

ZBIGNIEW ZIOŁO

Podkarpacka High School in Jasło

FUNCTIONING OF THE RURAL AREAS IN THE STRUCTURE OF GEOGRAPHIC SPACE

Abstract: The functioning of rural areas has been characterised, and the various relations occurring between their elements have been shown in the structure of a theoretical model of geographic space.

Key words: Geographic space, rural areas.

Introduction

Civilisation development processes take place as a result of the implementation of new ideas; new technological solutions, which facilitate technical progress, stimulate organisational progress and cultural transformation of society. These processes are apparent in various scales of spatial systems (from the local scale through the regional, national, European to the global scale) with different intensity. The spatial systems often create different possibilities for the progression of social, economic and cultural growth processes which lead to improvement in living standards and quality of life. Also, the authorities significantly influence the direction, pace, and intensity of transformation processes. Depending on their intellectual stock and ability to use knowledge in the management process, they may stimulate the growth rate and determine reasonable development directions with different intensity. As a consequence, processes of reducing or enlarging disparities strengthen the level of global economic space development, therein also domestic and regional space.

Recognition of regularities in the social, economic and cultural development process, taking place in particular spatial conditions, is especially important to reasonably manage the aim, which is to stimulate growth and reduce occurring disparities. This requires a permanent improvement to the methodology and the implementation of new research concepts which would allow the recognition of complex processes of various sector formation and the possibilities to improve society's existence in spatial systems, therein in the rural areas, more and more precisely. These studies should be aimed at the comprehensive capture of various phenomena formation in spatial sys-

tems. Determining the strength of the influence of economic rules and the possibilities for attracting exogenous factors, as well as stimulating endogenous factors, seems to be particularly important.

In the light of the assumptions adopted in this paper we make an attempt to characterise the functioning of rural areas in the structure of geographic space. We adopt that both geographic space and rural area functioning in its structure are characterised by high diversity in terms of environmental conditions, social, economic as well as cultural potential in the global, domestic, regional and local system [Falkowski, Kostrowicki 2001; Górz 2002; Bański 2008], and they play a significant role in the structure of social and economic space [Kamińska 1996,1997; Stasiak 2000; Zioło 2003; Rydz 2006; Bański 2005, 2008, Markowski, Strzelecki 2008; Falkowski 2009; Heffner 2010; Kamińska, Heffner 2010, 2012]. Also, diagnostic studies into domestic economic space emphasise this fact [Kukliński 1995; Kulikowski 2002, 2003; Węclawowicz *et al.* 2006; Kudełko 2007, 2013; Korcelli 2010] as well as research into issues related to food economy [Styś 1983; Zalewski 1989; Zioło 1991; Czyżewski 1992; Józwiak 2010, Zegar 2010], and agrarian policy [Bański 2001, Rudnicki 2010, Zegar 2010; Wiklin 2011; Majet *et. al.* 2012]

1. Functioning of geographic space

Let us adopt the fact that all environmental, social, economic and cultural processes forming rural areas take place in a given spatial system, which creates various chances for their development. That is why outlining the mechanism of geographic space formation as a place of development process execution is a very important problem. Here, we refer to the concept of the systemic presentation of the relationship between economy and natural environment [Domański 1992] and to model approaches under development [Zioło 2003]. Three main categories and the relations occurring between them should be distinguished in the geographic structure (Tab. 1):

- environmental space, also called physiographic space (X_1, \dots, X_n),
- socio-economic space (Y_1, \dots, Y_m),
- cultural space (Z_1, \dots, Z_k).

The distinguished categories of space include many diverse elements, which perform specific functions in them and as a result of mutual relations, they form various systems of structure with distinctive properties.

The structure of environmental (physiographic) space includes geological location, climatic conditions, hydrographic conditions, landscape, soils, flora and fauna.

Structure of the socio-economic space consists of the spatial structure of agriculture, the spatial structure of industry, network (transport and telecommunications), the service and institutional network, demographic conditions, capital and financial resources of the population.

Table 1

Place of the rural areas in geographic space

Elements of the structure of geographic space				Geographic space			
				environmen- tal space	socio-econo- mic space	cultural space	settlement network
				X1, ... ,Xn	Y1, ... ,Ym	Z1, ... ,Zk	O1, ... ,O3
Geographic space	environmental space	Geological location	X1	X ^o ij	X ^o ij	X ^o ij	X ^o ij
		Climatic conditions	X2				
		Hydrographic conditions	.				
		Landscape	.				
		Soils	.				
		Flora	.				
		Fauna	Xn				
	socio-economic space	Structure of the agriculture	Y1	Y ^o ij	Y ^o ij	Y ^o ij	Y ^o ij
		Structure of the industry	Y2				
		Service network	.				
		Institutional network	.				
		Communication network	.				
		Demographic conditions	.				
		Capital resources of the population	Ym				
	cultural space	Material culture	Z1	Z ^o ij	Z ^o ij	Z ^o ij	Z ^o ij
		Spiritual culture	Z2				
		Aspirations	.				
		Educational attainment	.				
		Intellectual resources	.				
		Social awareness	.				
		Political awareness	.				
Cultural awareness		Zk					
settlement network	Total, therein:	O1	O ^o ij	O ^o ij	O ^o ij	O ^o ij	
	Urban network	O2					
	Rural areas	O3					

Source: On the basis of Ziolo 2003.

The structure of cultural space comprises: material culture resources, spiritual culture resources (*e.g.*, religious, related to the philosophy of life), educational attainment level, society's aspirations, intellectual resources (therein professional qualifications), social awareness (social and human capital), political and cultural awareness.

In the face of progressing civilisation development and entry into the information phase of social development, it is essential to distinguish the cultural space, whose importance will be growing. Also, the idea of steady development, which on the one hand determines human needs and on the other indicates the necessity to impose certain conscious limitations on individuals, supports distinguishing the cultural space [Domański 1992].

Particular relations occur in the functional structure of geographic space between its elements (Tab. 1).

The first group is composed of the relations occurring between the elements of the same category of geographic space:

- i. relations between elements of the environmental space (X_i) :

$$\left[x_{ij}^x \right] \quad (i = j = 1, n)$$

- ii. relations between elements of the socio-economic space (Y_i) :

$$\left[y_{ij}^y \right] \quad (i = j = 1, m)$$

- iii. relations between elements of the cultural space (Z_i) :

$$\left[z_{ij}^z \right] \quad (i = j = 1, k)$$

The second group is constituted by relations appearing between elements of different categories of geographic space. Active relations, presented in the table horizontally and passive relations illustrated by columns of the table are found among them.

- a) active relations are illustrated by the following example:

- influence of elements of the environmental space (X_i) on the social and economic elements (Y_i) :

$$\left[x_{ij}^y \right] \quad (i = 1, n); \quad (j = 1, m),$$

- influence of the cultural space (Z_i) on elements of the socio-economic space (Y_i) :

$$\left[z_{ij}^y \right] \quad (i = 1, k); \quad (j = 1, m).$$

- b) passive relations are illustrated by the columns of the table:

- influence of the socio-economic elements (Y_i) on the geographic environment (X_i) is defined by:

$$\left[y_{ij}^x \right] \quad (i = 1, m); \quad (j = 1, n),$$

– similarly, influence of the cultural space (Z_i) on the socio-economic elements (Y_i) are defined by:

$$\left[z_{ij}^y \right] \quad (i = 1, k); \quad (j = 1, m).$$

This means that $\left[x_{ij}^y \right]$ and $\left[y_{ij}^x \right]$ are not equal and define different directions of the relation. The relation $\left[x_{ij}^y \right]$ shows influence of the natural environment on the socio-economic elements, whereas the relation $\left[y_{ij}^x \right]$ defines influence of the socio-economic elements on elements of the geographic environment. Relations $\left[z_{ij}^y \right]$ and $\left[y_{ij}^z \right]$ differ from each other in a similar way. The first one defines the influence of elements of the cultural space on elements of socio-economic space, while the other one defines an opposite relation.

In the light of the above remarks we can assume that the distinguished categories of space are not a sum of the particular elements but their function.

Physiographic space (Px) is a function of the natural environment elements (X_i) and a random parameter related to it (e_i^x) :

$$Px = f(X_i) + e_i^x$$

The socio-economic space (Py) is a function of the socio-economic elements (Y_i) and a random parameter (e_i^y) :

$$Py = f(Y_i) + e_i^y$$

The cultural space (Pz) is a function of the cultural elements (Z_i) and a random element (e_i^z) :

$$Pz = f(Z_i) + e_i^z$$

In light of the above definitions, geographic space (G) may be defined as a function composed of the distinguished categories of space (Px, Py, Pz) , i.e., environmental elements (X_i) , socio-economic elements (Y_i) , cultural elements (Z_i) and random parameter (E_i^g) , thus:

$$G = F [f(X_i) + e_i^x, f(Y_i) + e_i^y, f(Z_i) + e_i^z] + E_i^g$$

or:

$$G = F(Px, Py, Pz) + E_i^g$$

The presented model of the geographic space functioning indicates the variety of geographic space elements and relations occurring between them. This means that qualitative and quantitative studies, not only on particular elements of geographic space but also on various intensifications of relations occurring between them, are necessary in order to execute the idea of spatial order.

The settlement network in the geographic space structure is formed by the elements of environmental $[x_{ij}^o]$, socio-economic $[y_{ij}^o]$, and cultural $[z_{ij}^o]$ space, and also by transformations of the settlement network influencing it: $[o_{ij}^x]$, $[o_{ij}^y]$, $[o_{ij}^z]$.

2. Formation of rural areas in geographic space

Spatial concentration of the potential of environmental, socio-economic, and cultural elements influences the formation of the urban and rural settlement network, therein: metropolises and metropolitan areas, larger cities and the suburban zones related to them, the remaining cities, and rural areas. Rural areas occur both in the structure of metropolitan systems, suburban zones as well as the areas outside them. Thus, rural areas are characterised by their high diversity in terms of quality of the natural environment, socio-economic and cultural potential and structure, location in geographic space, and the functions performed.

Various internal relations between elements of environmental space, socio-economic and cultural elements, and relations between elements of different spaces: e.g., between elements of environmental space and elements of socio-economic space, between elements of socio-economic space and elements of cultural space, or between elements of environmental space and cultural elements occurring often in the structure of rural areas located in different places in geographic space.

This means that a deeper analysis characterising various types of relations occurring in the structure of rural areas is crucial in the diagnostic studies concerning the assessment of transformation processes and the assumed aim of strategic development. Individual features of particular elements, which influence the functions performed by them, account for an important rationale determining tasks and objectives of strategic development.

Possibilities for the authorities' influence related to the formation of rural areas (O_3) on particular elements are indicated by the following (Tab. 1):

- the influence of rural areas on elements of environmental space (X_1, \dots, X_n):

$$O_3 \rightarrow \begin{bmatrix} o_1^x \\ o_2^x \\ \cdot \\ o_{1n}^x \end{bmatrix}$$

– influence on elements of socio-economic space (Y_2, \dots, Y_m):

$$O_3 \rightarrow \begin{bmatrix} o_1^y \\ o_2^y \\ \cdot \\ o_{1m}^y \end{bmatrix}$$

– influence on elements of cultural space (Z_1, \dots, Z_k):

$$O_3 \rightarrow \begin{bmatrix} o_1^z \\ o_2^z \\ \cdot \\ o_{1k}^z \end{bmatrix}$$

At the same time, the quality and potential of particular elements of geographic space creates specific possibilities for influencing rural areas.

They refer to the influence of elements of environmental space (X_1, \dots, X_n) on rural areas (O_3):

$$\begin{bmatrix} x_1^o \\ x_2^o \\ \cdot \\ x_{n1}^o \end{bmatrix} \rightarrow O_3$$

Influence of elements of socio-economic space (Y_2, \dots, Y_m) on rural areas (O_3):

$$\begin{bmatrix} y_1^o \\ y_3^o \\ \cdot \\ y_{m1}^o \end{bmatrix} \rightarrow O_3$$

Influence of elements of cultural space (Z_1, \dots, Z_k) on rural areas (O_3):

$$\begin{bmatrix} z_1^o \\ z_2^o \\ \cdot \\ z_{k1}^o \end{bmatrix} \rightarrow O_3$$

A more precise definition of active and passive relations allow the recognition of positive and negative factors, which accelerate or impede development processes in rural areas. The derived conclusions may create a good rationale for creating reasonable strategies for rural area transformations.

The presented analysis shows that rural areas should be treated as a very complex structure existing in the superior system of geographic space. They are characterised by the occurrence of a series of units varying in terms of function, which stand out by specific active and passive relations.

Contemporary rural areas are moulded in the circumstances of strengthening globalisation and the European integration processes related to them. They lead to an internationalisation of the socio-economic and cultural life of spatial systems of different scales, therein rural areas. Their goal is to create a more organised and developed European space. It results from the willingness to create more organised European areas, which would provide conditions for improving its competitiveness in relation to the world environment.

3. Formation processes of rural areas

Formation processes of rural areas are affected by economic development rules, whose influence is apparent with the different intensity in spatial systems as well as by the adopted types of the development policy.

The basic role in managing a transformation process of rural areas is played by economic development rules with the following character: microeconomic, mesoeconomic, macroeconomic, mega-economic and the rules of the global economy (Tab. 2). Microeconomic rules refer to business entities management, whose main criterion of activity is profit (M_1). Mesoeconomic rules characterise managing processes of spatial systems of various scales, therein rural areas and particular sectors of the economy (M_2). The processes of managing a state's national economy are subject to macroeconomic rules (M_3). Mega-economic rules influence the managing development of a particular group of countries, *e.g.*, The European Union (M_4). Meanwhile, the most complex economic development rules characterise the world economy (M_5).

Table 2

Relations between the economic development rules

Economic rules M_1		Micro- M_2	Meso- M_3	Macro- M_4	Mega- M_5	Global economy
Micro-	M_1	m_{11}	m_{12}	m_{13}	m_{14}	m_{15}
Meso-	M_2	m_{21}	m_{22}	m_{23}	m_{24}	m_{25}
Macro-	M_3	m_{31}	m_{32}	m_{33}	m_{34}	m_{35}
Mega-	M_4	m_{41}	m_{42}	m_{43}	m_{44}	m_{45}
Global economy	M_5	m_{51}	m_{52}	m_{53}	m_{54}	m_{55}

Source: Own elaboration (Tables. 2-5).

Influences of the mentioned rules interfere and penetrate each other in the process of moulding geographic space, therein the rural areas. For instance, influence of the microeconomic rules on the mega-economic ones is illustrated by $[m_{14}]$, whereas influence of the world economy rules on the macroeconomic rules is reflected by $[m_{53}]$.

Relations leading to the mutual stimulation of growth or stagnation, sometimes resulting in certain conflicts, occur between the mentioned economic rules influencing processes of rural area moulding. In compliance with microeconomic rules, business entities aim to maximising profit, whereas according to macroeconomic rules, a domestic economy's objective is to receive the highest possible budgetary revenue. Growth of state revenues takes place partially by raising corporate taxes, which causes a proportional decrease to a business entities' profit. By the same token, it is in every European member state's interest to raise the production of food, while the European Union's interest is not to admit to excessive production. This is where production and distribution limitations for particular products originate from. As a consequence, many conflicts emerge in the transformation process, which can be limited through negotiations and the acceptance of compromises.

Diverse potential, and the functions of particular elements of rural areas, and the intensification of the relations taking place between them, lead to a necessity for analysing their transformation in various scales of spatial systems (Tab. 3). We can distinguish the following systems among them: local (O_1), regional (O_2), national (O_3), group of states, *e.g.*, the European Union (O_4) and rural global systems (O_5).

They are often characterised by different structures and economic potential, which to a great extent influences the relations occurring between them. They are reflected in agrarian product distribution, technology in agriculture, migrations of the labour force, possibilities for recreation, tourism, *etc.* Relations occurring in the local system are reflected by $[o_{11}]$, in the regional system – $[o_{33}]$, domestic system – $[o_{33}]$, while in the global system – $[o_{55}]$. Various relations between the distinguished categories of rural areas are described by the active and passive relations. For instance,

influence of global rural areas on rural domestic systems, are described by $[o_{53}]$, while influence on regional relations are described by $[o_{52}]$. Meanwhile, vice versa–influence of the domestic system on the global system is described by relations $[o_{35}]$ and influence on the regional systems is described by $[o_{25}]$.

Table 3

Relations between different scales of the rural areas

Spatial scales of the rural areas		Spatial scales of the rural areas				
		O_1	O_2	O_3	O_4	O_5
Local	O_1	o_{11}	o_{12}	o_{13}	o_{14}	o_{15}
Regional	O_2	o_{21}	o_{22}	o_{23}	o_{24}	o_{25}
Domestic	O_3	o_{31}	o_{32}	o_{33}	o_{34}	o_{35}
Of a group of states	O_4	o_{41}	o_{42}	o_{43}	o_{44}	o_{45}
Global	O_5	o_{51}	o_{52}	o_{53}	o_{54}	o_{55}

Reaching the set development goals at various spatial scales of rural areas is taking place on the basis of policy rules of various types, which overlap at a certain scale of the spatial system (Tab. 4). The following play a dominating role among them: economic (P_1), social (P_2), international (P_3) and regional (P_4). Next to them, one can also distinguish policies in the scope of ecology, education, culture, defence, etc. They aim to effectively execute certain objectives, so particular types of policy aim at economic growth (p_{11}), social development (p_{22}), improvement of international relations (*e.g.*, raising the effectiveness of trade activities) – (p_{33}), or regional development (p_{44}). In general, these policies should aspire to raise the quality of life and living standards of rural populations through the instruments typical for them.

In the process of forming rural areas, the distinguished types of policy influence each other to various extents, creating certain development possibilities, but also some barriers in this respect. It is expressed in the relations occurring between them in the structure of various categories of rural areas. For instance, influence of the economic policy (P_1) on the social policy (P_2) is described by relation $[p_{12}]$ and vice versa: influence of the social policy on the economic policy is illustrated by $[p_{21}]$. Similarly, influence of the international policy on the regional policy is reflected in $[p_{34}]$, whereas influence of the regional policy on the international policy is described by $[p_{43}]$.

Different possibilities for development may emerge under the influence of domestic economic policy in rural areas of various categories. This may lead to their development, stagnation or recession. For instance, deterioration of international relations may result in limitations in the delivery of natural resources or an export surplus of agrarian products. Backwardness in respect to network infrastructure decreases the attractiveness of rural regional systems for stimulating socio-economic and cultural,

among other things, development. These processes are moulded in certain environmental circumstances and influence the implementation of an appropriate environmental policy, through which we are able to stimulate economic growth or limit it.

Table 4

Relations between types of policies

Types of policies		Economic	Social	International	Regional
		P ₁	P ₂	P ₃	P ₄
Economic	P ₁	p ₁₁	p ₁₂	p ₁₃	p ₁₄
Social	P ₂	p ₂₁	p ₂₂	p ₂₃	p ₂₄
International	P ₃	p ₃₁	p ₃₂	p ₃₃	p ₃₄
Regional	P ₄	p ₄₁	p ₄₂	p ₄₃	p ₄₄

Tendencies currently appearing at the European scale aim at creating a uniform market and assure the distribution of agrarian products as well as services for agriculture and the flow of work force, capital, technology and organisation. Appropriate instruments of direct and indirect influence, generated by the European policy, pursued towards rural areas under formation account for a factor which accelerates this process. Farming processes based on modern technologies are implemented as a result of this process, new strengthening tendencies to concentrate and specialise agricultural production occur, multifunctional development of rural areas takes place, and more and more favourable forms of cooperation for agriculture and farms are adopted, which is exemplified by French agricultural cooperatives as the new forms of rural area organisation [Ziolo 1998].

4. Model of functioning of rural areas

The presented analysis indicates a high complexity of functioning of rural areas, which results from various structural elements and relations occurring between them. A need for attempts at elaborating comprehensive concepts to explain the complex processes of formation of rural areas of various scales arises from here.

In general, it should be accepted that the quality and potential of geographic spatial elements can be distinguished in the structure of functioning of rural areas (environmental, socio-economic, cultural), which are overlapped by the rules of economic development (micro-, meso-, macro-, mega- and global economy). They influence the formation of various scales of rural areas (local, regional, domestic, a group of states, global), which is controlled by appropriate types of policies (economic, social, international, regional).

The functioning of rural areas is a complex process, which differentiates their economic potential and functions [s^s]. Defining mutual relations occurring between

the structural elements is an important issue for the rational management of these areas (Tab. 5). In the process of functioning, rural areas influence the transformation of geographic spatial elements [s^g], effectiveness of the economic development rules [s^m], which in turn influence their economic potential [s^o] and design of various types of policies [s^p].

Table 5

Model of functioning of the rural areas

Elements of the model		Rural areas	Elements of geographic space			Economic development rules			Spatial scales of the rural areas			Types of policies		
		S	G ₁	.	G _m	M ₁	.	M _n	O ₁	.	O _k	P ₁	.	P _h
Rural areas	S	s ^s	s ^g			s ^m			s ^o			s ^p		
Elements of geographic space (environmental, socio-economic, cultural)	G ₁	g ^s _{ij}	g ^g _{ij}			g ^m _{ij}			g ^o _{ij}			g ^p _{ij}		
	.													
	G _m													
Economic development rules (micro-, meso-, macro-, mega-, global)	M ₁	m ^s _{ij}	m ^g _{ij}			m ^m _{ij}			m ^o _{ij}			m ^p _{ij}		
	.													
	M _n													
Spatial scales of the rural areas (local, regional, domestic, global)	O ₁	o ^s _{ij}	o ^g _{ij}			o ^m _{ij}			o ^o _{ij}			o ^p _{ij}		
	.													
	O _k													
Types of policies (economic, social, international, regional)	P ₁	p ^s _{ij}	p ^g _{ij}			p ^m _{ij}			p ^o _{ij}			p ^p _{ij}		
	.													
	P _h													

At the same time, the mentioned structural elements affect rural areas. Influence of geographic spatial elements on rural areas [g^s_{ij}], influence of economic development rules [m^s_{ij}], influence of spatial scales [o^s_{ij}] and influence of various types of policies [p^s_{ij}] illustrate this.

Feedbacks appear in these relations, as well. For instance, rural areas may influence implementation of the most effective instruments of a policy, which will stimulate their development to the greatest extent on the one hand, but on the other, various types of policies may influence the direction of rural area development [p^s_{ij}]. These feedbacks may stimulate rural area development but they may also cause stagnation, or certain conflicts may even appear, leading to retardation of their development.

Similar feedbacks occur between particular structural elements of rural areas. Elements of geographic space affect economic development rules [g^m_{ij}], formation of the rural area scale [g^o_{ij}], and particular types of policy [g^p_{ij}]. At the same time, the opposite relations appear, which are illustrated by [m^g_{ij}], [o^g_{ij}] and [p^g_{ij}].

Similarly, policies' influence is reflected, e.g., in $[p_{ij}^m]$, $[p_{ij}^o]$, whereas influencing the policy is defined by $[m_{ij}^p]$ and $[o_{ij}^p]$.

The outlined model of functioning of rural areas in the structure of geographic space emphasises their high structural and functional complexity. It seems that this justifies the need for getting them to know more and more precisely for setting rational objectives and methods of meeting them with the certain capital and financial resources.

Final remarks

In the face of contemporary civilisation challenges and strengthening European integration processes, defining directions for rural area formation is a particularly important issue. It should lead to an increase of competitiveness and the creation of conditions to intensify economic development to improve the quality of life and living standards of rural populations. It should be emphasised that mutual advantages, which stimulate growth of particular elements of space and conflicts appearing between particular groups of elements, creating their internal structure, occur in the transformation process of rural areas.

The presented deliberation refers to the necessity of elaborating precise models of diagnostic studies, which comprehensively capture the functioning of rural areas. They should serve to assess their development level, as well as quality of life, and then to define rational directions for their development. Selection of the most favourable option leading to a reduction of the civilisation gap in reference to the general social development process, and reducing the negative results of social and spatial polarisation remains a significant problem.

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