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Summaries

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SOCIO-ECONOMIC POTENTIAL
OF POLISH VOIVODSHIP CITIES

Summary: The aim of the research was to evaluate the differences in the level of the socio-economic potential of Polish voivodship cities. Also, an attempt was made to answer the question if there is a positive relationship between the level of this potential and the economic performance of the surveyed cities. It was assumed that socio-economic potential can be described in four dimensions: 1) development level of economic infrastructure, 2) development level of social infrastructure, 3) quality of human and social capital, and 4) economic development level. The obtained results indicate that voivodship cities are characterized by a significant variation of endogenous potential. However, one cannot observe a direct relationship between the level of the socio-economic potential and the economic development level of voivodship cities.

Keywords: socio-economic potential, voivodship cities, economic development.

1. Introduction

In the real economy, one can always observe two opposite tendencies. The first leads to the spatial concentration of an economic activity, and the second is responsible for its dispersion in space [Gorzelak 2009, p. 8]. When the former is stronger, it causes spatial differences in the level of economic development.

Independently from the still ongoing discussion, of if and how, the observed differences in the level of economic development are economically and socially desirable, there is a consensus that the main reason for the spatial concentration of enterprises is a variation in the level of the socio-economic (endogenous, internal) potential of cities, regions and countries. Enterprises and consumers seeking to maximize their profit and utility will chose locations which offer well-developed internal resources. This leads to a higher concentration of economic activity, which stimulates the growth of further external advantages.

In recent years in Poland one could observe growing differences in the level of economic development, especially in a regional dimension. This is well documented in many researches [see for example: Jóźwik 2012; Korenik 2011; Heller 2010]. The

process of economic divergence might be caused by the diversification of socio-economic potential.

The aim of the presented research was to measure the differences in the socio-economic potential of Polish voivodship cities. This was done using the authors' synthetic index of socio-economic potential. Several statistical data were used to evaluate socio-economic potential, which was divided into four dimensions – 1) economic infrastructure, 2) social infrastructure, 3) quality of human and social capital, 4) level of economic development. By measuring the differences in the level of the endogenous potential of voivodship cities it was possible to assess, in an indirect way, whether the observed factors had any influence on the disparities in the level of the economic development of the researched cities.

2. The aim, research hypothesis and the data source

In order to achieve the research objective. a synthetic index of the socio-economic potential of cities was constructed. This accounts for a number of variables influencing the quality of life and also determining the effectiveness of economic activity. The index allows to measure the level of localization advantages of a city. The socio--economic potential of a city was defined as the ability of a city to keep existing or to attract new enterprises or/and inhabitants.

The study adopted a research hypothesis, which assumes that the socio-economic potential of voivodship cities is strongly varied, with its highest levels in cities that are characterized by a high level of economic development. To put it in other words, there is a positive relation between the level of the endogenous potential of cities and their level of economic development. Numerical confirmation of this relationship may help to identify the factors playing a dominant role in the process of economic divergence in Poland. Some grounds for the formulation of this hypothesis were the earlier analyses carried out by one of the authors. In these researches an analogous dependence was observed for all cities in Poland [Bogdański 2012, pp. 13-20].

The analyses carried out were divided into two stages. During the first one a synthetic index of the socio-economic potential of voivodship cities was constructed and calculated.

In the second part, the obtained results were compared with data describing the economic development level of voivodship cities. Data used in this part of the analysis related to the level of average gross monthly salary. This was caused by the lack of access to other data reflecting the economic development level of cities.

The time range of the research covers the period of 2003-2008. This was mainly dictated by the limited availability of statistical data relating to Polish cities. Unfortunately, up to the date of the research, the last period for which comparable data were available was 2008.

The source of data was the statistical database of Główny Urząd Statystyczny (GUS) called Bank Danych Lokalnych (Local Data Bank) and reports of GUS

entitled *Miasta w liczbach* (*Cities in Figures*) for 2003-2004, 2005-2006 and 2007-2008.

3. The concept of socio-economic potential, its dimensions and measures

Although the term "potential" is widely used in many science disciplines, especially in physics, its application in economic sciences is relatively rare. Most often it is identified with the ability of a specific place to influence its surroundings. The level of potential, according to this approach, is measured using gravitation models taken from physics [Wójcik 2009, p. 98].

In a second approach, the term "potential" is understood as the ability of an economic system (state, region, city) to produce goods and to satisfy the needs of its inhabitants and enterprises. This translates into faster economic growth and an improvement in the quality of life. Potential is determined by the internal resources of capital, labour and by the level of economic development already reached. In this way, to measure the level of potential, one can use taxonomic methods and methods of linear ordering [Myadzelets 2009, p. 160].

In the presented paper, potential is understood according to the latter approach. It is described by a number of localization factors offered by a city. The higher they are, the greater the ability of a region or a city to maintain the existing and to attract new entrepreneurs and inhabitants [Nazarczuk, Kisiel 2013, pp. 3-4]. In consequence, this leads to the higher rate of economic growth.

One of the elements of socio-economic potential is the development level of the infrastructure. This can be divided into two categories [*World Development Report* 1994, p. 2]:

– economic infrastructure – consists of: public utilities (for example: power stations, drainage and telecommunication), public works (sewer, irrigation, road building), and transport (railways, public transport);
– social infrastructure – consists of means and services in the field of education, health care, social care.

Economic infrastructure, in some respects, can be identified with the hard localization factors, which decide if the endogenous functions of a city can be properly fulfilled [Bogdański 2012, p. 15]. Social infrastructure, in turn, determines the quality of life in a city. It is essential to satisfy the non-material needs of cities' inhabitants and is "rooted" in specific objects, buildings and people working in them [Juchnicka, Skibicka-Sokołowska 2001, pp. 147-148]. It determines the number and quality of soft localization factors offered by a city. From the perspective of enterprises, it is also very important to have access to business support services. These are such types of activities like: finance and insurance, real estate services, advertising and marketing, accounting, professional management. According to the

Polish Classification of Activities (Polska Klasyfikcja Działalności – PKD) these types of services belong to sections K, L, M.

One should however remember that the level of an infrastructure, its quality and availability, is also dependent on the level of economic development. There is a strong relation between those two factors. Thus in order to measure the level of socio-economic potential of a city there is a necessity to include measures which will also be related to the level of economic development.

The analysis carried out, except of the measures mentioned above, also include variables relating to the level of human and social capital. This is due the fact that human and social capital play a more and more important role in stimulating economic processes. Human skills, competence, creativity have a significant impact on economic actors, their innovation and competitiveness. A precondition for economic development at regional and local level, especially in the era of a knowledge-based economy, is the high quality of human and social capital [Korenik 2011, pp. 41-48]. Kukliński notes that human and social capital is particularly important for less developed regions and cities, as it promotes collective action, supports and accelerates the creation and diffusion of knowledge and innovation, and stimulates development of networks between enterprises [Kukliński 2003, p. 9].

The term "human capital" can be defined as "skills of individual people, their accumulated knowledge, and an ability to work, their health and hygiene". Human capital is a "carrier" of knowledge and innovation, which enables economies to effectively compete and develop [Chądzyński 2007, p. 84].

With regard to social capital, the subject literature still lacks a precise and universal definition of the term. Some definitions draw attention to the individual benefits which can be achieved with the development of this resource, while others emphasize the collective dimension of these benefits. Nowadays it seems that the latter approach prevails. In this context, social capital consists in social ties, networks and norms of reciprocity and trust which arise with the development of networks. A high level of social capital leads to an increase in economic activity and the improvement in the functioning of public institutions [Sorensen 2012, p. 875].

Summarizing, one should note that the socio-economic potential of spatial units can be described in four dimensions. These are: 1) economic infrastructure, 2) social infrastructure, 3) the level of economic development, and 4) the quality of human and social capital. In order to measure the socio-economic potential and to make comparisons of territorial units, it is necessary to consider all of these dimensions. At the same time, it can be assumed that with the development of the endogenous potential of cities one can expect the more dynamic economic development of spatial units.

4. The research method

To construct a synthetic index of the socio-economic potential of cities, the Hellwig method was used. This is one of the linear positioning methods which allows for transforming the researched spatial units described by many variables into a one-dimensional space. This is possible by constructing so-called synthetic variables. The interrelations between these objects can be measured by using a distance function (in the research the distance was calculated using Euclid's measure). The main advantage of this method is that its interpretation is simple and that it allows the positioning of objects according to the value of the index [Wanat, Zeliaś 2000, pp. 75-82].

The use of this method requires, in the first place, the construction of a hypothetic reference object (by using variables which have the highest values for stimuli and the lowest values for destimuli), and then the calculation of the distance between the real, studied objects and the reference one. When the distance is smaller, then the index value is closer to 1. With an increase of the distance between the reference and the studied object, the value of the index approaches 0. A detailed algorithm of constructing a synthetic index according to Hellwig's method is described by Sokołowska-Woźniak [Sokołowska-Woźniak 2008].

In the study, a total number of 33 variables were used to construct a synthetic index of the socio-economic potential of Polish cities. After the elimination of variables which were highly correlated and not diversified enough, 16 variables were left. These were:

– x_1 – percentage of city inhabitants using the water supply system;
– x_2 – percentage of city inhabitants using sewerage;
– x_3 – percentage of city inhabitants using the gas system;
– x_4 – length (in km) of the city roads with an improved surface per 1,000 city inhabitants;
– x_9 – number of beds in hotels and motels per 1,000 city inhabitants;
– x_{11} – number of seats in cinemas per 1,000 city inhabitants;
– x_{12} – number of medical doctors per 1,000 city inhabitants;
– x_{13} – number of kindergartens per 100,000 city inhabitants;
– x_{15} – number of theatres and music institutions per 100,000 city inhabitants;
– x_{16} – number of enterprises operating in sections K, L, M per 1,000 city inhabitants;
– x_{17} – population density in cities;
– x_{18} – percentage of population of productive age in the labour force in cities;
– x_{20} – percentage of employed in the labour force;
– x_{22} – number of graduates of higher schools per 1,000 city inhabitants;
– x_{26} – number of infant deaths per 1,000 births in city;
– x_{27} – number of people migrating to city per 1,000 city inhabitants.

All the variables were given the same weighting coefficients. The author is aware that this might be a simplification. However the proper identification of these coefficients would require a much more advanced statistical analysis. In turn, assuming their values a priori by the author could lead to greater mistakes in the obtained results [Pociecha 1998, p. 56].

5. Socio-economic potential diversification in voivodship cities in 2003-2008

In Table 1, the values of the synthetic index of the socio-economic potential of Polish voivodship cities in the period of 2003-2008 are presented. In the case of the kujawsko-pomorskie and lubuskie voivodships, where the governor and council cities are separate cities, the index was calculated for the two cities together.

Table 1. Socio-economic potential index values of Polish voivodship cities in 2003-2008

City	Year						Average 2003-2008
	2003	2004	2005	2006	2007	2008	
Wroclaw	0.29	0.32	0.34	0.23	0.24	0.25	0.28
Bydgoszcz + Torun	0.10	0.07	0.15	0.15	0.10	0.07	0.11
Lublin	0.17	0.16	0.12	0.14	0.14	0.09	0.14
Gorzow Wlkp. + Zielona Gora	0.11	0.17	0.16	0.11	0.11	0.11	0.13
Łodz	0.11	0.14	0.11	0.11	0.13	0.08	0.11
Krakow	0.45	0.45	0.46	0.43	0.36	0.31	0.41
Warsaw	0.49	0.53	0.55	0.50	0.49	0.39	0.49
Opole	0.32	0.28	0.29	0.23	0.25	0.25	0.27
Rzeszow	0.27	0.26	0.26	0.21	0.38	0.22	0.27
Bialystok	0.15	0.11	0.10	0.10	0.09	0.13	0.11
Gdansk	0.17	0.20	0.19	0.20	0.21	0.15	0.19
Katowice	0.34	0.34	0.33	0.32	0.27	0.24	0.31
Kielce	0.20	0.20	0.19	0.22	0.15	0.10	0.18
Olsztyn	0.43	0.44	0.38	0.33	0.27	0.24	0.35
Poznan	0.35	0.35	0.36	0.32	0.33	0.26	0.33
Szczecin	0.17	0.21	0.23	0.16	0.18	0.12	0.18

Source: authors own calculations based on: GUS Bank Danych Lokalnych http://www.stat.gov.pl/bdl and GUS *Miasta w liczbach 2003-2004, Miasta w liczbach 2005-2006, Miasta w liczbach 2007-2008.*

In all of the analyzed years, Warsaw was characterized by the highest socio-economic potential. It has a well-developed economic and social infrastructure. In each of the analyzed years it was characterized by the highest number of enterprises in sections K, L, M and the greatest population density. In addition, the variables reflecting the quality of human capital were also at a relatively high level. Warsaw was also the only city in which one could observe the high positive values

(absolutely and relatively) of net internal migration (only in 2007 in relative terms did Rzeszow have a higher net internal migration). Of course this is largely due the fact that Warsaw is the biggest Polish city and the capital of the country.

A relatively high socio-economic potential could also be observed in Krakow. Compared to other cities, Krakow was characterized by a highly developed economic infrastructure and a relatively well-developed social infrastructure. Taking into account that Krakow is one of the biggest academic cities in Poland, it is surprising that there was a noticeable distance between this city and other voivodship cities in terms of human capital quality. This was especially visible when analyzing data on the number of graduates per 1,000 inhabitants. The high level of the socio-economic potential of this city was also demonstrated by the fact that in all the years (except for 2008) one could observe positive net internal migration. This shows that the city was seen as a relatively attractive place to live and to do business in, with a growing number of enterprises in general, and in sections K, L, M per 1000 inhabitants.

Comparing the other cities, it is surprising that one could observe the relatively high values of the index in some of the smallest voivodship cities like Olsztyn, Rzeszow and Opole. More detailed analysis reveals that they all had a well-developed economic and social infrastructure. In addition, the relatively high position of Olsztyn was decided by the comparatively high proportion of population of a productive age, low infant mortality and a positive, though small in absolute terms, balance of internal migration. Rzeszow, in turn, had a very high percentage of employed and a high number of graduates per 1,000 inhabitants. One of the reasons for the high position of these cities could be their relatively small population. As voivodship capitals, they are a natural place for locating public institutions providing specialized services of a higher order (administrative, cultural, commercial, educational), which is an element of the ESPON program for greater cohesion [Szlachta 2011, p. 33]. The small number of inhabitants means that these institutions and their range of services is more available for the residents. The question is, however, whether the quality of these services is similar to those provided in bigger cities.

A surprise may be the lower position of such cities as Lodz, Torun and Bydgoszcz, Szczecin and Gdansk. A common feature of these cities is that, apart from a relatively well-developed economic infrastructure, they all were characterized by a low level of social infrastructure (the variables related to this dimension of the city`s potential rarely exceeded 70% of the corresponding variables for the "leader" cities) and a very differentiated level of human capital. The relatively low position of these cities may result from the fact that they are still struggling with the problem of restructuring their economies after the collapse of industry which before 1989 was stimulating their growth. This is particularly the case with textile industry in Lodz, and shipbuilding in Gdansk and Szczecin.

To conclude, Polish cities are characterized by a great diversity of socio-economic potential. Comparing the average values of the synthetic index in the period of 2003-2008, the difference between the city with the greatest potential – Warsaw, and the

lowest level – Torun and Bydgoszcz, was almost 4.5-fold. One may also notice some regularity in its variation.

Relatively high values of the index were characteristic for the largest cities in Poland. This goes primarily for Warsaw, but also for Krakow, Poznan and Wroclaw. Smaller cities and most of the voivodship capitals located in the so called 'eastern wall' of Poland were characterized by the relatively low values of the index. Hence, it is worthwhile to compare the data on the level of the socio-economic potential of the cities with data describing the level of their economic development.

The relation between those two measures is presented in Figure 1. One of the most often used synthetic measures of economic development level is value of GDP per capita. Unfortunately GUS does not publish data on its value in Polish cities. Therefore, as a rough measure of the economic development of voivodship cities, the authors decided to use the data on the value of an average monthly salary in voivodship cities. A correlation coefficient value calculated for voivodships between the values of GDP per capita and average monthly salaries in 2002-2010, was between 0.98 and 0.99 so there was an almost ideal correlation between these two measures.
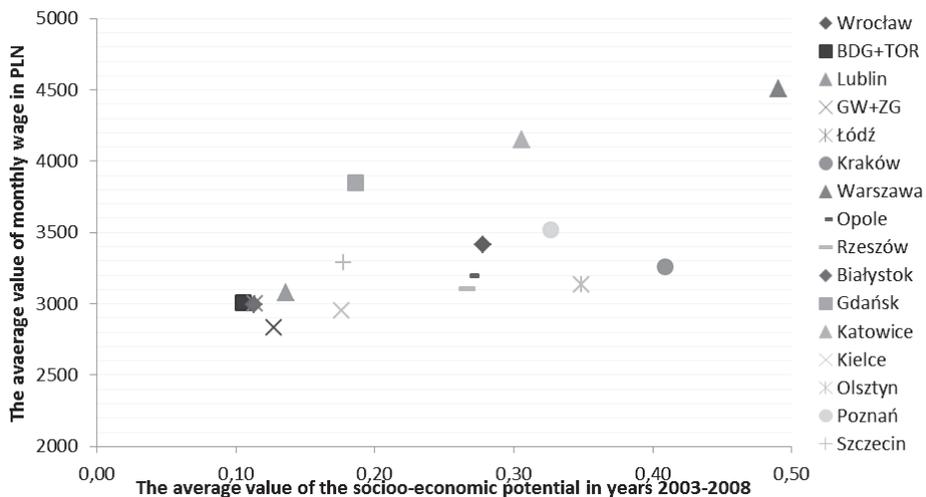
Figure 1. Average values of socio-economic potential and monthly salary in Polish voivodship cities during 2003-2008.

Source: authors own calculations based on: GUS Bank Danych Lokalnych http://www.stat.gov.pl/bdl.

Analysis of the data does not allow confirming the existence of a positive relationship between the level of socio-economic potential and the average monthly salary in the surveyed cities. There is only one cluster of cities, including Kielce, Lublin, Bialystok, Lodz, Bydgoszcz and Torun, Gorzow Wielkopolski and Zielona Gora. These are cities with a relatively low socio-economic potential and low level

of average remuneration. At the other extreme, there is Warsaw with by far the greatest socio-economic potential and the highest salaries. In the case of other cities the relationship is not as clear. The calculated correlation coefficient between the studied measures reached 0.65 ($p<0.05$), which also indicates the lack of a significant relation. It may, however, also suggest that the process of economic development of cities was also affected by other factors, both internal and external, which were not included in the index. However the question remains open, as to what extent the obtained results were influenced by the method used and by the inability to obtain certain statistical data relating to such aspects as the quality of social capital and the level of the economic development of cities.

6. Summary and conclusions

The aim of the presented research was to evaluate the differences between the level of the socio-economic potential of Polish voivodship cities. The term potential was defined as the ability of the surveyed cities to maintain their existing status and to attract new inhabitants and enterprises. It was also assumed, that the socio-economic potential of cities can be described in four dimensions: 1) economic infrastructure, 2) social infrastructure, 3) quality of human and social capital, and 4) economic development level. In order to construct the synthetic index of the socio-economic potential, a total number of 33 variables were used. In the research an attempt was also made to analyze if there was a positive relationship between the level of socio-economic potential and the level of economic development of voivodship cities in Poland. The conducted analyses allowed us to draw some basic conclusions.

During 2003 and 2008, one could observe significant disparities in the level of the socio-economic potential of voivodship cities. The difference between the city with the biggest potential (Warsaw) and cities with its lowest level, was more than 4.5-fold. Despite small shifts in the selected years, the ranking of cities in terms of socio-economic potential was quite stable. Usually the highest levels of potential were characteristic for the biggest cities, capitals of large and relatively highly developed voivodships (Warsaw, Poznan, Wroclaw and Krakow). The lowest level of potential could be observed in Torun and Bydgoszcz, and the capitols of voivodships located near the eastern border of Poland (Bialystok, Kielce, and Lublin). These were also relatively poorer regions.

These observations could suggest the existence of a positive relationship between the level of the socio-economic potential of cities and their economic performance. However, the analyses carried out do not allow to make a clear decision on this issue. The relationship was only evident in the case of some cities with low potential and low level of economic development. It is also apparent for Warsaw, which was in the exactly opposite position.

A common feature of cities with low socio-economic potential is that they are located in regions with a low level of economic development and a peripheral

location. This means that the "gaps" in their endogenous potential were strengthened by external factors – a poorly developed economic base, outdated structure of production, and low innovativeness. In addition, the low accessibility of these cities makes them unattractive for potential investors who could contribute to their development. In the case of these regions, we are dealing with an accumulation of negative factors creating a kind of a vicious circle. It can therefore be concluded that the voivodship cities of mainly eastern Poland are weak mainly due to the weakness of their regions.

The fact that negative influence of a weak regional economy can reduce the positive effect of a relatively well-developed city`s potential, are provided by the examples of Olsztyn and Rzeszow. These cities were characterized by a relatively high level of socio-economic potential, which however did not translate into fast economic growth. This is probably caused by the fact that their regions lack other big urban centers, which limited the movement of goods, people and ideas. This in turn, did not lead to the development of more intensive networks stimulating growth of production. It also limited the ability to create innovation.

On the basis of the research results one can also state that, although the index of socio-economic potential is a useful tool for measuring disparities in the endogenous potential of cities and their localization advantages, its use in explaining the disparities in the level of economic development is limited.

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POTENCJAŁ SPOŁECZNO-GOSPODARCZY MIAST WOJEWÓDZKICH W POLSCE

Streszczenie: Celem badań było oszacowanie różnic w poziomie potencjału społeczno-gospodarczego miast wojewódzkich w Polsce. Podjęto także próbę odpowiedzi na pytanie, czy istnieje pozytywna zależność między wartością wskaźnika opisującego ten potencjał a przebiegiem procesów gospodarczych w badanych miastach. Przyjęto założenie, że potencjał społeczno-gospodarczy może być opisany w czterech wymiarach: 1) poziomem rozwoju infrastruktury ekonomicznej, 2) poziomem rozwoju infrastruktury społecznej, 3) jakością kapitału ludzkiego i społecznego, 4) poziomem rozwoju gospodarczego. Uzyskane wyniki pozwalają stwierdzić, że stolice województw charakteryzują się znacznym stopniem zróżnicowania poziomu potencjału społeczno-gospodarczego. Jednakże nie można zaobserwować bezpośredniego związku między poziomem potencjału społeczno-gospodarczego a poziomem rozwoju gospodarczego miast wojewódzkich.

Słowa kluczowe: potencjał społeczno-gospodarczy, miasta wojewódzkie, rozwój gospodarczy.