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**SPATIAL DIVERSITY OF ECONOMIC POTENTIAL AND THE
CONCEPT OF BIPOLAR DEVELOPMENT
– THE CASE OF WARSAW AND ŁÓDŹ**

1. INTRODUCTION

Contemporary globalisation processes accelerate changes in the paradigm of the socio-economic development of territories. Particular importance is acquired by such qualities of urban and regional economy as openness, flexibility, innovation and competitiveness. The present socio-economic structural transformation necessitates a process of constant learning, creation and application of knowledge as well as systematic monitoring of changes and rapid reaction to unwanted stimuli. The existing spatial inequalities in the level of socio-economic development between and within countries and regions are largely a consequence of their capabilities for adaptation to a multitude of rapidly changing conditions (from local through regional to global).

Representatives of various branches of science connected with transformations of spatial structures observe diverse processes which require a completely different approach to the prevailing theory and practice of regional and local development. The processes of globalisation and metropolitanisation quickly change spatial structures formed during industrialisation and urbanisation period of the 20th and 21st century. Intensive developments occur in national and regional settlement systems. The changes affect not only the hierarchy of centres measured in terms of their demographic or economic resources, but above all the intensity and direction of relations between settlements'. The situation is further

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complicated by the fact that the regional and national settlement systems are influenced by worldwide impulses and become a part of a global system. In such configuration the vertical hierarchical relations in the settlement system become weaker, and are replaced by new, more complex horizontal relations, whose geographical horizon, thanks to advances in communications, is practically unlimited.

Competition for innovation as a source of both modernisation and income, especially innovation which attracts other innovative activities, requires amassing and growth of a certain category of goods (known as innovative goods) and functions capable of servicing the processes of their exchange and management.

Competition in economy of the globalisation period becomes stronger not only between business enterprises, but it also exists in an expanded form within territorial systems. Investments, people and companies are all objects of competition between regions, especially large cities located on their territories, which are the most important elements of their structure as well as the main nodes of national settlement system. Intensification of these phenomena at different territorial levels – from parts of the world, through nations and regions, all the way to particular settlements – necessitates an integration of actions. Territories that are closely located to each other (nations, regions and cities), seek to profit from mutual competitive advantage or to undertake actions in order to avert the danger of marginalisation. Incorporation of the Polish settlement system into the worldwide information, capital and investment flow necessitates a revision of the present view of Poland's spatial structure, especially the notions of polycentric and balanced development. One of the ways to increase the potential of the main settlement nodes without placing development constraints on some in favour of others are bipolar, or multipolar, concepts of development of agglomeration. The authors of the concepts demonstrating the capabilities of functional-spatial integration of agglomerations draw attention to the fact that such actions ought to result in bettering the competitiveness of Polish and European space (i.e. Kołodziejski, 1996; Markowski and Marszał, 2002; Ziolo, 2003).

2. POLAND IN THE EUROPEAN SPACE

One of the important elements of the European socio-economic change monitoring is observation of changes in territorial organisation. ESPON's (European Spatial Planning Observation Network) research stresses that identification of differences in European socio-economic space on many levels – regional, national and European – should progress i.a. towards formulating a concept of policy of cohesion and thus breaking down disproportions (*Territory Matters...*,

2006). Balancing of European structures involving recognition of the need polycentric development is reflected, among others in searching for such centres, beyond those forming ‘Pentagon’ described by ESPON’s researchers, which are capable of absorption of positive development stimuli from the European Union’s ‘core’, of generating innovations and exerting influence onto their nearest space (*Territory Matters...*, 2006).

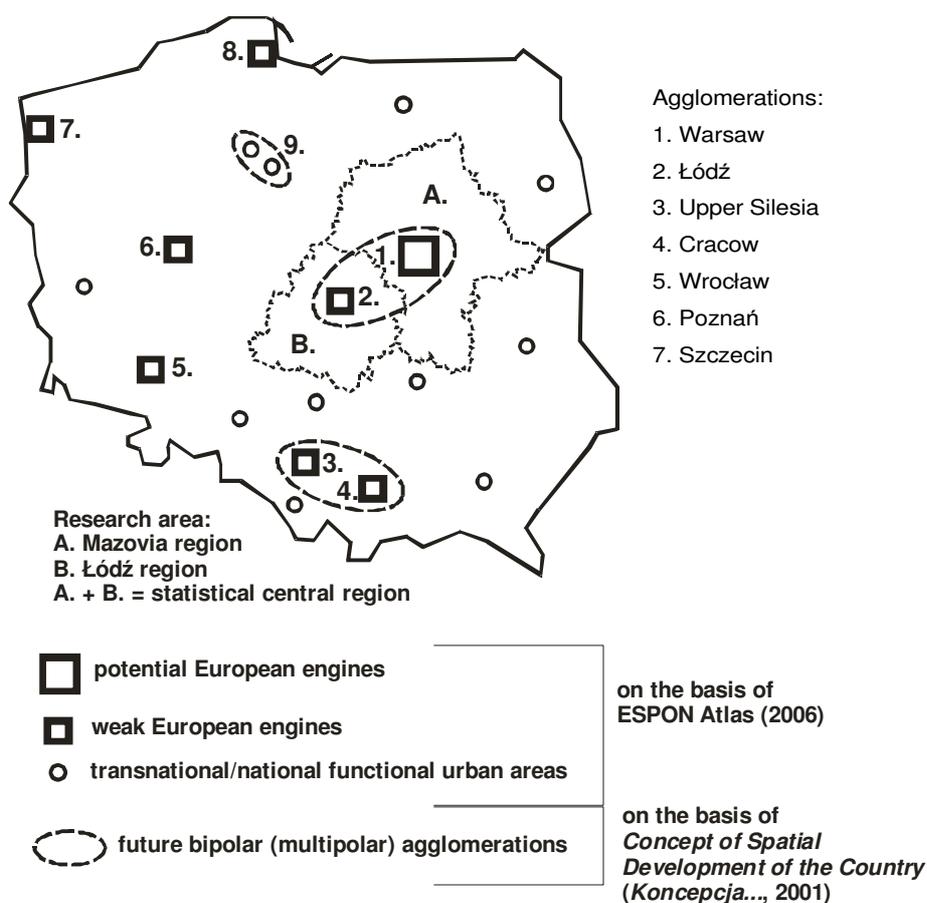


Fig. 1. Elements of European urban system in Poland
 Source: on the basis of *ESPON Atlas* (2006, pp. 28–29)

In Eastern Europe, treated as European outskirts, Budapest and Warsaw are thought of as specific ‘isolated hotspots’ outside the development ‘core’ (‘Pentagon’). Polish capital is described in ESPON research as a potential European growth pole (*Territory Matters...*, 2006; *ESPON Atlas*, 2006). Amongst large Polish urban clusters in the group of strategic importance (category – weak) are

included such agglomerations as Upper Silesia, Gdańsk–Gdynia, Łódź, Cracow, Wrocław, Poznań and Szczecin (figure 1). Analysis of the spatial distribution of these agglomerations provides some basis for rethinking the concept of Poland's spatial development, taking into account the European perspective, especially the perception of the country's spatial potential. Observation of processes from this perspective gives rise to reflections, in which the main motives are ideas for integration of certain centres, which should result in strengthening the competitiveness of Polish territory in the European space. On the basis of the classification produced by ESPON, attention should primarily be focused on two metropolitan areas: Warsaw–Łódź and Upper Silesia–Cracow.

3. BIPOLARITY OF AGGLOMERATIONS IN THE SPACE OF POLAND

Considerations over bipolarity of agglomerations in the space of Poland possess primarily character of theoretical and forecast studies and in most cases are connected with concepts of spatial development of Poland. Forerunning work in this area was published in the 1970s by S. Leszczycki, P. Eberhardt and S. Heřman as well as B. Malisz, who proposed as a basis of a development plan for Poland an arrangement of agglomerations in the fashion of systems of belts and nodes (Bański, 2007). It was presumed that urbanisation of space would progress along communication lines, which should have lead towards mergers of some agglomerations (Warsaw–Łódź, Upper Silesia–Cracow, Bydgoszcz–Toruń). Most of the plans of Poland's spatial structure development in the 1970s and 1980s appeared to be out of proportion and unreal to effectuate, which later found expression in the formulation of a thesis about 'persistence of spatial structure of the country' (i.e. Dziewoński and Malisz, 1978).¹

The socio-economic transformation of the country, inclusion of Poland into European structures and growing processes of globalisation and metropolisation verified the basic assumptions of the country's development plans, both in reference to exogenous factors (i.e. political and economic position of the country, integration of European structures) and endogenous factors (i.e. restructuring and modernisation of the economy, emergence of local government). The most important dilemma in the *Koncepcja polityki przestrzennego zagospodarowania kraju (Concept of Spatial Development of the Country)* (2001, 2005) is reconciling the postulate of competitiveness and effectiveness with balanced development of Poland (Bański, 2007). In this concept it is presumed that a concentration of socio-economic potential in the main nodes

¹ An extensive discussion of the concept of spatial development of the country was published by Bański (2007).

(agglomerations) of the country should in the longer perspective free positive impulses in the so called potential growth poles and in the peripheral zones (*Koncepcja...*, 2001).

The *Concept* has also introduced a notion of bipolarity, which corresponds to the idea of strengthening spatial competitiveness through creation of bipolar connections between centres (Warsaw–Łódź, Upper Silesia–Cracow, Bydgoszcz–Toruń). Many different studies emphasise future importance of Warsaw–Łódź agglomeration as a space which generates innovation and cultural influence on European level yet oriented towards the eastern part of the continent (Kudłacz *et al.*, 2003; Kuciński, 2003; Poniatowska-Jaksch, 2002).

The concept of Warsaw–Łódź union aroused much interest among scientific, planning and local government circles as well as inhabitants of these agglomerations. However, the idea has been surrounded by vagueness, especially as regards the form and scope of integration, functions of both elements in such settlement system, parallel existence of competition and cooperation and also (perhaps above all) tools which should be used to implement this idea. It can also be questioned whether the idea of bipolarity for the Warsaw–Łódź system is merely a planning procedure intended to produce an impression that large centres of innovation capable of being competitive in the space of Europe and the world are present in the space of Poland, and whether, in the face of the process of integration, this concept has any real merit for potential partners.

4. DIVERSITY OF ECONOMIC POTENTIAL IN THE CENTRAL REGION

4.1. Thesis and Methods of Research

Contemporary research into changes in the settlement system of Poland ought to encompass a number of issues and employ a diverse range of research methods. The already proven, not only in the field of geography, dual model of settlement system research can be employed to investigate the state of development of bipolar systems (i.e. Maik, 1998). On the one hand research examines global effects of human activities, i.e. the analysis comprises the morphology and functions of settlement systems, and on the other hand attention is focused on identification of factors responsible for the mechanisms of changes.

In this study attention is concentrated on the first dimension i.e. the spatial structure of the economic potential in the central region, identified using a set of economic measures for the poviats (counties) of Mazovia and Łódź voivodeships (administrative regions). The aim of the study is to identify the magnitude

of differences in spatial diversification of economic potential in the statistical central region (NTS 1) and to refer the results of the research to the concept of bipolar development of Warsaw–Łódź agglomeration.

The following thesis is proposed in the article: ‘Economic potential of Łódź agglomeration is much lower than the economic potential of Warsaw agglomeration, which can be considered to be one of the structural barrier to the development of a balanced bipolar system’.

Statistical material was obtained with the use of the method of potential. The notion of potential in literature possesses a colloquial and scientific meaning. As a colloquial term it means a certain capability or efficiency characteristic of someone or something in a given discipline. However, in science potential means a certain property or dimension characteristic for a field. In the socio-economic sciences which adopt naturalistic model of explanation potential is described by method(s) transferred from physical models of gravitation (Chojnicki, 1966). A potential of a point is described as a certain value or measure of influence of other points which possess certain mass and are at a certain distance. The potential of a point is directly proportional to mass and distance, which means that its high values depend on close proximity between points (centres) characterised by large masses.²

Models of potential are employed mostly to describe interactions, which are often interpreted as a measure of connexions in a settlement system (Domański, 1998). It appears that in today’s conditions, where in the socio-economic space processes of metropolisation are so intense, models of potential could be well used as a appropriate tools to describe processes of accumulation of goods (functions) in given places and arising from it growing advantage that some territories possess over others. Field of potential indicates a certain range of influence which centres exert onto surrounding spaces (outskirts), which can be used as a basis for conclusion about the degree to which one is dependent on others. In spite of criticism of the models of potential, which predominantly refers to their lack of practical use (i.e. Kudłacz *et al.*, 2003) such form of spatial analysis should not be discarded. These models play cognitive and informative functions. These models interpreted as a system of interactions describe potential capabilities existing in settlement systems of different grade. The following stages of research i.e. functional analysis can be helpful in explaining the real dimension of force and direction of connections (i.e. Strykiewicz, 2004).

² In the research a potential formula was used, which is a sum of own potential and of potential in a point. The calculations of the potential magnitude have been obtained using the following formula: $V_i = \frac{P_i}{A_i} + \sum \frac{P_j}{d_{ij}}$ (1, 2, ..., m), where V_i = total potential of a spatial unit i ; P_i = mass of a spatial unit i ; A_i = radius of a circle plotted onto a spatial unit i ; P_j = mass of a spatial unit j ; d_{ij} = distance between i and j .

The following characteristics have been chosen as measures of economic potential:

- gross value of fixed assets in business enterprises;
- investment outlays in business enterprises;
- total industrial production sold;
- employment in the market services.

Diversification of the potential of these characteristics in the central region is for the year 2006. Additionally, the dynamics of changes are for the years 2002–2006.

5. SPATIAL VARIABILITY OF THE ECONOMIC POTENTIAL

The economic potential of Warsaw and its agglomeration in terms of the value of fixed assets in business enterprises during 2006 significantly dominated over the potential of the agglomeration of Łódź (table 1a, figure 2). In 2006 the relation of the value of Łódź's potential to the value of Warsaw's potential was 1:3.2. During the years 2002–2006 the distance between these centres decreased. In the spatial dimension, the domination of the agglomeration of Warsaw is evident in this respect. The range of isoline of 8,000 million PLN/km can be identified with an area of functional urban region of the capital (figure 2a). The value of fixed assets potential was growing in both cities, but growth rates were higher in Łódź (relative growth in Łódź – 26%, in Warsaw – 14%). However, it ought to be stressed that in the case of the voivodeship of Łódź intensive growth of potential occurred characteristic mainly for Łódź, while in the voivodeship of Mazovia intensive growth of potential occurred also in the peripheral zone of the capital (figure 2b).

Among direct causes of economic revival of Łódź is the size of investment outlays in business enterprises. In this respect clearly visible is the great superiority of the potential of the agglomeration of Warsaw over the agglomeration of Łódź (table 1b, figure 3a). Łódź had a greater increase in yearly investments in business enterprise in the period (relative growth of 76%). Larger investment outlays in business enterprises during recent years in Łódź have decreased in this respect the distance in economic development of both cities (table 1b, figure 3b). In 2002 the ratio of potentials of yearly capital investment in business enterprises of Łódź and Warsaw was 1:3.6 whereas in 2006 it was 1:2.6.

Significant differences in the size of economic potential in the central region are visible in the case of characteristics which can be perceived as the effects of investment in business enterprises and deployment of fixed assets. To describe differences in this aspect of development the following variables have been chosen: total industrial production sold and employment in the market services.

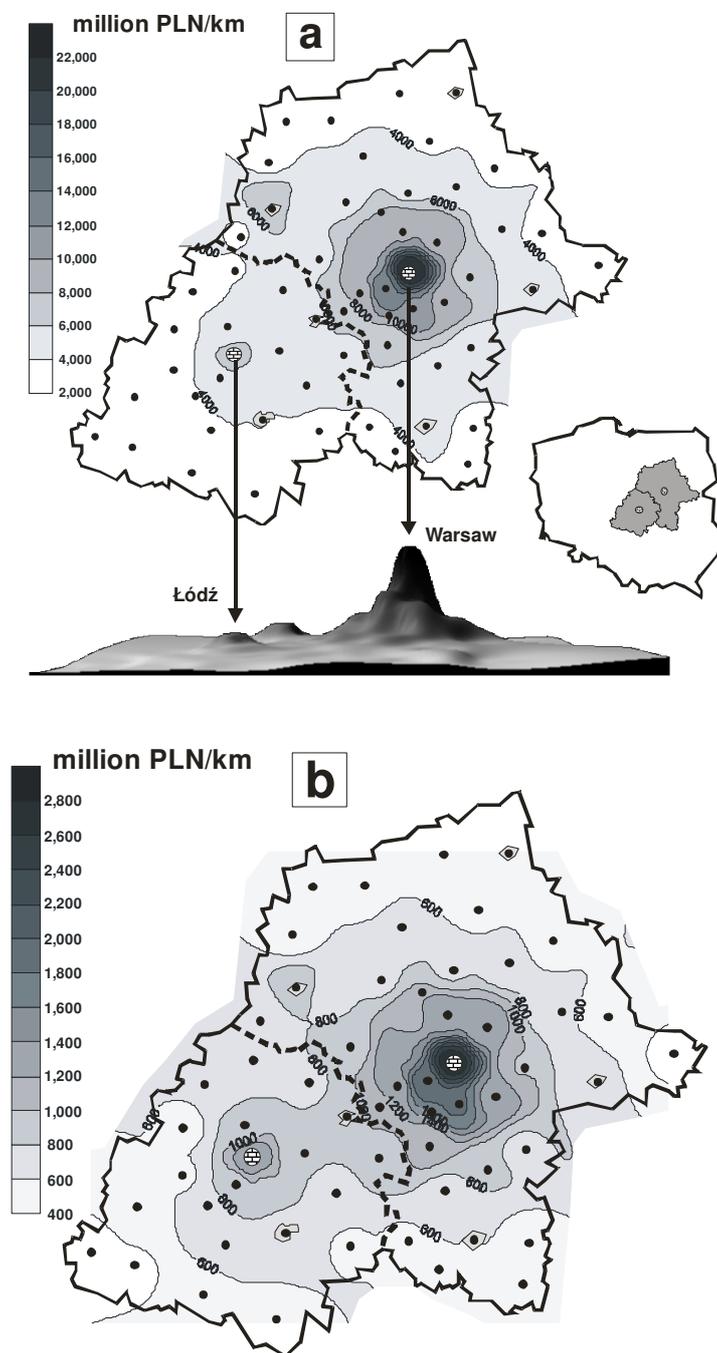


Fig. 2. Gross value of fixed assets in business enterprises in 2006 (a) and increase in gross value of fixed assets in business enterprises in the years 2002–2006 (b) in the central region

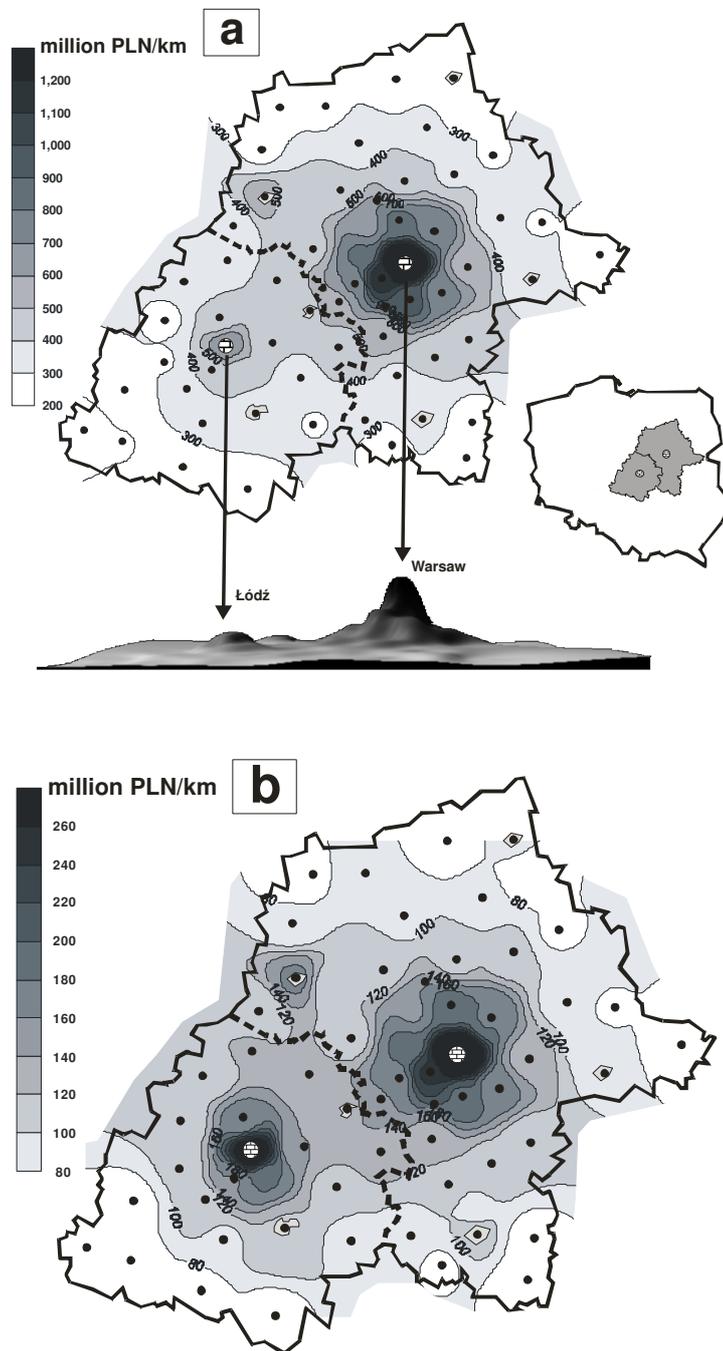


Fig. 3. Capital investment in business enterprises in 2006 (a) and growth of investment in business enterprises in the years 2002 and 2006 (b) in the central region

Table 1. A comparison of the economic potentials of Łódź and Warsaw in 2002 and 2006

Year	Łódź	Warsaw	Ratio of the potential of Łódź to the potential of Warsaw
(a) value of fixed assets in business enterprises (million PLN/km)			
2002	5,360	19,060	1 : 3,6
2006	6,730	21,768	1 : 3,2
Absolute growth of potential 2002–2006	1,370	2,708	1 : 2
Relative growth of potential 2002–2006	26%	14%	–
(b) investment outlays in business enterprises (million PLN/km)			
2002	387	1,410	1 : 3,6
2006	681	1,787	1 : 2,6
Absolute growth of potential 2002–2006	294	377	1 : 1,3
Relative growth of potential 2002–2006	76%	27%	–
(c) total industrial production sold (million PLN/km)			
2002	2,332	6,562	1 : 2,8
2006	3,081	9,879	1 : 3,2
Absolute growth of potential 2002–2006	748	3,316	1 : 4,4
Relative growth of potential 2002–2006	32%	51%	–
(d) employment in the market services (employed/km)			
2002	18,022	48,327	1 : 2,7
2006	20,048	55,030	1 : 2,7
Absolute growth of potential 2002–2006	2,026	6,703	1 : 3,3
Relative growth of potential 2002–2006	11%	14%	–

In the whole of the central region there was a rise in the value of total industrial production sold during the years 2002–2006 (table 1c, figure 4). The greatest dynamic of changes in this respect occurred in the agglomeration of Warsaw. A much greater increase of the potential of Warsaw (51%) as compared to Łódź (32%) widened the disparity between these cities in this sphere. Whereas in 2002 the ratio of potential of total industrial production sold in Łódź

to the corresponding potential in Warsaw was 1:2.8, in 2006 it increased to the level of 1:3.2. Analysing spatial variation in total industrial sales in 2006 as well as the growth of potential in the years 2002–2006 a marginal importance of both the agglomeration of Łódź and the voivodeship of Łódź can be noticed.

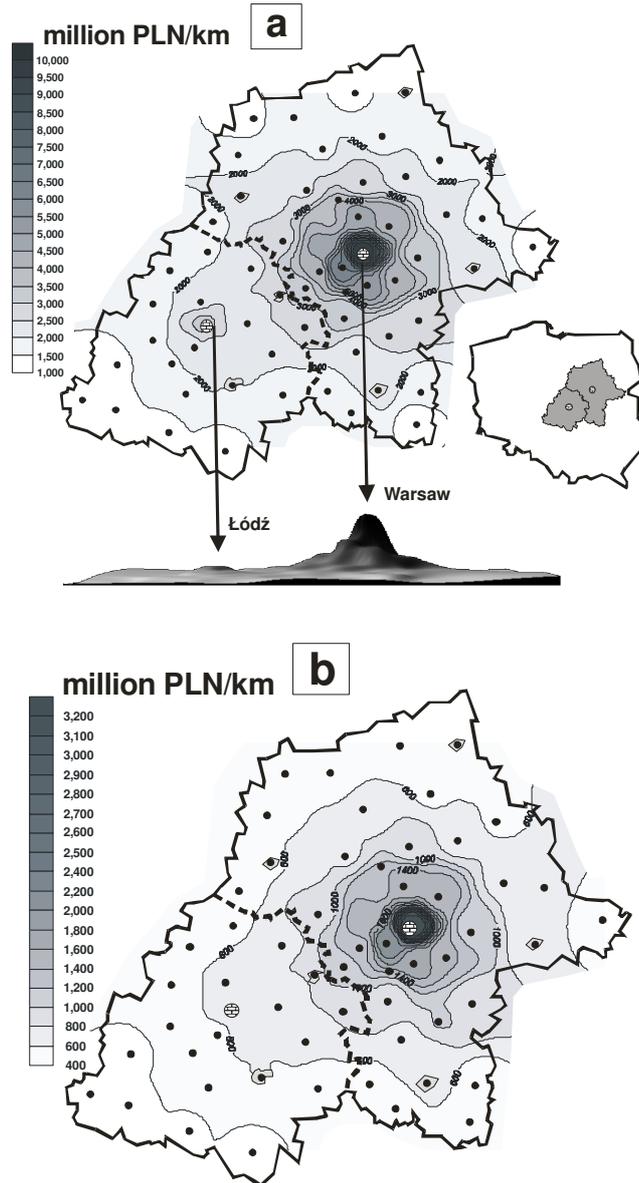


Fig. 4. Total industrial production sold in 2006 (a) and growth of total sales in industry in the years 2002–2006 (b) in the central region

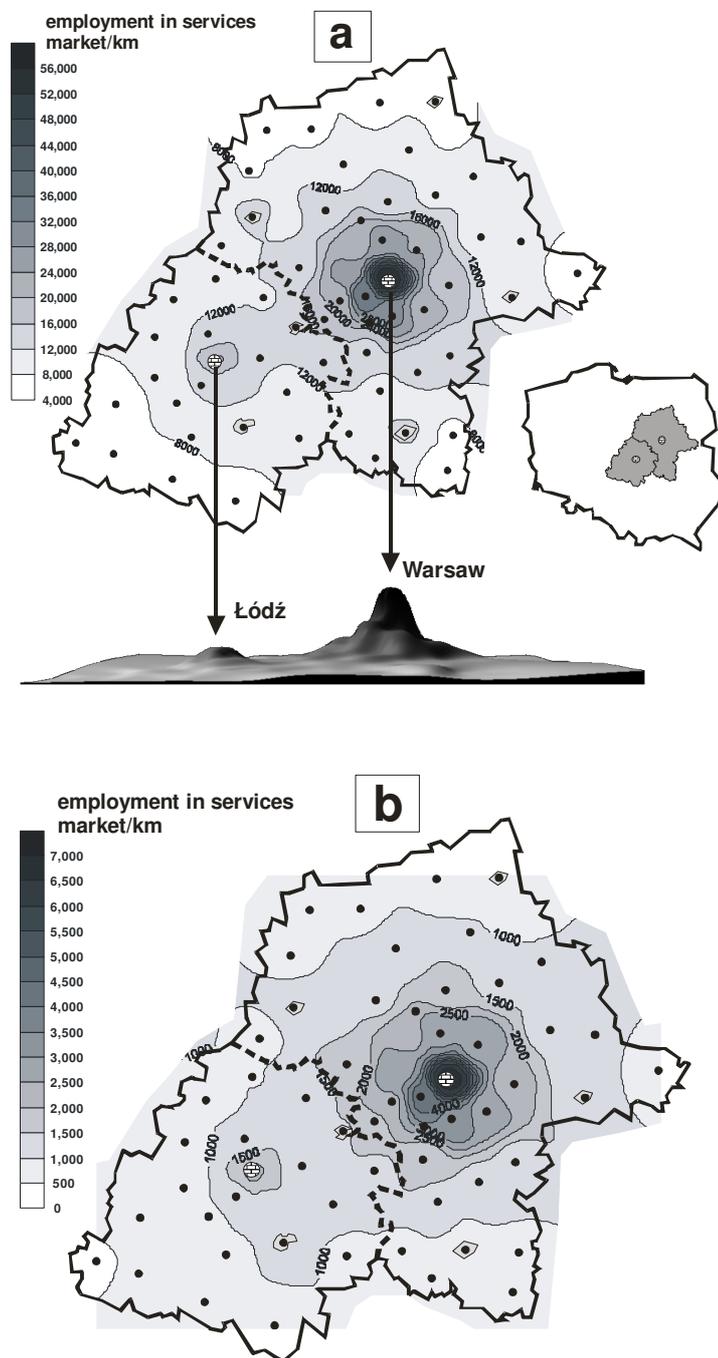


Fig. 5. Potential of employment in market services in 2006 (a) and growth of potential of employment in market services in the years 2002–2006 (b) in the central region

In the years 2002–2006 the ratio of total employment in market services in Łódź to the respective potential of Warsaw was steady at a similar level of 1:2.7 (table 1d). In that period Warsaw was characterised by a higher rate of growth. Spatial differences in employment in market services of the central region a pronounced domination of Warsaw agglomeration in the whole area under study is clearly visible (figure 5).

Diversification of economic potential has been additionally illustrated by economic development indicators for the agglomerations of Łódź and Warsaw (calculated for 1 inhabitant).³ This comparison is a verification of measurements of differences between Łódź and Warsaw as obtained by the method of potential (table 2). The results confirm the observed magnitude of disparities in the level of economic development of both settlement systems.

Table 2. Comparison of economic development indicators for agglomerations of Łódź and Warsaw in 2002 and 2006

Years	Agglomeration of Łódź	Agglomeration of Warsaw	Ratio of value for agglomeration of Łódź and agglomeration of Warsaw
(a) value of fixed assets in business enterprises (thousand PLN/inhabitant)			
2002	19,8	67,8	1 : 3,4
2006	26,9	76,3	1 : 2,8
(b) investment outlays in business enterprises (thousand PLN/inhabitant)			
2002	1,5	5,2	1 : 3,4
2006	3,1	6,2	1 : 2
(c) total industrial production sold (thousand PLN/inhabitant)			
2002	9,8	24,3	1 : 2,5
2006	12,6	35,2	1 : 2,8

Source: on the basis of information of Bank Danych Regionalnych GUS (www.stat.gov.pl)

Reassuring, it must be stressed that both agglomerations are dynamic systems, however, the agglomeration of Warsaw has a much greater potential as well as dynamics of changes. In the agglomeration of Łódź (especially in Łódź itself), positive economic changes in the recent years mainly include the growth of capital investment potential.

³ In 2002 the number of people in the agglomeration of Łódź was 1,152 thousand, however, in 2006 – 1,130 thousand. In 2002 the number of people in the agglomeration of Warsaw was 2,718 thousand and in 2006 – 2,794 thousand.

6. CONCLUSIONS

The results of research confirm the thesis about a much lower economic potential of Łódź in comparison to Warsaw. The distance is even greater if the areas of agglomerations of both cities are considered. Towns surrounding Warsaw and the peripheral zone of the functional urban region of Warsaw possess a much greater potential than the area around Łódź. The basic barrier to economic development of areas surrounding Łódź is the limited ability of this city to generate positive impulses for development. Lower economic potential of the agglomeration of Łódź and the dynamics of development of the agglomeration of Warsaw lead to inclusion of border poviats of the voivodeship of Łódź (Skierniewice, Łowicz, Rawa Maz.) into Warsaw's zone of influence.

Certain hopes for the growth of economic importance are associated with the increase of investment potential. Above all, it translates in Łódź into the increase of importance of the services sector, and to a lesser extent of industry. Research into the functional structure of the agglomeration of Łódź and functions deciding about its position in the national settlement system indicate that in the last 10 years some important changes have taken place (Jewtuchowicz and Suliborski, 2006). The agglomeration of Łódź is currently developing not only formal functions stemming from the increase of its importance as a regional service centre, but also functions resulting from development of metropolitan functions of Łódź.

The agglomeration of Łódź is an original example of a settlement system in which a basic change of functional structure is currently occurring from the predominantly industrial to services type. A radical change is taking place in the quality of regional functions of the agglomeration, resulting from its transition from the production structure to the services structure in which the services of a higher order begin to occupy a more and more important place. Qualitative changes of this type are the basic cause of change of the agglomeration's regional functions from formal administrative functions (resulting from the administrative status) to natural functions (real regional-metropolitan centre).

Undoubtedly, the integration of agglomerations of Łódź and Warsaw into a bipolar system should be beneficial for both. However, it is important to realise that functioning of such a settlement system possesses some dangers. Łódź is in a stage of developing its metropolitan functions (especially as the services centre of the region). Close ties with Warsaw at this stage, when the economic potential of the agglomeration is not really high, can cause intensification of the effect of erosion of resources (in the social sphere and in the economic sphere this process has been happening for many years now) and a takeover or restriction of some metropolitan functions of Łódź. Bipolar development of these agglomerations requires definition of functions which both elements are going to play (a partner-

ship system). Practice indicates that problems in this field exist in metropolitan systems (Kaczmarek and Mikuła, 2007). Therefore, establishing of domains between agglomerations (metropolises) can be even more difficult.

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