

STUDIA REGIONALIA

Journal of the Polish Academy of Sciences,
Committee for Spatial Economy and Regional Planning
&
European Regional Science Association
(ERSA) Polish Section

Volume 46, 2016, pp. 27–39
doi: 10.12657/studreg-46-02

FUNCTIONAL AREAS IN THE REGIONS AND THEIR LINKS TO SCOPE SUB-REGIONAL CENTRES IMPACT

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Abstract: The emphasis on the territorial dimension of the public policy can be reduced to transition from a sectorial approach to an integrated territorially approach, which is based on the integration of activities of various public entities towards the territories referred not so much administratively as functionally. The functional areas (FA) is defined as spatially separated territory, which shares a common geographical differences, spatial and socio-economic conditions and the system of functional relationships and on this basis shares the uniform development objectives, ensuring effective use of its space. This understanding of the functional areas are to be the subject for intervention of the public policies. The regional development policy implemented by the voivodeship governments closely follows the findings of EU and the national strategic documents and intentionally uses a territorial approach to developmental challenges and problems. Such policy is focused (and will be focused) on the use of endogenous potential, including the territorial resources and knowledge, and will also allow for the interventions adapted to the local conditions. Thus, implementation of policy conceived in that matter is associated with geographic and thematic concentration with respect to the areas and key issues in achieving goals of the regional development. Identification of areas for which public intervention is necessary to fully exploit their endogenous potential – will be pursued with the assumption that they can have a problem character, but they can also be the potential poles of regional growth.

The aim of the paper is to identify the integration processes between territorial units forming urban functional areas on regional level. In particular, it focuses on clarification the intensity of existing relationships and on the attempt to create and verify a list of criteria for delimitation of functional areas at the sub-regional level (by k-Means and Huff's methods), assuming that each urban centre on metropolitan, national and regional level also carry-out the functions at sub-regional level.

Keywords: functional urban areas: delimitation of the functional areas: scope of impact: sub-regional centres

JEL codes: R11, R12, R15, R58

1. Introduction

The discussion on the directions of the regional development is directly linked to the cohesion policy conducted in the European Union (EU). In general, it consists in supporting a comprehensive and harmonious development of the entire structure, and especially on reducing the disparities in the development level among the most and the least developed European regions (Kudełko 2013; Heffner & Gibas 2012). In the new budget perspective, the cohesion policy is continued, however, numerous documents detailing the goals of the “Europe 2020” “push” its convergent context into the background, setting new tasks in the regional development (including strengthening the competitiveness of the regions and its mechanisms of competition) and giving them a clear territorial focus (e.g. the policy towards rural areas and the urban policy) (McCann & Ortega-Argil 2013).

The territorial policy which equalizes the development level, whose beneficiaries are mostly peripheral regions and intermetropolitan regions, is replaced by proposals for indirect redistribution of growth factors through metropolitan areas located externally (diffusion concept) (Wishlade 2008). In turn, the concept of polycentric settlement structure derived from the empirical studies conducted in the interwar period (30's of the twentieth century) and merging to the theory of central places formulated and (Christaller 1933) explained the hierarchical nature of the settlement system structure through the size of impact area of different goods and services or market areas of various sizes (Lösch 1944). In the 50's of the twentieth century a completely different point of view was proposed (Perroux 1955; Myrdal 1957) – the polarization theories emphasized the growing importance of market economies of scale, resulting in a growing concentration of activity, but only in a few major cities. Both approaches were integrated in the concept of the so-called new economic geography (Fujita et al. 1999) where various systems associated with the economies of scale and the cost of effects of spatial integration lead to formation of spatially distinct systems of consumption and production.

An important contribution of this approach, is the conclusion that not only relationships of a hierarchical type are important, but also horizontal ties between the cities with complementary economic specialization (see: e.g. Idczak 2013; Andersson & Mellander 2011; Heffner 2011; Korenik & Zakrzewska-Półtorak 2011; Grosse 2007).

2. Conditions for functional areas creation

The emphasis on the territorial dimension of the public policy can be reduced to transition from a sectorial approach to an integrated territorially approach, which is based on the integration of activities of various public entities towards the territories referred not so much administratively as functionally. The indicated areas (territories) are to be characterized by similar economic, social and spatial characteristics. This understanding of the functional areas are to be the subject for intervention of the public policies.

The functional areas can be determined based on economic, social and environmental ties emerging and operating on a specific territory. Defining of such area is of key importance in the development policy, since the traditional concepts on which the development policy is based, are folded within administrative borders and does not correspond to the actual spatial systems. According to the Organization for Economic Cooperation and Development (OECD) the functional region (area of strong functional relationships) is a geographical area extending beyond the official administrative borders, on which specific (functional) territorial interdependences are observed that may require some form of management (Urban-Rural Partnership and Governance... 2013).

The functional area (FA) is defined as spatially separated territory, which shares a common geographical differences, spatial and socio-economic conditions and the system of functional relationships and on this basis shares the uniform development objectives, ensuring effective use of its space. In a broader sense, it comes to isolate areas for which it will be necessary to take different types of interventions, which in strategic documents at the national level are called the areas of strategic intervention (ASI), the problem areas (PA) and in a broader sense – the functional areas (FA).

In the National Strategy of Regional Development (NSRD; National Strategy... 2010) category of subdivisions known as the areas of strategic intervention (ASI) was introduced, which are defined as “the areas towards which: (a) the government intervention is required, due to the burden that region alone is not able to bear, and (b) the areas which due to social, economic or environmental problems cause or may cause in the future a significant impact on the development of the country”. Those areas selected thematically and defined spatially achieving a greater efficiency of activities undertaken within the framework of regional policy by concentrating regional policy interventions.

As a result of the above categories, the ASI (areas of strategic intervention) are classified in two completely opposite types of territories: (a) the areas of processes concentration of socio-economic development (which can be referred to as poles of growth), and (b) the problem areas – the territorial units having the highest concentration of negative development phenomena with a national or supra-regional importance and range.

On the other hand, in the current National Spatial Development Concept 2030 (National Spatial... 2011) the functional areas have been defined and designated, which in broader sense are understood as areas with common geographical characteristics (socio-economic, environmental and spatial). In this perspective, both types of ASI fall within the definition of the functional areas adopted for above strategic document. The definition of the functional urban area, adopted there, has also become the basis for the elaboration of the definition for the functional area of voivodeship (regional) centre.

The functional area of voivodeship centre can be understood as spatially coherent zone of city influence, characterized by the existence of the economic, social, cultural and other relationships and advancement of the urbanization processes, standing out from its surroundings and becoming similar in some aspects to the main city (Kryteria delimitacji miejskich obszarów... 2013; see also Śleszyński 2013). The

metropolitan areas included those functional areas of voivodeship centres, where, among many other factors, there is a population of over 300 thousand inhabitants, employment in the service sector is above 40 thousand of people, there is a collaboration of research institutions within 5th and 6th EU Framework Programme and the airport with passenger traffic is located.

The functional areas that do not meet these criteria are recognized as the centres of national importance. The functional areas of these centres are established around cities with a population between 100 and 300 thousand people which do not operate as a voivodeship centre, but have considerable potential and because of its fundamental role in the economic, social and administrative sphere of different regions, are also of a great importance for the development of the country. These cities play greatly important administrative, economic and social roles; they do possess some metropolitan functions, but mostly on a regional scale.

The functional areas of sub-regional centres include the communes (Polish: gmina) located in the immediate vicinity of the towns with a population of 50 to 100 thousand people which have been designated by the voivodeship government. These towns play a significant role as the centres focusing on economic and social functions as well as being a place of public service delivery important from the perspective of their residents, as well as residents from the surrounding rural areas, and they have a complementary offer to regional and voivodeship cities.

In the regional policy pursued at the national level, there were underlined the functional areas of a planning character (urban and specific phenomena – mountain and border regions) and of a diagnostic character, e.g. the functional rural areas and functional areas of specific macro-regional scale phenomena (soil protection for agricultural production as well as closed areas). The functional rural areas are divided into two types of opposite nature in relation to development processes in the country and in the regions: (a) the rural areas participating in development processes, and (b) the rural areas requiring support of development processes.

Some of the functional areas are the areas of strategic intervention (ASI). They are spatially distinct areas for which government intervention is required, due to the burden that the region alone is not able to bear, and the areas which due to social, economic or environmental problems cause or may cause in the future a significant impact on the development of the country (NSRD). The areas of strategic intervention (ASI) should be defined in geographical terms, so that it could be possible to determine their development potentials, development objectives and projects aimed at achieving these objectives which are subject to the procedure of agreement of the territorial contract with the government. Similarly, one can understand, indicatively shown in NSRD, the problem areas where intervention in the regional policy is planned directly from the national level. It is limited only to cases where the scale and complexity of the problem justifies the direct involvement of the government or when the effectiveness of actions taken at the regional level is too low.

The regional development policy implemented by the voivodeship governments closely follows the findings of EU and the national strategic documents and intentionally uses a territorial approach to developmental challenges and problems. Such policy is focused (and will be focused) on the use of endogenous potential, includ-

ing the territorial resources and knowledge, and will also allow for the interventions adapted to the local conditions. Thus, implementation of policy conceived in that matter is associated with geographic and thematic concentration with respect to the areas and key issues in achieving goals of the regional development. Identification of areas for which public intervention is necessary to fully exploit their endogenous potential – will be pursued with the assumption that they can have a problem character, but they can also be the potential poles of regional growth.

Recognizing the scope of influence of centres of sub-regional importance on their surrounding municipalities is one of the requirements in order to conduct a rational regional policy in terms of practical implementation of the polycentric development, i.e. based on a number of centres serving diverse functions of a metropolitan character (see: i.e. Dijkstra et al. 2013; Parkinson 2013; Meijers et al. 2007; Heffner 2011). Understanding the processes leading to the distinction of the functional areas depending on the settlement layout and intensity of existing relationships is one of the key elements of conducting this policy. But this is not possible without creating and verifying a list of criteria for the functional areas delimitation and identification of the functional relationships among the centres of the given settlement network (see: Heffner & Gibas 2013; Śleszyński 2013; Gorzelak et al. 2008).

3. Method used in the assessment of the impact range of the metropolitan and sub-regional centres

The study of the impact range of the metropolitan and sub-regional centres was conducted in the municipal entities network (data for 2012). The study used variables that were subjected to a process of standardization with the respect to their dichotomous division to stimulants and destimulants¹. It was assumed that the number of features would be as small as possible, but they would well describe the specifics of the centre operation for at least the rank of sub-regional. A total number of twenty five variables were selected to describe four ways of how centre influences over their surroundings (in brackets, the impact of the variable on the examined phenomenon was given):

- population and population movement (5 variables: W1. population density in persons per km² (S), W2. resident population as of December 31, as a percentage of the population of a particular voivodeship (S), W3. registering out into the countryside as a percentage of registrations to other municipalities (S), W4. registration as a percentage of the population living as of December 31 (S), W5. registration from abroad as a percentage of the population living as of December 31 (S)),
- public services (7 variables: W6 – average number of participants taking part in the events organized by the cultural institutions (music and theatre) per resi-

¹ Prior, the variables were subjected to a simple statistical test (using, among others, correlation coefficients, variation coefficients).

- dent (S), W7 – expenditure from the municipalities budgets for culture and national heritage protection as a percentage of expenditure from municipal budget in total (S), W8 – sports clubs including religious clubs and school sports clubs per 10,000 residents (S), W9 – expenditure on culture and sport as a percentage of the expenditure of municipal budgets in total (S), W10 – percentage of children benefiting from a nursery (S), W11 – graduates of the technical high school (with matriculation exam) as a percentage of graduates in total (S), W12 – percentage of units registered in Section M – Education (S)),
- enterprises and labour market (7 variables: W13 – visitors coming to work per person departing to work² (S), W 14 – percentage of the entities registered in sections J, K (Information and communication, financial and insurance activities) (S), W15 – percentage of the population in the working age (S), W16 – entities employing more than 250 people as a percentage of all enterprises (S), W17 – share of the municipality budget in the corporate income tax revenue as a percentage of the total budget (S), W18 – children benefiting from a nursery, as the percentage of children aged 0 to 2 years (S), W19 – share of the unemployed registered in the number of population in the working age (D)),
 - quality of life (6 variables: W20 – percentage of investment capital expenditure in the total expenditure of municipality budget (S), W21 – percentage of residents using the gas installation (S), W22 – five-year growth dwellings per 1000 residents (S), W23 – commercial objects surface size per km² (S), W24 – green areas at the discretion of the local government as a percentage of the total area of the municipality (S), W25 – share of expenditure on the social assistance in total budget expenditure (D)).

The grouping of municipalities was made using K-Means method³. The number of groups was selected on the basis of the Hierarchical Cluster Analysis, which was made using Ward's method (while using the Euclidean distance, not standardized)⁴. Thus, formed grouping allows objects most similar to each other in one group, while maximizing the taxonomic distance between the groups (see: Stanisław 2007; Ward 1963).

The study consisted of two stages. In the first stage, the impact zones of sub-regional centres⁵ were designated (with weights equal to 1). In the second stage, on the basis of the setting of coverage zones using Huff method (Huff 1962; Huff & McCallum 2008) the theoretical impact zone of the centres⁶ in two cases was determined: a) the impact zone of Opole on the background of the impact zones of

² According to data for 2011.

³ The study was conducted using quantitative data in Statistica software.

⁴ Obtained results are not directly comparable with those presented in i.a. Heffner and Gibas elaboration (2013) – the reason for that is different range of initial information (which is dictated by the objectives of the study and the methodological considerations).

⁵ In the interpretation, because of the subject matter of the elaboration, one focused on the development of Opolskie Voivodeship and its immediate surroundings.

⁶ Determined for at least 50 percent chance of supplying the population in the metropolitan or sub-regional centre, where the attractiveness of the market was determined by the population potential, and the square distance was calculated using the developed availability model (based on the increasing cost of getting around on public roads)

centres recognized as metropolitan, b) the impact zone deemed to be sub-regional centres in Opolskie Voivodeship.

4. Analysis of the sub-regional centres' impact range

The grouping of similar objects allows to identify five groups: (a) the metropolitan municipalities with strong development position (in Fig. 1 represented by a group no. 1), (b) the municipalities with strong development position, able to shape their own future (group no. 3), (c) the municipalities highly prone to metropolization and agglomeration processes (group no.2), (d) the municipalities less prone to metropolization and agglomeration processes (group no. 4) and (e) the municipalities with low development position, not prone to metropolization and agglomeration processes (group no. 5).

According to the results obtained in Opolskie Voivodeship, practically, the municipalities of the fifth category do not exist (except cases in north-western part of the region – Wilków and Domaszowice in Namysłów district). The core of the urban metropolitan area is the city of Opole, although sub-regional centre – Kędzierzyn-Koźle has a strong development position as well (functionally linking the eastern part of the region with the impact zone of the cities from Śląskie Voivodeship, in particular Gliwice). The vast majority of municipalities are under a strong pressure from the metropolization and agglomeration processes – in the zone, which may appoint an ellipse, extending from Wrocław agglomeration to Kraków surrounding areas. The municipalities less prone to the metropolization and agglomeration processes can be found in the districts of Nysa (Pakosławice, Skoroszyce, Łambinowice), Kędzierzyn-Koźle (Reńska Wieś, Pawłowiczki), Głubczyce (Branice), Namysłów (Świerczów) and Opole (Popielów).

The theoretical impact zone of metropolitan and sub-regional centres designated by Huff's method, presenting the probability of satisfying its needs in a given spatial unit (assuming that dispersed population will be supplying in the unit, the more likely the greater the potential of population (the larger the centre) and the more likely the centre is closer (the availability of spatial is bigger), divide Poland into seventeen disjunctive areas and one area of combined impact of Toruń and Bydgoszcz (see Fig. 2).

The probability of supply in Opolskie Voivodeship at the level of 50 percent and above, assuming that we consider only the impact of metropolitan centres, covers almost the entire voivodeship. However, it should be noted, that border of Wrocław impact reaches to Wilków (which is completely under the metropolitan influence of this city), Namysłów, Lubsza and Skarbimierz. The border of Opole impact in the eastern direction usually ends on the administrative border of the region (except for the municipalities: Pawonków, Wielowieś and Toszek – the latter two are already included in the impact zone of the Upper Silesian metropolis).

The impact range of Opole, designated under the assumption of supplying in it at the level of 50 percent and above, is relevant to the impact range of Brzeg, Kluczbork and Kędzierzyn-Koźle, and the functional structure of the sub-regional level

complements the area of Nysa impact (bordering with the range of Opole influence zone). Together, these five cities support almost the entire voivodeship (except for the municipalities serviced by the local centres: Namysłów in the north-west of the voivodeship, Strzelce Opolskie in the east and Głubczyce in the south (see: Fig. 3).

The impact range of Brzeg stretches from Grodków in the south to Jelcz-Laskowice in the north (Dolnośląskie Voivodeship) and from Popielów (in the east) to

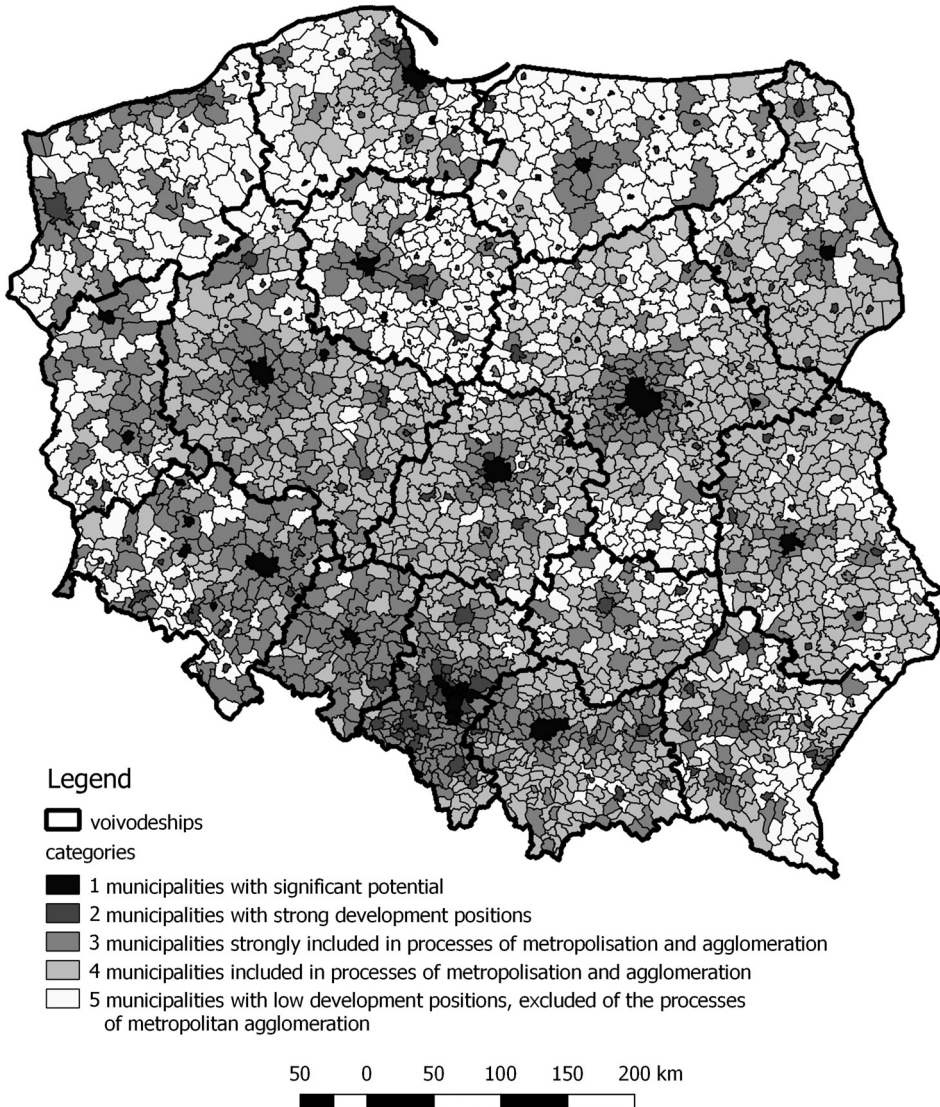


Fig. 1. Impact zones of centres designated based on the method of k-means (5 groups), according to data for 2012 – grouping excluding the spatial effect

Source: own elaboration

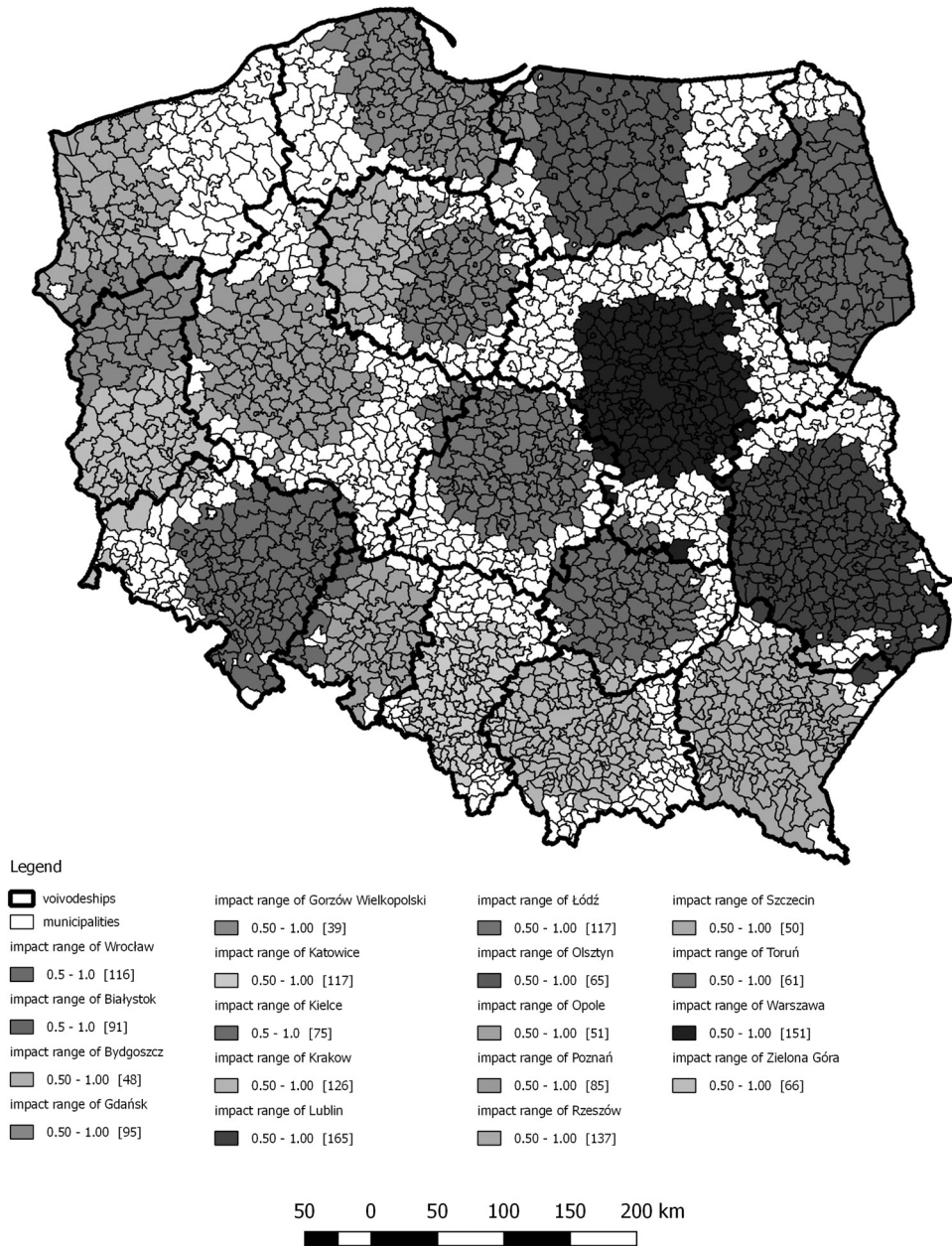


Fig. 2. Comparison of the impact zone of metropolitan centres designated by the Huff's method of gravitational potential based on the model of spatial accessibility and data on population potential for 2012 – the visualization of probabilities over 50% based on 8 groups of quintiles

Source: own elaboration

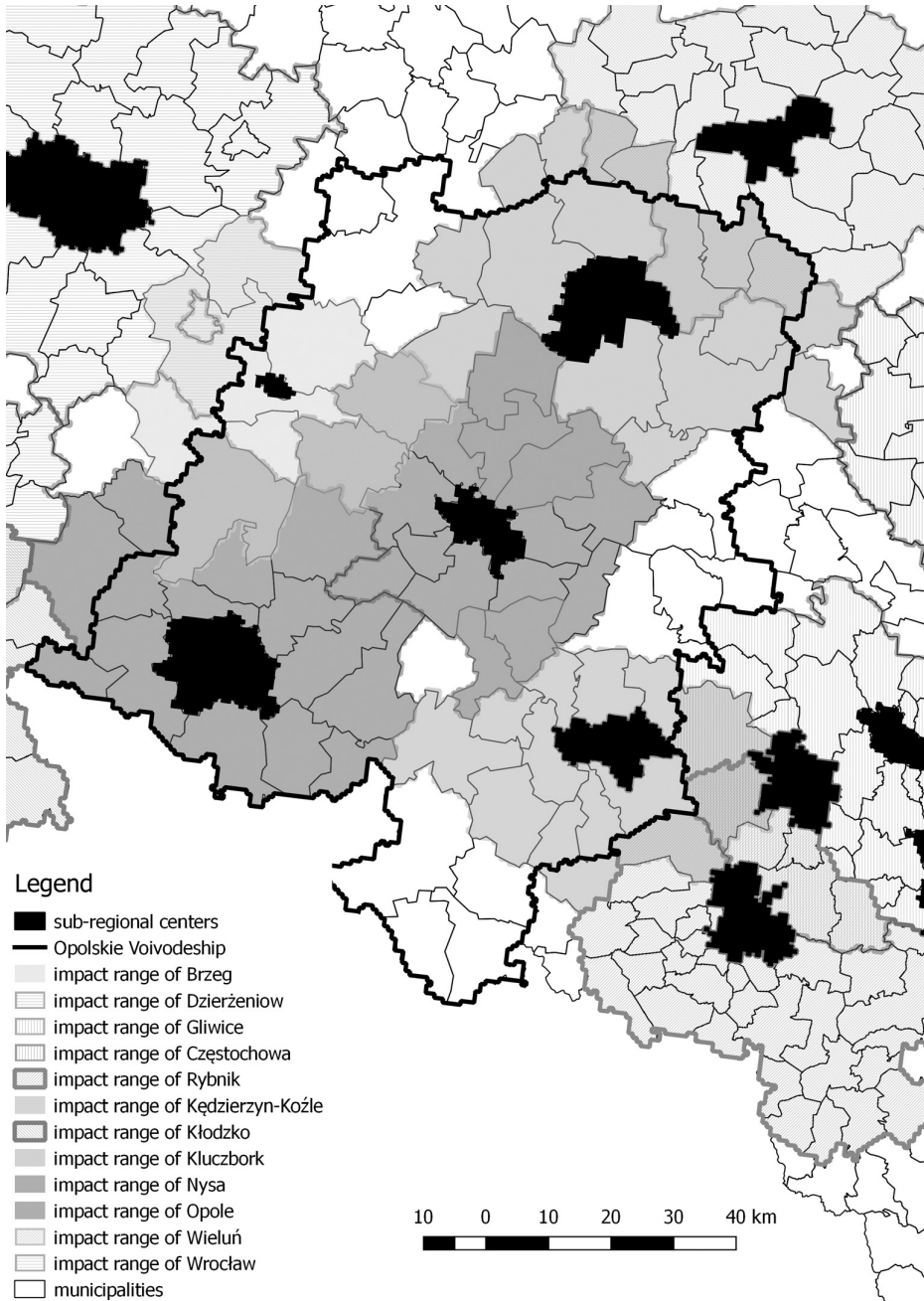


Fig. 3. Impact zones of the sub-regional centres from Opolskie Voivodeship designated by the Huff's method of highest gravitational potential based on the model of spatial accessibility and data on population potential for 2012

Source: own elaboration

Wiązów (in the west in Dolnośląskie Voivodeship). The Brzeg impact zone also includes so called “bagels”⁷ municipality and town of Oława (Dolnośląskie Voivodeship) and Lewin Brzeski (locality within the functional urban area of Opole).

The city of Kędzierzyn-Koźle affects the area amid the municipalities of Głogówek (in the west), Gliwice (in the east), Gogolin (in the north) and Rudniki (in the south). It should be noted that municipalities of Krapkowice and Gogolin also belong to the influence zone of Opole, and a large part of the impact zone covers the western part of the region of Śląskie Voivodeship (in the impact zone of Gliwice and Rybnik).

The population of northern side of Opolskie Voivodeship is supported in particular by Kluczbork and Wieluń (Łódź Voivodeship). The range of Kluczbork influence is determined in the latitudinal direction by line Pokój – Krzepice (Śląskie Voivodeship) and in the meridional direction by line Łąka Opatowska (Wielkopolskie Voivodeship) – Turawa (directly bordering with the city of Opole). The town of Kluczbork also has a direct impact on Murów and Łubniany (municipalities in the Opole functional urban area). It should also be noted that most north-eastern located municipalities Rudniki, Praszka and Gorzów Śląski are in the direct impact of Wieluń.

The Nysa range of influence extends from the southwestern border of Opolskie Voivodeship to the Czech border in the South. It should also be noted that the impact of Nysa extends beyond the region borders, reaching localities of Ziębice and Przeworno in Dolnośląskie Voivodeship.

5. Summary

The delimitation of the functional areas and designation of their scopes, as a tool for the regional policy, is a political decision. However, this does not mean, that its basis should be centrally adopted, limited in number, the range of variables (see i.e. Śleszyński 2013; Gorzelak et al. 2008). Because of the far-reaching effects of such indications, the delimitation decisions should take into account the results of research approaches based on the greater sets of variables (see i.e. Czyż 2011; Heffner & Gibas 2013).

Although these considerations apply only to two methods of determining the functional areas (numerical taxonomy and methods of gravitational potential), but at this stage it is shown that these approaches are complementary, thus their results, supported by other studies of the delimitation type, allow a greater degree of objectivity in determining the functional areas of cities.

Also of great importance are activities of the municipalities and districts (Polish: powiat) entities which independently shape their functional relationships alongside voivodeship authorities. Their diverse relationships develop a network of administrative and functional ties, not necessarily compatible with the divisions made for

⁷ “Bagels” municipality (gmina obwarzankowa) means in Polish territorial administrative structure rural municipality surrounding city or town and that is governed jointly by the local government located in urban centre.

statistical or administrative⁸ purposes. However, it enriches the network of cooperation between institutions in the regions. It also seems possible and likely to extend such networks outside the administrative regions. This is particularly evident in the sphere of mutual interactions of Kędzierzyn-Koźle and Gliwice (Śląskie Voivodeship) as well as Kluczbork and Wieluń (Łódzkie Voivodeship).

Summing up, the impact zones of sub-regional centres, in many cases goes beyond the region's borders to the neighbouring regions peripheries (which means their large impact and importance in the process of integration in regional peripheral areas). Sub-regional centres also frequently include outer zones of its influence in functional areas of metropolitan and regional centres – they can fulfil supplementary role in the areas where the impact of metropolitan functions is weaker and relationships are worse.

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⁸ See <http://lewin-brzeski.pl/5049/utworzenie-subregionu-brzeskiego.html>, accessed: January 2015, <http://www.radio.opole.pl/warto-posluchac/loza-radiowa/stefanski.html>, accessed: January 2015.

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To cite the article:

Heffner K, Gibas P (2016) Functional areas in the regions and their links to scope sub-regional centres impact. *Studia Regionalia* 46: 27–39. doi: 10.12657/studreg-46-02