Functionality versus gerrymandering and nationalism in administrative geography: lessons from Slovakia

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**ABSTRACT**

Functionality versus gerrymandering and nationalism in administrative geography: lessons from Slovakia. *Regional Studies.* A correct definition of administrative regions is one of the crucial factors in the efficient performance of public administration. The paper stresses the advantages of a spatial interaction approach. It builds on four conceptual cornerstones: functional relationships in space, functional regions, the distance-decay function and administrative geography principles. It also includes a presentation of the selected risks that can degrade the correctness of an administrative arrangement. The proposed approach provides administrative regions that follow the principles of spatial efficiency and spatial equity, and the territory of Slovakia is used as an example.

**KEYWORDS**

administrative geography; gerrymandering; nationalism; spatial interactions; functional regions; Slovakia

**ZUSAMMENFASSUNG**

Funktionalität statt Wahlkreismanipulation und Nationalismus in der Verwaltungsgeografie: Lektionen aus der Slowakei. *Regional Studies.* Eine korrekte Definition von Verwaltungsregionen ist einer der entscheidenden Faktoren für eine effiziente und leistungsfähige öffentliche Verwaltung. In diesem Beitrag werden die Vorteile eines Ansatzes der geographischen Verwaltung besprochen, der auf Funktionsbeziehungen in der Raumordnung, funktionale Regionen, die Entfernungswirkung und administrativen Geographieprinzipien basiert. Eine Darstellung der ausgewählten Risiken, die die Richtigkeit eines administrativen Arrangements beeinträchtigen, ist ebenfalls enthalten. Der vorgeschlagene Ansatz liefert administrative Regionen, die den Prinzipien von räumlicher Effizienz und räumlicher Gerechtigkeit folgen, und die Territorien der Slowakei werden als Beispiel verwendet.

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A correct definition of administrative areas is an important prerequisite, not only for the efficient performance of public administration, but also in relation to the fields of regional planning, spatial planning, collection of statistical data, economic analyses, etc. The objectives of this paper are to present a functional spatial interaction approach to administrative geography based on statistical data, to propose the use of this approach to reconfigure the existing administrative division of a territory at the micro-regional level and particularly at the meso-regional level, and to discuss its advantages and achievements using the example of the administrative geography of Slovakia. The proposals presented here build upon the micro-regional level units, which are actually functional regions based on daily travel-to-work flows; approximately at the level of LAU-1 (local administrative units according to the European Union classification). However, the major discussion concerns a reconfiguration of the existing administrative geography at the meso-regional level: NUTS-3 and NUTS-2 (Nomenclature of Units for Territorial Statistics according to the European Union classification). As the issue of administrative divisions of territories is a spatial one, the paper applies the approaches and concepts used in human geography and spatial science and thus contributes to the interdisciplinary solutions to such problems.

The paper is structured as follows. The next section discusses concisely, but in sufficient detail with respect to the objectives of the paper, three issues related to spatial interactions – the general nature of functional relationships in space, functional regions and distance–decay functions – and comments on administrative geography. It also includes a discussion concerning some of the risks for administrative geography. The next section describes the method of construction of the basic functional regions at the micro-regional level and the method of construction of the higher hierarchical units at the meso-regional level. The following section uses the administrative geography of Slovakia as an example for theoretical discussion, discusses its disadvantages and presents a reconfigured administrative division of Slovakia achieved through the approach proposed in this paper. This section also includes the necessary discussion of the subject in the European and Central European context. The concluding section highlights the findings and returns to some more general considerations made in the more theoretical sections of the paper.
Besides the theoretical cornerstones used to define the functional administrative geography of a territory, the paper discusses other factors and influences that should be taken into account in administrative geography and which are not related to spatial flows of the population. The risks that can reduce the objectivity (i.e., functionality for the purpose of this paper) of an administrative division can occur in the form of gerrymandering, other kinds of political intervention, nationalism and other negative influences related to intolerance towards different national, ethnic and religious population groups. Thus, the construction or reform of the administrative division of a territory appears to be a very demanding process. It cannot adopt only a quantitative approach, as that has its limits, but it should also acknowledge the role of other factors.

Functional relationships in space
Geographic space is not homogeneous and its constituent elements are distributed in an uneven manner. Their quantities and qualities vary across sections of geographic space, across locations and regions. In most cases involving the inherent heterogeneity of geographic space there is a natural tendency toward balance in the differences (or polarity) between locations and regions by means of the spatial interactions. Ullman (1980) refers to this interaction as a situation (or situational concept) wherein phenomena in one section have an influence on phenomena in another section. While these processes have a physical basis within the scope of physical geography and can be illustratively witnessed in, for instance, the form of wind streams between areas with different air pressures, human geography sees the spatial interactions as aggregated individual horizontal flows, mobility or contacts of persons, goods, finances or information.

Spatial interactions concerning society, in the form outlined above, act as functional relationships in space, linking different sections of geographic space. Spatial interactions in human geography can be considered to be a reflection of unintentional or intentional behaviour of particular individuals and of society as an aggregation of these individuals. The spatial behaviour of individuals is influenced by their individual needs and their efforts to optimize their spatial location and movements in the search for economic or social benefits. It incorporates the possibility of choice and some psychological constraints, as in the perception of distances (e.g., Fotheringham, 1986; Golledd & Stimson, 1997; Stilwell, 1991; Taylor, 1983; Timmermans et al., 2003; Ullman, 1980). An individual has to consider so-called friction of distance (expressed in units of either length, time or cost) between two locations and weigh the benefits and costs of their situation. As such, spatial interactions considerably influence the spatial organization of society and express the mutual relations between sections of geographic space, emphasizing the situational spatial context.

Functional regions
A relevant analysis of spatial patterns of functional relationships and their intensities can produce so-called functional regions, which are based on a situational context. Functional regions are usually understood to be the areas organized by the horizontal functional relations (flows, interactions) that are maximized within a region and minimized across its borders so that the principles of internal cohesiveness and external separation regarding spatial interactions are met (e.g., Farmer & Fotheringham, 2011; Karlsson & Olsson, 2006; Klapka & Halás, 2016; Smart, 1974). This can be denoted as the self-containment of a functional region, which is then the only crucial defining characteristic of a general functional region (Halás, Klapka, Bednář, & Tonev, 2015). This means that a functional region is an autonomous section of space in terms of horizontal spatial relations. The higher the self-containment, the more a region differs from other regions. The spatial interaction intensities decrease from the central parts towards the boundaries of functional regions. A functional region is not an abstract spatial concept, but to a certain extent it can be regarded as a reflection of the spatial behaviour of individuals in a geographic space, as has been presented above.

Apart from the principle of self-containment, two further requirements for functional regions are related to the issues discussed in the paper. The first is the principle of coherence, which states that a functional region should have a geographically reasonable shape and easily recognizable boundaries. The second is the principle of conformity, which states that the boundaries of a functional region should conform to the boundaries of an administrative unit on the condition that those units are correctly defined. Last but not least, a functional region should have at least a minimum size (in terms of area or population, for instance).

Distance-decay functions
Spatial interactions have different intensities in space. The general rule used here, based on experience, is that the interaction intensity between geographic locations and regions decreases as the distance separating the locations and regions increases. The question of how this decrease behaves can be answered by the use of distance-decay functions. The relation between interaction intensity and distance is a complex one. The main problem lies in quantifying the measure and shape of the decreasing function of the spatial interaction.

A pioneering work on distance-decay functions was published by Taylor (1971), who drew attention to the fact that the social and economic environment does not obey physical laws and put forward several alternatives for distance-decay functions: power function, exponential function, logarithmic function and Pareto function (pp. 229–230). These functions were later modified and so-called compound functions have been defined. They often have an inflexion point and better capture any changes in interaction intensities as distance increases. Most of these functions have two parameters.

Recently more complex distance-decay functions have been applied in geographical and spatial research. For instance, Martínez and Viegas (2013) named the Tanner function, the Box–Cox function and the Richards function.
These functions are considered to be more flexible and they were theoretically described and used by Tiefelsdorf (2003), Willigers and Floor (2007), and Ortúzar and Willumsen (2011). The most complex Richards function has four parameters and can capture in detail any changes in the interaction intensity. However, it can be used only in specific cases and cannot be generalized for whole regional systems. The compound power exponential function was used by Halás and Klapka (2015) in examples of labour commuting to regional centres in Slovakia. This function captures very well the decreases in interaction intensities that occur as distance increases, and therefore it will also be used in this paper; some arguments for that will be presented.

**Administrative geography principles**

The administrative geography of a territory should follow several theoretical and relatively independent principles in order to secure a generally acceptable solution to an administrative division problem based on the objectively existing geographical reality and on the spatial behaviour of a population. However, in practice they are often subject to general societal needs, geographical reality, political decisions and local interests. According to Bezák (1997), who builds upon the concepts put forward by Goodall (1987), three basic principles can be defined for the administrative geography of a territory: the principles of spatial efficiency, of spatial equity, and of spatial stability.

The principle of spatial efficiency states that the administrative geography of a territory should reflect the population distribution, particularly its spatial flows, to the highest possible extent. In other words, the principle of spatial efficiency is based on the minimization of spatial interactions, while maximizing the benefits of locations, or on the maximization of spatial interactions with the least effort, i.e., the costs of the interaction. This clearly refers to the concept of a functional region and its self-containment. The principle of spatial equity is based on the assumption that administrative centres should be equally accessible from the most peripheral parts of each administrative region. Finally, the principle of spatial stability requires that the administrative geography (e.g., boundaries of administrative units) of a territory should be stable over time.

The principle of spatial efficiency can sometimes be in opposition to the principle of spatial equity, because large regional centres usually form much larger hinterlands compared with smaller regional centres. In this case it is necessary to find a balance or compromise between the two principles. If functional regions are to be utilizable as administrative units, the principle of spatial equity should prevail. This can be secured by using Smart’s interaction measure (Casado-Díaz, 2000; Halás, Klapka, Bednář et al., 2015; Halás, Klapka, Bleha, & Bednář, 2014; Smart, 1974) as one of the methods used to define functional regions. Similarly, the principle of spatial stability can be in opposition to the principles of spatial efficiency and spatial equity. This is the case when a biased administrative division does not respect natural patterns in settlement and regional systems over a long period of time.

Apart from the analysis of the daily rhythms of the population (daily travel-to-work flows in this paper), there are several other ways to define administrative regions. The first group consists of quantitative approaches that differ from the method used in this paper. One example is the issue of accessibility to various types of public and private social facilities and their spatial distribution. The issue of accessibility to healthcare (e.g., Haynes, Lottett, & Sünnerberg, 2003; Paez, Mercado, Farber, Morency, & Roorda, 2010) can also be used to define tributary areas, which can add to the definition of administrative regions. Unlike the method used in this paper, the analysis of the accessibility of healthcare and educational facilities is, in many cases, a matter of spatial interaction modelling (e.g., Guagliardo, 2004; Guiwen & Lijuan, 2013; Haugen, Holm, Strömgren, Vihelmsen, & Westin, 2012), and a term frequently used by the conceptual basis of time geography (e.g., Kwan, Janelle, & Goodchild, 2003).

The second group consists of more cultural approaches, which favour the roles of historical context, ethnic and religious population structure, and issues of regional identity, etc., and which are not strictly quantitative.

However, in this paper the quantitative methods of functional regional taxonomy are used to define administrative regions. Several notes regarding the pros and cons of this method should be made here. Daily travel-to-work flows, analysed using the presented method, are certainly the most frequent and regular movements of the population. They act as a representative for spatial mobility (Andersen, 2002; Coombes, Green, & Openshaw, 1986; Cövers, Hensen, & Bongaerts, 2009), which is positively crucial for the definition of a functional administrative division. The method presented in this paper enables one to optimize the fulfilment of basic principles as mentioned above through the use of interaction measures (the principle of spatial equity in particular). In contrast, this method does not enable one to take into account historical context, regional identity or the principle of spatial stability, which should not be omitted when finalizing the results. However, their role can be seen as supplementary in case there are areas with ambiguous, uncertain and oscillating regional (spatial) affinity. As for the distribution of healthcare and educational facilities, it is important that decisions on their location and management are key competencies of regional self-government (e.g., Datta, Figueira, Gourtani, & Morton, 2013). Finally, the limited extent of this paper means that the definition of alternative proposals for administrative regions is based on the analysis of daily travel-to-work flows, while the ethnic structure is confronted with the current (special-purpose) administrative division of the case study territory.

**Risks for administrative geography: gerrymandering and nationalism**

Administrative geography and the above-mentioned principles in their pure form are often affected by societal needs, economic pressures and particularly by political decisions. These factors are mostly negative with regard to administrative principles and the geographical...
organization of space, even though they can sometimes be legitimate. For instance, economically induced interventions in the administrative geography are caused by an economic change (Bennett, 1997) and economic transition, by a need for the redistribution of financial means (e.g., subsidies etc.), or by the actions of local stakeholders. In Romania the administrative reform constructed regions in order to maximize financial flows from the Structural Funds of the European Union (Suciu, 2002).

Political decisions can affect the administrative geography of a territory in two ways: by influencing the results of elections of any kind, which relates to the well-known issue of gerrymandering; and in the handling of the issue of nationality, such as the covering up problems related to national or ethnic minorities. It can be sometimes difficult to differentiate between these two ways as they are closely interlinked. Gerrymandering and nationalism can be viewed as complementary, even though gerrymandering does not necessarily imply nationalistic arguments and vice versa. Within the issue discussed in this paper, both gerrymandering and nationalism form a common ground for political decisions.

Gerrymandering can entail a significant risk resulting in a non-transparent and spatially inefficient administrative division. In regional and spatial science it was discussed in detail during the 1960s (e.g., Bunge, 1966). Recently, more attention has been paid to its identification in particular states and territories (Johnston, 2002; Moore, 2002) and to mathematical alternatives of its exercise in different definitions of regions (Apollonio, Becker, Lari, Ricca, & Simeone, 2009). In principle and with regard to the issue discussed in this paper, gerrymandering considers that administrative regions are made the same as election districts, while the different delineation of election districts combined with different voting systems produces a great variability of election results. This can be a very tempting method for politicians to use in order to influence election results in a way that suits them.

Under the aegis of nationalism there are a number of arguments and motivations that can affect administrative geography negatively. As the thorough discussion would go beyond the scope of this paper, because nationalistic (ethnical) reasons are less evident than gerrymandering, only brief necessary rudiments are presented here. Generally, the nationalistic motives are mostly rooted in an old assumption related to the existence of national states. It claims that national boundaries should coincide with political boundaries (Knight, 1982). Though this view has been criticized during the last decades (e.g., Pries, 2005), it remains latently persistent in some post-socialist countries, including Slovakia, particularly due to historical development (e.g., Coakley, 1994; Hajdú & Hajdú, 2003; Kocsis, 2013). Nevertheless, several ethnicities living in one political territory can potentially increase the risk of ethnically motivated adjustments to the administrative geography and, again, the risk of gerrymandering. The reason for this can lie, for instance, in the attempt to prevent an ethnic minority from the ‘administrative’ self-determination, or, more generally, from participation in political power.

METHODS

The methodological section is divided into two parts. The first concisely describes the construction of the basic building blocks in the reconfiguration of the administrative geography of Slovakia: the functional regions, which in this case coincide with a proposal for LAU-1 regions. Municipalities of Slovakia were used as basic spatial units in this case. The second part presents the procedure for an amalgamation of the building blocks into higher hierarchical level regions using the distance-decay functions. Both steps are based on the same theoretical concept of functional spatial relationships and both steps make use of the same dataset, which comprises daily travel-to-work flows.

Delineation of functional regions

The problem of identifying functional regions belongs to the group of functional regional taxonomical tasks. There is extensive literature on the topic (for detailed reviews, see, for example, Casado-Díaz & Coombes, 2011; Cörvers et al., 2009; Farmer & Fotheringham, 2011; Klapka & Halás, 2016; and Karlsson & Olsson, 2006). The functional regions used in this paper as building blocks for further analyses were defined by the adjusted second variant of the CURDS algorithm (Coombes et al., 1986; the adjustments made by the authors are thoroughly discussed in Halás et al., 2014, 2015). For the purpose of this paper, functional regions have been adopted from Halás et al. (2014).

Application of the distance-decay function

This part requires more detailed explanation than the preceding one. The power-exponential function with two parameters:

\[ f(d) = \exp(-\alpha \times d^\beta) \]

which was tested on centres in Slovakia (Halás & Klapka, 2015), proved to be the most advantageous for the identification of functional regions at the meso-regional level. It is a bell-shaped function with an inflexion point, at which the curve changes from concave to convex. It better captures the interaction intensities at shorter and longer distances from a centre. Its coefficient of determination is comparable with or even higher than that for a more complex function with more than two parameters.

Functional regions at the micro-regional level serve as the basis for the definition of functional regions at the meso-regional level (i.e., NUTS-3 or NUTS-2 regions). Cities that, according to the distance-decay function, have sufficiently large catchment areas are considered to be the centres of functional regions at the meso-regional level (further referred to as administrative regional centres). A basic variant has tested current administrative regional capitals. The next step introduced the condition that a regional centre should have a catchment area consisting of, apart from its own functional region, two other functional regions. If this condition is not fulfilled, the resulting...
region should have at least 250,000 inhabitants. The break point between the influences of regional centres is determined by individual distance–decay functions according to daily travel-to-work flows. The concept of the existence of a break point between influences of two or more administrative regional centres is given in Figure 1. In this case it is not points that are assigned to administrative regional centres but functional regions (LAU-1). The municipalities (i.e., basic spatial zones) that form these LAU-1 regions reach several values for the distance–decay function which relates to the administrative regional centre (the span of the values is shown in Figure 2). The resulting value of the distance–decay function for a functional region at the micro-regional level is given by a weighted mean of the values for individual municipalities, where the weight is determined by the population. A functional region at the micro-regional level is assigned to such a regional centre, for which the weighted average of the values for distance–decay functions is the highest.

**ADMINISTRATIVE GEOGRAPHY OF SLOVAKIA**

**The European context**

Administrative reforms in Central European post-socialist countries primarily had to deal with administrations of public affairs set by previous regimes. This necessarily involved a shift from a centralized system and the devolution of numerous competencies to lower hierarchical levels of administration. Territorial divisions also had to be compatible with administrative regions used in the European Union, a requirement that was not always fulfilled.

In Western European countries administrative reforms have been under way since the 1950s (e.g., the UK, Greece, Belgium, Sweden, Denmark). However, these were predominantly concerned with issues at a local level and with the amalgamation of municipalities, primarily on the basis of functional areas and functional regions (e.g., Denmark has only 98 municipalities after the 2007 reform). This approach has indisputable economic benefits; however, the weakening of a local identity can be seen as a disadvantage. Currently, the European Union countries differ significantly in population and the area of their municipalities. On average the smallest municipalities can be found in France, the Czech Republic, Hungary and Slovakia, while the largest can be found, after their reforms, in the UK, Ireland, Sweden and Denmark (Klobučník & Bačík, 2015).

The paper predominantly deals with the regional level and regional self-governments, which have various forms in Europe. From the territorial point of view they correspond, with some exceptions, to the NUTS-2 and NUTS-3 regions. In the post-socialist countries regional self-governments usually correspond to the NUTS-3 regions (the Czech Republic, Hungary, Slovakia), in contrast to equally large Austria, where the *bundesländer* – federation states are NUTS-2 regions. Regional self-governments in Poland (*województwa* – voivodeships) correspond to the NUTS-2 regions and their number decreased from 49 to 16 after the 1998 reforms. However, Poland is much larger than the above-mentioned Central European countries. The reasons for the use of smaller regions for regional self-governments are varied. In the Czech Republic the division into meso-regions appeared to be the most natural (Erlebach, Tomáš, & Tonev, 2016); in Hungary and Slovakia political influences played their role – a larger number of self-governing regions gave greater opportunities to create more jobs in public administration as an informal policy tool to reward potential supporters.

In the European Union the main redistribution of financial means into regional policy is concerned with the NUTS-2 regions. This level is also crucial for the collection of most key statistical data. Discrepancies between relevant regions (NUTS-2 versus NUTS-3 levels), as seen by the European Union and by particular post-socialist countries during the early phases of democracy, brought many risks. Responsible and independent institutions have not been established at the NUTS-2 level, so this has brought an increased risk of corrupt behaviour in the redistribution of financial means from European funds (cases recorded, for instance, in the Czech Republic).

For this paper and for regional level of administrative geography the most important units in Slovakia are *kraje* – regions, also called regional self-governments, which conform to the NUTS-3 level. However, in general regional self-governments do not have a strong position in the **Figure 1.** Identification of the boundaries of functional regions using the distance–decay function. **Figure 2.** Span between the values of distance–decay function for basic spatial units of a particular region.
political system of Slovakia, even though their position has been strengthened by the formation of the Association of Regional Chairpersons, which has become a partner for the central government in issues concerning its competence (Buček, 2011). However, a position comparable with that of regional self-governments in Austria and Spain is not going to be reached either in the near future or the far future.

**Criticism**

The administrative division of Slovakia was intended to follow the historical boundaries, particularly the division into 

\[ \text{župy} \] – counties (existing between 1867 and 1922) within Austro-Hungary. The counties had reflected the historical development, the natural settlement and the regional structure of the territory as well as the terrain and ethnicity ( Slovčina & Bacič, 2014). The number of counties was twice as high as the present-day regional self-governments. After 1920 several transformations of administrative division were carried out, although all had a relatively short lifetime.

The last administrative division preceding the current one is related to the period of developed socialism in Czechoslovakia (1960–90), and the regions of that time (three) approximately resemble the current NUTS-2 regions; the districts of that time are presently the LAU-1 regions in the Czech Republic. However, neither regions nor districts have ever been regional self-governments, but only regions of state administration, de facto tools for the fulfilment of central directives issued by the Communist Party.

The current administrative division of Slovakia is considered by many authors to be not well designed (see further below). It was formed around the mid-1990s and is a product of the political situation and interests at the time of the Vladimír Mečiar government (1994–98). Immediately after its introduction it was harshly criticized by experts (e.g., Buček, 2002, 2003; Hamalová & Papanková, 2005; Michniak, 2003; Slavik, 1997, 1998). Yet, the proposals of that time were implemented and have remained valid until now. After 1998 several alternatives to the administrative division were proposed by the collective led by the Slovak Republic’s commissioner for decentralization of public administration (Nižňanský, 2005). They did not come into effect for political reasons and therefore the original, least suitable division remains in force. The criticism of the administrative division can be covered under two basic points:

- The unsuitable and biased definition of districts (\( \text{okresy} \) – LAU-1) does not respect the principles of functional affiliation and organization of space. In the southern part of the territory the districts (Nové Zámky, Trebišov, Rimavská Sobota, Levice etc.) are much larger than those in other parts of Slovakia (Myjava, Bytča, Kysucké Nové Mesto, Turčianske Teplice, Medzilaborce) (Figure 3). The principle of spatial equity is infringed considerably in this case.

- The unsuitable and biased definition of regions (\( \text{kraje} \) – NUTS-3 units) was designed so that Hungarian nationals are not in the majority in any region (Figure 3).

Besides this, some historical regions (e.g., Spiš) have been divided insensitively into two regions. The fact that the cities of Trnava and Trenčín are administrative regional capitals raises the question of whether other comparable regional centres with a similar position in the Slovak settlement system and a similar spatial influence (e.g., Michalovce, Poprad or Lučenec) should not also be administrative regional capitals.

Figure 3 shows that districts with a more than 20% share of Hungarian nationals are significantly larger on average, in terms of their population, by 50.6% and in terms of their area by 73.4%, compared with districts where the share of Slovak nationality exceeds 97%. This shows that besides the not officially admitted risk of gerrymandering, the principle of spatial equity is not followed in the current administrative division of Slovakia.

In both cases (LAU-1 and NUTS-3) the criticism stemmed from national and ethnic motives. However, the administrative division of Slovakia is not criticized by professional public primarily for ethnic motives, but because it does not respect natural patterns in settlement and regional systems, and spatial distribution of relevant flows and relationships. This disrespect of natural geographical patterns is the result of efforts to disadvantage the Hungarian minority. These efforts were not only motivated by nationalism but also were a combination of political and ethnic reasons. Vladimír Mečiar’s government planned to transform the administrative divisions as well as the electoral systems. This was finally not fully implemented except for some very minor adjustments. Therefore, the influence on national elections was minimal, but in regional elections the political parties of the Hungarian minority still remain disadvantaged because, as has been mentioned above, the Hungarian minority has been deliberately split between several self-governing regions in order to stop them from achieving a majority in any one of them.

The districts (LAU-1) currently also serve as statistical units. However, paradoxically they are not accepted by many authors who use different basic spatial units for their regional analyses. Zubrický (2005) uses so-called functional urban regions, Korec (2009) and Rosina and Horváňek (2013) use approximate functional regions. Functional regions are also suitable for the construction of regional systems at a higher hierarchical level (e.g., Řehák, Halás, & Klapka, 2009).

Act No. 515/2003, related to regional offices and district offices, devoluted the lowest level of public administration to the so-called territorial authorities (\( \text{územní obvody} \)). There are 50 and they are based on the transformation of districts and the amalgamation of districts. For a description of these territorial authorities including the critical discussion, see Appendix A in the supplemental data online.

**Reconfigurations**

Functional regions at the micro-regional level were adopted from Halás et al. (2014, p. 108) as their FRD-2 system (functional regions based on daily travel-to-work flows). These functional regions are most suitable for the
construction of administrative division of Slovakia at the administrative level of LAU-1. They represent natural socio-economic regions that are internally coherent and externally relatively separate as regards the daily movements of their populations. They can be easily adapted to the formation of a system of public administration, transport infrastructure and public transport. The boundaries of the proposed administrative division (LAU-1) show a low number of flows crossing them in comparison with other regional and administrative divisions of Slovakia.

The proposed administrative division (LAU-1) is highly spatially effective, as 91.4% of all daily travel-to-work flows occur within administrative units and only 8.6% of these flows cross their boundaries. The proposed administrative units significantly capture the distribution of the most frequent daily movements of the population. The aim was also to respect the principle of spatial equity, i.e., the resulting administrative units should be comparable in size. This was accomplished by the use of the Smart’s interaction measure in the algorithm which defines the functional

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**Figure 3.** Current administrative regions of Slovakia (NUTS-3), districts (LAU-1) and distribution of Hungarian nationality.

**Figure 4.** Proposal for the administrative division of Slovakia at the meso-regional level (thirteen NUTS-3 regions) and distribution of Hungarian nationality in functional regions (FRD-2).
regions (LAU-1). This measure moderately levels the size difference between regions. The appropriate compromise between the principles of spatial efficiency and spatial equity is one of the most important conditions for the assessment of the relevancy of an administrative division.

Functional regions at the micro-regional level (LAU-1) were used as the basis for the delineation of administrative units at the NUTS-3 level. Three regional systems of this type have been identified: with six, 12 and 13 administrative units. Distance–decay functions for individual meso-regional centres have been applied for this purpose (see the method above and Halás & Klapka, 2015, p. 180). The alternative administrative divisions of Slovakia at the meso-regional level are based on the identification of break points in the influences of meso-regional centres according to distance–decay functions. Detailed discussion of their construction, particularly of the divisions with six and 12 units, is provided in Appendix A in the supplemental data online. The paper itself presents the variant with 13 administrative units (Figure 4 and Table 1).

The proposed alternative for an administrative division (NUTS-3 level) with 13 regions easily enables their amalgamation into NUTS-2 regions; their current names can be preserved (Western, Central and Eastern Slovakia). The NUTS-2 region of Western Slovakia would include the NUTS-3 regions of Bratislava, Nitra, Noví Zámky, Trenčín and Trnava; the NUTS-2 region of Central Slovakia would include the NUTS-3 regions of Banská Bystrica, Lučenec, Martin and Žilina; and the NUTS-2 region of Eastern Slovakia would include the NUTS-3 regions of Košice, Michalovce, Poprad and Prešov. All three proposed NUTS-2 regions would conform to the recommended population size criteria. The stand-alone NUTS-2 region of the capital city of Bratislava is not considered to be relevant, since it does not have 1 million inhabitants and it is not necessary at the present time to delineate NUTS-2 regions in such a manner that would maximize the financial inflows from European funds.

Even though only functional criteria have been used to provide the definition of administrative regions and population structure has not been taken into account, the resulting final proposal appears to be more equitable as regards the distribution of the Hungarian minority, and it keeps a sufficient level of functionality; more so than the current administrative division of Slovakia (Figure 4). Functional regions have a similar distribution of this minority in all areas where it is concentrated, particularly in the southern part of Eastern Slovakia, but also in the southern part of Western and Central Slovakia. The proposal for NUTS-3 regions comprises the Nové Zámky region, where the Hungarian minority exceeds 50%. The westernmost area with the highest concentration of the Hungarian minority belongs indisputably to Bratislava, if functional criteria are applied.

CONCLUSIONS

The shift from a centrally planned system to partly decentralized systems demanded the necessary reform of public administration in the post-socialist Central European countries. Administrative divisions had to conform in a certain way to the European Union systems of administrative units – LAU and NUTS. The side-effects of the formation of the new administrative geographies in early democracies were interventions into the delineation of regions which were brought about by either political and nationalistic reasons, or both of them simultaneously. If one returns to the title of this paper, the above-mentioned side-effects can be seen as a general risk in the formation or transformation of any administrative division in sensitive territories. In contrast, the functional approach, as presented in this paper, can be considered objective, at least geographically, with respect to the nature of the data used for the construction and to the natural patterns of settlement and regional systems. Thus, the paper has attempted to conclude that the geographical organization of space, the spatial organization of society, should be one of the crucial factors in the construction of the administrative geography of territories.

The issue of ethnicity also negatively affected the definition of administrative regions in Slovakia during the mid-1990s. This fact has been continuously criticized by the professional public (e.g., Buček, 2002, 2003), but until now no revision has occurred. The primary reason was the need to solve more pressing problems during two consequent terms (1998–2002, 2002–06). During the 1994–98 term, Slovakia was internationally isolated and not included in the first integration wave into European and Transatlantic structures, unlike neighbouring countries (the Czech Republic, Hungary, Poland). The two governments of Mikuláš Dzurinda after 1998 were primarily concerned with economic reforms. Meanwhile the activity of regional self-governments and offices was established and no revision of administrative geography has occurred in Slovakia since 1998. This development resembles a path dependence theory (David, 1985; Krugman, 1991), when the development of partial components can be influenced by a sequence of historical events, and when some of them can only be coincidental. The principle of spatial stability is also followed in this case, even though it is the stability of incorrect administrative division.

The functional spatial interaction approach proposed by this paper has proved able to contribute to the reconfiguration of the current administrative division of Slovakia. Correctly defined functional regions at the micro-regional level appear to be the most suitable for administrative regions at approximately the LAU-1 level. These regions are based on the analysis of important segments of the spatial behaviour of individuals (daily movements to work). They better reflect the existing geographical reality and are resistant to political decisions and any ensuing possible spatial bias. Functional regions defined at the micro-regional level can be favourably used as building blocks for the identification of administrative units at the meso-regional level (approximately NUTS-3 and NUTS-2 levels). In this case, both regional systems, based on the same dataset, are nested hierarchies, which is a necessary prerequisite in administrative geography.
Correctly defined functional regions (i.e., those based on informed choices) can better serve as a geographical tool for normative use (a virtue acknowledged already by Haggett, 1965), particularly for the administrative division of territories. Correctly defined functional regions for administrative purposes respect maximally existing geographical reality and the natural spatial differentiation of socio-economic phenomena in a territory, particularly the organization of daily movements of the population in this territory. Thus, functional regions serve more effectively as regions for administration and planning of spatial systems. The delineation of administrative regions should be based on expert and scientific knowledge of space; it should respect its socio-economic structures and the interactions between them. The delineation of administrative regions at all hierarchical levels should be independent from external political interference, which usually acts against the principles of spatial efficiency and spatial equity for selected population segments and users of regionalized territory.

The fact that up to now there has been no relevant proposal for the administrative geography of Slovakia at the meso-regional level can be seen as a major insufficiency in the experts’ discussions on this topic. The current statistical and administrative regions at the meso-level (NUTS-3) act as regional self-governments in Slovakia; however, they are not well designed because political interests of the government played a key role when they were introduced in 1995–96. There are only a few expert proposals for NUTS-3 regions (e.g., Bačík & Sloboda, 2005; Sloboda & Bačík, 2014), but they are not based on the exact quantitative analysis of data or on the real or potential movements of the population. Moreover, these proposals are based on the 1996 districts, which are not constructed in a transparent way, as has been previously pointed out.

The proposals for the administrative division of Slovakia put forward in this paper reflect and respect the horizontal organization of the settlement system of Slovakia (the distribution of spatial interactions) and the vertical links (settlement hierarchy) between the settlements as expressed by the daily spatial movements of the population. Besides hierarchical levels based on a simple index of the population size for instance, the proposals also take into account the relative position of potential administrative centres in relation to other centres (see, for instance, the discussion of the position of Trnava in the vicinity of Bratislava as a potential centre of a NUTS-3 region). At the same time the applied method enables one to respect the recommended size criteria for a given hierarchical level of a potential proposed NUTS region.

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**SUPPLEMENTAL DATA**

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