

EUROPEAN SPATIAL RESEARCH AND POLICY

10.2478/v10105-009-0014-4

Volume 16

2009

Number 2

Dariusz ILNICKI***MAIN SPATIAL ASPECTS OF THE FUNCTIONING OF HIGHER
EDUCATION INSTITUTIONS IN POLAND****1. INTRODUCTION AND OUTLINE OF THE PROBLEM**

At present, the main factor deemed responsible for boosting economic growth and development is intellectual capital – human capital – and connected with it possibility to create and absorb innovation in the broad sense. It needs to be stressed, however, that this factor is nothing new among factors determining socio-economic growth and development. It was only the stress that shifted from quantity to quality of the work factor. The desirable qualities of a potential worker are his/her level of education, his/her actual skills, flexible behaviour in the job market, ability to work in a team and creativity. As a result, we are not only theoretically, but actually dealing with Knowledge-Based Economy. Therefore, it is hardly surprising that there is a growing interest in the recognition of the role of higher education in socio-economic development as well as in many fields of science (economics, geography, land management or sociology). This is a consequence of ever more direct, as opposed to previously indirect, influence on economic development.

When analysing issues connected with higher education, we more and more often perceive them in spatial terms, i.e. as issues having particular spatial consequences. The influence of universities (higher education institutions) can be analysed on a local scale – the influence of their immediate surroundings (district, town where they are located, or its part), regional or even national. The influence on their closest, immediate surroundings seems more difficult to grasp. This is mainly caused by the fact that university – as an institution, or part of its

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physical form, is 'already there' in the urban space. Therefore, this issue, in this spatial aspect, is still not widely recognised and discussed in the subject matter literature (see Markowski and Drzazga, 2008).

The recognition of issues relating to the functioning of higher education institutions on both urban and regional scale is not commensurate with the needs. This is caused by a pronounced lack of statistics detailed enough in substantial or spatial terms. Moreover, for a valid discussion of any influence, not only that of higher education on its surroundings, comparable data for a relatively long period of time is required. Thus, the recognition of spatial aspects connected with the functioning of higher education institutions, especially on a local scale, will for some time take the form of deliberations or case studies of particular universities. It needs to be stressed, however, that in order to formulate general rules connected with the functioning of higher education institutions and define their actual impact in different spatial scopes, we need empirical evidence rather than cautiously formulated speculations. This, in turn, requires a research team, not single researchers who often 'duplicate' their researches by basing them on similar statistical data. At the same time there is a great need to seek 'new' sources of data, beyond official statistics. We know exactly what we want to investigate, but more and more often there is no empirical basis for the analysis of the ongoing phenomena and processes.

2. PURPOSE, SCOPE AND SOURCES OF THE PAPER

Markowski and Drzazga (2008) identified four significant research areas of higher education in the broad sense. They refer to the role of:

- higher education institutions in spatial and socio-economic development (towns regardless of the number of inhabitants) and their role as elements influencing competitive position (region, country);
- national policy in the development of higher education in the spatial aspect at the national level;
- spatial and urban planning as support for the development of higher education institutions;
- external and internal integration of public space as nodal points of flows.

As one can see, scales of spatial reference interpenetrate. It seems, though, that the regional scale (in the meaning of a voivodship) and the national scale are much more emphasised. This does not preclude, of course, research on the local scale, as higher education institutions are an important element of the city's economic base. It seems that when considering the role of higher education institutions in spatial development we need to concentrate more on the regional scale. This seems even more justified because higher education institutions are parts of the service centre – understood as an administrative whole. At the same

time, commercial activity of a higher education institution can be described using two criteria of commercial activity classification, i.e., (1) size of the area covered by the activity, which is also described as the frequency of using the services and (2) social environment it needs for its functioning. Therefore, the post-primary character of educational service at academic level and centrality of the service centre generated by it justifies the analysis of higher education from the point of view of the impact on its surrounding. The consequence of this influence is the formation of influence area of a given service centre – an academic education centre. Academic centres with their significance determined by substantial and historical factors remain in feedback with their influence areas. This statement is confirmed, among other things, in criteria of selection of a given academic centre as the place of education (Marcinowicz and Kaczmarek, 2008). Among them, the most important are: educational offer, prestige, level of education and distance from the place of residence.

Therefore, the main objective of this paper is to try to answer the question whether and to what extent the incorporation of the number of out-of-town departments in the analysis of the academic space facilitates the delimitation of their actual influence areas. The answer to this problem was achieved using two sources of data. The first of them was statistical data taken from official public statistics concerning the functioning of higher education (*Szkoły wyższe i ich finanse...*, 2003, 2007 [*Higher education institutions and their finances*]). This data concerned the number of higher education institutions in particular locations and their out-of-town centres (consultation points, branches and out-of-town departments). It was the number of out-of-town departments that was the key to define the extent of connection with their surroundings. Due to the factors connected with presentation of statistical data for higher education, after 2002 this research concerned public universities in general, without division into particular types.

The second source of data was obtained from electronic registration of candidates for admission to the University of Wrocław in the academic year 2007/2008. This database comprised candidates applying to all departments, types and levels of studies. It allowed to compare the influence area of the University of Wrocław identified on the basis of candidates' actual place of origin with the influence area identified via a network of organisational-spatial connections between the university's head office and its branches.

3. SPATIAL CONTEXT OF THE FUNCTIONING OF HIGHER EDUCATION INSTITUTIONS – INFLUENCE AREAS

Until the end of the 1980s there was a clear pattern of spatial distribution of higher education institutions and in consequence, a clear division of the students' areas of origin and market dominance of given educational centres at

academic level. Higher education institutions were located in the largest cities of the country. At the beginning of the 1990s there were at the most 10 scientific centres (Werwicki, 1994; Chojnicki and Czyż, 1997a, b) (figure 1). These were: Warszawa, Kraków, Poznań, Wrocław, Łódź, Lublin, Szczecin, Górny Śląsk, Trójmiasto and the Bydgoszcz–Toruń system. Their identification was always connected with hierarchy arrangement of these centres and attempts at identification of their influence areas – identification of academic regions (Chojnicki and Czyż, 1997a). The above-mentioned centres were identified as core centres of their academic regions. In other words they also constituted influence areas of academic centres. Their delimitation rested mainly on two assumptions. Firstly, an academic region covers the voivodship in which the scientific – academic centre is located (centre, the core). Secondly, it also includes the voivodships of the first or even second circle of neighbouring voivodships. They may be included in the region completely or partially.¹ The latter case applies to the situation in which one voivodship is under the influence of at least two centres. Chojnicki and Czyż (1997b) basing on similar assumptions, using the potential model, identified seven macro-regions of science. Macro-regions are to a certain degree a generalisation or, a higher level of academic division of the country (figure 2).

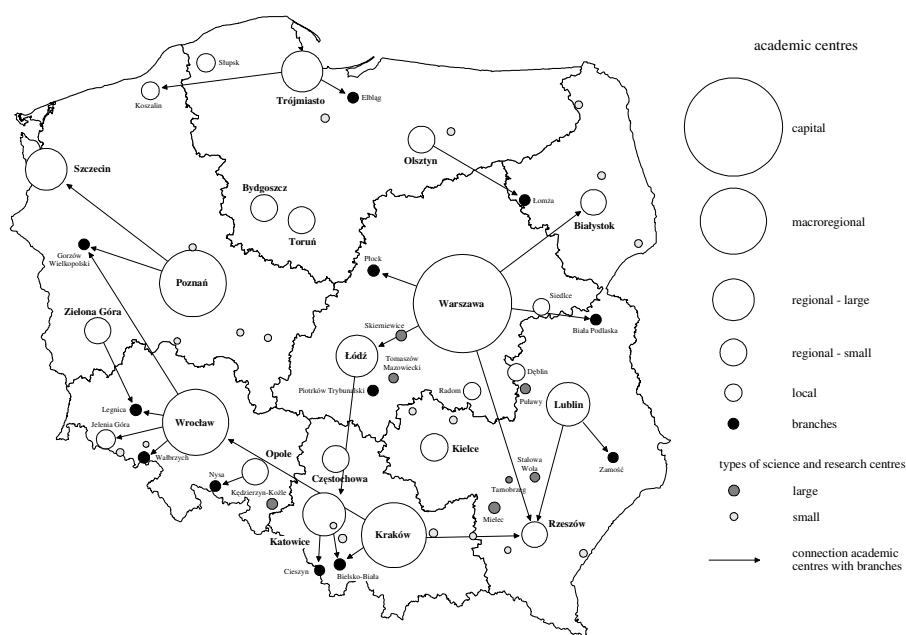


Fig 1. Spatial structure of Polish science in 1990

Source: on the basis of Werwicki (1994, p. 76)

¹ In this case the former territorial division with 49 voivodships is referred to.

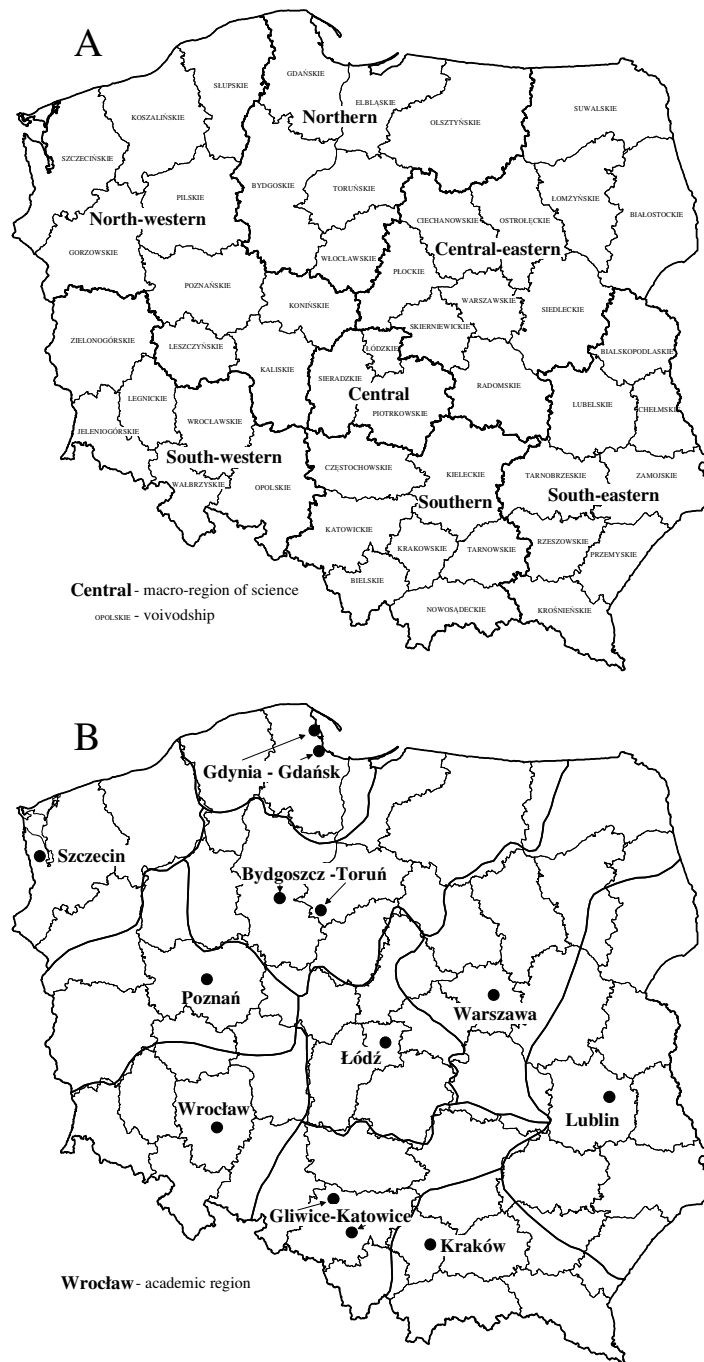


Fig. 2. Macro-regions of science (A) vs. academic regions (B)
Source: on the basis of Chojnicki and Czyż (1997a, b)

Based on the table presented above we can see that as a result of using mathematical potential model and the afore-mentioned assumptions, in three cases pairs of 'neighbouring' academic regions merged. It needs to be stressed, however, that borders of macro-regions of science differ significantly from borders of academic regions. This must be partially caused by the fact that the results of the analysis of the potential were applied to voivodships as administrative wholes. These results cannot be so easily transferred from regions to voivodships and they cannot be simply added up, either. In the case of academic regions, the authors point out the similarity between their borders and economic regions.

There are also studies in which hierarchy levels are assigned to terms referring to their scope of influence. In consequence, there are capital, macro-regional, regional (large or small) and local scientific centres (Werwicki, 1994; Rykiel, 1995). Such approach is in line with already existing and applied in literature criteria of division of scientific centres. These criteria are as follows: (1) form of spatial organisation; (2) functions; (3) size of scientific potential; (4) scope of influence. In the algorithm in question, which is used for indirect identification of influence areas, the last two criteria interpenetrate. For the criterion (3) (on the basis of scientific potential, which is usually measured by the number of independent research personnel-professors) hierarchy levels of the centres are defined. These levels are later extended to include (4) national or regional influence character. Obviously, there is a high level of correlation between the centre's potential and its actual area of influence.

It is clear that in cases of centres network which have irregular character, the concentration of particular potential (e.g. number of students or independent researchers) in one centre makes the results of such delimitation highly theoretical. However, the necessity to make such attempts cannot be denied. Their theoretical character is the consequence of statistical database that is limited and lacking information in this respect. However, this is not the only sphere in which research encounters obstacles of this type (Ilnicki, 2002; Ilnicki and Raczyk, 2003).

At present, after almost 15 years, we are dealing with a qualitatively different situation. When comparing the network of academic education centres in 1970 and 2002, we can see a considerable increase in the number of new locations apart from academic centres identified in traditional ways (figure 3; see figure 1). From the beginning of the transformation period spatial structure of science is the result of two contradictory tendencies. On the one hand this is manifested in efforts to ensure a more even distribution of scientific-educational centres. On the other hand, however, at the same time scientific potential is concentrated in traditional academic centres. It seems, though, that the process of concentration dominates over entropy. This means that decrease in concentration which was observed both in the number of higher education institutions in each centre as

well as the number of students is just the result of establishing higher education institutions outside main educational centres in the country. Only from the point of view of the number of higher education institutions spatial deconcentration is visible. This number decreased by 20% in relation to 1970 and in 2002 it reached 60%. It must be stressed, however, that 2/3 of that decrease happened in the first decade of the transformation period (1993–2002) (see Wolaniuk, 2006). As regards the number of students, the decrease in concentration was only 6% and stabilised at the end of the decade at the level of 67%. Interestingly, the proportion of decrease in concentration of schools as well as persons studying there before and after the transformation period is 2:3. It seems that by using such approach and dividing university locations according to independent research personnel (professors) we would still be dealing with *status quo* from before 1990.

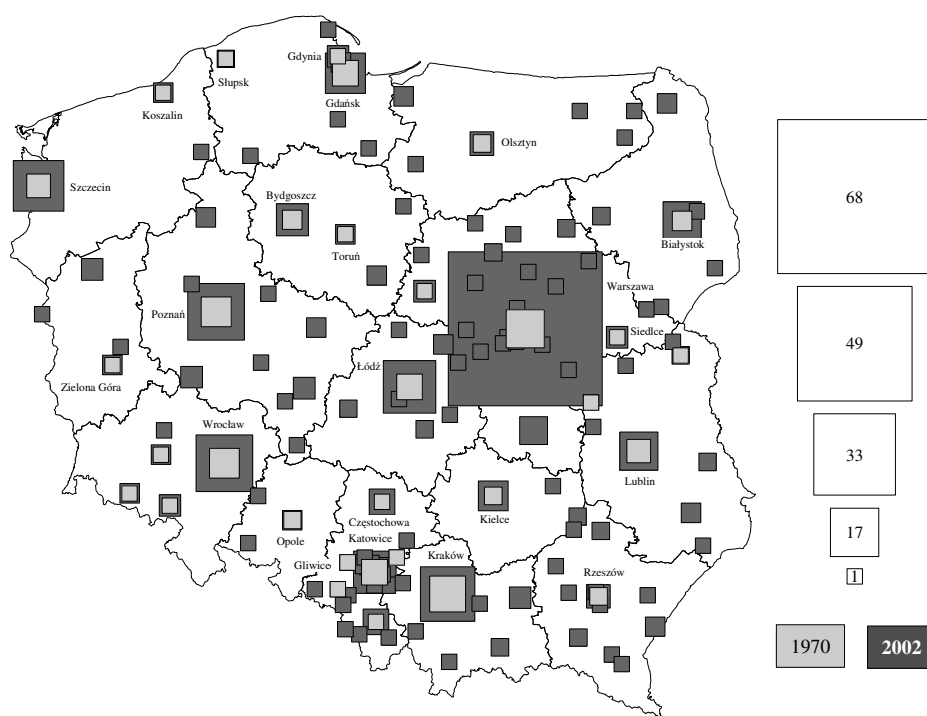


Fig. 3. Network of academic centres in 1970 and 2002

Explanation: the size of the symbol reflects the number of higher education institutions in particular location

Source: on the basis of *Szkoły wyższe...* (2003) and own data

It is characteristic for the shaping of the centres network in which higher education institutions are located that they were established to the east of Katowice–Łódź–Toruń–Gdańsk line in the first decade of the market economy period. It was supposed to compensate so-called *educational void* at academic level, because in this area, apart from Kraków, there were basically 4 main academic centres in Warszawa, Lublin, Białystok and Rzeszów. It was not until the beginning of the 21st century that ‘new eastern’ educational space started to be counterbalanced by new higher education institutions which started to emerge in the western part of the country.

Naturally, location of service centres, and more precisely, their head offices, does not immediately translate into their areas of influence. Apart from building new schools, another highly dynamic phenomenon was setting up branches and out-of-town departments or consultation points. This applied more to public schools although it concerned private schools as well. The question remains whether organisational–spatial relations between head offices and their branches will indirectly allow for delimitation of their influence areas. Such approach to delimitation would require to assume that branches, out-of-town departments and consultation points are located in places where potential clients could come from, even if such centres had never been established. It can be assumed that regardless of the point of view – that of the service provider (higher education institution) or the client, each party is driven by economic calculation but also by individual profit and loss account. These educational institutions by creating branches ‘avoid’ problems with space which would be bound to arise if all potential students from the surrounding areas gathered in one place. For students it means lower costs connected with higher education and for some it is the only chance to study.

Influence areas of academic centres are presented on the basis of the latest data (from 2006). This data concerns public universities only (figure 4). It is caused by the fact that Central Statistical Office (GUS) either ceases to publish data that is interesting to us or presents it in such a way that makes it impossible to aggregate or disaggregate. As a result, it is not possible to research issues that are of interest to us in the longer perspective. The same refers to private universities. Since 2003 information on private universities is presented generally, and not as it was before – individually.

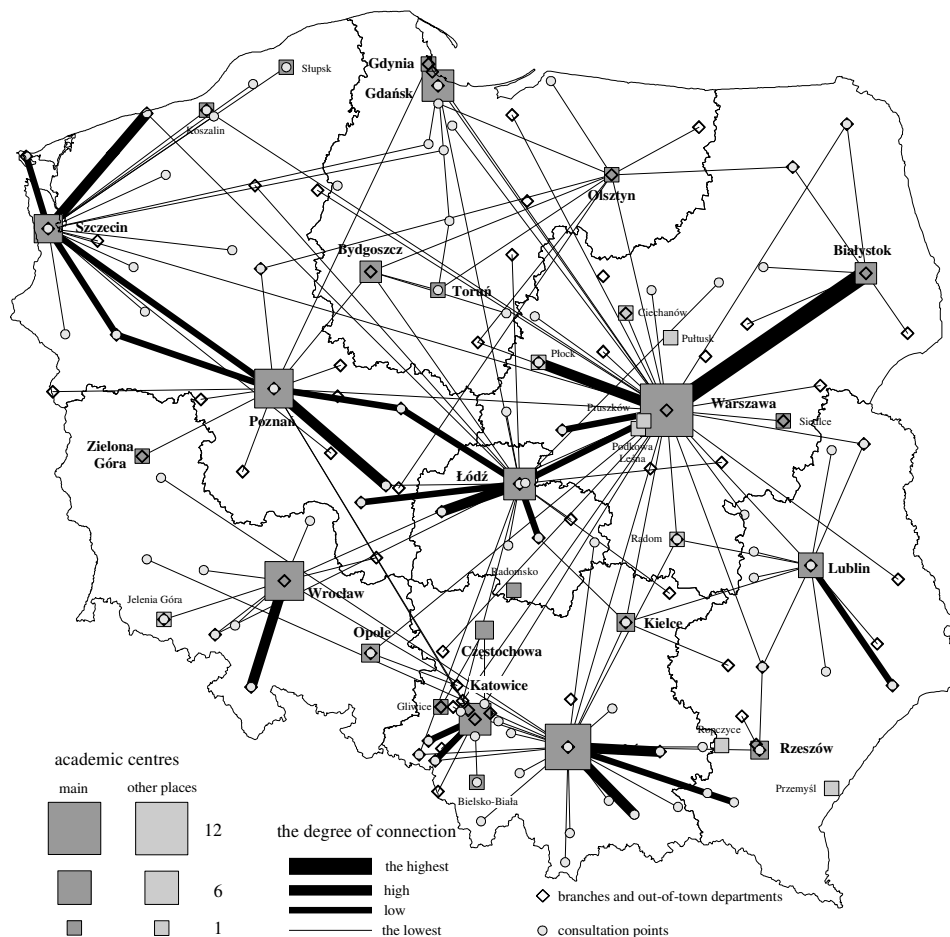


Fig. 4. Spatial structure of Polish science and the degree of connection between academic centres and their surroundings – the case of public universities in 2006

Explanation: (1) the size of the symbol reflects the number of higher education institutions in particular location; (2) the degree of connection was shown through the number of out-of-town departments – the highest – 4 departments, high – 3 departments, low – 2 departments, the lowest – 1 department; (3) connections are presented in comparison with macro-regions of science; (4) linear calibration of symbols

Source: on the basis of *Szkoły wyższe...* (2007)

There is no doubt that the relations between the core of an academic centre and its branches and out-of-town departments are complicated. This statement is even more accurate when we add that only chosen relations are presented. (see figure 4). They are limited to scientific centres which Werwicki (1994)

identified as being at least regional. The capital level was ascribed to Warszawa.² As macro-regional centres he described: Kraków, Poznań and Wrocław. At the last level he distinguishes large regional centres (Katowice, Lublin, Łódź, Szczecin, Trójmiasto) and small ones (Białystok, Bydgoszcz, Częstochowa, Kielce, Toruń, Olsztyn, Opole, Rzeszów, Zielona Góra). If we exclude small regional centres we will see the shaping of influence areas rather than their connections. Then, a strongly interconnected triple system of Łódź–Warszawa–Białystok as well as double system of Poznań–Szczecin become visible. It needs to be stressed that thanks to connections between universities of Łódź and Warszawa and clear overlapping of influence areas of Łódź and Poznań we can talk about axial influence area covering five centres. At the same time this axis reveals relatively less developed influence areas in northern and southern Poland. The situation of Kraków and Katowice is very interesting. Despite geographical, time and economic closeness, we observe a clear division of influence areas between them. At the same time, stronger ties with the surroundings are established on opposite sides of each of them. However, in the case of Kraków we can observe a clear ‘expansion’ of the influence area into the conurbation of Upper Silesia together with ‘transfer’ of its influence to the south-western Poland. Influence areas of Trójmiasto and Wrocław, however, are not so easily identifiable. In these cases one can only guess at the shape and scope of their influence.

Small regional centres practically do not ‘form’ their influence areas. They are rather incorporated into influence areas of centres that are at a higher level in hierarchy. This statement has speculative character, but it is worth verifying empirically. Olsztyn seems to be an exception to this rule. There are good reasons to believe that a clear influence area is shaping there. This results mainly from the location of this centre in relation to other centres which have academic character. Looking comprehensively at generalisations concerning influence areas we can say that ‘the problem’ does not lie in the existence of the central macro-region, but in maintaining such ideas concerning its influence area. The former krośnieńskie, przemyskie and rzeszowskie voivodships can be described as ‘not assigned’ clearly to any particular macro-region. They are considered to belong to south-eastern macro-region but actually seem to belong *more* to the southern macro-region. Another example of such an area is the former zielonogórskie voivodship, which is described as belonging to south-western macro-region. However, in practice it seems to be a part of north-western macro-region. Thus, we can form a hypothesis that southern and south-western macro-regions are *too big* compared to the potential of the core centre. The area of

² It seems that in this case the description of this level as national would be more accurate in relation to the character of the centre.

Warszawa–Łódź–Katowice–Kraków square, however, may be identified as the most complicated one when determining the real market dominance areas.

Ultimately, the question is whether the university's head office and its branches may form the basis for identification of influence areas. To answer this question, we need to refer to two graphic illustrations, differing as to the level of detail, depicting actual places of origin of students (figures 5 and 6).

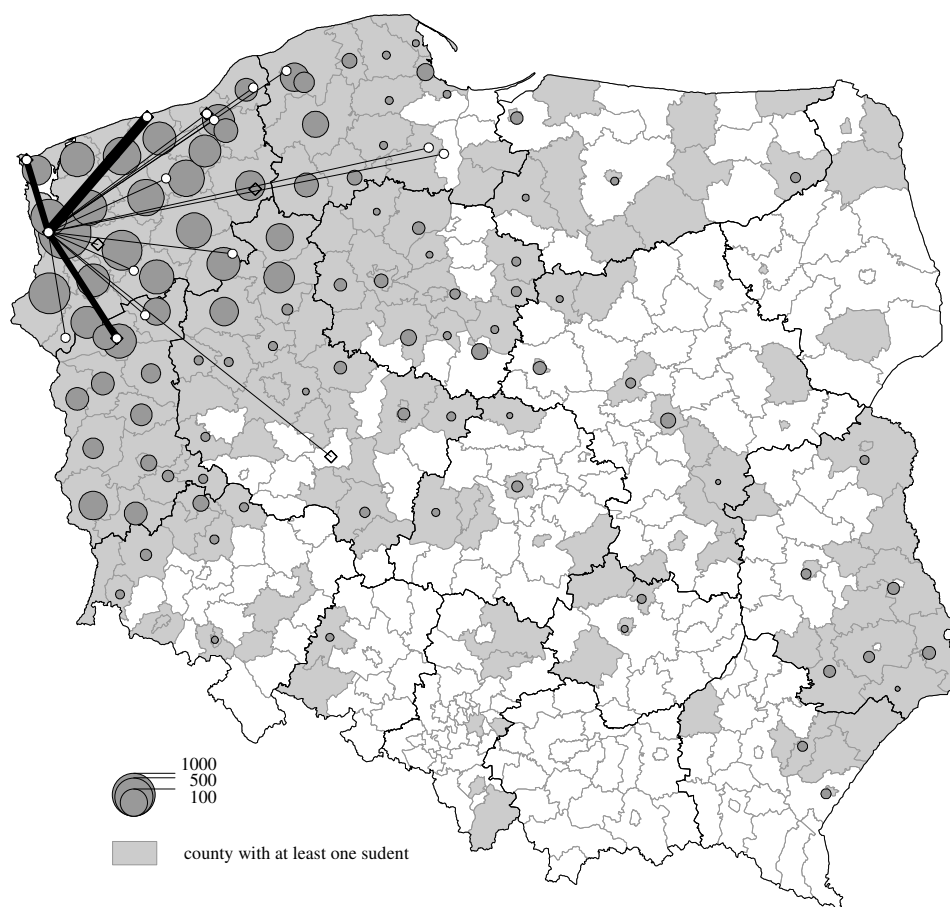


Fig. 5. The level of connection of academic centres with their surroundings compared to territorial origin of the students of Faculty of Natural Sciences at the University of Szczecin
Source: Surowiec (2007), after Dutkowski (2008, p. 35)

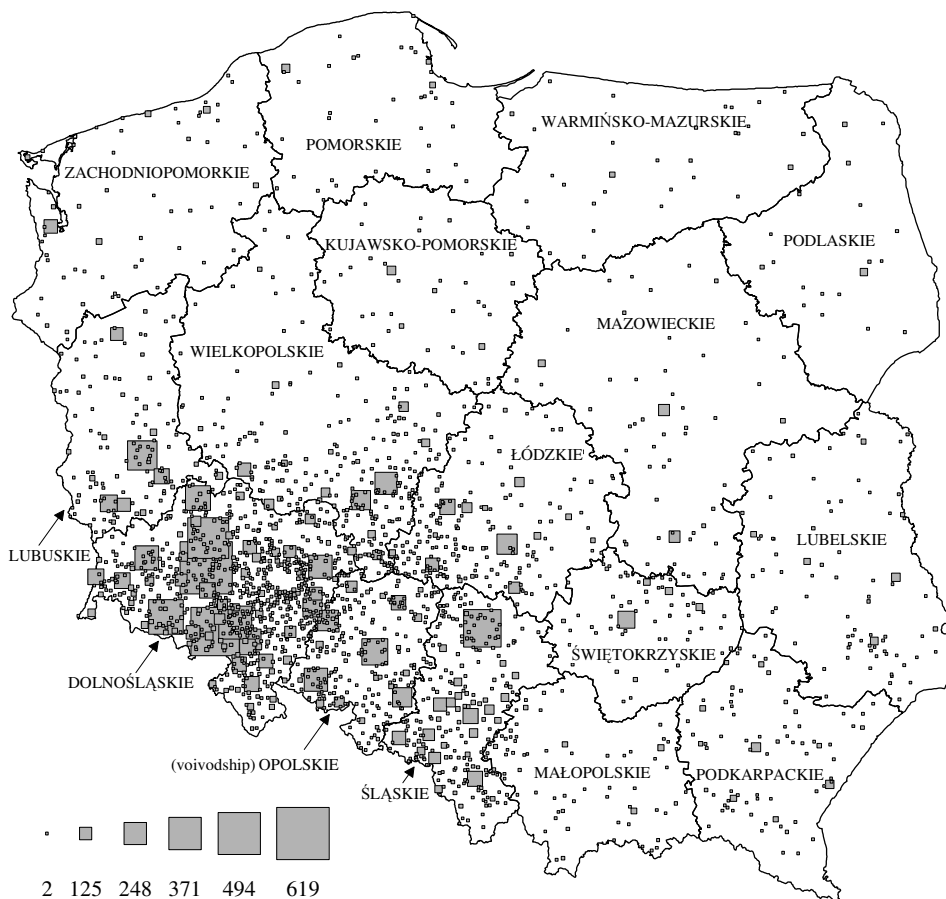


Fig. 6. Origin of all candidates for the admission to Wrocław University in 2007

Explanation: (1) for the purpose of this presentation, towns which were represented by one candidate only and all candidates from Wrocław were excluded; (2) linear calibration of symbols
 Source: own study based on central registration database of candidates for admission to the University of Wrocław in 2007

In the case where places of territorial origin of students of Natural Sciences Faculty of Szczecin University overlap with the degree of connection between the academic centre and its surrounding analysed before, we can observe that a lot of clients live within such distance from the core centre in which there are the most branches and out-of-town departments (see figure 5). At the same time places with large concentrations do not 'extend' beyond the maximum distance of out-of-town departments. At first glance, however, such rule might seem unjustified in the case of Wrocław. Students of the University of Wrocław come from all over the country. The vast majority of this region, naturally, constitutes

so-called 'supplementary area'. Its main part, however, and its market dominance area lie within the dolnośląskie voivodship (nearly 52% of all candidates), opolskie voivodship (8%) and śląskie voivodship (9%) together with southern parts of the voivodships neighbouring with them to the north (lubuskie, łódzkie and wielkopolskie voivodships – on average 6% each). The main influence area within the region is so-called large cities belt (see Jakubowicz, 1991), stretching from Kłodzko, via Wałbrzych, Legnica, Lubin, Głogów, Bolesławiec, Jelenia Góra, Oleśnica and Oława (see figure 6). When applying these statements to the part of figure 4 regarding Wrocław it can be seen that theoretical influence area is 'directed' at southern and western parts of the voivodship. Therefore, it can be said that the level of connection between academic centres and their surroundings, measured and identified by the number of branches and out-of-town departments, is a good indicator of their influence areas. However, the Wrocław macro-region of science described above in its Opole and Zielona Góra parts is dominated by other academic centres.

4. CONCLUSIONS

Until the end of the 1980s there was a clear pattern of spatial distribution of higher education institutions and in consequence, a clear division of the students' areas of origin and market dominance of given educational centres at academic level. At present, educational space at academic level is still the outcome of two opposing tendencies identified by Werwicki (1994) leading to its concentration in the most important centres and spatial egalitarianism. It needs to be stressed, however, that scientific potential of academic centres identified in traditional ways does not seem to be endangered. Greater accessibility of higher education does not directly result from establishing new educational centres which could compete with traditional academic centres, but is mainly the result of expanding the educational offer in the broad sense and setting up branches and consultation points. As a result of 'expansion' of education beyond universities' head offices, an organisational-spatial network is created, which constitutes a new phenomenon of the transformation period. One aspect of the discussion was the question whether these connections may form the basis for determining not only theoretical influence areas – division into influence areas. This research question was positively verified by comparing territorial origin of students of Wrocław University and Szczecin University. Approach which concentrates on organisational-spatial connections between the core and its centres depicts the existing influence areas better than in the case of placing the whole potential in one area.

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