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A Method for Evaluating the Peripherality of Rural Settlement Units Based on the Principles of Spatial Order and Sustainable Development

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Abstract

The objective of this study was to propose a method for evaluating the peripherality of rural settlement units based on the principles of spatial order and sustainable development. Detailed goals involved the determination of evaluation indicators, a scoring system and evaluation principles based on the results of a questionnaire survey. The proposed method was verified on the example of three survey sites.

Keywords: village, settlement unit, peripheral area, land management, scenic attractiveness

Introduction

In the spatial (territorial) dimension, development takes place between two poles representing opposing trends: concentration and deconcentration of settlement and economic activity (Gorzelak 2009). In land management, the level of economic and social activity varies considerably on a territorial basis. The permanence of those variations is strictly related to spatial order and sustainable development. Rural areas are characterized by particularly significant variations in economic and social activity. According to Cymerman, a village is a rural settlement unit with a dense or dispersed settlement pattern, which has agricultural functions, agricultural support services or tourist functions, and which does not have town privileges or the status of a city. A settlement unit is a spatially distinct rural residential area with access to utility services (Cymerman 2013). Rural settlements are often characterized by much lower levels of social organization and social capital (Kamiński 2008).

In the past, peripherality was defined as a settlement unit's remoteness and isolation from an urban center. Today, this concept should be analyzed in view of multiple factors, and the group of classification criteria should be modified and extended. The peripherality of rural areas is associated with numerous problems, mostly underinvestment, negligence and marginality. According to Gorzelak and Kozak, for a given area to develop, external demand has to exist for its resources. This demand can relate to goods and services produced in a given area (this theory is somewhat congruent with the economic base theory) or immobile resources (raw materials, labor, tourist attractions, etc.) (Gorzelak and Kozak 2012).

In view of those handicaps, the physical distance measured in kilometers or the time required to travel that distance are less important considerations than the ecological, economic and social inequalities in a given region. According to Dubisz, a region's marginality should be determined based on the extent to which the local community's needs are being met (see: Dubisz, Drabik, and Sobol 2003). Gorzelak observed that regions which are too weak and/or too distant from growth centers should receive additional support, but such aid should promote economic growth rather than social welfare (Gorzelak et al. 2010).

The need for spatial order in area occupied by settlement units is dictated by three main features of space: limitedness, uniqueness and diversity. Measures aiming to instill spatial order should rely on the principles of sustainable development, the need to develop spatial systems that increase the value of space, eliminate social conflict and preserve the natural environment.

In view of the above considerations and the fact that the unique character of rural areas requires continuous monitoring efforts to preserve their quality, attractiveness and spatial cohesion, the aim of this study was to propose a method for evaluating the peripherality of settlement units based on the principles of spatial order and sustainable development.

1 Spatial order and sustainable development

The main aim of rational land management should be to guarantee spatial cohesion and sustainable development. The desirable level of spatial cohesion should be achieved by maintaining the right balance between natural and anthropogenic components in the surrounding space. The process of managing and planning rural areas, including rural settlement units, is a conscious effort that aims to instill a balance between natural and anthropogenic elements of the environment to ensure that the resulting functions, which are created to satisfy human needs, account for the principles of spatial order and sustainable development. The main challenge in this process is to reconcile civilizational development with the preservation of natural resources (Cymerman 1993).

The concept of spatial order implies the maintenance of cohesion and harmony in a defined set of spatial components. Spatial order aims to eliminate random distribution of spatial components, and it involves conscious efforts to ensure that those components constitute a harmonious, homogeneous, structured, cohesive and hierarchical system. Spatial order is also a process of building connections and correlations between elements of space to create a transparently structured system. In a spatially cohesive system, material objects are arranged through human activity, and the resulting structure reflects the efforts that went into the creation of a larger system. Some of the undertaken measures lead to the preservation or restoration of order, whereas other activities can deteriorate or disturb spatial cohesion (Parysek 2007).

According to Bański, spatial order is a harmonious spatial system that caters to the local community's social, economic, natural and cultural needs. Space is adequately managed when it is structured and arranged in a desired manner and when the scenic and esthetic attributes of space are preserved. In a spatially cohesive system, economic functions are distributed in a manner that eliminates conflict and ensures optimal use of space. Spatial order is an indispensable element of sustainability. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs, and in this sense, spatial order is a prerequisite for sustainable growth. Economic growth has to be accompanied by increasing awareness about environmental, social and cultural goals (Bański 2008).

Dubel argues that social order embodies high esthetic values, logic, functionality, clarity and transparency of spatial structures and their harmonious coexistence with nature, high effectiveness and usefulness at all levels, from national to local (Dubel 1998). According to Parysek, spatial order is the spatial organization and functioning of a territorial social system, which is developed consciously and in view of social rationality criteria. Spatial order should deliver equal benefits for all residents of a given territorial unit (Parysek 2007).

Szolginia defines spatial order as the organization of space characterized by balanced distribution of spatial components, which is achieved naturally with the involvement of the forces of nature or artificially through human activity (Szolginia 1987). According to Bogdanowicz, spatial order is a manifestation of the order created in the human mind (Bogdanowicz 1989). Hopfer sees spatial order as an ordered system that is introduced to a given area in line with legal regulations, scientific and technical guidelines and esthetic principles to create structures which cater to human needs in the present and future (Hopfer 1993).

Kołodziejski links the concept of spatial order with spatial planning and management, processes that aim to create a harmonious, organized, proportional and balanced environment for human activity. It is an expression of man's desire to create an orderly whole whose elements are

governed by a set of common rules, whose functional logic is manifested by structural functionality, and where spatial legibility contributes to the high esthetic value of space in every territorial dimension (Kołodziejski 1995).

According to other authors, spatial order is the organization of space that harmoniously incorporates complex functional, social, economic, scenic and esthetic conditions and requirements (Kachniarz and Niewiadomski 1994).

Inadequate decisions and errors in land planning and management often lead to the marginalization of rural settlement units. Spatial planning authorities responsible for spatial order and sustainable development policies are not always successful in maintaining the desired balance between different functions in territorial units (Małysa-Sulińska 2008).

2 Criteria for evaluating the peripherality of rural settlement units

In the process of identifying elements that shape the environment of rural settlement units, attempts were made to select indicators that bring together distinctive components of space and contribute to spatial order and sustainable development. The above approach supported the determination of individual components of space and their mutual relations. Evaluation criteria were selected based on the cited sources, own observations and the results of a questionnaire survey involving 100 respondents (urban planning experts). The selected assessment indicators with the corresponding weights were arranged in the following order based on their contribution to the achievement of spatial order and sustainability: distance between settlement unit and urban center (0,073), power supply network (0,072), water supply network (0,070), transport network (0,070), street lights (0,069), public transport (0,069), sewerage system (0,066), retail and service outlets (0,066), educational facilities (0,065), medical facilities and medical assistance points (0,065), land-use type (0,064), public cleanliness (0,064), tall and short greens (0,063), waste management (0,062), cultural sites (0,062).[1]

3 Indicators for evaluating the peripherality of rural settlement units

A scoring system was developed for each of the 15 identified assessment indicators, which were graded on a scale of 0 to 2 points, where 0 implies that the evaluated spatial component has a negative impact on the preservation of spatial order and sustainability, and 2 indicates that the element has positive implications for spatial order and sustainability. The scoring system supported the development of a model for evaluating selected survey sites. Assessment indicators were graded as follows:

- Distance between the settlement unit and an urban center: up to 20 km — 2 points; 20–40 km — 1 point; more than 40 km — 0 points.
- Power supply network: the evaluated area has 230 V and 400 V power supply — 2 points; the evaluated area has 230 V supply and only selected locations have 230 V and 400 V power supply — 1 point; the evaluated area has only 230 V power supply — 0 points.
- Water supply network: the entire evaluated area has access to the water supply network — 2 points; selected locations in the evaluated area have access to the water supply network — 1 point; the evaluated area does not have access to the water supply network — 0 points.
- Transport network: all roads in the evaluated area are paved — 2 points; the evaluated area has paved and unpaved roads — 1 point; there are no paved roads in the evaluated area — 0 points.
- Street lights: all streets in the evaluated area are lit at night — 2 points; only selected streets in the evaluated area are lit at night — 1 point; there are no street lights in the evaluated area — 0 points.
- Public transport: the evaluated area is served by a municipal bus and a school bus — 2 points; the evaluated area is served only by a municipal bus — 1 point; the evaluated area is not served by a municipal bus — 0 points.

1. [In the journal European practice of number notation is followed — for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style). — Ed.]

- Sewerage system: the entire evaluated area has access to the sewerage system — 2 points; only selected locations in the evaluated area have access to the sewerage system — 1 point; the evaluated area does not have access to the sewerage system — 0 points.
- Retail and service outlets: the evaluated area has retail and service outlets — 2 points; the evaluated area has only retail outlets — 1 point; there are no retail or service outlets in the evaluated area — 0 points.
- Educational facilities: the evaluated area has a primary school and a middle school — 2 points; the evaluated area has a primary school — 1 point; there are no primary schools in the evaluated area — 0 points.
- Medical facilities and medical assistance points: the evaluated area has medical facilities — 2 points; the evaluated area has a medical assistance point — 1 point; there are no medical facilities or medical assistance points in the evaluated area — 0 points.
- Land-use type: the evaluated area is characterized by positive spatial autocorrelation — 2 points; the evaluated area is characterized by zero spatial autocorrelation — 1 point; the evaluated area is characterized by negative spatial autocorrelation — 0 points.
- Public cleanliness: the evaluated area has high cleanliness standards — 2 points; the evaluated area has average cleanliness standards — 1 point; the evaluated area has low cleanliness standards — 0 points.
- Tall and short greens: tall and short greens are well kept — 2 points; only tall or short greens are well kept — 1 point; tall and short greens are neglected — 0 points.
- Waste management: the evaluated area has a waste sorting scheme — 2 points; the evaluated area has a waste collection scheme without waste sorting — 1 point; the evaluated area has a waste collection scheme, but illegal dumping sites are reported — 0 points.
- Cultural sites: the evaluated area has numerous cultural sites — 2 points; the evaluated area has few cultural sites — 1 point; there are no cultural sites in the evaluated area — 0 points.

4 Method for evaluating the peripherality of rural settlement units based on the principles of spatial order and sustainable development

The proposed method can be used to evaluate rural settlement units, and in areas with a different land use function – to evaluate distinctive fragments of settlement units. Information about the surveyed area is acquired in the following stage of the evaluation process. Information is collected during field surveys, interviews with local residents and from existing sources of data (base maps, property information maps). The collected data is used to developed a simplified assessment card (tab. 1). The level of peripherality of a rural settlement unit is evaluated based on the principles of spatial order and sustainability with the application of the indicators and the scoring system described in the previous chapter (points 1 to 15). Every spatial component is graded on a scale of 0 to 2 points (scoring system), and the resulting number of points is multiplied by weights. The resulting values are added up, and the final score is used to determine the peripherality index of the evaluated rural settlement unit. The following peripherality indices have been defined for the needs of this study:

I — low level of peripherality: $1{,}5 \leq x \leq 2{,}0$
II — average level of peripherality: $1{,}0 \leq x < 1{,}5$
III — high level of peripherality: $0{,}5 \leq x < 1{,}0$
IV — very high level of peripherality: $0{,}0 \leq x < 0{,}5$

5 Verification of the proposed evaluation method on a selected example

The proposed evaluation method was verified on the example of three survey sites in the Region of Warmia and Mazury:

- Wilkasy — a rural settlement unit in the Region of Warmia and Mazury, county of Giżycko, municipality of Giżycko, situated along national road No. 59. Wilkasy constitutes the southern suburb of the town of Giżycko. In Poland's previous system of administrative division

(1975–1998), Wilkasy was part of the Suwalskie Voivodship. The village is surrounded by lakes Niegocin, Tajty, Wilkasy Małe and Wilkasy Duże. It is a water sports center.

- Grzybowo — a rural settlement unit in the Region of Warmia and Mazury, county of Kętrzyn, municipality of Reszel. In Poland's previous system of administrative division (1975–1998), Grzybowo was part of the Olsztyńskie Voivodship.
- Kronowo — a rural settlement unit in the Region of Warmia and Mazury, county of Kętrzyn, municipality of Reszel. In Poland's previous system of administrative division (1975–1998), Kronowo was part of the Olsztyńskie Voivodship.

The above information was used to develop simplified assessment cards for each of the three survey sites. Every indicator (points 1 to 15) was graded on a scale of 0 to 2 points. A simplified assessment card is presented in table 1.

Tab. 1. Simplified assessment card

	Wilkasy			Grzybowo			Kronowo		
A	B	C	D	E	F	G	H	I	J
Indicator	Points	Weight	Value B·C	Points	Weight	Value E·F	Points	Weight	Value H·I
1	2	0,073	0,146	2	0,073	0,146	1	0,073	0,073
2	2	0,072	0,144	2	0,072	0,144	2	0,072	0,144
3	2	0,070	0,140	2	0,070	0,140	2	0,070	0,140
4	2	0,070	0,140	0	0,070	0,000	1	0,070	0,070
5	2	0,069	0,138	1	0,069	0,069	1	0,069	0,069
6	2	0,069	0,138	0	0,069	0,000	0	0,069	0,000
7	2	0,066	0,132	2	0,066	0,132	2	0,066	0,132
8	2	0,066	0,132	0	0,066	0,000	0	0,066	0,000
9	2	0,065	0,130	0	0,065	0,000	0	0,065	0,000
10	2	0,065	0,130	0	0,065	0,000	0	0,065	0,000
11	2	0,064	0,128	1	0,064	0,064	1	0,064	0,064
12	2	0,064	0,128	2	0,064	0,128	1	0,064	0,064
13	2	0,063	0,126	1	0,063	0,063	0	0,063	0,000
14	2	0,062	0,124	2	0,062	0,124	2	0,062	0,124
15	1	0,062	0,062	1	0,062	0,062	1	0,062	0,062
Total		1,000	1,938		1,000	1,072		1,000	0,942
			Index I			Index II			Index III

Peripherality Indices	Value	
I — low level of peripherality	$1{,}5000 \leq x \leq 2{,}000$	Developed by: Tomasz Podciborski
II — average level of peripherality	$1{,}000 \leq x < 1{,}500$	
III — high level of peripherality	$0{,}500 \leq x < 1{,}000$	Verified by:Iwona Krzywnicka
IV — very high level of peripherality	$0{,}000 \leq x < 0{,}500$	Date: 1 June 2014

The results of the evaluation are presented in table 1. The village of Wilkasy, a rural settlement unit situated in the proximity of an urban center, characterized by a high level of urbanization and diverse land-use types, has peripherality index I. Grzybowo has peripherality index II, and Kronowo — peripherality index III.

Conclusions

An analysis of the relevant literature and legal regulations indicates that spatial order and sustainability are the pillars of spatial planning and sustainable development in rural areas. Spatial planning policies rooted in the above principles will enable the present generations to meet their current needs and leave resources of high economic, esthetic and environmental value for the future generations. The proposed method of evaluating the peripherality of rural settlement units based on

the principles of spatial order and sustainable development relies on 15 indicators which, according to the surveyed respondents, make the greatest contribution to spatial cohesion and sustainability. The developed method is universal, and it can be applied in assessments of rural areas throughout the country. The method not only evaluates the peripherality of rural settlement units with respect to spatial order and sustainable development, but it can also be used to pinpoint the greatest weaknesses of a settlement unit. The identified weaknesses can be addressed and the relevant improvements can be introduced as part of revitalization measures. Subject to need and individual preferences, the results of the evaluation can be presented in descriptive, tabular or graphic form.

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