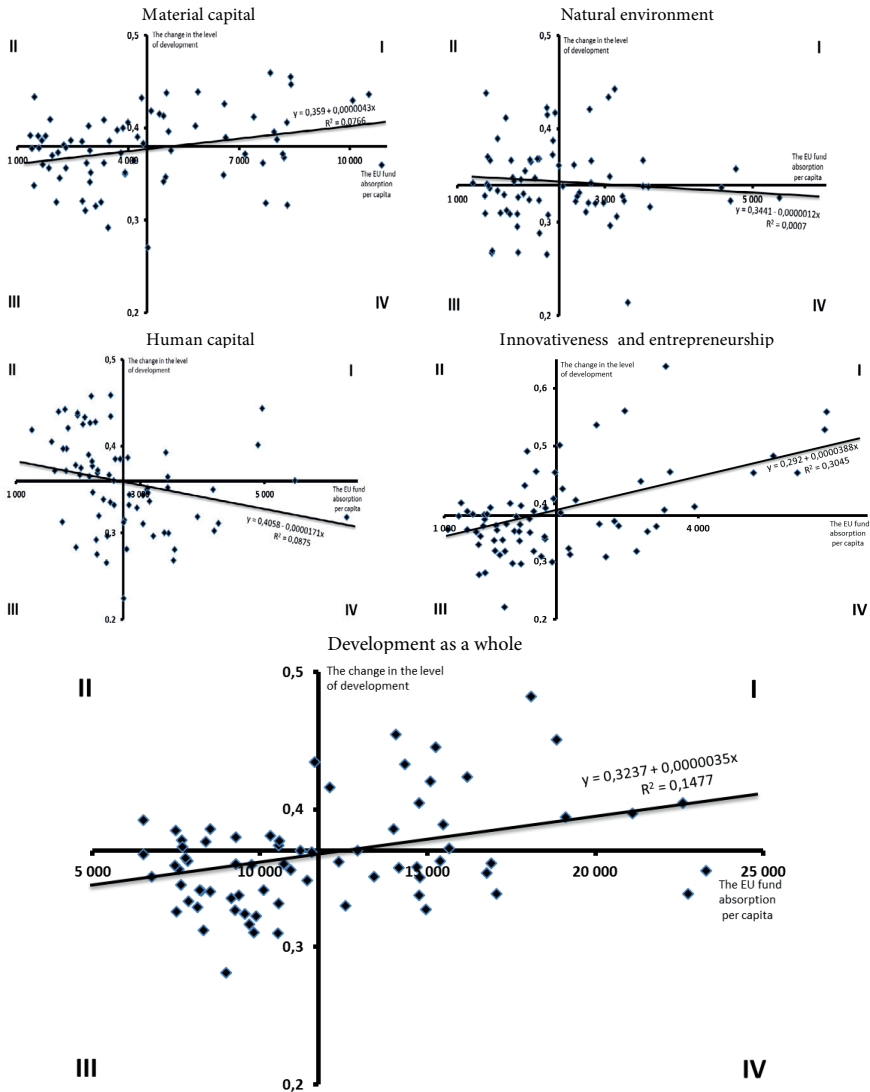


Figure 4. Charts of the EU fund absorption dispersion as well as changes in the level of socio-economic development of NUTS-3 units in Poland
 Source: Own compilation based on the research conducted.

ing highly developed agglomeration areas: poznańska, warszawska, trójmiejska, krakowska and wroclawska. Moreover, group 1, also encompasses the subregions within the area of Białystok, Rzeszów, Bydgoszcz and Zielona Góra. The least active areas in terms of the EU fund absorption as well as an increase in the level of development included, among others: the NUTS-3 units of the central part of the łódzkie province, the świętokrzyskie subregions or the units of North-Eastern Poland. It is well worth noting that in nearly all subregions of the warmińsko-mazurskie province, in which the biggest number of EU projects were realised per 10 000 inhabitants, one of the lowest changes in the socio-economic development were noted. Based on that, the hereinabove mentioned subregions were included in the ineffective group no. 4, which also encompasses a big part of the NUTS-3 units from the opolskie, kujawsko-pomorskie and zachodniopomorskie provinces.

At the next step of the research, straightforward linear regression models between the researched variables are constructed within the respective factors of development (Table 2). A positive correlation is observed between the extent of the EU fund absorption in the case of the funds supporting development and the change in the level of development in the years 2010-2019 in the case of the material capital, innovativeness and entrepreneurship, as well as development as a whole (Table 3). In the case of the human capital as well as the natural capital, a negative correlation is registered.

Table 2. Linear regression models between the variables researched

Factor of development	Regression model pattern
Material capital	$y = 0.359 + 0.0000043*x$
Natural environment	$y = 0.3441 - 0.0000012*x$
Innovativeness and entrepreneurship	$y = 0.292 + 0.0000388*x$
Human capital	$y = 0.4058 - 0.0000171*x$
Total socio-economic development	$y = 0.3237 + 0.0000035*x$

Source: Own compilation based on the research conducted.

Based on the selected statistics of the models obtained, the explanatory value of the obtained regression functions is assessed as relatively low (alternatively as average). The highest value of the R^2 determination coefficient is obtained in the case of the model specified for innovativeness and entrepreneurship (0.30). In the case of this factor of development, the variability of the dependent variable has thus been explained through the independent variable in over 30%. One may thus acknowledge that the direction of the EU fund intervention in the case of funds supporting innovativeness and entrepreneurship is correct, and the proper direction of the EU fund intervention in the development of

Table 3. Parameters stating the quality of regression models within the arrangement of the respective factors of socio-economic development

Description	Material capital	Natural environment	Innovativeness and entrepreneurship	Human capital	Development as a whole
Correlation: absorption vs. development	positive	negative*	positive	negative	positive
R ² determination coefficient	7.66%	0.07%	30.45%	8.75%	14.77%
Value p for F test	0.0170	0.8290	0.0000	0.0105	0.0007
F statistic value	5.97	0.05	31.53	6.91	12.48
Standard residue mistake	3.73%	4.22%	6.06%	5.11%	3.47%
Standard errors of parameter estimates	0.00000176	0.00000563	0.00000691	0.00000649	0.00000098
Sum total of residue squares	26.48%	37.50%	69.17%	52.34%	23.71%
Residual variability coefficient	9.86%	12.36%	15.86%	14.22%	9.50%
Akaike's information criterion	-274.74	-256.63	-203.04	-228.16	-285.55

* No statistically significant relationship was found.

Source: Own compilation based on the research conducted.

innovativeness has been confirmed by high EU fund absorption devoted for that purpose, a high number of newly created, highly innovative enterprises as well as modern solutions implemented in the economy. The highest quality of the regression model assessed for innovativeness and entrepreneurship is also confirmed by the fact that the explanatory variable turned out to be significant already at a very low level of significance, i.e. at the level of 0.00003% (the p-value for the parameter as well as the F-Snedecor statistic (Nowak, 2018—the probability of making a mistake). One may thus conclude that in the case of innovativeness and entrepreneurship, the regression model states the correct—a positive correlation between the EU fund absorption and the change in the level of innovativeness and entrepreneurship.

A synthetic gauge of empirical value dispersion around theoretical values is standard variation of the residue subcomponent. It informs about what is the average variation in empirical values of the explanatory value from the theoretical values obtained from the regression function. With an increase in the values of standard variation of the residue component, the statistical “goodness”

of the matching of a particular regression function to empirical data decreases. In the research conducted, positive and negative residue values were identified. The positive residue values indicate that the observed extent of the explanatory variable is higher than the expected one, resulting from the model. The negative residual values, however, prove the reverse situation to be the case. The lowest value of the residue standard fault is registered in the case of the model assessed for the level of the socio-economic development as a whole (3.47%). Relatively short distances from the trend line, and because of that, quite a good matching of the model is proven by the fact that the sum of the residue squares constitutes only 23.71% of the average for the change in the level of development in total. Moreover, taking account of the residue variability coefficient, one may consider a model as relatively well matching, as the value of the coefficient amounted to 9.5%⁴ (such a part of the average value of the explanatory variable constitutes a standard residue variation). The real change in the level of the socio-economic development as a whole in the NUTS-3 units in Poland—apart from few cases—there is relatively little difference between the value obtained from the regression model.

Conclusions

Concluding the research concerning the impact of spatial variation of the EU fund absorption on the changes in the level of socio-economic development conducted in the article as well as the respective factors of development in the subregional dimension, i.e. within the arrangement of the NUTS-3 units in Poland, one may note that the positive correlation between the extent of the EU fund absorption per capita and the change in the level of development was identified in the case of material capital, innovativeness and entrepreneurship as well as development in total. In the case of the human capital as well as the natural environment, a negative correlation is registered. One may thus note that the EU fund absorption positively impacted the development of those factors (the subcomponents of development), within which the most EU fund allocation has been made available, which is related to the economies of scale. A negative impact is registered in the case of those factors in which the intervention turned out to be quite low.

Among all the assessed regression functions, the highest value is a model built within the analysis of the level of development of innovativeness and entrepreneurship, which explains 30% of the variability of the dependent variable, and the explanatory variable turned out to be significant already at the level of significance of 0.00003%. The satisfactory value of the model may also

⁴ In the subject literature, a regression model is considered to be admissible if the residue changeability coefficient assumes a value lower than 20%.

result from a liberal approach to the manner of characterising the factor of development as well as extensive indirect indexing. Based on the analysis of the residue, best matching the reality is the model built within the analysis of the socio-economic development in total, in the case of which the respective coefficients assumed the lowest values. Therefore, summarising the research, one ought to conclude that the EU fund absorption to the largest extent impacted the changes in the level of innovativeness and entrepreneurship in the Polish subregions of the NUTS-3 level. The factors of development were the most heavily funded from the general EU budget, and the results of the EU fund absorption supporting innovativeness or the material capital are visible in a relatively short time period.

In relation to the hereinabove mentioned, one may thus conclude that in the context of the research conducted, one may not definitively state the correlations between the EU fund absorption and the change in the socio-economic level, and the results of the research procedure conducted are based solely on the statistical correlation, therefore their interpretation should be careful. It is certainly beyond doubt that the EU funds have made a positive influence on the socio-economic impact of particular subregions. It is very difficult, however, to state in a definite manner the scale of the impact, as the development registered in the research resulted from the interplay of different kinds of stimuli. Moreover, it is well worth noting that in the case of human capital as well as the natural environment, within which a negative correlation was observed (no statistically significant relationship for the natural environment), the results of the projects financed from the EU funds shall be visible only in a longer time frame, and therefore they have not been taken into account in the research conducted. Furthermore, it is a big difficulty to measure the level of innovativeness or the state of the natural environment, due to a lack of widely accessible objective criteria which would relate directly to the mentioned factors of development. With respect to the specificity of spending the means from the EU budget, it is therefore well worth considering in similar analyses prolonging the research period in order to take into account also the long-term impact of the EU aid funds.

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