The Someşul Mare Anisotropic Region
Geographical and Historical Factors

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1. Introduction

THIS PAPER proposes the analysis of an anisotropic entity in Romania, the Someşul Mare region. The anisotropic regions are interpreted as territorial anomalies of the homogeneous and polarized regions (Dauphine, 1979, 28); they are addressing specific research needs of deviations from the ideal scheme of the classic regional models. In selecting the research topic, two arguments were decisive:

– anisotropic regions are favorable to economic investment and provide an effective regional development;

– Romania allowed the structuring of a number of anisotropic regions which enable sustainable development.

The analyses of anisotropic regions are new and are based on the terms of "anisotropy" and "anisotropic" that were taken over from the technical sciences, such as geophysics, mineralogy, fluid mechanics, optics, material resistance, seismology, etc. (Boţan and Ilovan, 2005, 217). Regional geographers took up those terms, giving them a unique meaning in order to explain the anisotropic space and/or region (Creţan et al., 2015).

In technical sciences, "anisotropic" and "anisotropy" refer to different objects, substances, processes and phenomena which do not show equal manifestations in all directions. The meaning of "anisotropic" and "anisotropy" come from the main definitions and contexts of use: anisotropic mediums may have one optical axis or two optical axes (Dulcescu et al., 2012, 80); in biology, wind dispersal implies an anisotropic (direction-dependent) transport along wind highways defined by wind azimuth and speed (Muñoz et al., 2004); anisotropic minerals present different light propagation speeds, depending on the direction in which light propagates through the mineral (Jianu et al., 2007, 5); anisotropy is a feature of crystalline minerals and substances, presenting variations in their physical properties, including their optical characteristics, according to direction (Ionescu and Ghergari, 2006, 451); the speed of seismic waves in anisotropic media varies according to the direction of propagation (Maupin and Park, 2009, 290), etc.

Geographical space reveals, in most cases, anisotropic territorial models (Creţan et al., 2015), as the territory is not a utopian construction in which components are distributed evenly and uniformly in all directions (Paasi, 1991). The concept of "anisotropic region" was introduced in geography by Dauphiné (1979) and is the only one that addresses the deviations from the classic existing utopian regional models.

The aim of this paper is to demonstrate, through a case study, that anisotropic regions represent atypical territorial models, but solid, attractive and effective ones in terms of development opportunities. So, in order to achieve our aim, we set four research directions: (1) to confirm that the analyzed region fits perfectly into the structural matrix of an anisotropic entity; (2) to analyze the impact of the his-

torical context on the region and its polarizing centers; (3) to analyze a series of quantifiable indicators that confirm the existence of an anisotropic region along the Someşul Mare River, and (4) to demonstrate that the analyzed region is attractive and has certain regional development opportunities which will indicate that it meets all the structural and functional requirements of an anisotropic region.

2. Theoretical Model:
Structural Matrix of an Anisotropic Region

THE ANISOTROPIC regions are considered spatial entities with an elongated form, which are characterized by successive polarizing centers positioned in series (Boţan and Cocean, 2013, 304). The essential characteristic of anisotropic regions is given by their structural and functional asymmetry and the main element of their structural matrix is the main development axis (Dauphiné, 1979, 32) along which the entire regional assembly is structured.

The anisotropic region matrix contains some obligatory components (Figure 1): "structured along a privileged axis, which is highlighted by complex and overlapping energy, material and information fluxes" (Cocean 2005, 106); its territory is polarized by several centers with partial influence across the region; asymmetric fluxes which generate functional inequalities, hierarchies and disparities; the basis of its formation are habitats and activities concentrated in coastal areas, along hydrographic axes, on transport routes or morphological corridors, in elongated basins, etc.; anisotropic regions function as "territorial systems defined primarily by negative feedback loops, so they form irreversible spatial structures" (Dauphiné, 1979, 37); the fluxes are generated both in the respective region and outside it; "the anisotropic region combines the features of both homogeneous and polarized regions" (Cocean, 2005, 107); within the region, its subsystems are polarized by 2nd, 3rd or 4th-rank centers so the polarization capacity of each center is partial.
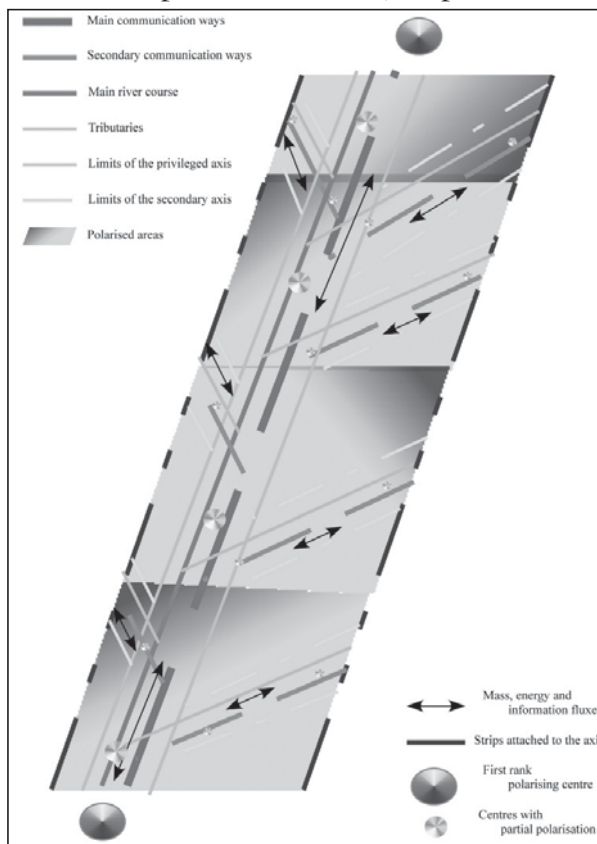
The anisotropic regions overlap gravity axes, which are mostly open, but there are also semi-opened or barred ones, where territories situated on the limits of the axis receive an important role in terms of development (Cocean, 2011).

Romania's territory favors the configuration of anisotropic regional entities through some existing elements: the Romanian seaside, the main hydrographic axes, trenchant contacts between the large landforms, the morphological corridors, and the navigable channels.

One may distinguish the following types of anisotropic regions (Figure 2): *fluvial regions* (e.g. the Danube region, the Upper Prahova, the Olt, the Târnava Mare, the Arieş-Mureş middle flow; the Someşul Mare, and the Siret Corridor), *coastal regions* (South Dobruja), and the *morphological corridor regions* (the Timiş-Cerna and the Bran-Rucăr corridors).
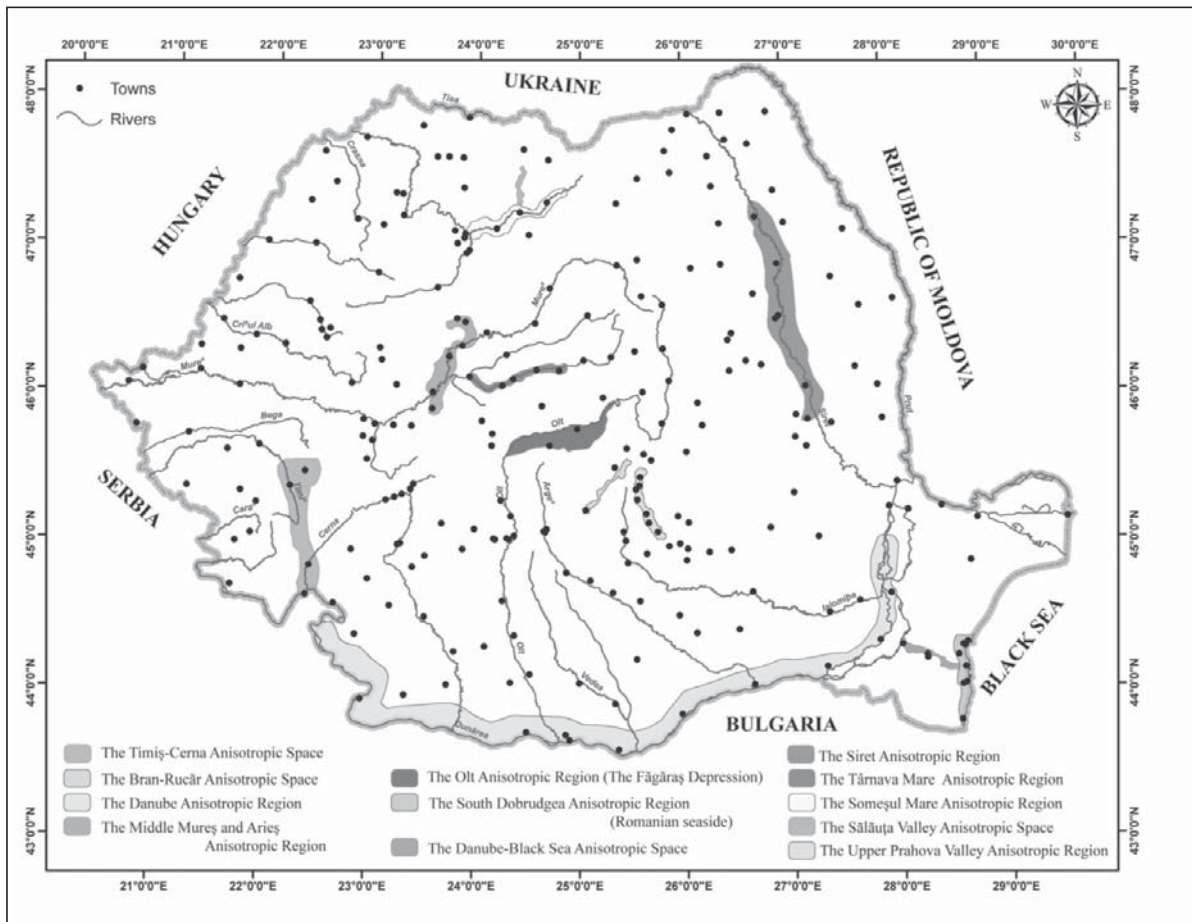

FIGURE 1. Structural matrix of an anisotropic

FIGURE 2. Romania. Main anisotropic regions and spaces

3. Methodology

IN ORDER to fulfil the first objective, the comparison between the Someşul Mare region and the overall theoretical matrix of an anisotropic region, we underlined the fact that the defining elements of the region totally overlap the presented matrix, both structurally and functionally.

For the second objective, we used the scientific literature review in analyzing the impact of the historical context on the region and its polarizing centers.

For the third objective, we analyzed a series of recent quantifiable indicators (juridical, educational, sport-related, health-related, economic, religious, cultural, touristic, and the transport infrastructure) to test the status of anisotropic region for the analyzed territory. The quantifiable indicators are linked to the infrastructural elements of the region, which were identified and registered, in order to confirm that this territory is not somehow totally polarized by a particular urban center. These indicators are different in their nature, but all are designed to attract and guide complex fluxes.

The fourth objective, referring to the economic efficiency of the anisotropic territorial models, was achieved by a comparative analysis of the number of inhabitants in the main cities of the privileged axis, between the 2002 and 2011 censuses. Through them, we demonstrate that because of a fragile economy, like that of Romania, an anisotropic region has weaker population losses, due to its territorial efficiency and complexity, which permanently generate jobs.

As a complementary step, in addition to the mentioned analysis of quantifiable indicators, we assessed also the road traffic intensity alongside the privileged axis at Bistriţa, Salva, Năsăud, and Ilva Mică points. The traffic intensity analysis was done within three working days in 2015, the aim being to demonstrate that the vectors of the privileged axis had larger fluxes than those of the secondary axes. Thus, we could demonstrate that internal fluxes carried by the privileged axis contributed decisively to the economic development of the region.

4. Results

4.1. Defining Elements of the Someşul Mare Anisotropic Region, Totally Overlapping the Presented Theoretical Matrix

The Someşul Mare region holds all the structural elements of an anisotropic region specified by us in the structural matrix (Figure 3). So the Someşul Mare corridor features a number of geographical elements and phenomena, with high reverberation for the northern part of Transylvania, through its main function as connecting corridor. Along the corridor we find a territory that has all the prerequisites to be classified as an anisotropic region.

The main element is the privileged axis, located along the homonymous river. The status of privileged axis results from the fact that, along this axis, a number of communication routes were built over time, through which circulated the main energy, material, and information fluxes.

These fluxes are generated both within the region and outside it. Through these, the privileged axis became the main transportation vector for Northern Transylvania. Along the Someşul Mare watercourse, there is a road and a railway which links Transylvania to Moldavia and to the Maramureş Depression. A number of secondary communication routes (roads and railways) converge to the privileged axis, which fed its fluxes continuously.

On both sides of the privileged axis, an asymmetrical space emerges, representing the inferior ranking element in the structure of the region. The area, attached to the privileged axis, is unequal, in extent and importance, on both sides of the axis, being more extended on the right side of the Someşul Mare River. Its unequal character results from the conjugated assistance of two other asymmetries, the morphological and functional asymmetry of the studied territory. The morphological asymmetry of the space attached to the axis is given by its wider expansion to the north, along the Someşul Mare, and by the more gentle southern slopes of the Rodna and the Ţibleş Mountains and by the smaller extension, on the left side, a situation created by the presence of the Someşul Mare Cuesta—that is why the Land of Năsăud, overlapping much of the analyzed anisotropic region, was called a "slope land" (Cocean and Ilovan, 2009). As a consequence of this morphological conditioning in the region, one may observe also a functional asymmetry; this is related to the fact that the intensity of the energy and material fluxes from the north and the supplies from the privileged axis are more consistent than those from the south. On the left flank, more important tributaries with significant energy, information and material intake are linked only to the catchment sector of the Ilva and in the Beclean sector, where the fluxes are amplified from the left. An analysis of the traffic intensity indicates that, in the Rodna-Beclean sector, the northern flank accounts for over 70% of the fluxes of the privileged axis. In the Beclean-Dej sector, the southern flank increases the fluxes of the privileged axis with over 72%, compared with the north.

Along the privileged axis, there are several small polarizing centers with partial influence across the entire region. Of these settlements, increased polarization capacity appears at Sângeorz-Băi, Năsăud, Beclean and Dej, due to their more complex functions.
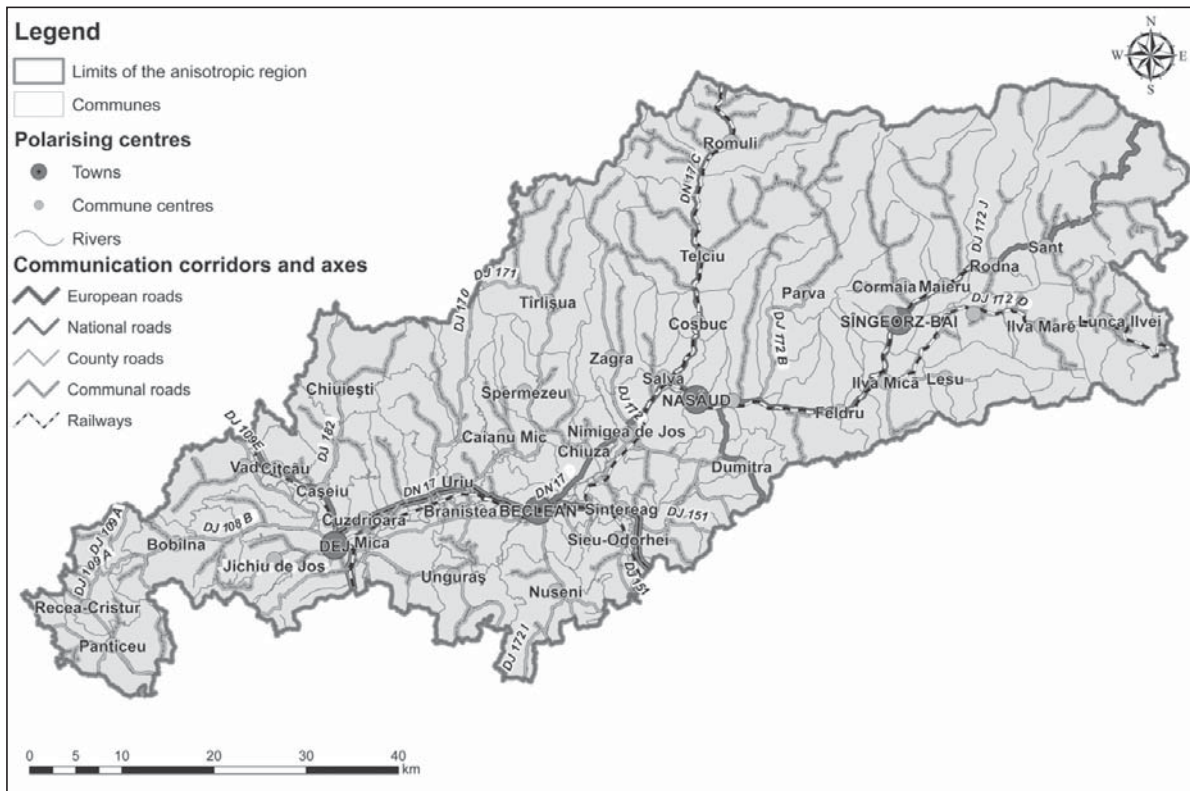
FIGURE 3. Structural matrix of the Someşul Mare anisotropic region

4.2. Impact of the Historical Context on the Region and Its Polarizing Centers

For the development and consolidation of the Someşul Mare anisotropic region, the evolution of two other regions was highly significant: the Military Border District of Năsăud and the Land of Năsăud. The present ethnographical region of Năsăud (i.e. the Land of Năsăud) overlaps more than half of the analyzed anisotropic region and, at the same time, it hosts the main polarizing center of the Military Border District—Năsăud—and more than half of the area and settlements of the Border District (Figure 4). The existence of these two regions also influenced, to a certain extent, the town of Beclean, located in their proximity. Taking these into account, we consider that the historical context was very important also for the appearance of the Someşul Mare anisotropic region, although the town of Dej, one of the centers in the western part of this region, was not included in or influenced by either the Land of Năsăud or the Military Border District of Năsăud.

At its point of maximum expansion, the Austrian Military Border (which existed during the 16th–18th centuries) was a border region of 1,800 km, separating the Austrian Empire (along its eastern and south-eastern borders) from the Ottoman Empire (Figure 5) and it appeared during a "process of power expansion and stabilization" (Ilovan et al., 2016, p. 220). The Transylvanian Military Border was a part of this defensive belt starting with the mid-18th century and ending in 1851. It included the Military Border District of Năsăud (1762–1851), where people had to defend the roads and to maintain the security in the region, besides fighting in the wars of the Empire. This latter region underwent processes of development (social, cultural, economic, etc.) and institutionalization (Bolovan and Bolovan, 2009; Ilovan, 2009, pp. 59-171; Mureşianu, 2000), which rendered its settlements more stable and powerful.
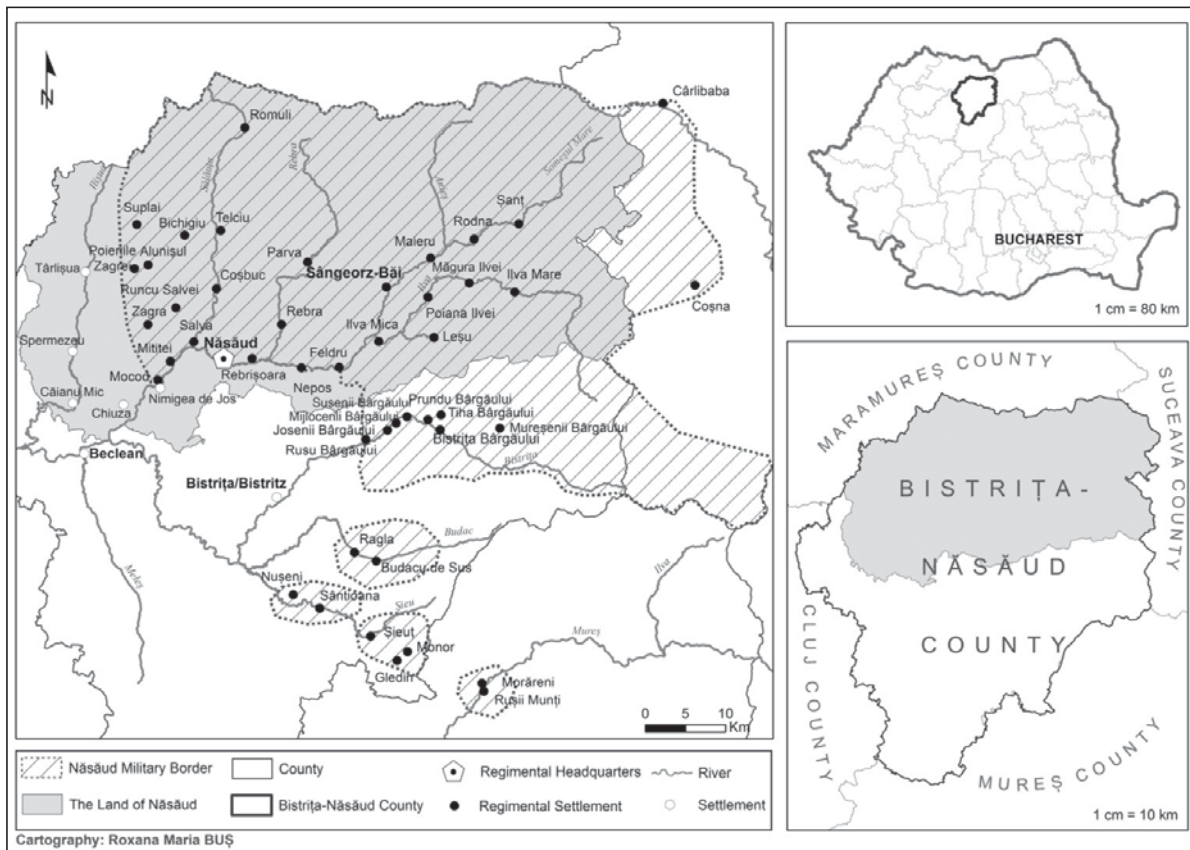
FIGURE 4. Năsăud Military Border and the Land of Năsăud. Source: Ilovan et al., 2016, p. 224

The Land of Năsăud and the Military Border District of Năsăud offered a certain habitat potential, with the Someşul Mare Corridor as their gravitational axis. Therefore, the settlement structure in this region was determined by geomorphology. The administrative organization and the imperial systematization themselves observed it. This is obvious in a text where M. Mureşianu (1997) presents the humanization of the superior basin of the Someşul Mare: "The military administration, according to program, compelled the people of Leşu village to relocate a large number of their households on the left of the river, with a trend of breaking through the Leştior, thus creating a nucleus that from that time on has been known as Leşu village. At the same time, as a result of the swarming of certain households upstream, in the corridor area belonging to the Leşu Valley, a second settlement nucleus appeared, still developing from a spatial perspective, called Leşu Luncă. This is a lineal settlement nucleus significant due to its length and different elevations (from 500 up to over 700 m)" (Mureşianu, 1997, p. 53).

To sum up, the direction of settling was from downstream to upstream. The same author mentions several exceptions to this trend (a trend that enabled the formation of secondary anisotropic axes) due to the population's migration because of restrictive historical conditions: "The trend from downstream to upstream was generated by conflicts with the Saxons, and that from upstream to downstream because of barbaric hordes and natural disasters" (Mureşianu, 2000, p. 112).

The systematization and remodeling of the settlement nuclei enabled the consolidation of towns and villages in the Military Border District, and overall economic development was a characteristic of most settlements in this region (Mureşianu, 2000, p. 217).

We may conclude that the physical-geographical conditions of the anisotropic region were complemented by political, social, and economic changes, which determined an adjustment of the flux-
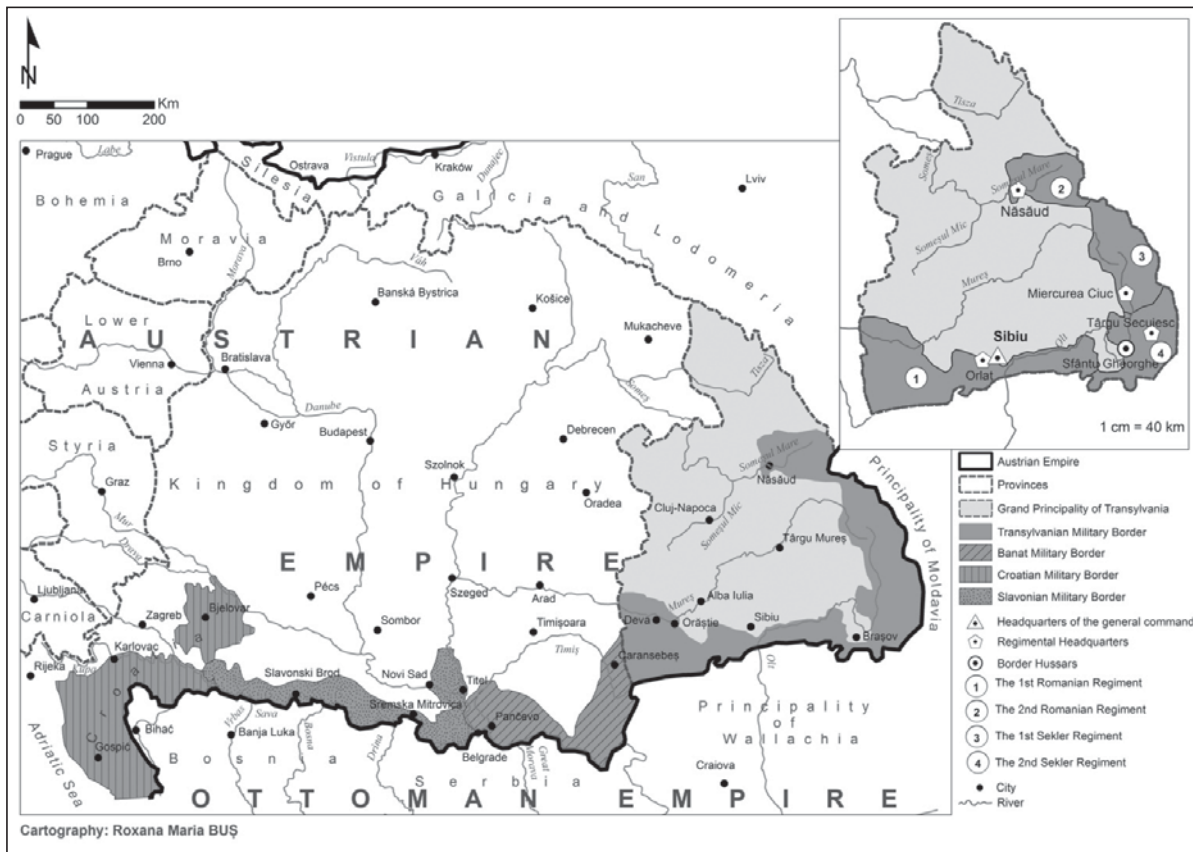
FIGURE 5. The Austrian Military Border in 1780. Source: Ilovan et al., 2016, p. 221

es (both material and spiritual-cultural): during the Military Border District and after it disappeared, settlements increased spatially and demographically, Năsăud, Rodna, Sângeorz-Băi, and Ilva Mică being the main polarizing centers also in the evolution of the ethnographical region known as the Land of Năsăud (a plurinodal region, with Năsăud as a rank I polarizing center).

4.3. Testing the Anisotropic Features for the Someşul Mare Region through Quantifiable Indicators

ESTABLISHING THE polarization capacity of the settlements in the privileged axis (Sângeorz-Băi, Năsăud, Beclean, and Dej) through quantifiable indicators is the central thread of the whole analysis.

The literature stipulates that "in an anisotropic region appear second, third or fourth rank polarized subsystem centers" (Boţan and Cocean, 2013, 305). Thus, in the Someşul Mare anisotropic region, the main cities, along the privileged axis, hold a number of elements, on which one can assess their polarization capacity within the region.

Elements with increased polarization capacity are courts, high schools, universities, hospitals, businesses (employing companies), monasteries, museums, and tourist attractions (Table 1).

Thus, in judicial terms, we find that, in the Someşul Mare anisotropic region, there are four polarizing centers (Năsăud, Beclean, Sângeorz-Băi, Dej), each accepting fluxes from their distinct sections. The largest judicially polarized area is associated with the town of Năsăud.

The educational polarization phenomenon results from the existence of specialized institutions such as high schools, university colleges, and children's clubs. The 13 existing high schools generate important educational polarization fluxes. The high schools in the rural areas of Feldru and

Table 1. Quantifiable Indicators of polarization in the Someşul Mare anisotropic region.

Settlement	Court	Secondary schools	High school	Children's club	University	Stadium	Sports hall	Hospital	Pharmacy	Economic agents	Monastery	Museum	Tourist attraction	Hotel	Guest house	Railway station
Rodna	0	1	0	1	0	1	1	0	2	23	0	2	6	1	6	1
Maieru	0	1	1	0	0	1	1	0	2	62	0	1	2	0	3	1
Sângeorz-Băi	**0**	**1**	**1**	**1**	**0**	**1**	**1**	**0**	**3**	**289**	**1**	**1**	**9**	**2**	**10**	**1**
Ilva Mică	0	1	0	0	0	1	1	0	1	23	0	0	1	0	3	1
Feldru	0	1	1	0	0	1	1	0	1	40	0	2	5	0	2	1
Rebrișoara	0	1	0	0	0	1	1	0	1	47	0	1	2	0	2	1
Năsăud	**1**	**2**	**3**	**1**	**1**	**1**	**3**	**1**	**3**	**431**	**0**	**3**	**4**	**1**	**4**	**1**
Salva	0	1	0	0	0	1	1	0	1	37	1	0	2	0	2	1
Nimigea	0	1	0	0	0	0	1	0	2	10	0	0	1	0	1	1
Beclean	**1**	**2**	**3**	**1**	**0**	**1**	**3**	**1**	**3**	**391**	**0**	**1**	**3**	**1**	**5**	**1**
Uriu	0	1	0	0	0	0	1	0	1	37	0	0	1	0	1	0
Petru Rareș (Reteag)	0	1	0	0	0	1	1	0	1	42	0	1	2	0	2	0
Dej	**1**	**4**	**4**	**1**	**1**	**1**	**5**	**1**	**12**	**1.770**	**0**	**3**	**14**	**4**	**25**	**2**

Source: (Bistriţa-Năsăud County and Cluj County Departments of Statistics, 2013)

Maieru are attractive only for students in the respective communes. Children's clubs from the four towns confirm their intra-regional polarizing role. In the analyzed region, we find also higher education institutions in Năsăud, which enhances the educational status as polarizing center characteristic of this locality.

The polarization by sports, through the existing infrastructure (stadia and gyms) is insignificant and is confined to the extent of the administrative units.

Năsăud, Beclean and Dej share their medical polarizing function due to the existing hospitals.

From an economic perspective, the four urban settlements have high polarization capacity. Dej stands out, through its role as an industrial center acquired during the communist period. Employees of businesses located in Sângeorz-Băi, Năsăud, Beclean and Dej come from the local administrative-territorial units and the nearby villages. Dej has the largest polarization area, from an economic perspective, because of the numerous jobs available in the 1,770 companies.

Religious polarization results solely from the existence of monasteries, because usually local cathedrals and parishes receive only fluxes of local population. Along the privileged axis, there are two monasteries: Cormaia and Salva. The two monasteries balance the religious polarization in the region, which is impossible to represent because they attract people from various spaces.

The Someşul Mare anisotropic region has 15 museums, which are important in our analysis because they generate the cultural polarization phenomenon. The most representative museums within the privileged axis are located in Năsăud, Dej, Sângeorz-Băi, and in Coşbuc (the last one outside the axis). Culturally, the main polarizing town is Năsăud, followed by Coşbuc village and the town of Dej.

Tourist polarization is induced by the existing tourist attractions, hotels and guest houses, revealing a settlement hierarchy along the privileged axis, depending on their attraction capacity. Thus, the main polarizing center is Dej, followed by Sângeorz-Băi, Beclean, and Năsăud. The remaining localities are insignificant from this point of view.

The transport infrastructure represents the polarization phenomenon in terms of circulation. Relevant to our study are the railway stations, because the competition in the form of road transport requires passenger stations in each locality. Localities with a polarizing role, important from this point of view, are those where trains with superior function (inter-regio) stop, namely: Dej, Beclean, Salva, Ilva Mică, Sângeorz-Băi, and Rodna.

By quantifying the above indicators, it results that in the Someşul Mare anisotropic region there are four main polarizing centers (Sângeorz-Băi, Năsăud, Beclean, and Dej), each with its sphere of influence. Thus, Sângeorz-Băi polarizes 9 nearby administrative units, Năsăud 10, Beclean 13, and Dej 8. The polarization capacity of these urban centers is given by their complex functions.

4.4. Anisotropy—Vector of Sustainable Economic Development

ANISOTROPIC REGIONS "function as territorial systems defined primarily by negative feedback loops, thus forming irreversible spatial structures" (Dauphiné, 1979, 37), outstanding through a permanent upward trend in terms of development. The settlements located along the privileged axis are the most viable ones, because the Someşul Mare axis attracts permanently fluxes from the neighboring areas.

The stability of the region is supported also by the analysis of the number of inhabitants between 2002 and 2011. In that period, Romania's population decreased significantly because of lower birth rates, intense emigration and the liberalization of abortions. In Bistriţa-Năsăud County, the population decrease had the lowest values around Bistriţa and also in the analyzed region, due to permanent investment, which increased employment rates.

The population of the Someşul Mare anisotropic region decreased between 2002 and 2011 as investment increased, compared to previous periods. Investors in the region are locals and especially foreigners and the areas of activity are various. In this case, "fluxes are generated both within the region and outside it by the higher polarizing centers situated along the development axis" (Cocean and Boţan, 2007, 12).

For regional development, mainly the internal fluxes present a positive impact, whatever their nature (goods, people, information, etc.) is. The internal fluxes allow for interrelations between those points that have raw materials and those that produce consumer goods. Also, they link points which provide workforce with production units. They are the main contributors to the local budgets through taxes, payrolls, increased consumption, increased monetary turnover, etc. The positive impact on the development of the analyzed region induces also semi-internal and semi-external fluxes. The semi-internal fluxes are generated within the region, but they connect with others and the benefits are to be found locally or regionally. External flows, however, do not contribute to the development of the region, only use its infrastructure.

The Someşul Mare anisotropic region "combines the specific features of the homogeneous and polarizing regions" (Dauphiné, 1979, 40); "within them occur only second, third and fourth rank polarized sub-systems" (Dauphiné, 1979, 43) and "the polarization capacity of each center is only partial in the entire regional system" (Cocean and Boţan, 2007, 13). The region holds some attributes of the polarized regions, this also resulting from the fact that the four towns (Sângeorz-Băi, Năsăud, Beclean, and Dej) generate polarized spaces around them.

5. Conclusions

T HE Someşul Mare region meets all the structural and functional requirements of an anisotropic region. This paper has served its purpose and research objectives demonstrating that the analyzed area is a typical anisotropic region, in which the main vectors are oriented along a privileged development axis.

The anisotropic region matrix is fully validated by the territorial assembly configured along the Someşul Mare, in the Sângeorz-Băi and Beclean sector. Anisotropy is favored by the morphological and functional framework; fluxes which supply the privileged axis are coming in mostly from the northern side. Moreover, the existence of the Military Border District of Năsăud and of the Land of Năsăud enabled the consolidation of towns and villages, from economic, social, and cultural perspectives.

The considered indicators confirm the initial scientific assumption that, at this point, none of the four urban centers is able to fully polarize the region.

The region possesses a complex technical infrastructure and transfers along its main axis significant vectors of matter, energy and information, making it attractive for economic environment. The region received sound economic investment in the recent years, becoming an engine of development in Bistriţa-Năsăud County. Even if the demographical balance is negative, population losses are much lower than those in other territorial entities, which also demonstrate its attractiveness.

Anisotropic regions, through their territorial complexity and the ability to attract population and economic vectors, may be considered efficient models of regional development, with profitable investment opportunities.

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Abstract

The Someşul Mare Anisotropic Region. Geographical and Historical Factors

Anisotropic regions occupy a distinct place in the typology of geographical regions due to their internal territorial structure and certain development opportunities. Regional geography adopted the terms "anisotropy" and "anisotropic" referring through them to a special type of territorial construction, namely the anisotropic region. In this paper, we demonstrate the complexity and interrelationships of the elements pertaining to anisotropic regions and the existing development opportunities, focusing on a representative region of Romania, the Someşul Mare anisotropic region. We demonstrate that this region meets all the structural and functional requirements of an anisotropic region by analyzing the geographical and historical factors influencing its evolution, as well as the present situation.