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EFFICIENCY OF THE INVESTMENT ACTIVITY OF POLISH COMMUNES IN RURAL AREAS

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The purpose of this paper was to evaluate the efficiency of investment activity in the communes in Poland. The commune is a basic unit of local government in Poland, and rural and urban-rural communes constitute the vast majority of municipalities. Communes in their own name and on their own account carry out public tasks that cover all tasks of local interest, including technical and environmental infrastructure. Despite many researches on the efficiency of communes, there are no studies on selected activities as well as on rural areas only. The nonparametric method of technical efficiency Data Envelopment Analysis (DEA) was used in the study. The inputs and the effects of investment activity of rural and urban-rural communes in 2007-2013 were compared. This period was related to the duration of EU support programs. The study was conducted on the basis of data from the Local Data Bank which is Poland's largest database of the economy, society and the environment. The ranking of investment activity for communes were made based of the calculated average for indicators of efficiency. The studies conducted show that the amount of expenditure incurred on the studied spheres of investment activity of the analyzed communes does not translate into their efficiency. This is connected with the possibility of obtaining additional funds from EU. Information on the use of EU funds for financing the municipal investments were not included in the study due to lack of data before 2010. Among the analyzed rural and urban-rural communes the most efficient ones were located in the Mazowieckie, Świętokrzyskie and Lubelskie voivodships, although they were not fully efficient throughout the considered period. Due to its closeness to the capital, the municipality of Mazowieckie voivodeship belongs to an area with a high degree of urbanization. Communes from the Świętokrzyskie and Lubelskie voivodships belong to regions characterized by a high share of rural areas. The dynamic development of infrastructure is extremely important in terms of divergence between regions of the country.

Keywords, communes, efficiency, investments, bioeconomy

INTRODUCTION

The development of regions, which is supported by European experiences, is a result of actions undertaken by public authorities or market entities operating in the regions as well as national economic, social, administrative and political conditions (Grosse, 2007). All levels of the territorial government should be held co-responsible for the development of respective regions. Therefore, it is important that the development strategies at the Community, national, regional and local level are linked. In Poland, these assumptions were reflected in the *Long-Term National Development Strategy – Poland 2030*, which proposes a model of development based on three main pillars: creating grounds for innovation, levelling differences in the development of regions, and building competitive advantage through the use of intellectual capital (Szłęzak, Bojar, 2013). National specializations were determined in the government's document entitled *National Smart Specializations*, identifying 19 smart specializations grouped in 5 thematic areas. With regard to smart specializations, bioeconomy is indicated as an area supporting development both at a national and regional level (Gralak, 2015). At the voivodeship level appropriate development strategies were prepared identifying the lines for the development of specific regions, and bioeconomy is an area indicated within a smart specialization both at a national and regional level. Most Polish voivodeships indicate issues related to bioeconomy as sectors of economy and scientific and technological specializations (Adamowicz, 2016). Bioeconomy was only indicated as a key specialization in the strategy for Lubelskie voivodeship (UMWL, 2014). Local (commune-level) governments in voivodeships, creating their own development strategies, make direct reference to the strategies of such voivodeships and implement the assumptions in their strategic documents.

The basic operating aim of communes is to satisfy the needs of local communities and create favourable operating conditions for economic entities. Communes, on their own behalf and at their own account, carry out public tasks comprising all tasks of local significance (Act of 8 March, 1990) in the area of technical and social infrastructure, public protection and security as well as spatial and environmental order (Walczak, Kowalczyk, 2010). For the purposes of satisfying the needs of their inhabitants, the communes make use of accumulated funds or their assets and make decisions on the ways of utilizing income and on the amount of expenditure (Czyszkiewicz, 2007). With regard to the aforementioned, it should be stated that investing activities of communes is a significant issue in the context of implementation of assumptions underlying the

concept of bioeconomy as a key development factor – in particular in outlying regions where the development of bioeconomy can stimulate and maintain economic growth. Creating new jobs and aiming at rational utilization of bioresources is particularly significant in rural areas and requires, for example, construction of rural, marine and industrial infrastructure, and a knowledge transfer network (European Commission, 2012). The fundamental area of satisfying the needs of the local community often requires building the elements of infrastructure from scratch. The development of infrastructure is oriented, in the first place, at improving the living conditions of residents but also supports the development of economic activities. Although it provides a chance to increase the future income of the communes, these receipts are indirect and distant in time (KRRIO, 2005). The communes must also undertake decisions on the systematic development and modernization of their assets in order to derive income from such assets. The communes' investments in infrastructure most often refer to the development of infrastructure for the needs of public utility services, and mainly road infrastructure. Expenditure incurred on such investments does not guarantee future income or it generates income limited only to covering the operating costs of the constructed facilities. In addition, future running expenses related to the operation of such facilities will increase and revenues will often be insufficient to cover them.

This paper aims to evaluate the investment efficiency of Polish communes in the period from 2007 to 2013 in connection with the completed term of EU funds programming.

RESEARCH METHODS

The efficiency of investment activities carried out by the communes was evaluated based on a non-parametric Data Envelopment Analysis (DEA) method, which is a tool for determining the relative efficiency of DMU (Decision Making Units). DEA is a deterministic mathematical programming technique applying Farrell's approach to measuring efficiency (Charnes et al., 1994; Coelli et al., 2005). This method is used to evaluate the efficiency of entities running various activities, both in the public and private sector. This method is also used to analyze charitable organizations or ones pursuing social programmes. DEA (next to Free Disposal Hull – FDH) is one of the methods most frequently used for evaluating efficiency in the public sector (Geys, Moesen, 2009). Its advantages include:

- no necessity to determine the functional relationship,
- possibility to introduce multiple outlays and effects,
- possibility to determine the returns to scale.

Among the analyzed units (DMU) an efficient one is identified for which the ratio of efficiency (TE) is 1. TE values for other units are lower than 1 – they describe the distance from the efficient unit but are also a measure of non-efficiency.

The study used DEAP software version 2.1 (CEPA, 2017) – effects-oriented variant effects with constant returns to scale (Coelli, 1996).

The analyses employed data from the Local Data Bank which is “Poland's largest database of economy and households, innovations, public finance, society, demography and the environment” (Local Data Bank, 2017) maintained by the Central Statistical Office. Data in the LDB also includes information concerning communes according to the administrative division of Poland. The analysis covered data concerning groups of rural communes and urban-rural communes (excluding cities) from respective voivodeships in 2007 – 2013, in compliance with the completed term of EU funds programming. Two main areas of the investing activities of the communes were identified as supporting the development of bioeconomy. Variables describing inputs and effects in respective areas of the commune's investment activities were selected based on a review of literature related to the scope of studies into the efficiency of territorial government units (Narbón-Pepina, De Witte, 2017; Balaguer-Coll, Priori, 2009; Afonio, Fernandes, 2006; Sampaio De Sousa, Stosic, 2005). Two inputs and four effects were identified (two for each input) and assigned as follows:

1. Investments in road infrastructure:

a) input:

- Public finance; Expenses from the budgets of communes and municipalities with poviatic rights; Expenses in Division 600 – Transport and communication; communes excluding municipalities with poviatic rights; total; rural communes and urban-rural communes;

b) effect:

- Transport and communication; Public roads; Roads according to surface type, location and ownership; hard-surface roads; out of city roads; local (commune) roads;

- Transport and communication; Public roads; Percentage of public roads with improved hard surface according to location; in rural areas;

2. Investments in infrastructure related to municipal management and environmental protection:

a) input:

- Public finance; Expenses from the budgets of communes and municipalities with poviatic rights; Expenses in Division 900 – Municipal management and environmental protection; communes excluding municipalities with poviatic rights; total; rural communes and urban-rural communes;

b) effect:

- Environmental status and protection; Municipal wastewater treatment plants; Residents using the services of wastewater treatment plants as % of the total population; in rural areas;

- Environmental status and protection; Economic aspects of environmental protection, Implementation of investments related to environmental protection and water management in rural areas.

Another step was the verification of variables by means of coefficients of variation (elimination of quasi-constant variables). The critical value of the coefficient of variation V^* was determined as 0.3. As a consequence, the variable “Percentage of the length of public roads with improved hard surface according to location” was eliminated. It was replaced with the variable “Transport and communication; Public roads; Bridges according to owners; owned by the commune”.

RESEARCH RESULTS

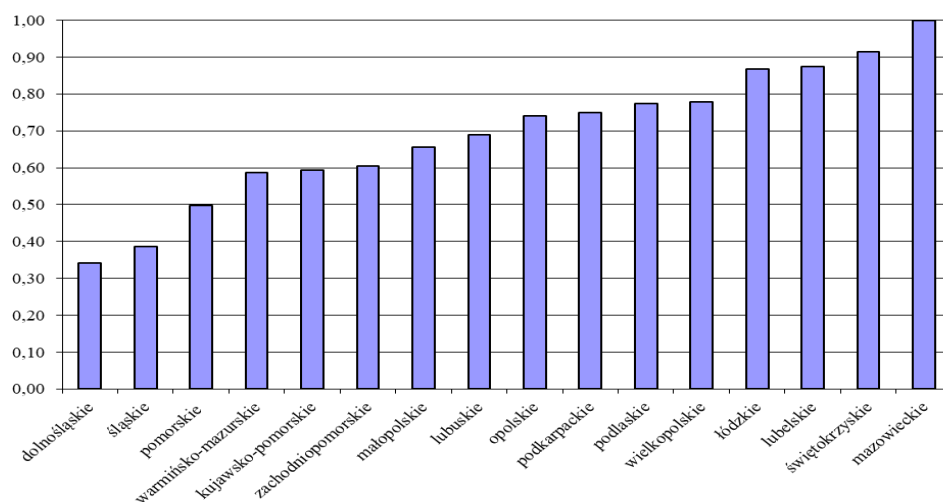
The values of the ratio of efficiency of investment activities carried out by communes located in rural areas ranged from 0.020 to 1.000 (Tab. 1). The average efficiency of investment activities of the analyzed communes throughout the analyzed period was 0.686. Considering the average values of the ratio of efficiency in respective years, a gradual increase up to 0.844 can be observed in 2013, which testifies to the increasing efficiency of utilizing funds. Only two out of sixteen groups of communes did not reach full efficiency in any of the analyzed years.

Table 1. Efficiency indicators of investment activity in surveyed communes according to voivodeship in years 2007-2013

Communes from voivodeship:	Year							mean	ranking
	2007	2008	2009	2010	2011	2012	2013		
Dolnośląskie	0.551	0.395	0.317	0.020	0.068	0.042	1.000	0.342	16
Kujawsko-pomorskie	0.159	1.000	0.635	0.426	1.000	0.471	0.461	0.593	12
Lubelskie	0.391	0.717	1.000	1.000	1.000	1.000	1.000	0.873	3
Lubuskie	1.000	0.535	0.352	0.744	1.000	0.328	0.869	0.690	9
Łódzkie	0.616	1.000	0.844	1.000	1.000	0.867	0.749	0.868	4
Małopolskie	1.000	0.728	1.000	0.378	0.533	0.299	0.650	0.655	10
Mazowieckie	1.000	1.000	1.000	1.000	1.000	1.000	0.495	0.928	1
Opolskie	1.000	0.860	0.672	0.440	0.525	0.684	1.000	0.740	8
Podkarpackie	0.610	0.682	1.000	0.556	0.694	0.732	0.969	0.749	7
Podlaskie	0.195	1.000	0.483	0.760	1.000	1.000	0.977	0.774	6
Pomorskie	0.442	0.272	0.461	0.373	0.560	0.510	0.869	0.498	14
Śląskie	0.633	0.231	0.659	0.036	0.060	0.086	1.000	0.386	15
Świętokrzyskie	0.462	1.000	0.940	1.000	1.000	1.000	1.000	0.915	2
Warmińsko-mazurskie	0.221	0.677	0.629	0.632	0.801	0.565	0.583	0.587	13
Wielkopolskie	0.474	0.725	0.967	0.645	1.000	0.766	0.875	0.779	5
Zachodniopomorskie	0.460	0.338	0.755	0.434	0.770	0.469	1.000	0.604	11
mean	0.576	0.698	0.732	0.590	0.751	0.614	0.844	0.686	x

Source: own study based on LDB

The overall evaluation of the efficiency of investment activities of communes was presented for the whole period of seven years. Based on the average efficiency ratios recorded in 2007-2013 a ranking of communes situated within respective voivodeships was prepared (Fig. 1). The first rank was assigned to communes in the Mazowieckie voivodeship despite the fact that in 2013 the efficiency index was only 0.495. Based on the results obtained from the DEAP program, it was established that this situation was caused by the increase in both outputs while the effects related to investments in road infrastructure decreased. The communes from the above-mentioned voivodeship, presented in the study, were fully efficient in six out of seven years covered by the study. They are a model of efficient utilization of funds for investment activities supporting the development of bio-economy.



Source: own study

Figure 1. Ranking on efficiency indicators of investment activity in surveyed communes according to voivodeship in years 2007-2013

Data presented in Table 2 indicates that expenditure on the analyzed spheres of investment activities of the said communes is not reflected in their efficiency. Communes situated in the Mazovian voivodeship allocated the highest amount of funds to investment activities compared to other communes analyzed, while in communes situated in Świętokrzyskie and Lubelskie voivodeships, the level of expenditure is less than half and in the analyzed period was not higher than average (PLN 575 million). Communes with expenditure levels similar to communes situated in Świętokrzyskie and Lublin voivodeships, namely, communes from the Zachodniopomorskie and Kujawsko-pomorskie voivodeships, were ranked much lower in the ranking of efficiency of investment activities (respectively 11th and 12th).

Table 2. Total expenditures (mln PLN) of investment activity in rural and urban-rural communes according to voivodeship in years 2007-2013

Communes from voivodeship:	Year							mean
	2007	2008	2009	2010	2011	2012	2013	
Dolnośląskie	517.918	624.992	704.215	813.197	792.657	727.534	773.709	707.746
Kujawsko-pomorskie	297.228	360.043	506.786	574.695	547.960	476.901	525.775	469.913
Lubelskie	299.922	364.673	484.107	693.347	528.739	445.907	490.546	472.463
Lubuskie	198.017	198.315	289.787	364.180	273.843	198.128	265.134	255.343
Łódzkie	408.964	440.435	608.532	814.223	710.484	597.764	642.006	603.201
Małopolskie	731.756	893.467	1105.962	1302.692	1377.083	1181.253	1161.468	1107.669
Mazowieckie	989.229	1299.226	1374.837	1505.268	1365.287	1197.007	1279.684	1287.220
Opolskie	245.023	241.496	333.822	394.949	357.000	285.562	317.146	310.714
Podkarpackie	438.115	522.177	782.351	996.337	807.051	523.118	574.890	663.434
Podlaskie	172.758	204.319	386.107	392.146	344.294	257.187	315.825	296.091
Pomorskie	214.918	307.993	380.984	471.598	438.411	332.752	405.021	364.525
Śląskie	407.979	462.729	600.538	650.404	627.723	556.694	593.839	557.130
Świętokrzyskie	219.719	274.352	466.879	555.172	492.392	385.386	383.135	396.719
Warmińsko-mazurskie	190.717	210.439	291.697	413.380	383.558	294.746	314.988	299.932
Wielkopolskie	672.324	873.630	991.133	1094.045	1117.609	982.405	1027.747	965.556
Zachodniopomorskie	296.396	351.620	448.316	532.599	523.553	446.158	550.956	449.943
mean	393.811	476.869	609.753	723.015	667.978	555.531	601.367	575.475

Source: own study based on LDB

CONCLUSIONS AND DISCUSSION

Newly built infrastructure not only contributes to improving the quality of life of the residents of rural areas. Thanks to adequate activities undertaken by the communes, there is a chance that depopulation of such areas will be reduced by improving their investment attractiveness, supporting the development of economic activity. As a consequence, increased investment activities of the communes provide options for their development.

In the analysis of the efficiency of local government units, it was assumed that they can be assessed on the basis of its inputs, effects and processes of transforming inputs into effects. As a result of this measurement, the efficiency of using not only material or financial but also non-measurable inputs (for example human factor) can be assessed. The DEA method also gives the opportunity to compare the efficiency of different units from the same commune segment. Problems that may arise during research are the lack of individual data in all years of analysis.

Based on the studies it can be concluded that the efficiency of utilizing the funds for infrastructural investments is not determined by the amount of expenditure incurred by the communes. This is connected with the possibility of obtaining additional EU financing. Data concerning utilization of EU funds on financing the investments of the communes was not included in this study due to a lack of data from the period preceding 2010.

Among the studied rural and urban-rural communes the most efficient ones were those situated in the area of the Mazowieckie, Świętokrzyskie and Lubelskie voivodeships, although they were not fully efficient at all times throughout the analyzed period. Due to their location in the neighbourhood of a capital city, communes from the Mazowieckie voivodeship are situated in a highly urbanized area. In turn, communes from the Świętokrzyskie and Lubelskie voivodeships are situated in regions characterized by a high share of rural areas. The dynamic development of infrastructure is extremely significant in the context of levelling disparities between the regions of Poland.

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