CENTRAL EUROPEAN REVIEW OF ECONOMICS & FINANCE

Articles
Book Reviews

Contents

Articles

Book Reviews

Tadeusz Dyr[1], Karolina Ziółkowska[2]

THE ECONOMIC INFRASTRUCTURE AS THE FACTOR OF CREATING THE MICROREGIONS' ECONOMIC POTENTIAL

Abstract

Theories of the regional development show that the economic infrastructure is a crucial factor of creating the regions and microregions competitiveness. The article presents results of empirical studies confirming relations between equipping microregions with the economic infrastructure and their economic potential, being a crucial competitiveness factor.

JEL Classification Codes: **R11, C15.**

Keywords: sregion, microregion, the economic potential.

Introduction

Analysis of the literature concerning the competitiveness of separate territorial units (e.g. states, regions, microregions etc) shows that the economic potential is considered as the essential factor determining their competitiveness. This concept means their ability to achieve better results in the economy growth and increase in social welfare among other location. In creating the competetivness elements of the endogenous potential are of special importance (Alarcón, 2004, p. 73), including the economic infrastructure, including devices and objects used in transport, communication, energetic, irrigation, land reclamation services etc. (Wojewódzka-Król, 2002, p. 13). They are confirmed by domestic and interna-

---

[1] Associate Professor, Ph.D., K. Pulaski University of Technology and Humanities in Radom, Faculty of Economic and Legal Sciences.

[2] Assistant Professor, Ph.D., University of Social Sciences in Lodz.

tional studies (Calderón, Servén, 2004; Gardiner, Martin, Tyler, 2004; Ratajczak, 1999). The economic infrastructure is the factor which affects the productivity of labor and capital. Its development causes the reallocation of the economic activity. Infrastructure investments are a prerequisite, though insufficient for capital inflows. Strategies of mobilization of regional units that use the economic infrastructure development, mainly the transport one, lead to an increase in their openness and can contribute to the inflow of competitive products from other areas (Rossert, 2000, s. 130).

The high level of the economic potential is reflected both in level of effectiveness of using manufacturing factors (ultimate competitiveness), as well as availability of resources (factorial competitiveness) (Bieńkowski, 1995, p. 21) In such a presentation the economic potential is the factor creating conditions to ensure the high quality of residents life. It also supports a localization of the business activity.

Considering presented premises, as an explicit objective of this publication an evaluation of the interdependence between the microregions economic potential and equipping them with the economic infrastructure was accepted . The studies were conducted on the example of microregions of the Świętokrzyski region. Microregions in the present article are identified with districts and town on district rights. Such a delimitation is compatible with nomenclature of territorial statistical units (NUTS). These are a part of NTS 4 level. (Regulation, 2007).

To achieve the formulated article purpose the following research hypotheses were adopted:

Hypothesis 1. Microregions of the Świętokrzyski region are characterized by the high level of diversity of economic potential and the level of economic infrastructure development.

Hypothesis 2. There is a statistically essential relation between the economic potential and the level of equipping microregions of the Świętokrzyski region with the economic infrastructure.

For verification of formulated hypotheses an econometric model using the method of information capacity rates was constructed (Hellwig method) [Hellwig, 1968]. This method allows for constructing the synthetic measure based on fragmentary diagnostic variables, reflecting various aspects of examined phenomenon [Dyr, Ziółkowska, 2014].

1. Methodological methods of microregions competitiveness evaluation and their equipment with the economic infrastructure

Further study levels included:
– creating the preliminary list of diagnostic features,
– creating the final set of diagnostic features,

– standardization of diagnostic features,
– calculating taxonomical measures.

Preliminary list of diagnostic features included all indicators, available in public statistics, that refer to various aspects of microregions economic potential and their equipment with the economic infrastructure. From this list, creating the final set of diagnostic indicators, variables characterized by a relatively high diversity were selected. They were determined by the classical coefficient of variation. It was assumed that too weak diagnostic features are these, for which the classical coefficient of variation based on the standard deviation, is smaller than the threshold amounting 10%. As a result of conducted procedure of eliminating unimportant indicators, i.e. for which the coefficient of variation was smaller than the 10%, a final set of diagnostic indicators was presented. It is a base for further analysis, i.e. the calculation base for every variable of the synthetic measure.

The set of diagnostic variables of evaluation of microregions economic potential was presented in table 1, their equipment with the economic infrastructure – in table 2. Values of these variables were assumed according to data collected in frames of public statistics and available by the Central Statistical Office. Accepting such a source ensured the comparability of statistical data and their relatively high credibility. These features are guaranteed by the Central Statistical Office statistical quality system. A unique symbol was assigned to every factor and every diagnostic variable (ID badge), which lets to distinguish it from other variables and assign them specific figures.

Table 1. Diagnostic variables of the economic potential

Taxonomic measure		Diagnostic features	
Symbol	Name	Symbol	Name
$x_{m1.1}$	Industrial production	$x_{m1.11}$	sold production of industry per 1 inhabitant [PLN]
$x_{m1.2}$	Investments outlays	$x_{m1.21}$	investment outlays per 1 inhabitant
		$x_{m1.22}$	investment outlays – share of the private sector
$x_{m1.3}$	Finances of districts	$x_{m1.31}$	total districts budget revenue per 1 inhabitant
		$x_{m1.32}$	expenses of property investments per 1 inhabitant
$x_{m1.4}$	Entrepreneurship	$x_{m1.41}$	entities entered in the National Official Business Register REGON per 10 thou. inhabitants

Source: own study.

Table 2. Diagnostic variables of economic infrastructure

Taxonomic measure		Diagnostic features	
Symbol	Name	Symbol	Name
$x_{m2.1}$	Transport Infrastructure	$x_{m2.11}$	density of regional, commune province roads with a hard surface [km/100 km²]
		$x_{m2.12}$	density of regional, commune province roads with a hard improved surface [km/100 km²]
$x_{m2.2}$	Water Supply Infrastructure	$x_{m2.21}$	density of a waterworks distribution network [km/100 km²]
		$x_{m2.22}$	number of waterworks combinations connected with residential buildings and collective settling per 1 km²
		$x_{m2.23}$	consuming water from the water supply system per 1 resident
$x_{m2.3}$	Sewerage infrastructure	$x_{m2.31}$	density of the sewer distribution network [km/100 km²]
		$x_{m2.32}$	number of sewer combinations connected with residential buildings and collective settling per 1 km²
		$x_{m2.33}$	sewers seen off to 1 resident
$x_{m2.4}$	Gas Infrastructure	$x_{m2.41}$	density of an active gas network [km/100 km²]
		$x_{m2.42}$	active combinations connected with residential buildings and collective settling per 1 km²
		$x_{m2.43}$	residential buildings and collective settling per 1 km²
$x_{m2.5}$	Energy Infrastructure	$x_{m2.51}$	electricity consumption per 1 resident

Source: own study.

The necessary condition to set the synthetic index of the regions' competitiveness and their economic infrastructure equipment correctly is their denominators standardization, in which the variables will be comparable and their character standardized – by transforming destimulants into stimulants (Grabiński, Wydymus, Zeliaś, 1989, s. 27).

In the regions' competitiveness evaluation, the denominators standardization was done by conducting the standardization *j*-th variable in *i*-th region. The calculations were done using following formulas:
– for stimulants:

$$t_{ij} = \frac{x_{ij} - \bar{x}}{S_j}$$

– for destimulants:

$$t_{ij} = -\frac{x_{ij} - \bar{x}}{S_j}$$

where:
t_{ij} – standardized value of *j*-th index in *i*-th subdivision,

x_{ij} – value of j-th denominator in i-th subdivision,
$\bar{x}$ – the arithmetic mean of j denominator value,
S_j – standard deviation in x_j denominator distribution.

Using the final set of diagnostic indicators after the standardization, values of Hellwig taxonomical indexes of development were calculated for each region, i.e. synthetic indexed were calculated for each of distinguished variables and fragmentary indexes – for aspects distinguished under individual areas.

In the Hellwig method, according to the matrix of standardized variables, a model object of following coordinates was set:

$$O = \left[x_{0j} \right]$$

where:
$x_{0j} = max_i \{t_{ij}\}$
t_{ij} – standardized value of j-th index in i-th subdivision.

Calculating the synthetic index of the regions competitiveness only the formula for stimulants was used, because amongst the denominators admitted to the evaluation there weren't any de-stimulants.

The next step was to set the Euclidean distance from the model object:

$$S_0 = \sqrt{\frac{1}{n} \cdot \sum_{i=1}^{n} \left(d_{i0} - \bar{d}_0 \right)^2}$$

where:
d_{i0} – euclidean distance between i-th and the model object,
t_{ij} – standardized value of j-th index in i-th subdivision,
$i = 1, 2, \ldots, n$,
$j = 1, 2, \ldots, m$.

Considering presented assumptions it is possible to calculate the synthetic index from the following formula:
Considering presented assumptions it is possible to calculate the synthetic index from the following formula:

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

where:
d_{i0} – Euclidean distance between i-th and the model object,
d_0 – the unit critical distance from the model:

$$d_0 = \bar{d}_{i0} + 2 \cdot S_0$$

$\bar{d}_{i0}$ – arithmetic mean of taxonomical distances between the object i-th and the model object:

$$\bar{d}_0 = \frac{1}{n} \cdot \sum_{i=1}^{n} d_{i0}$$

S_0 – standard deviation of taxonomical distances between i-th and the model object:

$$d_{i0} = \sqrt{\sum_{j=1}^{m} \left(t_{ij} - x_{0j}\right)^2}$$

In the above model, the synthetic index of the regions competitiveness and their equipping with the economic infrastructure the Si assumes values from the period [0.1]. Maximum value of the S_i index (1) reflects the so-called model, i.e. the region, in which all analyzed variables accept the maximum values.

In the adopted method, along with increasing the value of the synthetic index, both the region's competitiveness or a level of equipping it with the infrastructure also increase. Differences between indexes show a distance in the development of individual regions.

2. Spatial diversity of the economic potential in microregions of Świętokrzyskie region

Industrial production

According to the criterion of the industrial production one diagnostic variable, i.e. sold production of industry per 1 inhabitant was included in the structure of the taxonomical measure. Values of this diagnostic variable and the algorithm of calculating the taxonomical synthetic index reflecting the competitiveness of the microregion in studied area were presented in table 3. Calculated values of the synthetic index of the competitiveness balanced in the range from 0.17 to 1.0 and were characterized by a high changeability.

Table 3. Calculating the Taxonomical Index $S_{m1.1}$ *Sold production of industry* within *Economic potential* X_{m1}

District	Variable Value	Standardized variable Value	Euclidean Distance	Synthetic Index
	$x_{m1.11}$	$t_{m1.11}$	$d_{m1.1}$	$S_{m1.1}$
Buski	3 215.00	-1.13	3.26	0.21
Jędrzejowski	21 782.00	0.43	1.69	0.59
Kazimierski	1 235.00	-1.30	3.42	0.17
Kielecki	11 268.00	-0.45	2.58	0.37
Konecki	16 568.00	-0.01	2.13	0.48
Kielce town District	19 432.00	0.24	1.89	0.54
Opatowski	3 419.00	-1.12	3.24	0.21
Ostrowiecki	34 730.00	1.53	0.59	0.86
Pińczowski	9 224.00	-0.63	2.75	0.33
Sandomierski	18 298.00	0.14	1.98	0.52
Skarżyski	10 406.00	-0.53	2.65	0.36
Starachowicki	14 613.00	-0.17	2.29	0.44
Staszowski	4 1751.00	2.12	0.00	1.00
Włoszczowski	27 014.00	0.88	1.24	0.70
Arithmetic Mean	16 639.64	0.00	2.12	0.48
Standard Deviation	11 837.31	1.00	1.00	0.24
Variation Coefficient	71%	–	47%	50%
Max.	41 751.00	2.12	3.42	1.00
Min.	1 235.00	-1.30	0.00	0.17

Source: own study, based on GUS data.

A Staszowski district where the Połaniec power station is located, has got the maximum value of the taxonomical measure. Also an Ostrowiec Świętokrzyski district in which the mill is located has a maximum value. Minimum values concern agricultural microregions, i.e. Opatowski, Kazimierowski and Buski.

Investments outlays

Investments are one of the most crucial factors the economy growth and creating the regional units competitiveness. They cause the accumulation of capital by creating new resources of the real and intellectual capital, affecting economic and revenue growth in a long period of time (Samuelson, Nordhaus, 2002, p. 215) Relations between investments and the competitiveness have double-sided character. The growth in the investment expenditure causes the improvement of regions competitiveness. The higher competitiveness causes the improvement

in the region's investment attraction, supporting investment inflow (Marszał, Markowski, 1998, p. 29).

The value of sub-measure, reflecting investments, were appointed according to:
– investment outlays per 1 inhabitant;
– investment outlays – share of the private sector.

Values of this diagnostic variable and the algorithm of calculating the taxo-nomical synthetic index reflecting the competitiveness of the microregion in studied area were presented in table 4. Calculated values of the synthetic index of the competitiveness balanced in the range from 0.06 to 0.78 and were charac-terized by a high changeability.

The highest taxonomical indexes in order to reflect Investments outlays crite-rion were in Ostrowiecki and Staszowski districts. Their position results mainly from the relatively high expenditure per 1 resident

Table 4. Calculating the Taxonomical Index $S_{m1.2}$ *Investments outlays* within *Economic potential* X_{m1}

District	Variable Value		Standardized variable Value		Euclidean Distance	Synthetic Index
	$x_{m1.21}$	$x_{m1.22}$	$t_{m1.21}$	$t_{m1.22}$	$d_{m1.2}$	$S_{m.5.2}$
Buski	1 032.04	0.42	-0.89	-0.81	4.13	0.18
Jędrzejowski	3 261.43	0.43	0.40	-0.74	3.09	0.38
Kazimierski	154.93	0.62	-1.40	1.17	3.94	0.21
Kielecki	1 180.71	0.49	-0.81	-0.18	3.73	0.26
Konecki	1 736.25	0.64	-0.49	1.32	3.01	0.40
Kielce town District	3 826.32	0.36	0.73	-1.49	3.50	0.30
Opatowski	2 907.89	0.58	0.20	0.73	2.45	0.51
Ostrowiecki	6 900.79	0.55	2.52	0.43	1.08	0.78
Pińczowski	922.82	0.33	-0.96	-1.70	4.73	0.06
Sandomierski	1 711.50	0.47	-0.50	-0.32	3.53	0.30
Skarżyski	2 188.18	0.48	-0.22	-0.26	3.26	0.35
Starachowicki	3 312.93	0.48	0.43	-0.24	2.72	0.46
Staszowski	4 166.00	0.56	0.93	0.57	1.85	0.63
Włoszczowski	2 686.36	0.65	0.07	1.51	2.45	0.51
Arithmetic Mean	2 570.58	0.50	0.00	0.00	3.11	0.38
Standard Deviation	1 719.98	0.10	1.00	1.00	0.95	0.19
Variation Coefficient	67%	20%	–	–	31%	50%
Max.	6 900.79	0.65	2.52	1.51	4.73	0.78
Min.	154.93	0.33	-1.40	-1.70	1.08	0.06

Source: own study, based on GUS data.

Finances of local-government units

The district-government, like other units of the local and regional-government units, performs public tasks seen as a tool for meeting other needs of people (Constitution 1997). Action taken by self-government units are supposed to improve the quality of life of residents and create conditions for the economic and civilization development of the region (Dolnicki, 2009, p. 157–158). To accomplish these tasks the self-government must have appropriate financial resources (Dylewski, Filipiak, Gorzałczyńska-Koczkodaj, 2007, p. 71).

Table 5. Calculating the Taxonomical Index $S_{m1.3}$ *The district-government finances within Economic potential* X_{m1}

District	Variable Value		Standardized variable Value		Euclidean Distance	Synthetic Index
	$x_{m1.31}$	$x_{m1.32}$	$t_{m1.31}$	$t_{m1.32}$	$d_{m1.3}$	$S_{m1.3}$
Buski	3 112.92	3 306.33	0.17	0.11	4.24	0.42
Jędrzejowski	2 722.49	2 890.90	-0.42	-0.44	5.05	0.30
Kazimierski	2 315.29	2 344.76	-1.02	-1.17	5.99	0.18
Kielecki	3 141.56	3400.67	0.21	0.24	4.12	0.43
Konecki	2 671.07	2 915.27	-0.49	-0.41	5.08	0.30
Kielce town District	5 094.17	5 588.06	3.12	3.16	0.00	1.00
Opatowski	2 907.00	3 082.67	-0.14	-0.18	4.67	0.36
Ostrowiecki	2 664.24	2 955.82	-0.50	-0.35	5.05	0.30
Pińczowski	2 989.24	3 106.42	-0.02	-0.15	4.56	0.37
Sandomierski	3 153.72	3 328.26	0.23	0.14	4.18	0.42
Skarżyski	2 599.52	3 146.54	-0.60	-0.10	4.95	0.32
Starachowicki	2 547.60	2 565.35	-0.68	-0.87	5.54	0.24
Staszowski	3 403.81	3 496.73	0.60	0.37	3.76	0.48
Włoszczowski	2 700.61	2 955.20	-0.45	-0.35	5.01	0.31
Arithmetic Mean	3 001.66	3 220.21	0.00	0.00	4.44	0.39
Standard Deviation	669.97	749.82	1.00	1.00	1.41	0.19
Variation Coefficient	22%	23%	–	–	32%	50%
Max.	5 094.17	5 588.06	3.12	3.16	5.99	1.00
Min.	2 315.29	2 344.76	-1.02	-1.17	0.00	0.18

Source: own study, based on GUS data.

Analysis of the microregions competitiveness level within the financial position of self-government units was based on 2 variables which characterize districts revenue potential and the scale of investment expenses made by them. Values of this diagnostic variable and the algorithm of calculating the taxonomical synthetic index reflecting the competitiveness of the microregion in studied area were presented in table 5. Calculated values of the synthetic index of the competitiveness balanced in the range from 0.18 to 1.0 and were characterized by a high changeability.

The highest taxonomical indexes in order to reflect Finances of local-government units criterion was in district of Kielce town. Their expenditure and revenues per number of inhabitants is nearly two times higher than in Kazimierowski district and around 50% higher than the second in the ranking Staszowski.

Entrepreneurship

Entrepreneurship, as the human feature essential for the creative development of an economic activity (Gruszecki, 1994, p. 51), is perceived – next to the soil, labour and capital – as production main factor in the economy. Its core is to connect and direct to the business other production factors which will bring entrepreneur a profit (Pomykało, 1995, p. 689). So the entrepreneurship is connected with creating new economic actions based on innovations (Chodyński, 2008, p. 32). In such a presentation the entrepreneurship is the significant factor of microregions development.

According to the criterion of the Entrepreneurship one diagnostic variable, i.e. entities entered in the National Official Business Register REGON per 10 thou. inhabitants was included in the structure of the taxonomical measure. Values of this diagnostic variable and the algorithm of calculating the taxonomical synthetic index reflecting the competitiveness of the microregion in studied area were presented in table 6. Calculated values of the synthetic index of the competitiveness balanced in the range from 0.15 to 1.0 and were characterized by a high changeability.

The highest taxonomical indexes in order to reflect Entrepreneurship criterion was in district of Kielce town. The number of newly-registered entities compared to the number of inhabitants in the district is nearly three times higher than in Kazimierowski district (lower number of entities) and almost 50% higher than the second in the ranking Staszowski district.

Table 6. Calculating the Taxonomical Inde*x* $S_{m1.4}$ *Entrepreneurship* within *Economic potential* X_{m1}

District	Variable Value	Standardized variable Value	Euclidean Distance	Synthetic Index
	$X_{m1.41}$	$X_{m1.41}$	$X_{m1.4}$	$X_{m1.4}$
Buski	735.00	-0.08	2.98	0.39
Jędrzejowski	651.00	-0.46	3.36	0.31
Kazimierski	472.00	-1.28	4.17	0.15
Kielecki	671.00	-0.37	3.27	0.33
Konecki	735.00	-0.08	2.98	0.39
Kielce town District	1 390.00	2.90	0.00	1.00
Opatowski	577.00	-0.80	3.70	0.24
Ostrowiecki	904.00	0.69	2.21	0.55
Pińczowski	586.00	-0.76	3.66	0.25
Sandomierski	759.00	0.03	2.87	0.41
Skarżyski	942.00	0.86	2.04	0.58
Starachowicki	737.00	-0.07	2.97	0.39
Staszowski	688.00	-0.29	3.19	0.35
Włoszczowski	688.00	-0.29	3.19	0.35
Arithmetic Mean	752.50	0.00	2.90	0.41
Standard Deviation	219.90	1.00	1.00	0.20
Variation Coefficient	29%	–	34%	50%
Max.	1 390.00	2.90	4.17	1.00
Min.	472.00	-1.28	0.00	0.15

Source: own study, based on GUS data.

Synthetic index of spatial diversity of microregions economic potential

Taking into account the variables diagnostic a synthetic index of spatial diversity of microregions economic potential was calculated. The synthetic index balanced in the range from 0.02 to 0.59. Using three averages method classification of microregions according to synthetic index of competitiveness was made, distinguishing four groups of competitiveness level. They were presented in table 7.

This microregion, with the province capital in largely analysed criteria got maximum values of diagnostic variables. In consequence the taxonomical index of the competitiveness is over twice higher than in the second in ranking Skarżysko-Kamienna district.

Table 7. The synthetic index of the microregions competitiveness within economic potential criteria

District	Competitiveness index	Position	Competitiveness level
Kielce town District	0.59	1	Very high
Staszowski	0.45	2	
Jędrzejowski	0.44	3	
Włoszczowski	0.33	4	High
Opatowski	0.31	5	
Pińczowski	0.30	6	
Starachowicki	0.28	7	Low
Konecki	0.27	8	
Sandomierski	0.26	9	
Skarżyski	0.24	10	
Buski	0.20	11	
Kielecki	0.19	12	Very low
Kazimierski	0.11	13	
Ostrowiecki	0.02	14	

Source: own study, based on GUS data.

3. Spatial Diversity of Economic Infrastructure Equipment microregions of Świętokrzyskie region

Transportation Infrastructure

Values of this diagnostic variable and the algorithm of calculating the taxonomical synthetic index reflecting Transportation Infrastructure of the region were presented in table 8. The highest synthetic index of transportation infrastructure development was in Kielce town district. The density of roads in this microregion is – around 30% higher than the second in the ranking Kazimierowski microregion and almost twice higher than the average density of roads in Świętokrzyskie region.

Table 8. Calculating the Taxonomical Index $S_{m2.1}$ *Transportation Infrastructure within Economic Infrastructure* X_{m2}

District	Variable Value		Standardized variable Value		Euclidean Distance	Synthetic Index
	$x_{m2.11}$	$x_{m2.12}$	$t_{m2.11}$	$t_{m2.12}$	$d_{m2.1}$	$S_{m2.1}$
Buski	64.06	62.41	0.69	0.70	3.29	0.54
Jędrzejowski	47.70	44.22	-0.34	-0.41	4.80	0.32
Kazimierski	67.94	66.18	0.94	0.93	2.96	0.58
Kielecki	45.20	40.01	-0.49	-0.67	5.10	0.28
Konecki	46.23	43.21	-0.43	-0.47	4.91	0.31
Kielce town District	101.09	100.73	3.02	3.02	0.00	1.00
Opatowski	46.98	45.01	-0.38	-0.36	4.80	0.32
Ostrowiecki	49.82	48.06	-0.20	-0.18	4.54	0.36
Pińczowski	51.55	49.04	-0.09	-0.12	4.42	0.38
Sandomierski	48.42	47.46	-0.29	-0.21	4.63	0.35
Skarżyski	42.61	41.29	-0.66	-0.59	5.16	0.27
Starachowicki	44.26	41.24	-0.55	-0.59	5.08	0.28
Staszowski	48.31	47.66	-0.30	-0.20	4.63	0.35
Włoszczowski	38.35	36.89	-0.92	-0.85	5.53	0.22
Arithmetic Mean	53.04	50.96	0.00	0.00	4.28	0.40
Standard Deviation	15.89	16.46	1.00	1.00	1.41	0.20
Variation Coefficient	30%	32%	–	–	33%	50%
Max	101.09	100.73	3.02	3.02	5.53	1.00
Min	38.35	36.89	-0.92	-0.85	0.00	0.22

Source: own study, based on GUS data.

Water Supply Infrastructure

Values of this diagnostic variable and the algorithm of calculating the taxonomical synthetic index reflecting Water Supply Infrastructure of the region were presented in table 9. The highest synthetic index of water supply infrastructure development was in Kielce town district. The value of the taxonomical index in this region was twice that high than in the whole region. In Kielecki and Ostrowiecki districts there are also quite high levels of water supply infrastructure development.

In districts with the lowest level of water supply infrastructure development (Kazimierski, Włoszczowski, Jędrzejowski and Pińczowski) the taxonomical synthetic index is below 0.1. The index is twice lower than the average of Świętokrzyski region and four Times lower than in the microregion with the highest development level.

Table 9. Calculating the Taxonomical Index $S_{m2.2}$ *Water Supply Infrastructure* within *Economic Infrastructure* X_{m2}

District	Variable Value			Standardized variable Value			Euclidean Distance	Synthetic Index
	$x_{m2.21}$	$x_{m2.22}$	$x_{m2.23}$	$t_{m2.21}$	$t_{m2.22}$	$t_{m2.23}$	$d_{m2.2}$	$S_{m2.2}$
Buski	118.48	1.43	24.40	-0.13	-0.07	0.05	5.25	0.22
Jędrzejowski	57.87	2.70	17.00	-1.24	1.14	-1.00	6.11	0.09
Kazimierski	129.43	0.54	16.40	0.07	-0.91	-1.09	6.33	0.06
Kielecki	112.38	4.53	23.30	-0.24	2.89	-0.11	4.52	0.33
Konecki	89.96	2.04	21.80	-0.65	0.52	-0.32	5.50	0.18
Kielce town District	290.91	0.42	45.50	3.01	-1.03	3.03	3.91	0.42
Opatowski	119.48	0.99	21.70	-0.12	-0.49	-0.34	5.70	0.15
Ostrowiecki	141.56	1.26	27.30	0.29	-0.23	0.46	4.88	0.27
Pińczowski	103.82	0.89	20.20	-0.40	-0.59	-0.55	6.04	0.10
Sandomierski	166.15	0.93	22.70	0.74	-0.54	-0.19	5.23	0.22
Skarżyski	122.03	1.03	28.30	-0.07	-0.45	0.60	5.15	0.23
Starachowicki	131.91	1.24	25.00	0.11	-0.25	0.13	5.16	0.23
Staszowski	104.80	1.59	24.10	-0.38	0.09	0.00	5.34	0.21
Włoszczowski	72.64	1.42	19.30	-0.97	-0.08	-0.68	6.19	0.08
Arithmetic Mean	125.82	1.50	24.07	0.00	0.00	0.00	5.38	0.20
Standard Deviation	54.86	1.05	7.06	1.00	1.00	1.00	0.68	0.10
Variation Coefficient	44%	70%	29%	–	–	–	13%	50%
Max.	290.91	4.53	45.50	3.01	2.89	3.03	6.33	0.42
Min.	57.87	0.42	16.40	-1.24	-1.03	-1.09	3.91	0.06

Source: own study, based on GUS data.

Sewerage Infrastructure

Values of this diagnostic variable and the algorithm of calculating the taxonomical synthetic index reflecting Sewerage Infrastructure of the region were presented in table 10. The highest synthetic index of sewerage infrastructure just like the water supply infrastructure development was in Kielce town district. The value of the taxonomical index in this region was twice that high than in the whole region. Relatively high level of sewerage infrastructure development was also in Kielecki district.

Table 10. Calculating the Taxonomical Index $S_{m2.3}$ *Sewerage Infrastructure* within *Economic Infrastructure* X_{m2}

District	Variable Value			Standardized variable Value			Euclidean Distance	Synthetic Index
	$x_{m2.31}$	$x_{m2.32}$	$x_{m2.33}$	$t_{m2.31}$	$t_{m2.32}$	$t_{m2.33}$	$d_{m2.3}$	$S_{m2.3}$
Buski	37.75	1.69	48.83	-0.21	0.08	0.44	4.97	0.24
Jędrzejowski	17.26	2.68	37.02	-0.50	1.12	-0.63	5.38	0.17
Kazimierski	17.11	0.70	34.29	-0.50	-0.97	-0.87	6.43	0.01
Kielecki	46.38	4.09	39.23	-0.09	2.61	-0.43	4.74	0.27
Konecki	12.83	2.41	44.64	-0.56	0.84	0.06	5.09	0.22
Kielce town District	289.55	0.34	76.17	3.27	-1.35	2.91	3.96	0.39
Opatowski	15.63	1.53	42.90	-0.52	-0.09	-0.09	5.54	0.15
Ostrowiecki	38.90	1.63	41.02	-0.20	0.02	-0.26	5.37	0.18
Pińczowski	25.19	0.97	54.06	-0.39	-0.68	0.91	5.31	0.18
Sandomierski	26.42	1.43	41.72	-0.37	-0.19	-0.20	5.55	0.15
Skarżyski	38.46	1.02	44.58	-0.20	-0.63	0.06	5.55	0.15
Starachowicki	109.46	0.96	44.30	0.78	-0.70	0.03	5.04	0.23
Staszowski	46.41	1.42	36.73	-0.09	-0.21	-0.65	5.65	0.13
Włoszczowski	23.82	1.76	29.83	-0.41	0.15	-1.27	6.09	0.07
Arithmetic Mean	53.23	1.62	43.95	0.00	0.00	0.00	5.33	0.18
Standard Deviation	72.21	0.95	11.08	1.00	1.00	1.00	0.59	0.09
Variation Coefficient	136%	59%	25%	–	–	–	11%	50%
Max	289.55	4.09	76.17	3.27	2.61	2.91	6.43	0.39
Min	12.83	0.34	29.83	-0.56	-1.35	-1.27	3.96	0.01

Source: own study, based on GUS data.

Gas Infrastructure

Values of this diagnostic variable and the algorithm of calculating the taxonomical synthetic index reflecting Gas Infrastructure of the region were presented in table 11. Kielce town district, as with the water supply and sewerage infrastructure, has the highest level of gas infrastructure equipment. In this case the distance between Kielce town district and other microregions is smaller than in other infrastructure types. Relatively high level of sewerage infrastructure development have also Konecki, Sandomierski i Opatowski districts.

Table 11. Calculating the Taxonomical Index $S_{m2.4}$ *Gas infrastrucutre* within *Economic Infrastructure* X_{m2}

District	Variable Value			Standardized variable Value			Euclidean Distance	Synthetic Index
	$x_{m2.41}$	$x_{m2.42}$	$x_{m2.43}$	$t_{m2.41}$	$t_{m2.42}$	$t_{m2.43}$	$d_{m2.4}$	$S_{m2.4}$
Buski	0.84	47.92	36.40	0.39	0.27	-1.68	4.89	0.22
Jędrzejowski	0.00	23.01	61.50	-0.77	-0.97	-0.95	5.93	0.06
Kazimierski	0.00	24.94	124.70	-0.77	-0.88	0.89	5.35	0.15
Kielecki	0.06	36.51	55.90	-0.69	-0.30	-1.11	5.53	0.12
Konecki	0.12	101.04	147.00	-0.60	2.91	1.54	3.56	0.44
Kielce town District	2.71	36.64	114.90	2.95	-0.29	0.60	3.34	0.47
Opatowski	0.40	59.83	119.80	-0.22	0.86	0.74	3.86	0.39
Ostrowiecki	0.55	29.82	117.50	-0.02	-0.63	0.68	4.71	0.25
Pińczowski	0.07	45.24	133.40	-0.67	0.14	1.14	4.59	0.27
Sandomierski	1.10	45.64	112.30	0.75	0.16	0.53	3.67	0.42
Skarżyski	0.72	28.20	94.20	0.22	-0.71	0.00	4.79	0.24
Starachowicki	0.95	46.96	70.70	0.54	0.22	-0.68	4.24	0.33
Staszowski	0.32	24.58	70.90	-0.33	-0.89	-0.68	5.50	0.13
Włoszczowski	0.00	44.92	59.90	-0.77	0.12	-1.00	5.30	0.16
Arithmetic Mean	0.56	42.52	94.22	0.00	0.00	0.00	4.66	0.26
Standard Deviation	0.73	20.09	34.37	1.00	1.00	1.00	0.82	0.13
Variation Coefficient	130%	47%	36%	–	–	–	18%	50%
Max.	2.71	101.04	147.00	2.95	2.91	1.54	5.93	0.47
Min.	0.00	23.01	36.40	-0.77	-0.97	-1.68	3.34	0.06

Source: own study, based on GUS data.

Energy Infrastructure

Values of this diagnostic variable and the algorithm of calculating the taxonomical synthetic index reflecting Energy Infrastructure of the region were presented in table 12. Kielce town district is the microregion with the highest level of equipment with the economic infrastructure reflected in the level of Energy use per 1 inhabitant. In the microregion the use of energy is seven times higher than in Kazimierowski district (district with the lowest energy use) and around 20% higher than the second in the ranking Kielecki district. Relatively high level of sewerage infrastructure development have also Ostrowiecki and Starachowicki districts.

Table 12. Calculating the Taxonomical Index $S_{m2.5}$ *Energy infrastrucutre* within *Economic Infrastructure* X_{m2}

District	Variable Value	Standardized variable Value	Euclidean Distance	Synthetic Index
	$x_{m2.51}$	$t_{m2.51}$	$d_{m2.5}$	$S_{m2.5}$
Buski	26 705.00	-0.32	2.81	0.37
Jędrzejowski	31 871.00	-0.05	2.54	0.43
Kazimierski	11 449.00	-1.13	3.62	0.19
Kielecki	63 628.00	1.64	0.85	0.81
Konecki	29 661.00	-0.16	2.65	0.41
Kielce town District	79 563.00	2.49	0.00	1.00
Opatowski	19 639.00	-0.70	3.19	0.29
Ostrowiecki	43 820.00	0.59	1.90	0.58
Pińczowski	15 311.00	-0.93	3.42	0.24
Sandomierski	26 655.00	-0.32	2.81	0.37
Skarżyski	32 006.00	-0.04	2.53	0.44
Starachowicki	35 222.00	0.13	2.36	0.47
Staszowski	26 670.00	-0.32	2.81	0.37
Włoszczowski	16 388.00	-0.87	3.36	0.25
Arithmetic Mean	32 756.29	0.00	2.49	0.44
Standard Deviation	18 795.57	1.00	1.00	0.22
Variation Coefficient	57%	–	40%	50%
Max.	79 563.00	2.49	3.62	1.00
Min.	11 449.00	-1.13	0.00	0.19

Source: own study, based on GUS data.

Synthetic Evaluation of Spatial Diversity in Infrastructure Development of microregions of Świętokrzyskie region

Taking into account the variables diagnostic – used for the evaluation of the development of individual types of the infrastructure – a synthetic index of the regions' economic infrastructure equipment was calculated. In those calculations, like in appointing fragmentary indexes identical methodological, assumptions were applied, i.e.:

– all diagnostic variables were compared in one matrix,
– a standardization of diagnostic variables was conducted,
– indexes of the infrastructure development were calculated for every region,
– regions were classified according to the index of the infrastructure develop-
  ment value.

Results of the calculations are compared in table 13. Synthetic index values of microregions' economic infrastructure equipment were characterized by a high diversity – the variation coefficient was 50%. Spans between the microregion with the highest development of infrastructure level (Kielce city district) and the lowest (Włoszczowski district) was almost 6.

The group with the highest level of the infrastructure development creates only one district – Kielce city. Synthetic development index is over twice higher than in the second in the ranking Skarżyski district.

Table 13. Synthetic index of the microregions economic infrastructure equipment in Świetokrzyskie region

District	Infrastructure Development Index	Position	Development level
Kielce town District	1.00	1	Very high
Skarżyski	0.47	2	High
Kielecki	0.46	3	
Jędrzejowski	0.45	4	
Sandomierski	0.43	5	
Starachowicki	0.41	6	
Opatowski	0.40	7	Low
Pińczowski	0.36	8	
Buski	0.33	9	
Staszowski	0.32	10	
Kazimierski	0.31	11	
Konecki	0.26	12	Very low
Ostrowiecki	0.19	13	
Włoszczowski	0.17	14	

Source: own study.

4. Evaluation of Relations Between the Economic Infrastructure Development and Microregion's Competitiveness of Świętokrzyskie Region

In analyzing the interdependence between the level of infrastructure development and Świętokrzyskie microregions economic potential, a coefficient of Pearson linear correlation was calculated between the competitiveness synthetic index, and the economic infrastructure development synthetic (tab. 14). A coefficient of Pearson linear correlation is 0,64 and points on the high interdependence between microregions economic potential and economic infrastructure.

The demonstrated relation between the economic potential of the microregion and equipping it with the economic infrastructure is reflected in competitiveness

models. Well-developed, modern infrastructure is a crucial factor of creating and keeping the regions competitiveness. It allows on creating attractive service offer directed to present and potential users of the region like: residents, companies, investors, guests (Stawasz, 2004, p. 203). As a consequence it helps in production localization and reinforcing the economic potential of microregions.

Table 14. Relation between the infrastructure development and microregions' competitiveness

Region	Taxonomical Index	
	Economic potential	Infrastructure development
Buski	0.20	0.33
Jędrzejowski	0.44	0.45
Kazimierski	0.11	0.31
Kielecki	0.19	0.46
Konecki	0.27	0.26
Kielce town District	0.59	1.00
Opatowski	0.31	0.4
Ostrowiecki	0.02	0.19
Pińczowski	0.30	0.36
Sandomierski	0.26	0.43
Skarżyski	0.24	0.47
Starachowicki	0.28	0.41
Staszowski	0.45	0.32
Włoszczowski	0.33	0.17
A coefficient of correlation	0.64	

Source: own study.

Summary

Based on empirical findings, presented in the article, it is possible to propose a thesis, according to which there is a relation between equipping microregions with the economic infrastructure and their economic potential. Investing in the economic infrastructure development allows to achieve purposes associated with increasing microregions competitiveness and as well as social goals. The development of infrastructure affects the cost cutting and the increase in the enterprises productivity, a fall in unemployment or improvement in the safety, by performing the base of creating the competitive edge (Hawlena, 2012, p. 305). It's confirmed by the European Union experiences regarding the completion of regional policy, in which public investments into infrastructure have a primary

importance – especially improvement in road, energy and natural environment . These investments raise the competitiveness of poorly developed areas, contribute to the elimination of developmental imbalances across regions.

A positive effect of equipping microregions with the economic infrastructure on their economic potential points out to the need for concentration of public means in financing infrastructure investments. The chance to improve equipping microregions with the economic infrastructure is a possibility of their financing by funds from the European Union. In financial perspectives 2007–2013 in the studied region there were numerous infrastrucutre investments conducted with the help of EU funds. However their scope was too low to carry out long-term negligence and considerably improve the state of the depreciated infrastructure. It was also insufficient in order to catch up with the developmental distance towards regions with the high level of competitiveness. In the situation an allocation of resources is peculiarly essential in the next perspective, covering years 2014–2020.

References

Alarcón A.L., 2004, *Regional Competitiveness; the need for coordination between public and private action*, University Press, Łódź.

Bieńkowski W., 1995, *Reaganomika i jej wpływ na konkurencyjność gospodarki amerykańskiej*, Wydawnictwo Naukowe PWN, Warszawa, 1995.

Calderón C., Servén L., 2004, *The Effects of Infrastructure Development on Growth and Income Distribution*, World Bank Policy Research Working Paper, No. 3400.

Chodyński A., 2008, *Przedsiębiorczość i innowacyjność a kompetencje – aspekty strategiczne*, Zeszyty Naukowe Wyższej Szkoły Humanitas, z. 2, Seria: Zarządzanie.

Dolnicki B., 2009, *Samorząd terytorialny*, Oficyna a Wolters Kluwer Business, Warszawa.

Dylewski M., Filipiak B., 2007, Gorzałczyńska-Koczkodaj M., *Finanse samorządowe. Narzędzia. Decyzje. Procesy*. Wydawnictwo Naukowe PWN, Warszawa.

Dyr T., Ziółkowska, K., 2014, *Economic infrastructure as factor of the region's competitiveness*. Central European Review of Economics & Finance, Vol. 6, No. 3.

Gardiner B., Martin R., Tyler P., 2004, *Competitiveness, Productivity and Economic Growth across the European Regions*, University of Cambridge.

Grabiński T.,Wydymus S, Zeliaś A., 1989, *Metody taksonomii numerycznej w modelowaniu zjawisk społeczno-gospodarczych*, Wydawnictwo Naukowe PWN, Warszawa.

Gruszecki T., 1994, *Przedsiębiorca*. Cedor, Warszawa.

Hawlena J., 2012, *Konkurencja na rynku lotniczych przewozów pasażerskich w warunkach globalizacji*. Prace Naukowe Uniwersytetu Ekonomicznego, Katowice.

Hellwig Z., 1968, *Zastosowanie metody taksonomicznej do typologicznego podziału krajów ze względu na poziom ich rozwoju i strukturę wykwalifikowanych kadr*, Przegląd Statystyczny, nr 4.

Marszał T., Markowski T., 1998, *Konkurencyjność regionów jako element polityki przestrzennej*, Biuletyn Komitetu Przestrzennego Zagospodarowania Kraju PAN, Warszawa.

Pomykało W., 1995, *Encyklopedia Biznesu Tom I*, Fundacja Innowacja, Warszawa.

Pułaska-Turyna B., 2011, *Statystyka dla ekonomistów*, Difin, Warszawa 2011.

Ratajczak M., 1999, *Infrastruktura w gospodarce rynkowej*, Akademia Ekonomiczna w Poznaniu, Poznań.

Rossert B., 2000, *Contributing to regional development through project selection*, EBI Papers, No. 1.

Rozporządzenie Rady Ministrów z dnia 14 listopada 2007 r. *w sprawie wprowadzenia Nomenklatury Jednostek Terytorialnych do Celów Statystycznych (NTS)*. Dz. U. 2007 nr 214, poz. 1573.

Samuelson P. A., Nordhaus W. D., 2002, *Ekonomia 2*, Wydawnictwo Naukowe PWN, Warszawa.

Stawasz D., 2004, *Ekonomiczno-organizacyjne uwarunkowania rozwoju regionu – teoria i praktyka*, Wydawnictwo Uniwersytetu Łódzkiego, Łódź.

Wojewódzka-Król K.(red.), 2002, *Rozwój infrastruktury transportu*. Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk.

Dyr T., Ziółkowska K., 2014, *Economic infrastructure as factor of the region's competitiveness*. Central European Review of Economics & Finance, No 3, Vol. 5.

Anna Pająk[1], **Artur Orzeł**[2]

THE ECONOMIC EFFECTS OF THE IMPLEMENTATION OF THE OPERATIONAL PROGRAMME DEVELOPMENT OF EASTERN POLISH 2007–2013

Abstract

The aim of this article is to analyze the outflow of resources deriving from the European Union funds under the Operational Programme Development of Eastern Poland (OP DEP) 2007–2013 concerning the territory of five voivodships which are the part of the Eastern Poland Macroregion: Lubelskie, Podkarpackie, Podlaskie, Świętokrzyskie and Warmińsko-Mazurskie. The authors of this analysis made an attempt to study the idea of implementation of projects related to investments in transport infrastructures under the Priority Axis III: Voivodship Growth Centres, especially with an indication of the development of urban transport.

The major objective to initiate The Operational Programme Development of Eastern Poland as an instrument for implementing European Union cohesion policy was to equal development opportunities and improve the competitiveness in the poorest voivodships in Poland. Due to the fact that intensification of integration processes in Europe promotes the existence of evident regional disparities as well as disproportions between the particular Member States, it seemed to be essential to support the less economically developed regions, paying special attention to citizens having the lowest standard of living.

Report of the implementation of projects under the OP DEP 2007–2013 provides the basis for assessing the current outflow of resources, their effectiveness as well as creating recommendations for future under the ongoing Financial Framework 2014–2020.

JEL Classification Codes: **R11, R53.**

Keywords: European Union, competitiveness, cohesion policy, urban transport.

---

[1] M.A. Ph.D. student, K. Pulaski University of Technology and Humanities in Radom, Poland, Faculty of Economic and Legal Sciences.

[2] M.A. Ph.D. student, K. Pulaski University of Technology and Humanities in Radom, Poland, Faculty of Economic and Legal Sciences.

Introduction

The Polish accession to the European Union in May 2004 revealed the problem of disparities in the level of economic growth not only in regards to the particular members of the Community but also concerning the development of the individual regions within countries. What is more, situation of Polish economy at the moment of joining the European Union was still a subject to systemic and political transformation processes interconnected with rapid changes in global economies. These significant changes indicated substantial increase in the intensity and the scope ratione personae of competitiveness. Beyond the traditional notion of competition between economic operators, there appeared the new forms of this particular concept, i.e. competition at the regional and local economies level (at the global economies level as well). It is crucial to stress the fact that, supporting the competitiveness of regions aims not only at their social and economic development, but also has an impact on the development of entire country. In turn, the essence of the promotion of the competitiveness is to reduce disparities between highly developed regions and those lagging behind in development, though it is not expressed in the effects of development, but in providing equal development opportunities (e.g. income level equalization) (Markowska-Przybylska 2005, p. 91–94). The varying level of social and economic development of regions, different dynamics of development processes as well as the diverse level of competitiveness proved to be common and normal phenomena, having the significant impact on the economic growth. Nevertheless, the excessive appearance of these particular phenomena may be the cause of considerable decline in the economic growth. Major development disparities between the various regions continue to affect economic flows and interregional links, generate social unrest, lead to inefficient use of resources in regard to demand production and consequently have negative effect on competitiveness of local economy as a whole (Kuciński 2005, p. 51). Taking into consideration European integration, the issues mentioned above are also the problem for the entire EU Community since they affect European Union competitiveness on the global economic stage. It is of particular importance in the strong competition context between Europe, The United States or China since the level of competitiveness is currently expressed in the innovative capacity. The high level of competitiveness of the Member States (increased by the constant growth and social and economic stability) happens to be a strategic element for increasing the competitiveness of European Union regions.

1. Objective

The aim of this research is to indicate the support mechanisms related to the notion of the competitiveness of regions by means of the particular instruments of the European Union cohesion policy. Moreover, it is also the comparative analysis of the value of investments in road and transport infrastructure in the area of the particular voivodships over the Operational Programme Development of Eastern Poland 2007–2013, and thereby the analysis of the effectiveness of the project implementation under this Programme.

The empirical basis for the analysis presented in this article are the data from the reports and documents dealing with planning and implementing the Operational Programme Development of Eastern Poland 2007–2013, reports and financial statements of the Ministry of Agriculture (note: the Ministry of Infrastructure and Development until December, 2015) and the Polish Agency for Enterprise Development, as well as the reports submitted by the Programme beneficiaries. The analysis covers the territory of the Eastern Poland Macroregion, in particular, the voivodship cities, i.e. Lublin, Rzeszów, Białystok, Kielce, Olsztyn, recognized as the centres of the implementation of projects under the Priority Axis III: „Voivodship growth centres” within the Operational Programme Development of Eastern Poland 2007–2013.

The analysis, carried out in this article, demonstrate: 1) high efficiency of the OP DEP 2007–2013 in the context of the competitiveness development in the territory of the Eastern Poland voivodships, 2) disparities in the effectiveness of the implementation of programmes in the particular areas covered by the Priority axis III, 3) the need of planning actions in the next financial perspective, taking into consideration the experiences from the process of implementing projects over the period 2007–2013.

2. The European Union cohesion policy vs. the competitiveness of regions

The competitiveness of regions may be understood as a set of characteristics which determinate the attractiveness of region, taking into account the amount of located investments and the reputation of the region as a potential place of living. In other words, the competitiveness of regions stands for the ability to attract capital and financial support measures as well as the ability to make use of the acquired factors of production (Wyszkowska, 2005 p. 105).

The differences in the level of social and economic development of regions arise from natural, historical and cultural considerations as well as hitherto participation of the regions in the division of tasks. As a result, some regions face the negative phenomena, such as: low social activity, low entrepreneurship level, and lower than in other regions standard of living.

Intensification of the inclusive processes in Europe enhance deepening of disparities within regions. Unfortunately, the dynamic development of the more prosperous regions increases the existing gap between the urbanized regions and those with lower development potential. In the long term, the persistent disparities in the scale of the development of regions shall constitute a serious threat not only to Polish social and economic cohesion policy, but also to stability of the entire European Union (the European Commission, 2008).

One of the major objectives of the European Union cohesion policy is counteracting the threats by providing financial support under the EU funds designed to enhance competitiveness and reduce disparities in development at the regional level. The support given under the cohesion policy is strictly directed at those regions which economic growth have lower than the Union average level of the GDP per capita. Taking Poland into account, the region considered the most problematic in the context of the economic growth is the Eastern Poland Macroregion covering five Polish voivodships: Lubelskie, Podkarpackie, Podlaskie, Świętokrzyskie and Warmińsko-Mazurskie. The Eastern Poland voivodships are still characterised by the lowest level of economic growth and stand for one of the least developed areas in the European Union. Nowadays, low labour productivity and untapped employment resources constitute one of the key obstacles restricting the development of the Eastern Poland Macroregion. (the Ministry of Regional Development, 2015). The draft *Strategy for social and economic development of Eastern Poland by 2020*, approved by the Council of Ministers on 30 December 2008, emphasises the fact that, the lack of the well developed metropolitan regions directly contribute to the social and economic slowdown of the Macroregion. (the Ministry of Economic Development, 2008). The new phenomenon, that is observed while discussing the level of economic growth in relation to the tendencies in spatial dynamics, is the fact that the regions regarded as the most successful proved to be the ones which achieve their prosperity thanks to the close proximity to the agglomerations, i.e. large metropolis (advantages gained thanks to the partnership of different type of economic activities – „urbanization economies”) and so called territorial production systems (Pietrzyk, 2004, p. 14). The metropolis are becoming magnet for high quality human capital which is reflected in potential for production and assimilation of innovation in the political, cultural, economic and technological spheres. Since metropolis hold significant logistic functions, they have a considerable impact on the dynamics, directions and the level of the regional development. Nevertheless, they still compete with one another in the continental and transnational field (Wysocka, 2004, p. 57).

The projects implemented under Priority axis III of the Operational Programme Development of Eastern Poland 2007–2013 „Voivodship growth centres" were aimed at increasing the competitiveness of regions through the investments

in the public transport systems. The objectives of the projects are strictly connected with the development strategy reinforcing the metropolitan functions in the Eastern Poland territory. These particular actions were financed from the European Regional Development Fund. The aim of this article is to include the summary of the activities implemented under the Project in the area of five voivodship cities: Lublin, Białystok, Olsztyn, Kielce, Rzeszów. Finally, the article portrays the above mentioned cities as the „natural" candidates to gain the status of the metropolitan centres.

3. The Eastern Poland – characteristics of the region and the competitiveness factors

The Eastern Poland voivodships occupy a dense territory of an area of 99.045 km² (31.6% of the total territory of Poland), adjacent to the border with Russia, Lithuania, Byelorussia, Ukraine and Slovakia, that constitute almost the whole external frontier of the European Union. What seems to be characteristic to this region is the comparable level of social and economic and territorial development. Due to its scope of the development challenges, The Eastern Poland Macroregion is considered „the strategic intervention of the regional policy" area that needs special support at the national level as well as the external intervention under the European Cohesion Policy (the Ministry of Infrastructure and Development, 2014). The factors governing the level of the competitiveness of regions are, among others, diverse economic structure, the level of the social and economic endowment, and communication accessibility. The factors mentioned above relate directly to the scope of competitiveness of the region for the potential investors. According to the studies in the field of investment attractiveness of Polish voivodships, carried out in 1999 by the Institute for Market Economics, the regions which proved to be the least attractive for the potential investors are: the Podkarpackie, the Podlaskie, the Opolskie, the Lubelskie and the Świętokrzyskie Voivodships (Wyszkowska, 2005, pp. 107–108).

Barriers in development, which are not easy to overcome, arise to a large extent from considerations related to history. Varying development conditions in particular parts of Poland in the period of lost statehood, connected with its partition among three powers: Russia, Prussia and Austria, as well as new borders of the territory of Poland in the twentieth century caused significant disparities between particular regions of Poland. In the 19th century and at the beginning of the 20th century on areas which are presently the western voivodships of Poland an intense development was taking place in industry, technical infrastructure and modern methods of farming, and at the same time economy in the eastern part of Poland remained mainly based on traditional agriculture, which fails to generate necessary stimuli for intense economic development. The existence of marked

internal disparities in the level of social and economic development in Eastern Poland should nevertheless be sought in the first place in the already mentioned historical reasons, associated with the former belonging of particular areas of this region to three different countries. Furthermore, in the interwar period areas of the present Eastern Poland – divided by a state border, which separated Poland from Germany – were subject of much diversified economic policy. In the southern part of this area industrialization processes had been launched in connection with starting of the establishment of the Central Industrial Zone. On the other hand, an effect of economic policy implemented by Germany on the area of the present Warmińsko-Mazurskie voivodship is the relatively high level of infrastructure development.

Unfortunately, the peripheral location of the discussed region, in relation to the European space, limits its economic growth opportunities. As a consequence, one of the prerequisites for shortening development distance with relation to other regions is improving region's accessibility by the means of the sustainable development of transport infrastructure. In accordance with the European Commission „Regional Competitiveness Index", limited transport accessibility concerning the territory of Eastern Poland affects its competitiveness (the Ministry of Infrastructure and Development, 2014).

At the time of Poland's accession to the European Union, the average GDP per capita value amounted in Eastern Poland Macroregion only to 40% of the European average, which placed it in the group of the poorest regions not only in Poland, but also in the European Union.

4. The Operational Programme Development of Eastern Poland 2007–2013 as an instrument of The European Cohesion Policy

The Operational Programme Development of Eastern Poland was co-financed by the European Regional Development Fund and national public means. The financial allocations for the implementation of Programme by the ERDF amounted to EUR 2.38 mld in total. In December 2005 the European Commission granted EUR 992 million of total amount to the five poorest voivodships (EUR 120 per one inhabitant). The remaining sum of EUR 1.3 million was granted to this region by the Polish Government Authorities, who gained the funds from the ERDF.

The Programme involves the implementation of the projects essential for the social and economic development of the five most disadvantaged regions: Lubelskie, Podkarpackie, Podlaskie, Świętokrzyskie and Warmińsko-Mazurskie. The operations realized under the Operational Programme Development of Eastern Poland include the investments in infrastructure supporting research and scientific activity, concern the modernization of urban and regional transport

systems as well as reconstruction of the municipal public transport system. Another objective of the Programme is increasing the tourist attractiveness of the region as well as providing access to the broadband Internet to the great number of the inhabitants of Eastern Poland regions. The amount of EUR 2.7 mld was earmarked for projects implemented under the OP DEP (the Polish Agency for Enterprise Development, 2016).

The Objective of Operational Programme Development of Eastern Poland is: „Hastening the pace of social and economic development in Eastern Poland pursuant to the sustainable development principle". The main objective of the Programme will be achieved through implementation of specific objectives, and namely (The Ministry of Economic Development, 2016):

– stimulating development of knowledge based competitive economy,
– improving access to broadband Internet in Eastern Poland,
– development of selected metropolitan functions of voivodship cities,
– improving accessibility and standard of transport links in voivodships of Eastern Poland,
– enhancing the role of sustainable tourism in the economic development of the macroregion,
– optimising the implementation process of OP Development of Eastern Poland.
The objectives mentioned above will be pursued in the six Priority Axes.

The structure of the Priority Axes in the Operational Programme Development of Eastern Poland	
Priority axis I: Modern Economy	Measure I.1 Infrastructure of universities Measure I.2 Supporting the establishment and co-financing of financial engineering instruments Measure I.3 Supporting innovativeness Measure I.4 Promotion and cooperation
Priority axis II: Infrastructure of the Information Society	Measure II.1 Broadband network of Eastern Poland
Priority axis III: Voivodship Growth Centres	Measure III.1 Systems of municipal public transport Measure III.2 Infrastructure of congress and fair travel
Priority axis IV: Transport Infrastructure	Measure IV.1 Road infrastructure
Priority axis V: Sustainable Development of Tourist Potential Based on Natural Conditions	Measure V.1 Promoting sustainable tourism development Measure V.2 Bicycle routes
Priority axis VI: Technical Assistance	Measure VI.1 Support for the process of implementation and promotion of the Programme

5. Municipal public transport system (Measure III.1)

For the effective implementation of the programme, the Managing Authority has elaborated a list of individual projects, covering key investments which implementation will contribute best to the achievement of Programme's objectives.

The main objectives of the individual projects under Measure III.1 arise from the priorities formulated in a medium-term perspective in the National Development Strategy 2007–2015, including especially the priority „Regional development and the improvement of territorial cohesion", as well as the assumptions of The OP DEP 2007–2013 Priority Axis III „Voivodship growth centres". At the same time, the implementation of the individual projects contribute to the achieving the objectives of the National Strategic Reference Framework 2007– 2013 – „Increase of the competitiveness of Polish regions and preventing their social, economic and territorial marginalization".

The main objective of the Measure was to improve spatial mobility of the inhabitants by enhancing metropolitan development of the Eastern Poland voivodship cities. The implementation of Measure comprises the comprehensive projects aimed at construction and extension of the clean public transport system. The projects stem from the integrated plans for public transport development. Preference will be given to projects which combine diverse forms of transport in the areas recognized as „potential metropolitan areas" (e.g. tramway, trolleybus, busses, railways, airports, individual transport) as well so called „eco-compatible chains" that take into account public transport links with the movement on foot and by bicycle (The Ministry of Economic Development, 2015).

Below there is a presentation of the projects implemented under Priority axis III „Voivodship growth centres", Municipal public transport system, Measure III.1.

Table 1. Projects implemented under Measure III.1 OP DEP 2007–2013 (mln EUR)

Name of the project	Beneficiary	Project value	EU grant value
Lubelskie Voivodship			
Integrated municipal transport system in Lublin	Lublin Municipality	112.6	80.0
Construction of the municipal public transport corridor in the vicinity of The Integrated Intermodal Metropolitan Station in Lublin – 80 Lubelskiego Lipca Street	Lublin Municipality	7.8	6.0
Total Lubelskie Voivodship		120.4	86.0

Table 1 continued.

Name of the project	Beneficiary	Project value	EU grant value
Podkarpackie Voivodship			
Establishment of a system integrating public transport in the city of Rzeszów and its surroundings	The Town and the Municipality of Rzeszów	79.3	59.7
Improving public transport system in the centre of Rzeszów by imposing restrictions on transit traffic and introduction of paid parking zone	The Town and the Municipality of Rzeszów	44.9	37.0
Total Podkarpackie Voivodship		**124.2**	**96.7**
Podlaskie Voivodship			
Improving public transport system in the City of Białystok – Phase II	The City of Białystok	37.3	27.9
Improving public transport system in the City of Białystok – Phase III	The City of Białystok	46.7	32.9
Total Podlaskie Voivodship		**84.0**	**60.8**
Świętokrzyskie Voivodship			
Development of municipal transport system in the Kielce Metropolitan Area	Kielce Municipality	81.3	54.2
Total Świętokrzyskie Voivodship		**81.3**	**54.2**
Warmińsko-Mazurskie Voivodship			
Modernisation and development of the Integrated municipal transport system in Olsztyn	Olsztyn Municipality	154.8	91.6
Total Warmińsko-Mazurskie Voivodship		**154.8**	**91.8**

Table 2. Value of the projects implemented under the Operational Programme Development of Eastern Poland 2007–2013, Priority Axis III, Measure III.1, Municipal transport system: Voivodship Growth Centres

Value of the projects implemented under the Operational Programme Development of Eastern Poland 2007–2013, Priority Axis III, Measure III.1, Municipal transport system: Voivodship Growth Centres				
Voivodship	Number of projects	Project value (mln EUR)	EU grant value (mln EUR)	EU funds value (%)
Lubelskie	2	120.4	86.0	71,4
Podkarpackie	2	124.2	96.7	77,8
Podlaskie	2	84.0	60.8	72,4
Świętokrzyskie	1	81.3	52.2	66,7
Warmińsko-Mazurskie	1	154.8	91.8	59,2
Total	**8**	**564.7**	**387.5**	**68,2**

Source: http://www.mapadotacji.gov.pl/, The Ministry of Economic Development, data aquired from the IT Central System (SL 2014) at the end of June 2016.

6. Implementation of the Operational Programme Development of Eastern Poland 2007–2013

The implementation of the projects aimed at transport infrastructure in the territory of Eastern Poland voivodship resulted in the increase in public transport fleet to 423 units, construction or reconstruction of 350 national and voivodship roads, construction of 23 bypasses and 2 bridges on the Vistula River, as well as installing 12 Intelligent Transport Systems (ITS) (The Ministry of Economic Development, 2016).

Table 3. Value of the projects implemented under the Operational Programme Development of Eastern Poland 2007–2013, Priority Axis III and IV

Voivodship	Number of projects	Project value (mln EUR)	EU grant value (mln EUR)	EU funds value (%)
Lubelskie	13	407.2	286.9	71,4
Podkarpackie	11	442.5	298.9	77,8
Podlaskie	11	368.3	227.0	72,4
Świętokrzyskie	6	222.1	136.8	66,7
Warmińsko-Mazurskie	4	260.1	167.7	59,2
Total	**8**	**1 700.2**	**1 117.3**	**68,2**

Source: http://www.mapadotacji.gov.pl/, The Ministry of Economic Development, data aquired from the IT Central System (SL 2014) at the end of June 2016.

The analysis of the reports on the implementation of the OP DEP 2007–2013 allows drawing a conclusion to the implementation of projects at the voivodship level as well as presents the existing results of that implementation. An initial implementation stage of the Operational Programme Development of Eastern Poland coincides with the reporting period of 2007–2008 thus it is hard to notice any signifacnt implementation progress in the sphere of transport infrastructure projects, as well as to evaluate the financial indices. What has to mentioned with the reference to the implementation of the Programme is the significance of the institutional system introduced in order to promote proper planning, implementation, control and evaluation pf the Programme objectives. Additional aspect which has to be emphasised is the need to ensure training for beneficiaries (people and institutions) responsible for the implementation of the Programme. The allocation of funds in the analysed period is 19,91% which constitute the sum of EUR 450 million, and in subsequent years: 2010 – 23% (over EUR 103 million), 2011 – 55% (EUR 230 million), 2012 – 99% (EUR 420 million), 2013 – 97% (over EUR 423 million) (Stepaniuk, Orzeł, 2015).

Table 4. Financial information related to Priority Axis III „Voivodship growth centres"

	Beneficiary expenditure included in the payment claims (mln Eur)	Corresponding public contri-bution (mln Eur)	Private expenditure	Expenditure granted to beneficiaries (mln Eur)	Allocation utilisation level (%)	Total payments received from the Commission (mln Eur)
2007	0,00	0,00	–	0,00	0	–
2008	0,00	0,00	–	0,00	0	–
2009	27.2	27.2	–	27.2	16,01	16.5
2010	103.7	103.7	–	103.7	23	450.8
2011	230.0	230.0	–	230.0	55	418.2
2012	423.8	423.8	–	423.8	99	428.1
2013	423.8	423.8	–	423.8	97	437.0

Source: ow study on the basis (Stepaniuk, Orzeł 2015) in accordance with Euro average annual rate of exchange of the National Bank of Poland (source: www.nbp.pl).

What may be observed, owing to the implementation of the projects under The Operational Programme Development of Eastern Poland 2007–2013 Priority Axis III, is the radical improvement in accessibility and internal road and public transport systems, comprising the territory of 5 voivodship cities. In particular, these projects had considerable impact on increasing safety and the comfort of commuters, shortening travel times and removing the obstacles to fluid traffic flow. The Eastern Poland Voivodship cities (Lublin, Olsztyn, Rzeszów) were the main beneficiaries of three out of six large projects aimed at development of public transport system in Polish agglomerations. The projects were financed by EU funds.

Conclusion

While comparing the data concerning public transport passenger service in the area of the Eastern Poland Macroregion, one shall observe its growth by almost 5% during the period 2010–2013. Taking into account the development of public transport passenger service among the Eastern Poland voivodships in particular, one has to notice the major growth by almost 35% with regard to the Lubelskie Voivodship, and less significant growth in the Podlaskie and Świętokrzyskie voivodships. The presented phenomenon is of particular importance in the context the overall fall in the Polish public transport passenger service growth ratio by 7% (the Ministry of Infrastructure and Development, 2014).

One has to emphasize the significance of the EU financing in the transport infrastructure enhancement process, that undoubtedly would not be achieved without this kind of financial incentive. As previously mentioned, at the time of Poland's accession to the European Union, the average GDP per capita value amounted in Eastern Poland Macroregion only to 40% of the European average.

However, GDP per capita growth dynamics in 2004–2011 proved to be higher than the EU average, which had an impact on the considerable hastening of processes which were to help achieve convergence with other regions and member states of the Community.

In the period of 2004–2011, the GDP per capita value has risen in Eastern Poland Voivodships to 10 percentage points, which determined shortening The Eastern Poland Macroregion development convergence with relation to other European regions by 7 percentage points on average. Since 2004, one may observe the constant increase in the GDP absolute value, which in 2011 was higher by 58% than the one from 2004 (the Ministry of Infrastructure and Development, 2014).

Additionally, in 2013 the value of competitiveness index for the Macroregion reached the level equal to the one attained by the majority of the Polish voivodships.

Macroeconomic figures confirm the occurrence of the progressive development process in relation to the Eastern Poland Macroregion. It corresponds with the high mobilization of the voivodship internal potential as well as effective exploitation of the development opportunities provided by the EU funds. In the period of 2004–2014 one may observe a significant growth in the value of the social and economic development indices being the subject of this research analysis. The achievement of the discussed growth sufficiently diminishes the disparities in the average values reached in the territory of the European regions and the Eastern Poland voivodships (the Ministry of Economic Development, 2014).

The voivodship cities and the interregional centres are regarded as The Eastern Poland growth poles. Consequently, poorly developed metropolitan functions of the voivodship cities limited the development of Macroregion. The growth rate of the metropolis is usually interrelated with the specialization in the field of managerial functions, as well as strategic management, all occurring under the specific circumstances (Pietrzyk 2004, p. 14). According to the analysis of the population potential carried out in the cities and their neigh boring areas, there is a possibility of the further transformation and the extension of their metropolitan functions. Among the number of problems limiting the possibility of further development of the presented functions, there is a lack of modern public transport system and innovative infrastructure (the Ministry of Regional Development, 2008).

In accordance with the presented analysis one shall admit that the factors inhibiting formation of five metropolis in the area of Eastern Poland were inter alia the size of interregional centres, the scale of the development of innovative exogenous functions able to strengthen the competitiveness of the regions in the international dimension, and finally the negative outcome of demographic processes. The occurrence of these particular obstacles resulted in introducing systemic solutions of support and investment measures devoted to the develop-

ment of metropolitan functions in the territory of the Eastern Poland Macroregion (the Ministry of Regional Development, 2014). The advanced level of the implementation of the projects under the Operational Programmes of the financial perspective 2007–2013, aimed at resolving the problems mentioned above, restores optimism and creates hope for permanent growth in competitiveness ratio with regard to the Eastern Poland Macroregion. Shortening development convergence was evidence to the effectiveness of the undertaken actions. The key element in achieving the goals presented in the course of this research analysis was the implementation of the projects under OP DEP 2007–2013, and especially realization of the objectives of the Priority Axis III, which stand as an example of the effective use of the EU funds. In the period of 2007–2013, the value of transport infrastructure investments (including public transport systems) in the area of Eastern Poland, financed by the EU funds, amounted to PLN 24,7 billion (The Ministry of Regional Development, 2014).

Unfortunately, it does not change the fact that Eastern Poland voivodships are still among the group of 20 least developed regions belonging to the European Union (the European Commission, 2014). All at once, it is worth mentioning that processes aimed at removing development barriers among the Eastern Poland regions prove to be long-lasting, thus they require to be reflected in the EU's financial perspective for 2014–2020. The implementation of the Operational Programmes 2007–2013 reports will undoubtedly contribute to even more effective use of the EU's support measures.

References

Dyr T., Ziółkowska K. (2014). *Economic infrastructure as factor of the region's competitiveness.* Central European Review of Economics & Finance, Vol. 6, No. 3.

Dyr T., Ziółkowska K., Raczyński J. (2016). *Economic effects of the regional railways development.* Technika Transportu Szynowego, No. 7.

Mapa dotacji UE: http://www.mapadotacji.gov.pl (Access 7.10.2016)

http://www.nbp.pl/home.aspx?f=/kursy/arch_a.html

Komisja Europejska (2014). Inwestycje na rzecz wzrostu gospodarczego i zatrudnienia. Promowanie rozwoju i dobrego rządzenia w regionach UE i miastach, Szósty raport na temat spójności gospodarczej, społecznej i terytorialnej, (p.1); online access

Kuciński K. (2005). *Regionalne aspekty koniunktury gospodarcze*j, [In:] Kaja J., Piech K. (eds.), *Rozwój oraz polityka regionalna w Polsce.* Warszawa: Szkoła Główna Handlowa.

Maráková V., Dyr T. and Wolak-Tuzimek A. (2016). *Factors of tourism's competitiveness in the European Union countries.* E&M Ekonomie a Management, Vol. 19, No. 3.

Markowska-Przybylska U. (2005). *Polska polityka regionalna w aspekcie globalizacji*, [In:] Kaja. J., Piech K. eds.), *Rozwój oraz polityka regionalna w Polsce*. Warszawa: Szkoła Główna Handlowa.

Ministerstwo Infrastruktury i Rozwoju (2014). *Raport. Rozwój makroregionu Polski Wschodniej po 2004 roku.* https://www.mr.gov.pl/media/3371/RaportPLW-SCHpo2004.pdf

Ministerstwo Infrastruktury i Rozwoju (2015). *Informacja o realizacji Strategii rozwoju społeczno-gospodarczego Polski Wschodniej do roku 2020 za rok 2014*: https://www.mr.gov.pl/media/3370/informacja_SRPW_2014.pdf

Ministerstwo Rozwoju (2015). *Efekty Programu Rozwój Polski Wschodniej*: https://www.polskawschodnia.gov.pl/efekty-programu-rozwoj-polski-wschodniej-2007-2013/

Ministerstwo Rozwoju (2015). *Wstęp do Funduszy Europejskich*: http://www.polskawschodnia.20072013.gov.pl/WstępDoFunduszyEuropejskich/Strony/Beneficjenci_i_projekty.aspx

Ministerstwo Rozwoju Regionalnego (2008). *Strategia rozwoju społeczno-gospodarczego Polski Wschodniej do roku 2020*. Dokument przyjęty przez Radę Ministrów w dniu 30 grudnia 2008 r., uchwałą nr 278/08.

Pietrzyk I. (2004). *Globalizacja, integracja europejska a rozwój terytorialny*, [In:] Jewtuchowicz A. (ed.), *Wiedza, innowacyjność, przedsiębiorczość a rozwój regionów*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

Polska Agencja Rozwoju Przedsiębiorczości (2015), *Polska Wschodnia, album projektów PO RPW*: https://www.polskawschodnia.gov.pl/media/11354/Polska_Wschodnia_album_projektow.pdf

Program Operacyjny Rozwój Polski Wschodniej 2007–2013. *Nowe Strategiczne Ramy Odniesienia 2007–2013*, Warszawa.

Stepaniuk R., Orzeł A. (2015). *Transport miejski wojewódzkich ośrodków metropolitarnych Polski Wschodniej w świetle Programu Operacyjnego RPW 2007–2013*. Autobusy – Technika, Eksploatacja, Systemy Transportowe, No. 7-8.

Wysocka E. (2004). *Społeczeństwo informacyjne jako motor konkurencyjności terytorialnej*, [In:] Jewtuchowicz A. (ed.), *Wiedza, innowacyjność, przedsiębiorczość a rozwój regionów*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

Wyszkowska D. (2005). *Polityka regionalna jako instrument podwyższania konkurencyjności polskich regionów*, [In:] Kaja. J., Piech K. (eds.), *Rozwój oraz polityka regionalna w Polsce*. Warszawa: Szkoła Główna Handlowa.

Andrzej Abramowicz[1], Karolina Ziółkowska[2]

DILEMMAS OF GEOTHERMAL PROJECTS IMPLEMENTATION IN SOME POLISH CITIES

Abstract

In the article attitude of certain self-government bodies in Poland regarding the use of geo-thermal energy was discussed. In the synthetic way some development barriers of geothermal energy in Poland were described and factors which have a bearing on making a decision to build the geothermal objects were characterized. An issue of the economic profitability, as well as importance of geothermal energy for the development of a city were also emphasized. Using the example of geothermal energy effects made in the small town of Uniejów, the author in the synoptic presentation described predicted benefits to the development of Zduńska Wola town.

JEL Classification Codes: **Q42, Q57.**

Keywords: geothermal projects, geothermal energy.

Introduction

Poland has abounding sources of the geothermal energy, suitable for direct use. Around 80% of the country area lies in three geothermal areas: central-European, before-Carpathian and Carpathian. The range of water temperature for these areas based on estimated studies is 30–130°C depending on the depth of the deposit.

„A geothermal energy is a warmth obtained the depths of the earth as hot water or steam. It is used directly as the heating energy for the needs of communities and in production processes, as well as for generating the electric energy (by using dry steam or high enthalpy brine)" (GUS, 2015). Development of geo-

---

[1] M.A. Ph.D. student, K. Pulaski University of Technology and Humanities in Radom, Poland, Faculty of Economic and Legal Sciences.

[2] Assistant Professor, Ph.D., University of Social Sciences in Lodz.

thermal energy in Poland faces many barriers that significantly limit the use of geothermal waters, not only for the development of heating sector but also for use in farming, balneotherapy, recreation etc. Amongst many barriers in the development of geothermal energy like: inadequate regulations, amount of fees and taxes, political barrier is one of important barriers – using „Geothermal energy" for the political strife, not only by the ruling camps, but also by self-government officials).

In 2009, in the total balance of acquiring energy from renewable sources RES, the geothermal energy constituted the 0.2%. In 2014 the volume increased only up to 0.25%. This data may indicate, how this energy source is undervalued or faces barriers of different kind.

In figure 1 the increase in the participation of RES energy in the general energy balance of Poland in years 2010–2013 was presented.
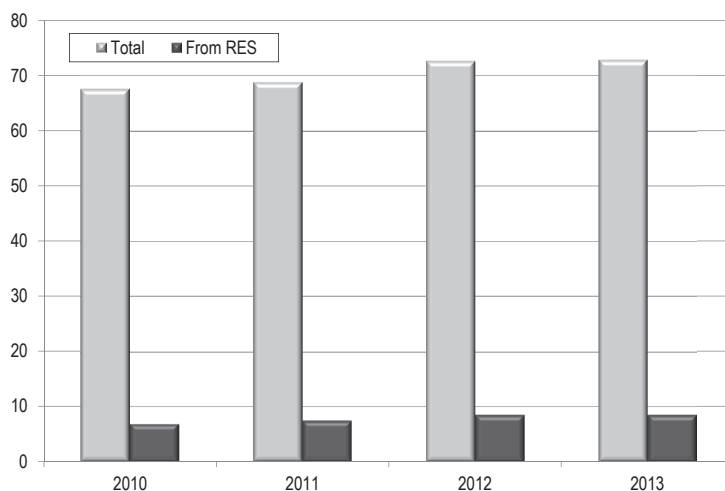
Figure 1. The participation of RES energy in the general energy balance of Poland in years 2010–2013

Source: Own work on the basis of GUS date.

Exploiting the energy from renewable energy sources in the general energy balance of Poland is small.

A geothermal energy has even a smaller participation in general RES balance. Percentage participation of individual RES energy types in 2014 was presented in figure 2.
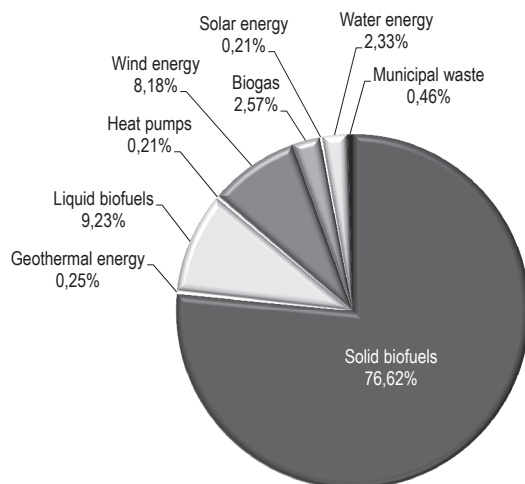
Figure 2. Acquired RES energy in Poland in 2014 according to fuel type

Source: GUS date.

Basic barriers of geothermal energy development in Poland and their influence on investment decisions

Difficulties had a high impact on development of use the energy of geothermal waters, which did not allow satisfying development of geothermal energy. Existing legal and economic barriers were the main development brake. Many communities in Poland drew attention of governing officials to „difficulties of geothermal energy development in Poland" (Kępńska, Tomaszewska, 2010) which included:

– provisions of law and financial conditions not-supporting investing;
– complicated and long legal and administrative procedures (causing delay in activating funds for investments, fall in their value, discourage investors);
– many charges and taxes (which has an impact on the heating price);
– lack of necessary incentives and economic instruments, including the lack of the Geological Risk insurance Fund and „green certificates" to the geothermal warmth („green certificates" in accordance with the Energy Law are support mechanisms of generating the electric energy from renewable sources. The property rights resulting from the certificates of origin are transferable and constitute stock exchange goods. There is a lack of such a system in relation to generating the warm weather from RES);
– lack of independent entity coordinating support of publicly funded projects (best and most economically profitable classified by external experts); high set-up costs (drillings, studies and specialist services).

Until 2009–2011in Poland procedures were simplified and conditions of obtaining the concession were cushioned, charges for using thermal waters were liquidated, charges for geological information for design purposes were reduced (Przybycin, 2011) and support for geothermal projects from National Fund for Environmental Protection and Water Management funds was provided.

Taken actions and their continuation turned out to be essential, even more so as results from figure 2 use of geothermal waters in Poland is unusually small compared with use of other energy types.

The Act modified by the Law of February 2015, concerning state support for RES, introduces next changes. Technologies which provide the energy generation in the predictable way, including geothermal energy will receive the highest support. Technologies enabling to acquire the energy from the wind and sun will receive smaller support. In June of this year Polish Senate entered amendments into the Law on Renewable Energy Sources.

Apart from listed barriers and actions for their liquidation there is a barrier of the political nature, for which provisions can't solve. In many cases this barrier has the strongest impact on decision making about geothermal energy use. There are many examples, where the politics took the place of economic imperatives. Good examples of such political decisions are Geothermal Energy in Toruń, Gostynin, Lidzbark Warmiński, Pabianice, Zduńska Wola (Karsznice Geothermal Energy).

Case of Geothermal Energy in Toruń has been well-known since 2007 when National Fund for Environmental Protection and Water Management granted the project of building the geothermal energy by Veritatis Lux foundation in amount of 27 million PLN. The grant was withdrawn without substantial reasoning. Geothermal water in Toruń has high parameters and can be used in the health care as well as in heating.

In Gostynin as part of geothermal waters use was to be built thermal „Disneyland". This object was supposed to be unique in Europe. For that purpose the city signed the pre-agreement with the Voivodship Office for co-financing of project with amount of 72 million PLN. Like in Toruń after the change of the government in 2007 Gostynin didn't receive the funds. In both cases in Toruń and in Gostynin as part of projects only wells were drilled.

Other, opposite to cases form Toruń and Gostynin example of the coherent action of the authority is support of Geothermal Energy structure in Lidzbark Warmiński. Warmian Thermae are economically unprofitable investment as the geothermal water temperature is exceptionally low and amounts around 21°C. Water with such a temperature cannot be used in heating, and using it in swimming pools must be to heated. According to the estimates the annual cost of water heating will amount around 800 thousand PLN. Thermae, in spite of controversy about their building were opened in 2014 although the construction

wasn't finished. Designed building cost amounts around 93.5 mln PLN, including the 64 mln PLN EU funds.

In 2013 according to the announcement of Polish Press Agency: „Ministry of Regional Development will verify documentation concerning the structure of Warmian Thermae in Lidzbark Warmiński. Investment is highly controversial, because thermal waters which will fill swimming pools, have a temperature a little bit above 20 degrees. and will require heating" (Polish Press Agency, 2016).

„Therme has been built for three years. As was originally announced they would have been ready in 2014, during the investment the main contractor went bankrupt. For this reason the district office had to announce new tenders for completing works. Lidzbark Warmiński Therme are one of the most expensive EU investments in Varmia and Mazury. The cost of their structure is estimated at over 93 mln PLN, but – according to local media – can be higher for next 12 mln PLN". (Kurs, 2015).

Like in case of Warmian Therme that arose from politically motivated decision, in Pabianice there won't be Geothermal Energy also for political reasons. Governing coalition under the conflict concerning the structure of Geothermal Energy broke down. Economic benefits and a public demands weren't taken into consideration.

Geothermal Energy Project in Pabianice assumed two variants of financing (Kozłowski, 2015):
– private funds,
– EU funds from the Marshal's Office in Łódź and Commune of Pabianice, Commune of Ksawerów and County Office's own funds.

Moreover boreholes in Jadwinin performed at a depth of 1500 meters have high parameters of water – temperature above 50°C, are enough for implementation of rest and recreation investment project. Making boreholes at a depth of 3 km according to estimates allows to get water with temperature of about 134°C. Such a water temperature is also enough for its use heating – in flats' heating.

It is significant that professor Ryszard Kozłowski from Cracow Technical University estimates, that „near Pabianice there are 200 million tonnes of fuel units, while entire Poland consumes 100 million tonnes annually". That's his statement from this year.

In Zduńska Wola just like in Pabianice there won't be Geothermal Energy. The political factor was also crucial here. Nimble manipulation of the town's authorities – a different political option which took power in 2008 led to discontinuation of highly advanced project of building Geothermal Energy in Karsznice. The town's authorities decided to reconstruct the town hall destroyed during the World War II and built it without any public consultation. A brand new object which did not resemble the pre-war town hall was built. The object doesn't performed its old town hall function.

Case study based on effects of Geothermal Energy in Uniejów

This case study, describes the development of a small town Uniejów placed by the Warta River in the Łódź district, where by investing in the development of geothermal infrastructure has been a substantial improvement in life of the commune inhabitants. In particular a rise in the tourism activity contributed to this improvement. The author in the synthetic way discusses particularly significant steps in progress of Uniejów Geothermal Energy development and its impact on town's development.

Uniejów is placed in the north-western part of the Łódź district by the Warta River. It has 3200 inhabitants and covers an area of 129 km^2 along with the Uniejów commune. This region constitutes area of typically agricultural character. Connections with Łódź (56 km), Turek (2 km), Konin (51 km) are the main communication – transport routs. The town economicaly similar to other towns in Poland, in 1999 decided to establish the „Therme Uniejów" Sp. z o.o. company, which would use geothermal waters in the heating. Structure of geothermal energy for heating purposes with use of geothermal water sources was donated by National Fund for Environmental Protection and Water Management in Łódź.

In the framework of successfully growing geothermal infrastructure in Poland, in 1999 a company Geothermal Energy Uniejów Sp. z o.o. was established. Its main shareholder is Uniejów Commune (58.8%), and National Fund for Environmental Protection and Water Management in Łódź (41.2 %).

In 2000, town's authorities decided to begin construction of the heating system called „Insulation of Uniejów town based on thermal waters". The program's main goal was to establish heating system which would provide heating for public utility buildings like: schools, Teachers' House, kindergarten, The Commune Cultural Centre, a church, a presbytery, „Geothermal Energy Uniejów" Sp. z o.o. company building, a health centre, pharmacies and council and cooperative blocks of flats, single-family houses. Finally about 170 supply connections were successfully implemented. However using geothermal energy for heating, brought losses. Too small demand on „warmth" and company financial liabilities arising from the necessity of loan redemption taken to the cost recovery in relation to the loss caused by the sale of thermal energy at an excessively depressed were the main factors causing the losses. The estimated cost of producing 1 GJ of the warmth amounted about 85 PLN, while realizable maximum price for the sale of this unit amounted about 40 PLN.

In order to improve company profitability, in 2002 a research on geothermal water use at healing targets was undertaken. In order to ensure financial equilibrium the commune decided to build water recreation complex called „Therme Uniejów", which should function entire year – through an open-air swimming pool with three swimming pools with geothermal water. The commune authorities received for this task funds from the European Union. The investments were

divided in two parts. Part of investment was completed in 2008, and the whole investment in 2011. One year later Uniejów gained the official status of health resort.

Since 2010 „Geothermal Energy Uniejów" company has made the slight loss in the average amount of 200 thousand per year. Advantageous occurrence is the company's income grow which is a good sign for the company's future. Figure 3 presents the company income in 2010–2014.
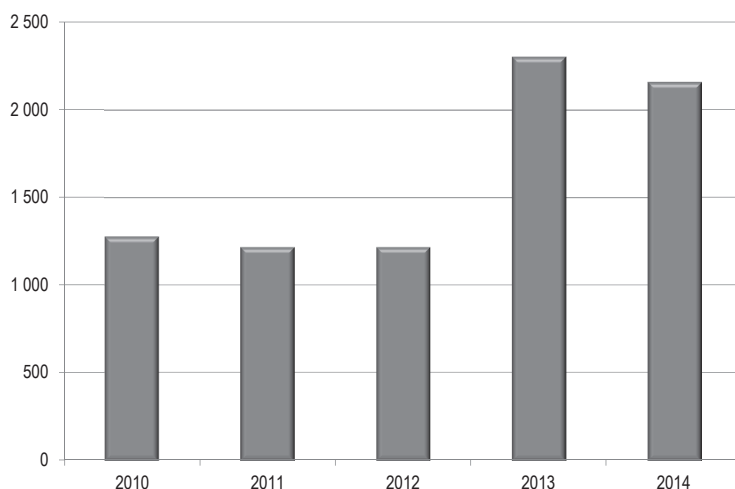
Figure 3. Geothermal Energy Uniejów sp. z o.o. incomes in 2010–2014 (thousand PLN)

Source: the profit and loss account of Geothermal Energy Uniejów sp. z o.o. in 2010–2014.

In relation to implemented program, Uniejów the town, apart from basic benefits achieved the recognisability on the tourist map of Poland as the spa city.

The basic advantages of the geothermal investments implementation include first and foremost:
– improvement of the town image,
– creating the only heating system in Poland that uses entirely renewable deposits,
– revitalizations of urban areas,
– town's development for the spa & health care purposes,
– create new jobs ,
– population increase,
– increasing the commune residents profits from accommodation rentals.

Even though Uniejów is a new spa & health care town, the first years of functioning of the tourism seem to be a promising and is promising well for the future. In 2009 there was only one place which offered only 49 accommodation places. Later new establishments providing hotel services were build and now can serve a great number of tourists.
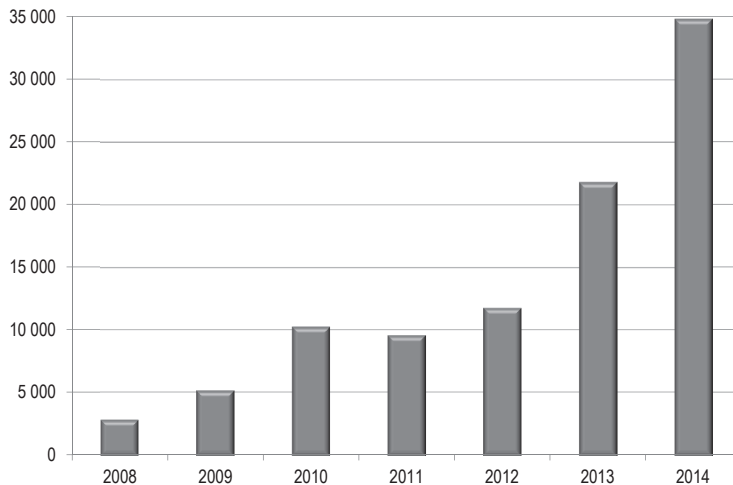
Figure 4. Number of tourists visiting Uniejów in 2008–2014

Source: own studies based on GUS date.

In 2008, 2856 tourists visited Uniejów and in 2009 the number of tourists rose up to 5153. There were 9367 tourists in 2011, and in 2014 Uniejów was visited by nearly 35 thousand tourists. The increase was presented in picture 4.
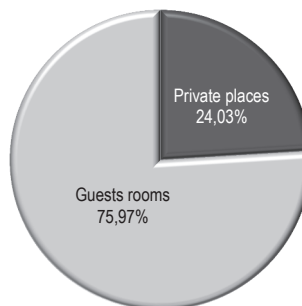

Figure 5. Number of accommodation places in Uniejow according to state of March 2013 in the division into private rooms and objects of the group accommodation. Number of residents from Poland using accommodation in objects of the group accommodation

Source: own studies based on GUS date.

It should be noticed that within five years the number of tourists increased by as many as 340%. However Number of overnight stays in the same period rose by 440%.
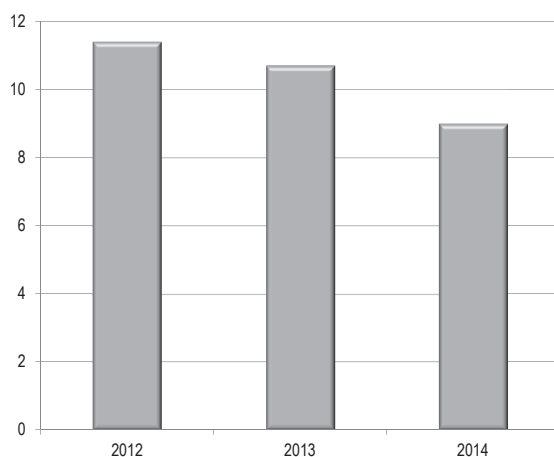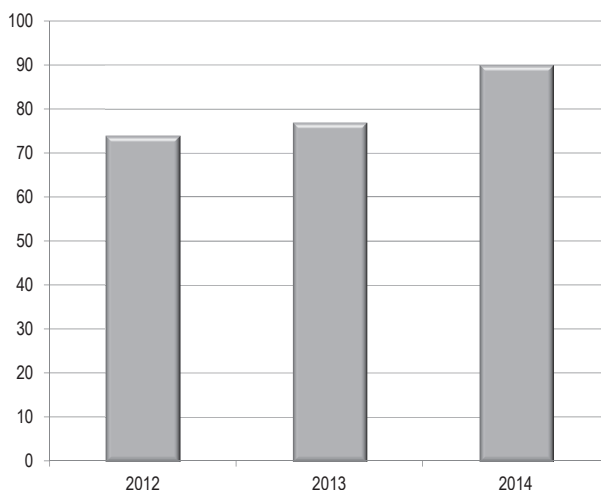
Figure 6. Unemployment in Uniejów in 2012–2014

Source: own studies based on GUS date.

A state of the unemployment in Uniejów and its connection with the development of tourism are interesting. The presented in picture 6 graph shows clearly the decreasing tendency of unemployment what undoubtedly is due to geothermal energy development in Uniejów.

Figure 7. Number of working people to 1000 of population in Uniejów, without business entities about the number working to 9 persons and privately owned farms

Source: own studies based on GUS date.

In relation to gradual implementation of the program suggested by Uniejów authorities, the town gained the title of the spa, thus joining the group of 45 spa centres in the country. A new town's position and its residents was possible mainly thanks to a harmonious team of people and town authorities who were able to create conditions and the development strategy of the town for the future. Such actions had a significant impact at improving the quality of life of the commune inhabitants, through the accretion of tourism in the town, an economic boom, increase public income, activity of residents, a rise in profits from trade and services and fall in unemployment. This in turn translates to a number of benefits, affluence of the area residents and maximize the opportunities which were created for them by geothermal investments.

Amongst other positive aspects of growing tourism we should underline more than a threefold growth in number of tourists visiting Uniejów, in just three years. In the corresponding period a number of the employed also rose, while the unemployment was lower by 2.4 of percentage points what in the situation of the small town is a success of its authorities and is measured positively.

One of the main conclusions that can be drawn after the analysis of analysis of Geothermal Energy Uniejów company's situation is basic. geothermal Energy in a small town won't be the investment that ensures the appropriate level of profitability, if is targeted exclusively at exploiting the energy of thermal waters in the heating. Therefore actions of use of geothermal waters must include a wide range of services: heating and healing services as well as the industrial production e.g. cosmetics.

Case study of exploring the geothermal energy for designed Geothermal Energy in Karsznice

The example of the wrong attempt at planning to use of geothermal waters in Poland is a self-government in Zduńska Wola, located on hot, thermal, water deposits.

The case study was based on: Feasibility Study for Obtaining the Geothermal Energy within the town Zduńska Wola – Geothermal Energy Karsznice (Polgeol, 2007); The project of geological works for recognizing and substantiating reserves of waters from the early-Jurassic level in Zduńska Wola (Polgeol, 2008); Feasibility study for heat supply of existing buildings belonging to Karsznice housing estate in Zduńska Wola, based on thermal energy of geothermal waters. Moreover a report prepared by the Management Board of Miejskie Sieci Cieple Sp. z o.o. from Febuary 2, 2009 was used (Piotrowski, 2009).

Karsznice is a very old town known since the 14th century In the study Karsznice history up to beginning of the 20th century was omitted , when in 1928

a main railway line connecting North and South and crossing Karsznice was built The line was used to transport coal from Silesia to Gdynia. In November 1930 in Karsznicach a railway station was opened, in 1933 a locomotive shed was built, and then residential area for 1300 railwaymen and their families was built. The company which carried investments out was French.

After the war the Workshops for Railway Equipment of the Polish State Railways was extended and modernised. In 1959–1972 Karsznice had the status of housing estate. Since January 1, 1973 Karsznice have been a part of Zduńska Wola town.

During the political transformation, after 1989 Karsznice stopped being an important railway junction. Polish National Railways, as the owner of the considerable industrial assets in Karsznice limited its activity practically to „zeroes". About the former Karsznice magnificence resembles the open-air ethnographic museum of the rolling stock, in which, combustion and electric steam engines from the 1st half of 20th century are presented.

At present Karsznice is a calm, forgotten by town authorities inhabited district with 4000 residents, without workplaces, depended on its residents ingenuity who have acted as a Local Government Unit in Karsznice since February 27, 2003. Unfortunately the Community activity is controlled by the town hall and doesn't include pro-economy activities. Its role is limited to popularizing self-government ideas and taking the local initiatives with exclusion of economic and industrial initiatives (Statut, 2003).

So residents influence via their Community in the scope of planned in 2008 Geothermal Energy was limited and authorities did not take account of common wealth that Geothermal Energy could become for Karsznice and Zduńska Wola. After giving up the construction of Geothermal Energy Karsznice, in March 2010 the Union for the Construction of Geothermal Energy in Karsznice was created. The union interested town authorities with the Geothermal Energy , however no effect were achieved. Authorities just like previously created only an illusion of geothermal energy construction. The mayor words written down by local media attest to it (Jeziorska, 2010).

In April 2007 „Feasibility Study for Obtaining the Geothermal Energy within the town Zduńska Wola – Geothermal Energy Karsznice" was prepared (Polgeol, 2007). In March 2008 „The project of geological works for recognizing and substantiating reserves of waters from the early-Jurassic level in Zduńska Wola" was presented (Polgeol, 2008).

The town's self-government body entrusted Miejskie Sieci Cieplne Sp. z o.o. heating company the task to build the geothermal energy in Zduńska Wola. Environmental positive opinions and audits drafted at the Ministry of the Environment for the versatile application of geothermal energy were received. Also the company received concession from the Ministry of the Environment for the

geothermal boring out, and the company and the city protected adequate financial means. However at the end of 2008, after the change of the chairman of the management board, the company (new management board) made the analysis of the use of geothermal waters again but this time exclusively for the Karsznice heating. They conducted superficial and imprecise calculations, experts opinions and examples of using thermal waters in Poland carried out successfully were ignored. Omitting well known, universal NPV and IRR methods for assessing effectiveness was a basic mistake while evaluating the planned investment. In 2009 as the effect of such an approach of the new company Management Board was discontinuation of further actions. To this day town's heating problems haven't been solved, even though Zduńska Wola is on the 29 for place amongst 33 the most polluted Polish cities in the EU (WHO Report, 2016). The report regards 50 European cities.

Zduńska Wola is heated by Heat Plant in Zduńska Wola, which sells the heat to towns heating company. The technology based on coal doesn't support residents and isn't cheap at all. Individual sources of the heating have Karsznice.

The plan of the building „Geothermal Energy Karsznice" in Zduńska Wola was created in 2007. Zduńska Wola has conditions for geothermal energy development, which include:
– adequate sources of geothermal waters,
– very well extended heating distribution network with service wires in the town,
– potential users of the geothermal energy in Karsznice,
– convenient geographical conditions (central Poland),
– convenient transport connection with Łódź, Warsaw, Wrocław, Poznań,

Moreover there are many centres in the country, which „blazed a trail" towards the building of geothermal objects thanks to:
– the high level and involvement of academic environment,
– designers experience, drill and geophysical companies, technical contractors,.

Additional incentive towards the geothermal energy development is the need to implement EU commitments regarding RES, sustainable energy development, etc.

Geothermal Energy in Zduńska Wola found the a prominent place in investment plans of Miejskie Sieci Cieplne Sp. z o.o., (MSC). One of the driving factors to work on the project was the town council resolution which allocated 2 million PLN for the purpose and passed the money from the town budget to an increase in capital of MSC. Altogether the MSC company collected 7.5 million PLN which were basis for applying in National Fund for Environmental Protection and Water Management for subsidizing test drilling and funding further works. Having the significant, not-used potential of energy from geothermal waters in Zduńska Wola was the second factor. According to estimates under the town there are deposits of water with temperatures from 20 to 80-120°C degrees.

This advantage creates prospects of the energy application of geothermal energy in Zduńska Wola directly as heating energy for public needs and in balneology, health care, production processes, in farming, as well as for generating the electric energy. The geothermal project has a big chance to be profitable mainly because the power needed for ensuring the warmth in Karsznice is 2.5–3 MW, and at forecast productivities of the hole it is possible to get 4.6 MW from one duplicate, so about 50 % more than demanded. What is more, scientists predict that water in Karsznice will be geothermal mineralized with the value of 120 g/l. These are sodium chloride, iodic waters.

Admittedly the MSC company carried out an analysis for the location of geothermal holes in Karsznice, where it is possible to supply 1600 families into the warmth , geothermal energy location in the centre of the town, close the network and central heating consumers provided at present by the MSC company wasn't considered. Zduńska Wola (without the Karsznice housing estate) has a well-developed heating distribution network, with concentrated building development and the sufficient number of customers. The length of heating network is 40 218,50 running metres. Additional advantage of the town centre is a fact of having by the self-government body areas fulfilling needs for the geothermal energy location. Exploiting the geothermal power in these places can bring not only economic, but also environmental benefits.

Geothermal Energy Project implementation in Karsznice, and in the following years in Zduńska Wola would also raise, in the distinct way residents safety concerning the supply of heat through the diversification of energy sources. Moreover, it should be noted that geothermal energy is available entire year, so can satisfy the base demand for the central heating. Unit heating price from geothermal energy is close to the price of heating from natural gas, however contrary to gas it guarantees the price stability. According to Energy Regulatory Office data in 2012 average heating price in Poland, produced from gas sources, amounted 88 PLN gross per gigajoule. The price from geothermal energy amounted 65.78 PLN per gigajoule.

MSC Zduńska Wola in 2015 carried costs in amount of 61 PLN/GJ. However apart from this price the customers had to pay profit margins, which is added to the purchase price of each GJ of the energy from Heat Plant in Zduńska Wola (Energy Regulatory Office, 2012).
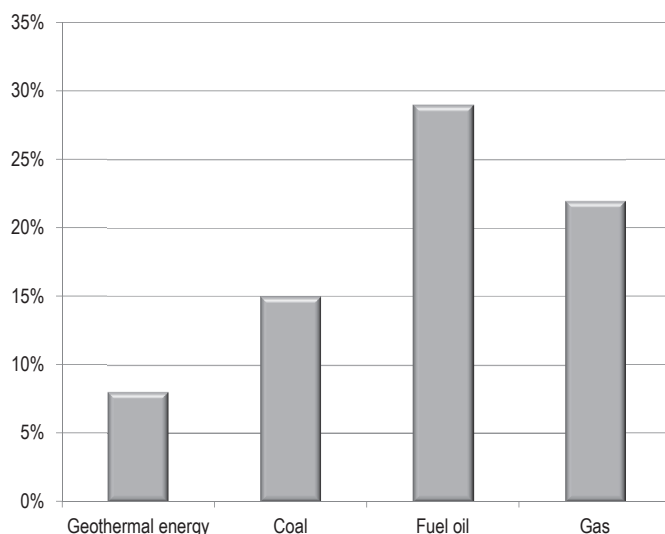
Figure 8. Percentage growth in heating prices in Poland in 2007–2013 according to fuel type
Source: Energy Regulatory Office Data from 2007–2013.

Conclusions

In Poland there are different circumstances supporting the geothermal energy development, which include:
- large resources of geothermal waters and energy,
- potential central heating consumers and users of leisure and healing centres ,
- the high level and involvement of academic environment,
- designers experience, drill and geophysical companies, technical contractors.

In spite of such numerous pro-development circumstances decisions on the structure of geothermal energy in Poland are made hardly and rarely. Among situations presented in the article concerning motives for taking investment decisions – geothermal energy construction – in all sorts of self-government bodies there is one basic conclusion, that very crucial for concrete decision making regarding the use and the way of developing geothermal waters is not the economic profitability – the productivity of mining holes, the water chemistry or its mineralization or the possibility to apply it in heating, health care or recreation – but above all political factor is crucial. It is a shocking observation.

The second factor affecting the decision making is falsely formed conviction about high costs of geothermal energy compared with other energy sources. Quite often this argument finishes all discussions.

The third factor which has currently passed, was the act on renewable energy sources, which regulations were disadvantageous for geothermal energy like e.g.

fiscal and grant policy. This lack of interest of geothermal energy by the public authorities has also caused the lack of interest of geothermal energy development by self-government authorities and investors.

   Structure of geothermal energy for the local community should be based on a few premises, which should include:

1) good understanding of hydro-geothermal parameters in Poland.
2) possibility of using experience of Polish installation, exploitation and search companies within PGNiG frames,
3) the lowest investment expenditure per unit of energy produced from RES sources.
4) unit net price of purchases of heat from geothermal energy which is not fundamentally different from heating prices of coal-fired power plants.

Table 1. Comparing the total capacity of heating plants in some Polish cities including the participation of the geothermal energy

Geothermal Energy	Power demand	Power from geothermal energy (MW)	Participation of the generated power from geothermal energy (%)
Uniejów*	7,4	3,2	43
Mszczonów**	7,5	2,7	36
Karsznice	3,6	4,6	127

* The structure geothermal heating plant in Uniejow let to reduce the number of dust and gas pollutants transmitted to the atmosphere (lack of accurate data). ** Geothermal Energy in Mszczonów contributed to eliminate 4.5 thousand tonnes of previously burnt fuels per annum. This fact caused the SO_2 emission reduction by 100%, NOx by 82%, CO by 98%, CO_2 by 75%, soot and dust by 100%.

Source: own study based on date from town: Uniejów, Mszczonów and Zduńska Wola.

   Carrying out investments associated with use of geothermal waters, fairly comprehensive and quite fast development of a town economic, environmental and social effects should be expected.

   It is worth mentioning that using existing PGNiG acquis in exploration works conducted for decades will allow to release capital invested in these works. It will undoubtedly be a benefit with major importance to a country.

   Comparing benefits that a small town Uniejów or bigger Mszczonów has achieved , to predicted benefits, which could be achieved as a result of the geothermal energy structure in Zduńska Wola, it isn't possible to refer in numbers, without conducting appropriate research. Based on presented examples and existing studies concerning geothermal energy it is only possible, in the vague way

to predict the influence of geothermal investments on the development of the local community. Development, of which components will be following benefits:
– growth in number of sale and service enterprises, restaurant, hotels, healing plants,
– fall of unemployment,
– lowering the release of pollutants,
– safety resulting from the constant access to energy sources,
– hold up the progressing depopulation of the town and growth of population,
– residents profits from tourist accommodation services,
– improvement of the city's image,
– an increase in the city's incomes.

Correcting specialists studies is a basic mistake of local government officials as happened in Zduńska Wola in December 2008, where the preliminary version of feasibility study was presented. The Orderer, that is MSC Sp. z o.o. instructed to take feed and return parameters of 80/60°C for operating temperature -18°C for further calculations and analyses. For the above reasons it has become necessary to construct a boiler house for heating geothermal water. It should be noted, however, that according to opinion of this feasibility study authors, option of the geothermal heat plant supported by the boiler house which at present is being considered is not optimal.

As indicated by simulations included in the study, water about parameters 55/35°C and the predicted network flow Q = 130 T/h fully will satisfy the heating demand of Karsznice housing estate, and so construction of the supporting boiler house wasn't necessary. This way the wrong decision made by MSC management board increased building costs of geothermal energy by over 4 million PLN. It may be assumed that the company prefers to defend its status quo than to develop itself or it is comfortable for the company to be an intermediary rather than a producer of the central heating.

The second mistake at decision making regarding the investment was to plan the use of geothermal energy only in heating with omitting use of heat and geothermal waters for other production-services and balneology purposes.

These are benefits of investment for the local community that must decide on investments, rather than politically motivated decisions, based on harmful principle – „the predecessor's project was bad, and mine was good".

One of main demands while decision making about the local government investment project implementation is the necessity to follow profitability of investment calculated with the use of proven methods (NPV and IRR), as well as with acquaintance of geological specificity of the location.

References

Geotermia. (2016). http://www.polgeol.pl/index.php?id=10

Jeziorska J. (2010). *Geotermia wraca i ma połączyć zduńskowolskie osiedla*: http://zdunskawola.naszemiasto.pl/artykul/geotermia-wraca-i-ma-polaczyc-zdunskowolskie-osiedla,362246,art,t,id,tm.html

Kępińska B., Tomaszewska B. (2010). *Główne bariery rozwoju wykorzystania energii geotermalnej w Polsce. Propozycje zmian*. „Przegląd Geologiczny", Vol. 58, No. 7.

Kozłowski M. (2015). *Energia czy termy? Prywatne czy publiczne?*: http://epainfo.pl/energia-czy-termy-prywatne-czy-publiczne/

Kurs T. (2015). *Cennik w Termach Warmińskich podgrzał emocje przed otwarciem*: http://olsztyn.wyborcza.pl/olsztyn/1,48726,19388696,cennik-w-termach-warminskich-podgrzal-emocje-przed-otwarciem.html#ixzz4EywzjCVr

PAP. (2016). Informacja z dnia 25.03.2016 r.

Piotrowski Z. (2009). *Raport Prezesa Zarządu Miejskich Sieci Ciepłych sp. z o.o. Zduńska Wola z dnia 3.02.2009 r.*

Polgeol. (2007). *Studium Możliwości Pozyskania Energii Geotermalnej w Obrębie Miasta Zduńskiej Woli*, Warszawa.

Polgeol. (2008). *Projekt prac geologicznych dla rozpoznania i udokumentowania zasobów wód termalnych z poziomu dolnojurajskiego w Zdunskiej Woli*, Warszawa.

Przybycin A. (2011). *Technika poszukiwań geologicznych geotermia*, „Zrównoważony Rozwój", No. 1–2.

Raport WHO (2016).

Statut Wspólnoty Lokalnej Osiedla Karsznice z 27.02.2003 r. (unpublished)

Studium. (2009). *Studium wykonalności dla zasilania w energię cieplną istniejących budynków należących do Osiedla Karsznice w Zduńskiej Woli, w oparciu o energię cieplną wód geotermalnych*. Zakopane, styczeń 2009.

Book Reviews

Mária Murray Svidroňová
Mimovladne neziskove organizácie – nositelia innovacií verejných služeb (Non-governmental and not profitable organisations – carriers of innovations of public services)
Belianum, Vydavateľstvo Univerzity Mateja Bela v Banskej Bystrici, Ekonomická fakulta, 2016 p. 131.

The reviewed monograph is well characterised in motto placed by the author in the introduction: 'It is impossible to define whether it will be better when it will be otherwise. But if it has to be better, it has to be changed' (Georg Christoph Lichtenberg). *Non-governmental and not profitable organisations – carriers of innovations of public services* is a tittle of the monograph taking the current topic in Slovakia. So far lack of literature which could show in a holistic way the studied issues prompted the author to interest the topic. The task was not so difficult for her because she has a dozen items of literature with similar problems in her scientific achievements.

Totality of the non-governmental organisations is defined as the third sector. The term is derived from the theory of division of a modern state into three main sectors: state, market and non-profit organisations acting pro publico bono but at the same time not linked institutionally with the public administration. In this review there will be also used interchangeable names non-governmental unprofitable organisations, non-profit or non-governmental organisation (NGO) to determine the third sector according to the convention accepted in this thesis.

According to the author the dominant legal-organisational form of the non-governmental organisations in Slovakia are associations which are up to 90.3% of all the organisations, on the second position there are so-called unprofitable organisations which represents 7.2%, funds 1.2% and not investment funds which are 1.3%.

Economy of each country among other things influences on connection of the public sector, private and non-profit. The sectors cooperate with each other and they fulfil their functions contributing to meet the needs in terms of improvement of quality of the provided services. The monograph is focused on the non-governmental organisations as institutional entities belonging to the private non-profit sector which is crucial for its existence but also from the economic theory's point of view of the youngest sector. The NGOs fulfil an important role in each society. They are not only providers of services which cannot be protected by the public or private sector. Finally, they are also an indicator of development of the civil society which often help and inform public opinion about initiating social and politic changes.

The non-governmental organisations are a development tool, an advocate of citizens' interests, a guardian of democratic society promoting of active citizenship and its self-awareness. They are also carriers of innovation and implementation of new forms and methods of providing public services in different areas, for example educational, social, health and physical culture services. The present monograph is focused on innovations in the public services sector related with respect of public space and obtaining social housing by local communities. The publication presents examples of good practices in Slovakia which bring benefits consisting on the fact that the non-governmental organisations are carriers of social innovations which bring tangible benefits for the society and economy.

For aims formulated in such way there was subordinated structure of the thesis which is presented as follows.

In the first chapter which is focused on theoretical considerations there were presented issues of the private unprofitable sector as a provider of the public services. Therefore, there were described differences and existing relationships between the three sectors.

In the second chapter there were showed innovations of the public services and among them social innovations, co-creation. A significance part was also devoted to simulators and innovation barriers in the public services.

In the third chapter of the monograph there are analysed individual innovations based on specific examples in the Slovak Republic. These are services which meet needs of the groups having little purchasing power and therefore commercially unattractive and also services which providing also requires the trust. The non-governmental organisations in such actions are usually better than companies or public administration institutions. Higher quality of the offered services results from the fact that the services offered by the organisations are usually cheaper, the organisations adapt quicker to the needs of the people for who they work and they have also better understanding of the needs.

In the fourth chapter of the publication there are identified selected examples of the innovative potential of the non-governmental organisations. It includes summary of results of own pilot studies using the method of structured review and also analysis and synthesis.

Effects of the co-creation which was devoted quite a lot of the thesis can be summarised based on the research as follows:
1. The co-creation is neither a miraculous solution of the social problems nor recompense in the form of increased efficiency and effectiveness in relation to the already existing public services.
2. The effects of the initiatives' co-creation are possible only by indicators typical for logic. It can be also claimed that the co-creation is itself a value therefore it engages the citizens to public action in the areas of the public administration.
3. The co-creation engages different groups of the citizens especially those who have: less education, are poorer or come from national minorities.

The publication is based on research purposes and methodology of interna-

tional scientific projects Learning from Innovation In Public Sector Environments (LIPSE), which is focused on development and implementation of innovative services in 12 EU countries including Slovakia. The project sensitizes on the barriers and limitations related to the specific environment of the public sector.

Moreover, the arguments included in the monograph are supported by practical experience of the author who participated respectively as a volunteer, project manager and recently as an executive director. Therefore, the theoretical findings are enriched and given in the thesis in the way which is suitable also for not academic society.

The monograph is especially dedicated for academic teachers and specialists studying issues of private unprofitable sector providing innovative public services. The publication gives valuable information and findings about innovation of the processes in providing public services which are also useful for the local governments and other organisations of the public sector as well as for the non-governmental unprofitable organisations which intention is to strengthen their innovative potential and engage citizens and other entities to development of the community they work in. Finally, the government authorities of the state can get information during introduction of the innovations in providing the public services in their own range.

After familiarisation with the monograph the following reflections appear which I would like to share with the Readers because they were not enough clearly articulated and they are as follows. Some associations and foundations often do not keep any promotional activities because simply they do not see such a need what in my opinion is a mistake. Real action is more important for them than promotion. Taking part in different kinds of actions and activities people often do not realise that for their organisation is responsible any association or foundation. The non-governmental organisation for majority of the society is an association or foundation collecting money for lofty goals and helping people in need. It can be concluded from the above mentioned considerations the better is image of the non-governmental organisations the greater is tendency of the society to involvement in philanthropy and volunteering for all kinds of associations. Therefore, significant part of the organisations publishes information about their activities on websites or keeps profiles in the social network. The vast majority of the society associates the non-governmental organisation with help for the people in need – poor, homeless, disabled, sick and with collecting money for important social goals.

The tendency of the local communities to support any non-governmental organisation evidences results of action of the association or foundation. In opinion of the respondents there is lack of mechanisms or processes allowing easy check of honesty of an organisation. High competences of employees are first of all an important factor of credibility of the non-governmental organisations. Our confidence to actions of a specific organisation (similarly like politics or product brand) often is not a result of direct contract but a result how the phenomenon is presented by the media.

At the end summarising the arguments indicated in the review it should be said that the non-governmental organisations are important element of democracy and the civil society. The roles fulfilling by them can be divided into social and economic functions.

1) The social functions are represented inter alia in:
   - creation and differentiation of the public opinion,
   - acting for interests of the minorities,
   - care of the common good,
   - social integration and initiating its change,
   - completion of the state's activities,
   - education of leaders which the evidence is the author of the publication.

2) The economical functions in turn manifest inter alia in:
   - education and hiring of unemployed people,
   - providing services,
   - proposing innovative solutions,
   - reducing expenses on social benefits,
   - creating of social capital,
   - promoting balanced development.

The third sector by building social and economic capital influences on changes in quantitative and qualitative form in the economy and thereby indirectly supports economic development and growth

Wojciech Sońta