DETERMINANTS OF POTENTIAL INVESTMENT ATTRACTIVENESS OF A COMMUNE

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A b s t r a c t

The aim of the study was to indicate which of the determinants shaping the level of potential investment attractiveness of a commune affects its level to the highest degree. The elements which determine the attractiveness for investment, understood as an area's ability to attract investors, were classified into five sections: labour resources, technical infrastructure, social infrastructure, administration and market. After the data were accumulated, which was necessary to create synthetic indices of the potential attractiveness of communes for investment and individual sections, they were verified statistically according to the two most important criteria: variance and correlation. Ultimately, selected indices were chosen for further analysis out of the original set of 39 indices. The Hellwig development pattern method was used to classify the communes into four classes depending on the level of potential attractiveness for investment and to determine which element had the greatest effect on the level of a commune's potential attractiveness for investment. The average level of potential attractiveness for investment and the sections under analysis prevailed in the Warmińsko-Mazurskie Voivodship communes in 2016. The results showed that the level of a commune's potential attractiveness for investment is affected by the following factors: technical infrastructure, administration, social infrastructure, labour resources and market.

DETERMINANTY POTENCJALNEJ ATRAKCYJNOŚCI INWESTYCYJNEJ GMIN

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A b s t r a k t

Celem badań było wskazanie, która z determinant kształtujących poziom potencjalnej atrakcyjności inwestycyjnej gminy oddziałuje na jej poziom w najwyższym stopniu. Elementy determinujące potencjalną atrakcyjność inwestycyjną, rozumianą jako zdolność obszaru do przyciągania na jej teren inwestorów, sklasyfikowano w pięciu działach: zasoby pracy, infrastruktura techniczna, infrastruktura społeczna, administracja i rynek. Po określeniu i zgromadzeniu danych niezbędnych do stworzenia syntetycznych wskaźników potencjalnej atrakcyjności inwestycyjnej gmin oraz poszczególnych działów zweryfikowano je statystycznie według dwóch najistotniejszych kryteriów: zmienności oraz korelacji. Ostatecznie z zestawu 39 wskaźników wybrano wskaźniki do dalszej analizy. Metodą wzorca rozwoju Hellwiga analizowane gminy sklasyfikowano w czterech klasach (zależnie od poziomu potencjalnej atrakcyjności inwestycyjnej i każdego z działów) oraz określono, który element w najwyższym stopniu wpływa na poziom potencjalnej atrakcyjności inwestycyjnej gmin. W 2016 r. w gminach województwa warmińsko-mazurskiego przeważał przeciętny poziom potencjalnej atrakcyjności inwestycyjnej oraz analizowanych działów. Na podstawie otrzymanych wyników stwierdzono, że na poziom potencjalnej atrakcyjności inwestycyjnej gmin największy wpływ miały kolejno: infrastruktura techniczna, administracja, infrastruktura społeczna, zasoby pracy i rynek.

Introduction

One of the elements differentiating regions is the development potential present in their area. This potential can be defined as the set of the region's features which determine its opportunities for generating development. The region's development potential depends on the amount, quality and effective usage of the assets present in the area (Reichel, 2003, p. 8; Milczarek, 2005, p. 9; Poniatowska-Jaksch, 2006, p. 9; Nazarczuk, 2013, p. 73).

The term "attractiveness for investment" can be used with reference to a specific area. The meaning of this term is narrower than territorial attractiveness and it considers the advantages of a specific area with respect

to location-related benefits and investment absorption because of the assets present in the area (e.g. infrastructure quality, market size, workers' qualifications, availability of means of production). The literature on the subject defines attractiveness for investment as the ability "to induce investors to choose the region as a place in which to locate their investment" (Gawlikowska-Hueckel & Umiński, 2000, p. 7).

Real and potential attractiveness for investment can be distinguished. The former is "the region's ability to satisfy a client / investor and to generate absorption of financial capital and real capital in the form of investment. It can be measured with the effectiveness of the financial, real, human and natural capital outlay" (Godlewska-Majkowska, 2013, p. 2). The real attractiveness for investment index (RAI) is calculated from the productivity of work, productivity of real assets, profitability of enterprises, self-financing of local government units, investment outlays and natural capital (Godlewska-Majkowska, 2009, p. 28-29). Potential attractiveness for investment is "a set of regional location assets which affect the accomplishment of the investor's objectives" (Godlewska-Majkowska, 2013, p. 2). According to the approach proposed by the Institute of Enterprise from the Warsaw School of Economics, the index of potential attractiveness for investment (PAI) for communes (PAI1) is calculated from five elements: labour resources, market, social infrastructure, technical infrastructure and administration. When calculated for voivodships (PAI2), the index is supplemented with social capital, innovation and sectoral elements (e.g. natural value) (Godlewska-Majkowska, 2010, p. 61). The Institute for Market Economics Research identifies nine determinants of potential attractiveness for investment: economic infrastructure, social infrastructure, transport accessibility, labour resources, market absorbability, level of economic development, condition of natural environment, level of common safety and activity towards investors (Nowicki, 2010, p. 12).

Individual authors mention other elements of potential attractiveness for investment: effectiveness of economic transformation, leisure opportunities (Swianiewicz & Dziemianowicz, 1998, p. 10-13), touristic attractiveness, and the business environment (Gawlikowska-Hueckel, 1999, p. 15-45).

It is important to determine both the elements shaping the potential investment attractiveness of the region and their impact on its final level. Treating each of them equally may lead to a distorted picture of the economic reality. The aim of the study was to indicate which of the determinants shaping the level of potential investment attractiveness of a commune affects its level to the highest degree.

Many authors point to the special role of municipalities in creating location values that contribute to the socio-economic development of the area (Godlewska-Majkowska, 2018, s. 105; De Jesus, 2017, s. 111; Wrona, 1997, s. 31; Szewczuk *et al.*, 2011, s. 21; Leśniewski, 2013, s. 149-153; Stanny, 2010, s. 93, 94).

Measurement of potential attractiveness for investment

Determination of which element has the greatest effect on commune attractiveness for investment, understood as the ability to induce investors to choose a specific area as the location for their investment, was performed using a statistical method. The 2016 data for analysis were obtained from the Local Data Bank at "Statistics Poland" (GUS) and from Google Maps. Communes in the Warmińsko-Mazurskie Voivodship were analysed. 39 indices, with 5 to 10 from each section, were defined and classified as stimulants (31) or destimulants (8) in order to determine which element – labour resources, technical infrastructure, or administration market – has the greatest effect on the potential attractiveness for investment (Tab. 1).

Table 1

Potential commune attractiveness for investment

Partial indices
Labour resources (LR)
Employment per 1,000 people (S)*
Percentage of employed people in the working age population [%] (S)
Percentage of registered unemployed among people of working age [%] (D)*
Balance of home migrations per 1,000 people (person) (S)
Balance of foreign migrations per 1,000 people (person) (S)
Percentage of working age people in the total population [%] (S)
Non-working age people per 100 people of the working age (person) (D)
Post-working age people per 100 people of the pre-working age (person) (D)
Post-working age people per 100 people of the working age (person) (D)
Technical infrastructure (TI)
People using the water supply system in the total commune population [%] (S)
People using the sewerage system in the total commune population [%] (S)
People using the gas supply in the total commune population [%] (S)
Length of the water supply distribution network per 100 km^2 [km] (S)
Length of the sewerage network per 100 km^2 [km] (S)
Length of the gas distribution network per 100 km^2 [km] (S)
Expenditure for transport and communication per person [PLN/person] (S)

Synthetic index of transport base (S):
– synthetic index of internal accessibility:
  • percentage of roads in the geodetic structure of the commune area [%]
  • percentage of railways in the geodetic structure of the commune area [%]
  • length of bike lanes per 10,000 km^2 of the commune area [km]
– synthetic index of accessibility of transport infrastructure facilities*
– a synthetic index of real (road) distance from the adopted points of reference [km]**

Social infrastructure (SI)
Average floor area in houses and flats [m^2] (S)
Average floor area in houses and flats per person [m^2] (S)

cont. Table 1

Partial indices
Number of flats per 1,000 people (*S*)
Children aged 3-5 years per one place in a kindergarten (*D*)
Net scholarisation index, primary schools [%] (*S*)
Number of books in libraries per 1,000 people (*S*)
Number of people per one library (*D*)
Distance from a hospital [km] (D)***
Proportion of leisure land and recreation in the commune area [%] (*S*)
Synthetic index of access to tourist attractions (*S*): – accommodation facilities offering SPA treatment per 1,000 people – accommodation facilities offering instructor-run activities per 1,000 people – accommodation facilities having tourist equipment rental per 1,000 people – accommodation facilities with a swimming pool per 1,000 people – golf courses per 1,000 people – length of bike lanes per 1,000 people – accommodation facilities with sauna per 1,000 people – accommodation facilities having sailing equipment rental per 1,000 people – accommodation facilities with a hippodrome/stud at the site per 1,000 people – accommodation facilities with a conference hall per 1,000 people – expenditures from the commune budget for tourism in section 630 [PLN/person]
Administration (A)
Proportion of the commune's own revenue in total revenue [%] (*S*)
Proportion of the commune area covered by the local plan to the total commune area [%] (*S*)
EU funds for financing community programmes and projects per person [PLN/person] (*S*)
Funds for financing the commune's own tasks obtained from other sources per person [PLN/person] (*S*)
Expenditure for education per person [PLN/person] (*S*)
Expenditure for culture and national heritage protection per person [PLN/person] (*S*)
Expenditure for healthcare per person [PLN/person] (*S*)
Market (R)
Population density [people/km^2] (*S*)
Proportion of special economic zones in the commune area [%] (*S*)
Proportion of personal income tax in taxes being state budget income [%] (*S*)
Proportion of corporate income tax per an employee in taxes being state budget income [%] (*S*)
Proportion of legally protected areas in the commune area [%] (*D*)

S – stimulant, *D* – destimulant.

 * Synthetic index of accessibility of transport infrastructure facilities was calculated by assigning weights to individual transport infrastructure facilities in the commune. The weight coefficients were multiplied by a number corresponding to the number of the transport infrastructure facilities in the specific commune. The weight coefficients were assigned depending on the category of roads in a commune: 3 – international or express road, 2 – trunk road, 1 – regional road; depending on the airports rank: 5 – international airport, 2 – other airport (sport, recreation, post-military); depending on the type of a border crossing point: 2 – road, 1 – railway; depending on the presence of a railway station or stop and a marine harbour: 3 – railway station, 2 – railway stop, 1 – marine harbour.

 ** This index was calculated as the sum of the distance from the capital town/village of the commune to the capital city of the voivodship and the capital cities of the neighbouring voivodships.

*** Distance from the commune capital town/village to the nearest hospital.

Source: own elaboration based on Godlewska-Majkowska (2012, 2013) and Nowicki (2014).

In order to eliminate excessive correlation between individual indicators, the coefficient of variation was calculated and the reversed matrix method was applied. The results of statistical verification were used as the basis for selecting for further analysis only those with a high coefficient of variance ($V > 20$) and uncorrelated with each other ($\tilde{r}_0 < 10$).

Due to the multidimensionality and comprehensiveness of the concept of investment attractiveness, it was necessary to include many elements in the analysis. A multidimensional comparative analysis proved useful (Pawlas, 2013, p. 163). The research was conducted using the method of taxonomic measure of development Z. Hellwig (Świdyńska, 2018, p. 74), which allowed for a hierarchy of communes in Warmińsko-Mazurskie Voivodship due to their potential investment attractiveness. A higher value of this indicator means higher potential investment attractiveness.

Synthetic indices characterising the five sections of attractiveness for investment were calculated for all the communes in the Warmińsko-Mazurskie Voivodship.

Based on the study findings, the communes were ranked from the highest potential attractiveness for investment (in general and in each of the five sections) to the least attractive and classified into four classes (Wysocki, 2010)[1].

The stepwise regression method was applied to determine which element had the greatest effect on the commune potential attractiveness for investment. The calculations were performed using the Statistica software package.

Potential investment attractiveness of communes in the Warmińsko-Mazurskie Voivodship

All of the communes in the Warmińsko-Mazurskie Voivodship (N=116) were analysed to identify the element with the greatest effect on the potential attractiveness for investment. The results of statistical verification were used as the basis for selecting for further analysis only those with a high coefficient of variance and non-correlation with each other. The following indices were left out based on the statistical verification: the employed per 1,000 people, percentage of employed people in the population of the working age, balance of foreign migrations per 1,000 people, percentage of people of working age in the total population, people of a non-working age per 100 people of the working age, people of post-working age per 100 people of the pre-working age, people

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[1] I: communes with high potential attractiveness for investment: $d_i \geq \bar{d}_t + S_{d_i}$ II: communes with medium potential attractiveness for investment: $\bar{d}_t \leq d_i < \bar{d}_t + S_{d_i}$ III: communes with average potential attractiveness for investment: $\bar{d}_t - S_{d_i} \leq d_i < \bar{d}_t$ IV: communes with low potential attractiveness for investment: $d_i < \bar{d}_t - S_{d_i}$; where: d_i – synthetic measure calculated by the Hellwig development pattern method; $\bar{d}_t$ – arithmetic average of the synthetic index d_i; S_{d_i} – standard deviation of the synthetic measure d_i.

of the post-working age per 100 people of the working age, the length of the water supply distribution network per 100 km^2, the length of the sewerage network per 100 km^2, percentage of roads in the geodetic structure of the commune area, percentage of railways in the geodetic structure of the commune area, average floorage area in houses and flats, average floorage area in houses and flats per person, number of flats per 1,000 people, proportion of personal income tax in taxes being state budget income, proportion of corporate income tax per employee in taxes being state budget income.

By applying the Hellwig development pattern method, the communes in the voivodship were classified with respect to the indices of potential attractiveness for investment and the synthetic indices of individual sections. These were separated into four classes from the most to the least attractive. The average level of potential attractiveness for investment prevailed (55% of the communes) in the voivodship communes and in the sections under analysis. The largest number of communes with a high development level were observed in the technical infrastructure and administration (15%) sections, while the smallest number of communes were observed (9%) in the "market" section (Tab. 2).

Table 2

The percentage of communes in the Warmińsko-Mazurskie Voivodship in individual classes depending on the level of potential attractiveness for investment and its components

Specification	Class			
Departments	I	II	III	IV
Potential commune attractiveness for investment	16	21	55	9
Labour resources	10	36	43	10
Technical infrastructure	15	19	59	8
Social infrastructure	14	32	39	16
Administration	15	29	46	10
Market	9	4	79	7

Source: own data.

The stepwise regression method was applied to determine which element had the greatest effect on the commune potential attractiveness for investment. The model obtained for all the communes of the Warmińsko-Mazurskie Voivodship ($N=116$) explained 99% of the variance of the commune's potential attractiveness for investment in the region. The multiple variance coefficient ($R=0.99$) indicated a strong link of potential attractiveness for investment with the five sections under analysis. A high level of F (5229.9) and the corresponding level of test probability p confirmed a statistically significant linear relationship. The value of t showed that the absolute term and the regression coefficient differed significantly from zero.

Potential investment attractiveness of a commune

Departments	Technical infrastructure	Administration	Social infrastructure	Labour resources	Market
Potential commune attractiveness for investment	0.37	0.23	0.18	0.11	0.09

Source: own data.

The results showed that the level of a potential commune's attractiveness for investment is affected by the following factors: technical infrastructure, administration, social infrastructure, labour resources and the market (Tab. 3).

According to a study by the College of Entrepreneurship Science, the Warmińsko-Mazurskie Voivodship is ranked 13th in terms of potential attractiveness for investment among the voivodships of Poland (*Atrakcyjność inwestycyjna regionów 2017. Województwo warmińsko-mazurskie*, 2017). Along with Świętokrzyskie, Lubelskie and Podlaskie, the Warmińsko-Mazurskie Voivodship is among the least attractive for investment. The attractiveness for investment in all voivodships can be increased by using their unique resources as a base (*Atrakcyjność inwestycyjna regionów Polski 2016*, 2016).

A study by Invest in Poland, entitled *Atrakcyjność inwestycyjna regionów Polski 2016* (2016) examined the potential attractiveness of communes for investment based on six synthetic indices called microclimates: labour resources, technical infrastructure, social infrastructure, market, administration and nature. Apart from a determination of the general attractiveness of communes for investment, its level was also determined for four economic sections: processing industry, accommodation and gastronomy, commerce and repair as well as professional, scientific and technical activities. Therefore, one additional section, omitted in this study, was taken into account – the natural microclimate. The need for taking it into account in the study mentioned above may be a result of analysing the potential attractiveness for investment for the section accommodation and gastronomy, which is closely related to tourism, as well as to professional, scientific and technical activity. The natural microclimate can be regarded as a stimulant for these sections, it can also be regarded as a destimulant for the processing industry and it could be a stimulant or destimulant for commerce and repair, depending on the type of activity. The highest marks in all of the sections under analysis were given to nine communes of the voivodship (8 urban and one rural). The largest number of communes with above-average attractiveness for investment was found in the "accommodation and gastronomy" section. In total, the level of potential attractiveness for investment in the "accommodation and gastronomy" section is above average or higher in more than half of the communes of the Warmińsko-Mazurskie Voivodship. Therefore, it is justified to regard the touristic sector as one of the best opportunities in the Warmińsko-Mazurskie Voivodship.

The report entitled *Atrakcyjność inwestycyjna regionów 2017. Województwo warmińsko-mazurskie* (2017) examines the level of potential attractiveness for investment based on five factors: the situation in the labour market, technical infrastructure, social infrastructure, situation in the market and natural conditions. Administration, taken into account in this study, was disregarded. It was replaced with natural conditions, with the argument that there is a need for "evaluation of attractiveness of location of touristic and related services". The level of potential attractiveness for investment was also examined in the following sections: processing industry, commerce and repair, accommodation and gastronomy as well as professional, scientific and technical activity. The highest marks in all the sections under analysis were given to 17 communes (15 urban and 2 rural). In total, the level of potential attractiveness for investment in the "accommodation and gastronomy" section is above average or higher in nearly 40% of the communes of the Warmińsko-Mazurskie Voivodship.

The findings of studies conducted in 2016 among investors for the Wrocław agglomeration showed that the level of attractiveness for investment is affected to the greatest extent by: size and quality of labour resources, engineering personnel, knowledge of foreign language by the population/workers, common safety level, size and quality of labour resources, managerial staff and cost of labour, and engineering personnel (Ignacy, 2016, p. 94). In terms of the factors of attractiveness for investment analysed in this study, the majority of these factors (except for the common safety level) can be included in the "labour resources" section. This factor was of the greatest importance among the communes of the Warmińsko-Mazurskie Voivodship.

The findings of a study conducted among communes representatives by W. Lizińska, R. Marks-Bielska and R. Kisiel (2011, p. 195-198) showed that the attractiveness of communes of the Warmińsko-Mazurskie Voivodship for investment was affected to the greatest extent by location (100% of the respondents mentioned its distinct or significant effect) and technical infrastructure and land development (85% of the respondents mentioned the distinct or significant effect of each). The "land development" factor should be regarded as an element of technical infrastructure, whereas, according to the study authors: "The commune location is rather a historical factor, whose importance should be reduced by applying tools, such as creating economically privileged areas".

According to the findings of a study (Lizińska & Nazarczuk, 2008, p. 150) conducted among commune representatives, investors were offered aid to encourage them to invest in communes of the Warmińsko-Mazurskie Voivodship, such aid having the form of tax exemptions, assistance in finding unoccupied land or establishments and improvement of the technical infrastructure condition. The findings indicate that the last of these factors has a great effect on the level of commune attractiveness for investment.

Many authors have emphasized the importance of infrastructure as a factor in economic development (Gładkowska-Chocian, 2016, p. 151, 152; Świdyńska, 2017, p. 60; Adamowicz, 2011, p. 198; Burda &Wyplosz, 2013, p. 145; Ratajczak, 2000, p. 84).

Conclusion

A link was observed between the level of a commune's potential attractiveness for investment and their type. Urban communes proved to be the most attractive places for investment and the rural communes the least so. These findings are consistent with the center and peripheries theory. The urban communes are the center which develop faster. Rural communes, which are unable to keep pace with them, are the peripheries. Olsztyn – the capital city of the voivodship – is regarded as the growth pole. The city, together with the neighbouring communes (regardless of their type) has high potential attractiveness for investment.

The study findings show that communes oriented towards improvement of potential attractiveness for investment should take action regarding each of the sections analysed; however, such improvement can be achieved most effectively by investing in technical infrastructure.

The Warmińsko-Mazurskie Voivodeship is one of the least developed in the country. For the less developed regions, the priority is to exceed a certain developmental ceiling, triggering the process of self-sustainable growth and development. The creation of infrastructure should be a priority.

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