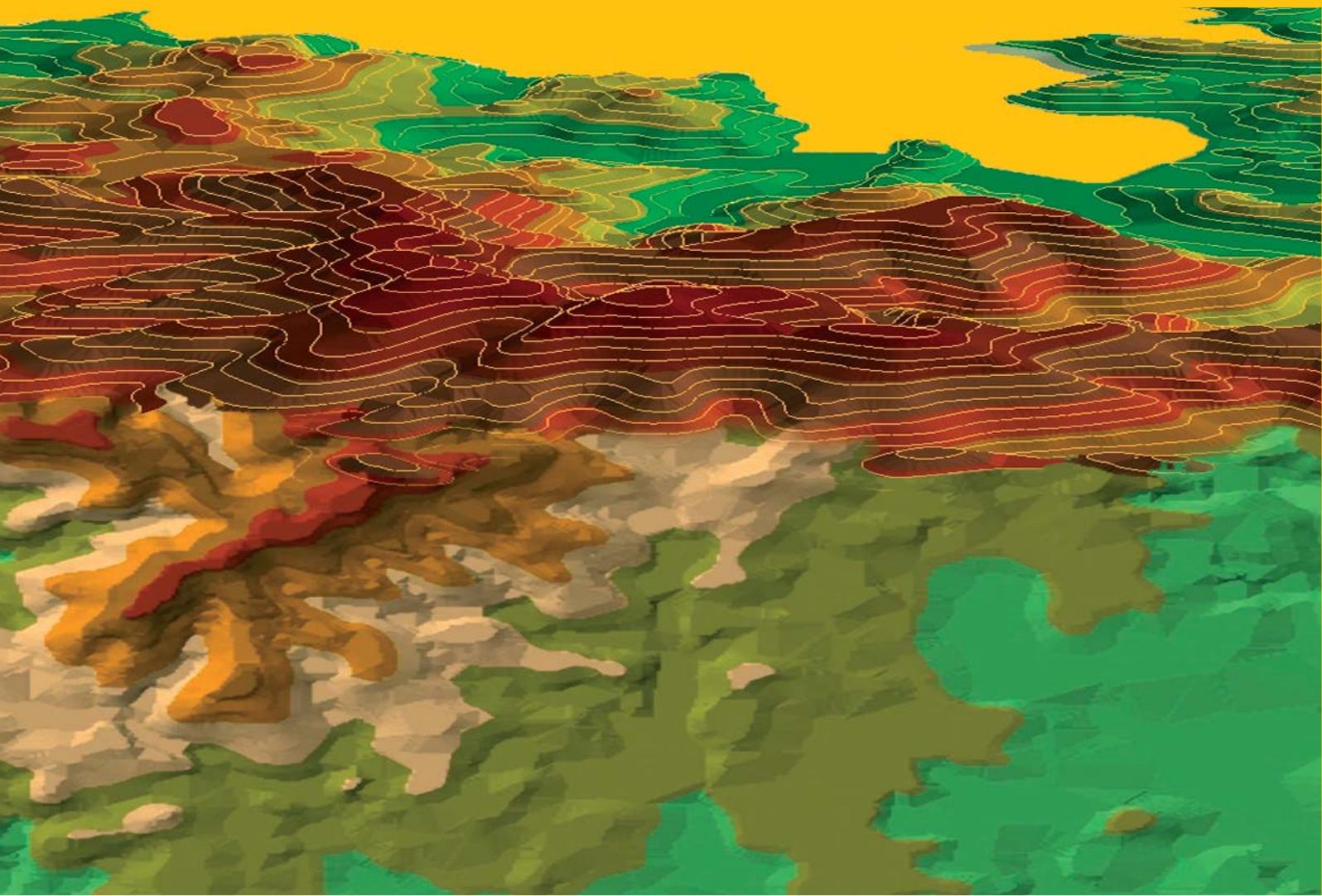# MORAVIAN
# GEOGRAPHICAL REPORTS

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# MORAVIAN GEOGRAPHICAL REPORTS

## Aims and Scope of the Journal

Moravian Geographical Reports [MGR] is an international peer-reviewed journal, which has been published in English continuously since 1993 by the Institute of Geonics, Academy of Sciences of the Czech Republic, through its Department of Environmental Geography. It receives and evaluates articles contributed by geographers and by researchers who specialize in related disciplines, including the geosciences and geo-ecology, with a distinct regional orientation, broadly for countries in Europe. The title of the journal celebrates its origins in the historic land of Moravia in the eastern half of the Czech Republic. The emphasis for MGR is on the role of 'regions' and 'localities' in a globalized society, given the geographic scale at which they are evaluated. Several inter-related questions are stressed: problems of regional economies and society; society in an urban or rural context; regional perspectives on the influence of human activities on landscapes and environments; the relationships between localities and macro-economic structures in rapidly changing socio-political and environmental conditions; environmental impacts of technical processes on bio-physical landscapes; and physical-geographic processes in landscape evolution, including the evaluation of hazards, such as floods. Theoretical questions in geography are also addressed, especially the relations between physical and human geography in their regional dimensions.

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## Articles:

# Tourism destination: The networking approach

Michał ŻEMŁA [a *]

## Abstract

*Different approaches to the analysis of tourism destinations as the basic units of research in tourism, are reviewed in this paper. Traditional geographical and economic perspectives are presented as the bases for more modern system and networking approaches. Network analysis is discussed as the most useful current approach to understand cooperation and coopetition processes taking place in destinations. This approach, developed in general management theory, however, if implicated directly in tourism, is not free from major problems and may lead to misleading conclusions. Among such problems, spatial embeddedness and the non-voluntary character of membership in a network, the crucial role of free goods in product creation, the predominance of SMEs in a destination network, differences between particular destinations and the difficulty in setting clear borders between networks, are discussed.*

*Key words:* tourism destination, networking, destination governance, destination management

## 1. Introduction

Tourism destinations are "the fundamental units of analysis in tourism" (WTO, 2002). In its origin, the term 'tourism destination' is a typical geographical term and is understood as a part of geographical space. This approach is visible in the classic definition by Burkart and Medlik (1974, p. 46): *"tourism destination is a geographical unit visited by tourists being a self contained centre"*. At present, even though it is one of the most commonly-used terms when analysing tourism phenomena, one cannot state that there exists a single, generally accepted definition or even approach to this term. As the subject of analysis of many different sciences, including human, social and life sciences, it started to be understood in many different ways. One cannot be surprised then that the approaches developed by sociologists, economists, regional and physical geographers, social geographers, etc. are different. Also, the models and approaches that are developed by particular sciences are becoming more and more sophisticated and thus, while they make it easier for specialists to achieve their research goals, at the same time they make it more difficult for researchers from different sciences to understand each other.

This paper aims to present the approach developed on the edge between economic geography and economic sciences, especially between management and the new institutional economics. The networking approach to tourism destination research is still perceived as a very promising way of understanding the term. The rules and tools developed by network analysis, however, cannot be simply transferred from management theory to the analysis of tourism destinations, for several reasons. The presentation of those reasons, at least those which were selected and postulated to be the most important ones, creates the content for the discussion part of the paper. Even though the paper is focused on the approach that is very suitable for economic geography and economic analysis, it should be kept in mind that the tourist destination is still a multidisciplinary issue. If a multidisciplinary approach is not applied to this topic, the analysis and conclusions will be unbalanced. The demand side approach derived from consumer psychology, which is difficult to be inserted into the network approach, in particular is extensively presented here as an attempt to avoid this kind of imbalance. The paper has a typical theoretical character in which the aims are reached by a literature review, the comparison of different approaches, and a discussion of the conclusions found in secondary sources.

## 2. The definition of the tourism destination concept

### 2.1 Classic spatial approaches

One of the most influential definitions of a tourism destination is the one given by Goeldner and Ritchie (2003, p. 466) in their world-wide recognised textbook, which states that "tourism destination is a particular geographic region within which the visitor enjoys various types of travel experiences". Other definitions that underline the spatial

[a] Department of Tourism and Regional Studies, Institute of Geography, Pedagogical University in Cracow, Poland
(*corresponding author: M. Żemła, email: *michalzemla@up.krakow.pl*)

nature of tourism destinations are those by Murphy (1985, p. 7), Gonçalves and Águas (1997, p. 12) or Burkart and Medlik (1974) cited above in the Introduction (see also Tab. 1). One of the most detailed definitions within this classic approach is the one given by Framke (2001, p. 5), which states that "*t*ourism destination is a geographical area, which contains landscape and cultural characteristics and which is in the position to offer a tourism product, which means a broad wave of facilities in transport – accommodation – food and at least one outstanding activity or experience." Finally, the definition given by Seaton and Benett (1997, p. 351), who were focused not only on the physical features of the place but also on intangible characteristics, is worth underlining. The last two definitions open new opportunities and a new approach which is much more connected with the achievements of economic geography and/or economics.

### 2.2 Economic geography and economics approaches

Economic geographers, following achievements of the economic sciences, often perceive a tourism destination not only as part of geographical space but also as an important element of the tourism market which can be described by features of tourism demand and features of tourism supply. Similarly, within economic approaches to the analysis of tourism destinations, two main attitudes might be pointed out (Ewing and Haider, 2000, p. 56). The supply side approach is developed both by economic geographers and economists, while the demand side approach is more typical for the economic sciences. In approaches typical of the demand side analysis, particular tourism destinations are still perceived subjectively. Hu and Rithie (1993, p. 25) state that a tourism destination "reflects the feelings, beliefs and opinions that an individual has on destinations and see the ability to ensure satisfaction with his holiday special needs". This approach is focused on the perceptions of particular (both past, current and future) tourists and their market choices. Destination is here a function of the tourists' choice – a place or region where tourists choose to go (Flagestad, 2002, p. 3). In this approach, a tourism destination can be a perceptual concept, which can be interpreted subjectively by consumers, depending on their travel itinerary, cultural background, purpose of visit, educational level and past experience (Buhalis, 2000). This leads to the conclusion that a destination is not just something that actually exists – it is also what is thought to exist, a mental concept in the minds of its tourists and potential tourists (Seaton and Bennett, 1997). This approach, focused on a consumer and his/her perceptions, is a cornerstone of modern tourism marketing. Among the attitudes most commonly used here, regarding tourism destinations as brands available for tourists and being alternatives in their choices (Konečnik and Ruzzier, 2006, p. 2; Hosany, Ekinci and Uysal, 2007, Dawes, Romaniuk and Mansfield, 2008), is very common. According to many researchers (Morgan, Pritchard and Pride, 2002; Pike and Page, 2014) destinations have emerged as the largest brands in the travel industry.

The theory of a destination choice based on a division of available destinations into decision sets – like the process seen on other markets – was developed as long ago as in the 1970s by Woodside (Woodside and Sherrell, 1977; Woodside and Lysonski, 1989). In this sense, particular tourism destinations are competing for being chosen by a tourist. The metaphor of a tourism destination as a brand allowed researchers to introduce into tourism destination practice the many achievements of corporate marketing

and management (Hankinson, 2004; Kozak, 2004; Żemła, 2010a). This subjective perception of the boundaries of a destination is in line with a view looking for definitions of a region (of any kind, not necessarily the tourist one) in social consciousness (Paasi, 2001; Chromý, Kučerová and Kučera, 2009; Semian, 2012). This approach now gains more and more attention among social geographers.

The demand side approach, which is very useful in marketing analysis and strategies and in the description of competition between destinations, also has some limitations. The subjectivities in the perception of particular destinations and their boundaries, makes analysis and management processes very difficult. This incoherence between the demand side approach and the supply side approach, which is focused on internal processes, comprises one of the largest contemporary challenges for destination marketers. Particular marketing actions are usually financed by a single entity or a group of entities located inside some kind of boundaries, especially administrative boundaries, as public administrations are often involved. Those administrative boundaries, however, are often not perceived by tourists who have their own, usually subjective, image of the destination they chose to go to. As a result, tourists may receive a leaflet that promotes to them an administrative region and they do not even know where it is located. This is exactly what happens when German tourists at ITB ('Internationale Tourismus-Börse') fairs are given brochures that invite them to Polish administrative regions, i.e. voivodeships.

A different perspective is accepted when defining a tourism destination from a supply side approach. Here, a tourism destination is most commonly understood as an area of the existence and/or concentration of tourism demand, tourism supply and their consequences, including economic, social, environmental and other consequences. This makes this approach useful also for physical geographers and even for sociologists. The supply side approach, however, is not homogenous. The basic definitions are focused on the analysis of particular phenomena that are visible in tourism destinations. This is often the development of tourism companies and tourism infrastructure, as in the definition by d'Angella and Sainaghi (2004, p. 38) who understand a tourism destination as "a geographic area where there is a concentration of small/medium- sized companies sharing a homogeneous background". A similar attitude can be found in the given by Bordas (1994, p. 3), who describes a tourism destination as "a group of tourist attractions, infrastructure, equipment, services and organisations concentrated in a limited geographical area". A more complex definition is offered by Elmazi, Pjero and Bazini (2006, p. 2). In their view, "destination represents a spatial unity of the tourism offer, possessing the appropriate elements of the offer, being market-oriented, as well as tourist-oriented, existing independent of administrative boundaries, requiring management. It provides the fundamental institutional framework for formulating a concept of tourism development in which the focus is shifted from the accommodation facility to the entire surrounding area together with its economic structure (town, region, zone, country)."

A tourism destination in the supply side approach is often perceived within the prism of its products. Destination is regarded here as an "area which consists of all services and offers a tourist consumes during his/her stay" (Bieger, 1998, p. 7) or an "amalgam of tourism products offering an integrated experience to consumers" (Buhalis, 2000, p. 97). Other researchers (Seaton and

| Definition | Source |
|---|---|
| **SPATIAL APPROACH** | |
| Both physical entity (a geographical location with spatial, physical properties), but it is also a more intangible socio-cultural entity (made up of history, its people, its traditions and way of life) | Seaton, Bennett, 1997, p. 351 |
| Geographical unit visited by tourists being a self-contained centre | Burkart, Medlik, 1974, p. 46 |
| An area (region or place) that possesses several natural resources or man-made attractions that attract tourists | Gonçalves, Águas, 1997, p. 12 |
| Area with different natural and/or human made features, which attract non-local visitors (or tourists) for a variety of activities | Murphy, 1985, p. 7 |
| Geographical area, which contains landscape and cultural characteristics and which is in the position to offer a tourism product, which means a broad wave of facilities in transport – accommodation – food and at least one outstanding activity or experience | Framke, 2001, p. 5 |
| A particular geographic region within which the visitor enjoys various types of travel experiences | Goeldner, Ritchie, 2003, p. 466 |
| A place where travellers choose to stay awhile for leisure experiences, related to one or more features or characteristics of the place – a perceived attraction of some sort | Leiper, 2004, p. 128 |
| A certain geographic area which contains tourism products that motivate visiting tourists and encourage tourism activities | Koestantia, et al. 2014, p. 1141 |
| Traditionally treated as a well-defined geographical area but it can also be viewed as a product or a brand | Tan, et al., 2013, p. 623 |
| **ECONOMIC APPROACH** | |
| *Demand side approach* | |
| A tourism destination "reflects the feelings, beliefs and opinions that an individual has on destinations and see the ability to ensure satisfaction with his holiday special needs" | Hu, Rithie, 1993, p. 25 |
| A destination is not just something that actually exists; it is also what is thought to exist, a mental concept in the minds of its tourists and potential tourists | Seaton, Bennett, 1997, p. 351 |
| Destination is a function of tourists' choice – a place or region where tourists choose to go | Flagestad, 2002, p. 3-1. |
| Destination can be a perceptual concept, which can be interpreted subjectively by consumers, depending on their travel itinerary, cultural background, purpose of visit, educational level and past experience | Buhalis, 2000, p. 97. |
| The destination as a geographic area (place or region) is determined by guest's needs concerning accommodation, catering and entertainment, and not primarily by local conditions and situations | Pechlaner, 1999, p. 336. |
| Defined as a region where tourists choose to travel outside of their place of residence | Mariutti, et al., 2013, p. 13. |
| A tourist destination is a situation or place where a tourist himself takes into account travelling there and visiting its attractions with his own special motivations. This situation in terms of geography can range from a limited historic or archaeological site to the geographical area of a country or even a set of countries | Izadi, Saberi, 2015, p. 147. |
| *Supply side approach* | |
| Destination represents a spatial unity of the tourism offer, possessing the appropriate elements of the offer, being market-oriented, as well as tourist-oriented, existing independent of administrative boundaries, requiring management. It provides the fundamental institutional framework for formulating a concept of tourism development in which the focus is shifted from the accommodation facility to the entire surrounding area together with its economic structure (town, region, zone, country) | Elmazi, et al., 2006, p. 2. |
| Geographic area where there is a concentration of small/medium-sized companies sharing a homogeneous background | d'Angella, Sainaghi, 2004, p. 38 |
| Destination can be regarded as a combination (or even a brand) of all products, services and ultimately experiences provided locally | Buhalis, 2000, p. 98. |
| The geographic area to which a tourism policy applies | Goeldner, Ritchie, 2003, p. 466 |
| An area which is separately identified and promoted to tourists as a place to visit and within which the tourist product is co-ordinated by one or more identifiable authorities or organisations | Capone, Boix, 2003, p. 1 |
| A particular geographic region within which the visitor enjoys various types of travel experiences | Goeldner, Ritchie, 2003, p. 466 |
| The geographical region which contains a sufficient critical mass or cluster of attractions so as to be capable of providing tourists with visitation experiences that attract them to the destination for tourism purposes | Bornhorst, et al., 2010, p. 572 |
| A target area in a given region for which a significant offer of attractions and infrastructure of tourism are typical. In a broader sense these are countries, regions, human settlements and other areas that are typical with their high concentration of tourists, developed services and other tourist infrastructure, the result of which is a great long-term concentration of visitors | Vajčnerová, et al., 2013, p. 450. |

*Tab. 1. Selected definitions and approaches to define a tourism destination*
*Source: author's elaboration, based on literature cited*

| Definition | Source |
|---|---|
| **MANAGERIAL APPROACH** | |
| *Destination as a product* | |
| Destination is the central tourism product that drives all others. It is one product but also many (Seaton 1997, s. 350-351) | Seaton, Bennett, 1997, p. 351 |
| Mosaic of different elements (products) with different life cycles. | Gonçalves, Águas, 1997, p. 12 |
| Area which consists of all services and offers a tourist consumes during his/her stay. | Bieger, 1998, p. 7. |
| Amalgam of tourism products offering an integrated experience to consumers | Buhalis, 2000, p. 97. |
| Destination can be regarded as a combination (or even a brand) of all products, services and ultimately experiences provided locally | Buhalis, 2000, p. 98. |
| A destination can be regarded as the tourist product that in certain markets competes with other products | Bieger, 1998, p. 7. |
| *A firm as a metaphor of a destination* | |
| A collective producer in a firm-like structure co-ordinating complementary services according to needs and preferences of target market-segmented and marketed as one unit under one brand | Flagestad, 2002, p. 3-2 |
| Because the markets linked to the products are quite stable, destinations may be seen as strategic business units from the management point of view | Bieger, 1998, p. 7 |
| Process-oriented units of competition, which must be able to provide products and offers for defined target groups and guest segments | Pechlaner, 1999, p. 336. |
| **SYSTEMS APPROACH** | |
| Tourism firms creating economic and jobs effects are part of a bigger totality, where it is not the service offer of single firms but all service offers together, that are the sale argument. This totality is in the literature called a destination. Destination can be described as a system containing of three resource bases: the attraction bases, the facility bases, and the market base | Framke, 2001, p. 5 |
| A place considered as a system of actors that co-operates in order to supply an integrated tourist product | Capone, Boix, 2003, p. 2 |
| System containing following subsystems: entrepreneurial systems, public self-government systems, other systems | Elmazi, et al., 2006, p. 2. |
| Defined as an area bound to no administrative limitations within which tourist aspects are interrelated and integrated in a systemic manner that drives travel motivations, visits, and the industry mechanism | Koestantia, et al., 2014, p. 1141 |
| **NETWORK APPROACH** | |
| Destination typically consist of a number of individual enterprises offering "their" product in a relatively non-coordinated way | Flagestad, 2002, p. 3-2 |
| A place considered as a system of actors that co-operates in order to supply an integrated tourist product | Capone, Boix, 2003, p. 2. |
| A group of tourist attractions, infrastructure, equipment, services and organisations concentrated in a limited geographical area | Bordas, 1994, p. 3. |
| Destinations are considered as complex systems, represented as a network by enumerating the stakeholders composing it and the linkages that connect them. (…) A tourism destination shares many of these characteristics, encompassing many different companies, associations, and organisations whose mutual relationships are typically dynamic and nonlinear | Baggio, et al., 2010b, p. 802 |

*Tab. 1: continued*

Bennett, 1997, p. 351) underline a destination as not only a place where tourism products are offered but also as the central tourism product that drives all other products. It is also not clear if a destination should be perceived as a single important product offered on the tourism market or as a pack of products offered locally. Seaton and Bennett (1997, p. 351) state that a tourism destination "*is one product but also many*", which underlines the duality of the nature of this concept. Perceiving a destination as a product, i.e. an offer for tourists to spend their time, is much closer to the demand side approach as it returns to customers' perceptions and to competing for what they choose. On the contrary, considering a destination as a pack of products is closer to the supply side approach. This reflects the fact that a destination's product might be targetted to different segments at the same time that

offers different ways of spending time in the same place. In that sense, local offers for active tourists, for culture lovers or spa and wellness lovers, might be perceived as different products of a destination and the task for destination managers is then managing the product portfolio. This kind of portfolio management is, however, to some extent different than in companies as particular products cannot be treated separately. Tourists' motivations are much more complicated than just participating in one form of tourism, and often during their stay at a destination, apart from the activity that is their main motivator, they might undertake other activities. Additionally, some local offers might be common for participants of different forms of tourism, which means particular products have common parts. Often accommodation facilities used by different tourists might be illustrations of such a common part.

The views presented above are typical for economists and/or economic geographers. Within the economic sciences, however, the concept of tourism destination also became the subject of interest for management studies. A tourism destination can be considered as the most important unit of management applications in tourism (D'Angella and Go, 2009). Usually, researchers who represent management science also define a tourism destination in a supply side approach, but the stress is put on management process and structures. This approach is more complex and part of it remains controversial as tourism destinations cannot be regarded as formal organisations and no formal hierarchical structures exist. This is because a destination typically consists of a number of individual enterprises that offer "their" product in a relatively non-coordinated way (Flegestad, 2002, p. 3).

The chaotic, non-coordinated development of tourism supply, however, can be replaced by the cooperation activities of particular entities, which is pointed out by Capone and Boix (2003, p. 2). A destination is perceived then as "a collective producer in a firm-like structure coordinating complementary services according to needs and preferences of target market segmented and marketed as one unit under one brand" (Flagestad, 2002, p. 3). As a result, Pechlaner (1999, p. 336) defines it as a "process-oriented unit of competition, which must be able to provide products and offers for defined target groups and guest segments". The metaphoric presentation of a destination as an entity similar to a company was required in order to implement a rich variety of tools "borrowed" from the area of corporate management, which is much better developed. It soon turned out, however, that although destinations have to compete on the tourism market in a very similar way to how companies compete, but as specific market entities that are not even being a formal organisation, destinations have so many and so strong characteristic features that a simple implementation was not required and sound adjustment was necessary. Among other things, the adjustment included perceiving a destination as an entity similar to a strategic business unit (SBU) of a diversified company rather than as a company itself. A place (region, city, country etc.) is also diversified in what its activities are and products offered on internal and external markets, as well as tourism, is just one of those activities/products as an SBU is in a diversified company. This way of thinking is found in the definition as cited by Pechlaner, but it can also be found in the works by Gnoth (2004) or Bieger (1998).

## 3. The network approach to tourism destinations

With the further development and the joint use of spatial and economic supply side definitions of tourism destinations, more sophisticated approaches could have been constructed, especially the systems and networking approach. In the systems view, a destination is defined as an area bound to no administrative limitations, where tourist aspects are interrelated and system-integrated. This has impacts on travel motivations, visits, and the industry mechanism (Koestantia, Nuryanti, Suwarno, Prayitno, and Femina, 2014). According to Elmazi, Pjero and Bazini (2006, p. 2), this system contains the following subsystems: entrepreneurial systems, public self-government systems, and other systems; however, this view might be too simplified, as the number of subsystems might be bigger and their relations might be more complicated. The development of the systems approach that analyses the complexities of tourism destinations, opened up new opportunities for establishing a modern network approach to destinations. This approach was possible due to some kind of evolution which took place in the major sciences adapted to tourism destinations analysis at the beginning of the century. The network approach gained more and more attention in sociology, economics, management studies, and regional and economic geography.

One of the main features of tourism destinations is that there are no hierarchical ties between the numerous entities that offer products independently. This is what makes contemporary researchers discuss effective coordination and/or governance rather than management (Baggio, Scott and Cooper, 2010a; Beaumont and Dredge, 2010; Paget, Dimanche and Mounet, 2010; Ruhanen, Scott, Ritchie and Tkaczynski, 2010; Cohen and Cohen, 2012). The existence and market effectiveness of destinations on the ground of management theories could be better understood, since market structures were further developed and the theories that followed them were further developed. In the contemporary world, numerous definitions are used to set the borders of companies. According to a new paradigm in strategic management based on inter-organisational relations (IR) (Doz and Hammel, 1998; Gulati, Nohria, and Zaheer, 2000; Barringer and Harrison, 2010), companies started to search for sources of their competitive advantage in non-competitive relations with other entities, including competitors. With its origins in sociology (Galaskiewicz, 1985; Galskiewicz and Wassermann, 1994), the networking theory (NT) started to be used in management studies (Provan, Fish and Sydow, 2007). This theory was also found to be very useful to better describe and understand processes that take place in tourism destinations. In contemporary research of tourism destinations, the networking approach is used more and more often.

According to a simple and general definition, a 'network is a set of items, which we will call vertices or sometimes nodes, with connections between them, called edges' (Newman, 2003, p. 167). In the business context, Hall (2005, p. 179) defines a network as 'an arrangement of interorganisation cooperation and collaboration'. There exist many different approaches and methods inside NT, however, which might be and were introduced into tourism destinations analysis, which result in substantial problems in establishing a coherent theory of destination networking (Van der Zee and Vanneste, 2015).

The theoretical literature on IR is fragmented, with several disciplines contributing to the field. Tourism researchers who attempt to implement it into tourism destination research point out several theories or microtheories, which might be valid (Beritelli, Bieger and Laesser, 2007, p. 97). Transaction costs, resource dependence theory and networking theory are cited most often (Beritelli, Bieger and Laesser, 2007; Wang, Xiang, 2007). The last one seems to be a particularly promising option when analysing the tourism market as tourism might be described as a network industry par excellence (Scott, Cooper and Baggio, 2008). Support for this claim is found in the definition of tourism as a system, where interdependence is essential (Mill, Morrison, 1985; Leiper, 1990; Bjork and Virtanen, 2005; Lazzeretti and Petrillo, 2006) and collaboration as well as cooperation between different organisations within a tourism destination create the tourism product (Pechlaner, Abfalter and Raich, 2002; Fyall and Garrod, 2005). In

this way, local alliances, agreements and other formal and informal governance structures help to compensate for the fragmented nature of a tourism destination (Scott, Cooper and Baggio, 2008).

NT has been suggested as a way to better understand ongoing marketing activities and processes aiming to develop a business (von Friedrichs Grängsjö, 2007). Buhalis (2000) indicates that most destinations consist of networks of tourism suppliers and that the benefits of such networks include a more profitable tourism destination. Within NT, a tourism destination may be considered as a cluster of interrelated stakeholders embedded in a social network (Scott, Cooper and Baggio, 2008). Such a network of stakeholders interacts, and jointly meets visitor needs and produces the experience that the travellers consume. These destination stakeholders include accommodation businesses, tourist attractions, tour companies, and other companies that provide commercial services, government agencies and tourism offices, as well as representatives of the local community. Interaction between these stakeholders is complex, dynamic, and subject to external shocks. The basic premise of tourism destination management is that through cooperative planning and organisational activities, the effectiveness of these joint interactions can be improved to the benefit of individual stakeholders (Baggio, Scott, Cooper, 2010a).

One reason for the study of networks as a central part of tourism is that they form a basis for collective action. In tourism, many of the main resources of a tourism destination are community "owned" and are used jointly to attract tourists. These may be physical resources such as beaches, lakes, scenic outlook and national parks; built resources such as museums, art galleries and heritage buildings; or intangible resources such as destination brands or the reputation of the friendly attitudes of local people. Such collective action does not necessarily require a network organisation, but if resources are generally missing and if decisions concerning tourism are not often seen within the government mandate, the response is often a network of the stakeholders involved (Scott, Cooper and Baggio, 2008). Also networks are suggested to function as systems which can organise and integrate tourism destinations, making the firms involved benefit, enhance destination performance and quality, as well as stimulate providing 'wholesome and memorable experiences' for tourists (Zach and Racherla, 2011, p. 98).

As the networking approach was found to be useful for business practice and studies, at the same time another process took place. This process enhanced the networking view of tourism destinations. Within human geography, a new network approach to 'place' was developed. Nicholls (2009) describes two different approaches: the relational conception of place, and territorial conceptions of place. Both examine social relations in distinct locations but they emphasise different aspects of these relations: the former emphasises the structured cohesion of relations in particular sites, while the latter highlights the contingent interactions of diverse (in terms of sociology and geography) actors. While supporting the relational conception of place, Amin and Thrift (2002, p. 72) argue that places are areas where actors with different statuses, geographical ties and mobilities interact in fleeting and unstructured ways. In this view, place has particular qualities that influence social networks that emerge within it. On the one hand, proximity and stability associated with a particular place create favourable conditions for strong-tie relations. Additionally, a particular place is made up of a number of contact points where diverse actors can come into regular interactions with one another (Nicholls, 2009, p. 91).

Among the earliest attempts to present a tourism destination in a network perspective, works that analyse destinations as clusters might be pointed out (Nordin, 2003; Weiermair and Steinhauser, 2003; Hawkins, 2004; Jackson and Murphy, 2006). Industry clusters exist where firms and organisations are loosely geographically concentrated or an association of firms and organisations is involved in a value chain producing goods and services, and they are innovative (Enright and Roberts, 2001, p. 66). Initially, benefits of industrial agglomeration resulted from natural resources, the spatial costs of external transactions (Scott, 1983), transport organisation and costs (Scott, 1986, Scott and Storper, 2003), labour or economies of scale (Enright, 2003). According to Porter (1990), clusters are geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (e.g. universities, standards agencies, trade associations) in a particular field that compete but also cooperate. Porter's view that underlying competition and cooperation between companies within a cluster and searching for competitive advantage in an economy in innovations and an instant search for development (Porter, 1990), gave a new impetus to the cluster concept. His cluster theory has become the standard concept in the field, and policy-makers from all over the world have seized upon Porter's cluster model as a tool for promoting national, regional and local competitiveness, innovation and growth (Martin and Sunley, 2003, p. 5).

According to many authors, regional clustering is part of a new industrial order (Hospers and Beugelsijk, 2002; Marková, 2014) and can be interpreted as part of the sub-national or global innovation and production system (Guinet, 1999). At present, the cluster concept focuses on knowledge transfer (Maskell, 2001), as well as on linkages and interdependencies among actors in value chains. It goes beyond the traditional ideas on clusters, which involved horizontal networks of firms operating on the same end-product market in the same industry group (Enright and Roberts, 2001). Especially when accepting modern definitions of clusters in which the cooperation between companies is underlined (Nordin, 2003), many similarities can be seen between the ways in which destinations and clusters operate. In both cases, the role of public authorities is acknowledged. For tourism destinations, however, this function is wider than just the creation of good conditions for the companies to develop, as the public sector is also responsible for delivering many important elements of a tourism destination product. The most important difference is seen in the sequential nature of product creation in such industrial clusters as Silicon Valley, the Italian fashion cluster or the forestry cluster in Sweden (Porter, 1998). A cluster is usually formed by a chain of suppliers and industrial customers with a visible single company (or together with several similar competing companies), which is responsible for a final product and for selling it to the final customer.

Even taking into the consideration the fact that in a cluster there are usually many different products that are produced and that almost all of them are offered by a different type of company, this is not similar to what can be seen in a tourism destination: all network members produce only a part of the

service potential that covers a wide scope of offers, and the final customers, i.e. visitors, build a product for themselves. The too simple implementation of the cluster concept into tourism research was also criticised as being too business-oriented and for disregarding the fact that cluster members – such as tourism companies – are usually unable to produce by themselves the reasons for tourists to come. This role is usually played by tourism goods, which often are free goods, and cluster implementation might result in marginalisation of their impact (Hassan, 2000). This special status of free goods, which are elements of comparative advantage and understood this way by Porter (1990) and followers (Hill and Brennan, 2000; Nordin, 2003; Tallman, Jenkins, Henry and Pinch, 2004) as less important in making an economy competitive, underlines the need for implementing geographic and spatial approaches (Scott and Storper, 2003; Scott and Garofoli, 2007; Asheim, Cooke and Martin, 2008) to industry agglomeration in tourism destinations. Hence, typically business-oriented approaches rooted in Porter's theory are not sufficient to explain the phenomena of clustering tourism destinations. Several researchers thoroughly discuss other similarities and differences between industry clusters and tourism destinations (Simpson and Bretherton, 2004; da Cunha and da Cunha, 2005; Jackson and Murphy, 2006; Feng and Miao, 2009).

Another concept developed in regional economics and economic geography and applied to tourism destinations analysis is the industrial district. Industrial district theory started in the late nineteenth century with the work of Marshall (1898), who was trying to explain the localisation (geographical concentration) of English industries such as pottery, cutlery and basket making (Becattini, 2002b). Then, in the late 1970s, the theory of industrial districts was applied to an area in Italy which became known as the 'third Italy' (Pyke, Becattini and Sengenberger, 1992). These regions seemed to be growing faster than the rest of the country and coming out of recessions more successfully. From that point on, the concept remains particularly popular among Italian scientists (Becattini, 2002a; Becattini, 2002b; Corň and Grandinetti, 2001; Sforzi, 1989).

According to Mottiar and Ryan (2006), industrial districts are characterised by geographical and sectorial concentration of firms, small size companies, strong inter-firm relations, a social or professional milieu, and a stress put on innovations. Similarly, Hjalager (2000) perceives the following main features of industrial clusters: the interdependence of firms, flexible firm boundaries, co-operative competition, trust in sustained collaboration and a "community culture" with supportive public policies. A very simple definition of an industrial district was given by Corň and Grandinetti (2001, p. 189), stating that this is a network of small- and medium-sized enterprises embedded in a local context, turns our attention to the network-shaped nature of industrial districts. All of these statements show that the concept of industrial districts deals with similar phenomena as clusters and, like the cluster, the concept might be implemented in tourism destinations analysis. According to Hjalager (2000) and Mottiar and Ryan (2006), tourism destinations might be treated as illustrations of industrial districts. This concept, however, is not as popular as clusters among tourism researchers. This might be due to the focus on production sectors by the core theory of industrial districts (Mottiar and Ryan, 2006). Also the comparability between tourism destinations and industrial districts is less obvious, especially with respect to governance structures. This is also true for the intensified

vertical division of labour between regions that provide services to tourists and regions that provide these services (Hjalager, 2000).

Another attempt to implement the approach typical for NT to tourism destinations analysis is Gnoth's metaphor of virtual service company, which might be defined as a network of enterprises that are using resources jointly and which organise their cooperation as a joint effort (Gnoth, 2004). As Gnoth (2004) points out, however, there are also important differences between the typical virtual firms found most commonly in industrial markets, and tourism destinations. Firstly, in tourism destinations, usually there is no focal company in charge of the overall management of the production process. Secondly, the contribution of each small- and medium-sized enterprise (SME) in tourism is not cumulative as is the case, for example, with the contribution of different companies in the motor industry. Tourism is experienced rather holistically and often the customer value is not derived directly from particular services but is created between the various services, as a combination of those services and the tangible and intangible assets of a given destination (Gnoth, 2004).

Probably the most complex proposition of how to analyse tourism destinations in the framework of NT is the one offered by Scott, Cooper and Baggio (2008). Sophisticated quantitative methods are implied here to better understand relations between particular stakeholders and their influence on the effectiveness of the whole network.

Currently, NT is most commonly used to better understand governance in tourism destinations. In the network approach, understood here as in opposition to the corporate approach (Ruhanen, Scott, Ritchie and Tkaczynski, 2010), governance might be defined as "the self-organising inter-organisational networks characterised by interdependence, resource exchange, rules of the game and autonomy from the state" (Rhodes, 1997, p. 15). Governance, however, is a concept which refers to relationships between multiple stakeholders and to how they interact with one another. It involves the issue of how the stakeholders determine, implement and evaluate the rules of interaction (Baggio, Scott, Cooper, 2010a, p. 51). According to Beritelli, Bieger and Leasser (2007, p. 96) the concept of governance applied to tourist destinations consists of setting and developing rules and mechanisms for a policy, as well as business strategies, by involving all the institutions and individuals. Similarly, Nordin and Svensson (2007) focus on social networks and relationships, with emphasis on those between the public and private sectors. It has been noted that the public and private sectors are involved, and as a result, the governance dimensions applied may be derived from those used in both sectors (Ruhanen, Scott, Rithie and Tkaczynski, 2010, p. 5). The whole concept of destination governance is based on making the groups of organisations that cluster together to form a destination context (Nordin and Svensson, 2007).

## 4. Special challenges in implementing NT in the area of tourism destinations

A tourism destination is very often perceived as a network of stakeholders by researchers. The image of a destination presented in the frame of NT makes it easier to better understand the processes and phenomena that might be seen in destinations. The implementation of NT in tourism, however, is not free from traps and difficulties. Among them, spatial embeddedness and the non-voluntary nature of

membership in a network, the crucial role of free goods in product creation, the predominance of SMEs in a destination network, differences between particular destinations and the difficulty in setting clear borders between networks, will be discussed here as the most important ones. Each of them may become more important if the methods and tools of analysis are implemented directly from other, especially industrial, markets (Żemła, 2010b).

### 4.1 Spatial embeddedness and the non-voluntary nature of membership in a network

One of the most prominent questions which have to be answered by a company with respect to NT is whether to enter the network or not (Möller and Svahn, 2003). In NT, a company is usually free in choosing the network it is going to join or whether to join any network at all. Tourism companies in destinations do not have such a choice. Regardless of whether they are willing to collaborate in the network, they are interlinked with other entities involved in the destination product preparation. This spatial embeddedness changes radically the rules of cooperation. According to NT, a company which is disappointed by the results of its network membership, might leave and search for other partners. This decision is more or less difficult to take – but it can be taken. In a destination, tourism companies are somehow "condemned" to cohabitation. A company cannot "escape" from its partners if they behave in a hostile manner or are irresponsible, and it cannot "escape" from a network if it is inefficiently organised and managed. A company, even if it does not regard itself to be a network member and does not collaborate actively with other entities, is under the influence of the network actions and other companies' actions, as well as the network itself is influenced by this company.

### 4.2 The crucial role of free goods in product creation

One of the biggest challenges in understanding relations in networks in tourism destinations is the fact that the tourist experience is derived from the 'between' of services of particular local companies, rather than directly from those services. The key factors for visitors are often the natural or cultural resources of the place that are still free goods. The very first problem which has to be underlined by this statement is the role of the public sector in tourism product creation (Flagestad, 2002). Future research should include answers to the question of what are the consequences of the fact that the external resources used by tourism companies are rather free resources which can be used simultaneously by many companies, whereas resource dependency theory underlines mostly the possibility to use the external resources that belong to other companies, especially the resources which are not available for other competitors. In the research by Albrecht (2013), it was found that substantial progress has been made in the investigation of private sector networks at the destination levels, but the research on networks involving public sector stakeholders and networks across sectors and levels of governance remains insufficient. Establishing a research approach that allows one to consider the public sector as a holder of free resources and the relations between local actors and free resources, seems to be one of the most important tasks for tourism researchers who look for methods to implement the NT into the field of tourism destination.

Free goods in the destination context are not only tangible goods, however, they are also marketing assets. The tourism destination brand and its attractiveness are among the main factors that influence success by the local companies.

In that case, the problem of the so-called freeriders, i.e. the stakeholders who benefit from the efforts made by other stakeholders without their own effort, remains an important issue (Zmyślony, 2009).

### 4.3 The predominance of SMEs in a destination network

There is much evidence in the literature that tourism is a small- and medium-sized enterprises (SMEs) dominated industry (Go and Appelman, 2001; Woods and Deegan, 2003; Jones and Haven-Tang, 2005). Additionally, a lot of literature on the NT is concerned with large companies' collaboration, which is the reason why the rules described there are not fully relevant to the SMEs-dominated tourism sector. There are several consequences of the dominance of SMEs in tourism destinations. On one hand, the SMEs sector should be particularly interested in collaborating as this might weaken their market constraints resulting from their size and from limited financial resources (Go and Appelman, 2001, p. 193). A micro-firm like a family company from the accommodation business might be promoted world-wide because of its participation in the destination network. This is just one example of possible benefits.

On the other hand, the SMEs dominated industry causes many difficulties and constraints in cooperation and network formation. Most of them are entities which are or should be included in a network. The more companies that are involved in a network, the more difficult is its management, especially for setting common goals for the network as a whole. Competitive relations between SMEs and their different profiles (e.g. the different services and goods that companies offer visitors) make setting the goals even harder. Small-scale operations are usually also the reason why the level of intangible resources, especially knowledge, is very low. This eventually results in the lack of professional management. In small, family-run companies that are usually managed by the founder who also works at the front desk, there is no space for a manager post. In other words, it is more difficult to persuade small firm owners to start cooperation as they might have not enough professional management knowledge to properly understand the benefit they may derive from it. SMEs also often reflect the personality of the founder (Keasey and Watson, 1993), and because of this, SMEs are often characterised by a strong will to survive. Running one's own small company is also often regarded as the founder's way to be independent. This may result in creating the so-called fortress mentality (Lynch, 2000) and hence an obstacle to cooperation (Simpson and Bretherton, 2004, p. 112). SMEs are also much more vulnerable to bankruptcy and new companies are frequently created (Wanhill, 2000), so the list of companies that are part of the destination network is often changed. This is a serious difficulty in establishing long-term sustainable relations between companies in a destination, which is suggested by the NT.

### 4.4 Differences between particular destination types

It is difficult to establish common rules of how to implement any competitive advantage paradigm in the tourism destinations field as destinations differ from one another significantly. Instead one should look for paradigms that are proper for particular types of destinations. The statement about the predominance of SMEs would not be relevant to some destinations, e.g. large cities. Instead, the problem of cooperation between hotels that are part of worldwide hotel chains may appear. Different destinations offer different products and are present in different markets. So, it is very likely that ideas that are effective in a

particular destination might not work in another. Different destinations might need different modifications of the NT when implemented.

The concept that examines the community and the corporate models of destinations is an example of the most popular differences between destinations (Flagestad and Hope, 2001; Beritelli, Bieger and Leasser, 2007). The community model represents a situation which is common in most European tourism destinations where multiple small-sized, mostly local companies, are involved in tourism product development. Additionally, the role and support of the local government are relatively high. In contrast, the corporate model is rather a North American destinations style model with unquestionable leadership of large, often external corporations in destination development. The structure of management here is more similar to company management and is more integrated, hierarchical and centralised than the community model destinations (Flagestad, 2002). Beritelli, Bieger and Leasser (2007, p. 97) claim that the NT is the proper approach for community model destinations, while the dyadic resource dependency theory explains correctly the relations within the corporate model destinations. It might be questionable, however, if, even in large company-dominated destinations where other companies play the roles of a leader's satellites, relationships between those satellites do not exist or do not play an important role in destination competitiveness. Still, even if this is accepted, it is likely that the dyadic relationships between the focal company and individual satellite firms would be mutually interrelated (Wang and Xiang, 2007, p. 76). Then, instead of the simple dyadic perspective, Jarillo's (1998) concept of a network within the hub firm, would better match the corporate model of destinations. But this argument does not change the fact that management in the corporate model destinations and the community model destinations should involve different NT approaches, as Jarillo's hub firm network does not match the community model.

Finally, destinations that attract different tourism markets have to cope with the different features they have and with different customers' behaviours which might require different methods of organising the local tourism network. This could include long-haul versus short break holidays, for example, or leisure versus business tourism destinations.

### 4.5 Difficulties in setting clear borders between destinations

One of the important arguments raised by IR supporters is the difficulty in setting exact borders between companies, with outsourcing and resource dependencies and activities crossing companies' borders. Instead, we should analyse the competitiveness of networks. It is surprising then that the IR researchers might repeat the same mistake, but on the level of a network. In many cases the whole network approach (Provan, Fish and Sydow, 2007; McLeod, 2014), which is very suitable for a tourism destination analysis, results in regarding a network of collaborating entities as well separated from the environment closed system, that acts on the market in a similar way to Porter's (1980) value system. This approach is not suitable for tourism destinations analysis for at least three reasons (Żemła, 2014, p. 243). Firstly, the hierarchical structure of tourism destinations must be considered. A single destination may consist of many smaller destinations. Several communities form a tourism region, just as several regions comprise a country, etc. Actions on different markets require different definitions of the destination. The most obvious reason for this is the different views of tourism

destinations that visitors have, which is usually, but not always, a result of the distance between a visitor's residence place and the destination. For people travelling from nearby, the destination can be a single settlement, while for tourists from overseas markets this is usually the whole country. This links the neighbouring destinations in coopetition (Bengtsson and Kock, 2000) ties in the same manner as tourism companies are connected within a single destination. Actions on many markets require the destination's ability to cooperate with the neighbour in one market, while competing with it in another. What makes this relation even stronger is the fact that the destinations set with regard to a supply side perspective, does not represent the perspectives of a particular visitor. While the visitors stay in one destination, they also often visit neighbouring areas, which means that having a neighbouring destination with a very competitive offer might not necessarily be just a threat but it may also be an opportunity for the destination. As a result, the need of both intra- and inter-destination cooperation is stressed (Fyall, Garrod and Wang, 2012; Żemła, 2014).

Secondly, many tourism entities, including both companies and localities, might simultaneously participate in more than one destination, which is the result of the fact that destinations are formed using different criteria in setting the borders. This makes the problem of competition and cooperation between destinations even more complex.

Finally, a destination's product is formed not only by internal entities, but also the external stakeholders' role has to be acknowledged. Some of them, like investors, might be treated as permanently connected with a destination; however, there are firms who cooperate with a destination's product creation and marketing only accidentally. This might include tour-operators and companies like breweries, sport equipment producers or others, who conduct common promotional campaigns with the destination. In some cases, they may cooperate with the destination as whole, but they also collaborate with particular companies within one destination (Żemła, 2010b).

## 5. Conclusions

It may also be clearly seen that current research results in creating more complex and complicated methods of interpreting the term. Among them, the networking approach is one of the most popular in the 21st century. Over the past two decades, a growing number of studies has been published which focus on the role of networks in tourism. Tourism destinations are a special kind of network and cooperation processes are crucial for them to succeed. Once researchers and practitioners accept the above statement, they can start looking for the best approach to create sustainable competitive advantage in the tourism market within NT theory. The differences between traditionally understood company networks and tourism destinations as presented here, however, make NT difficult to implement and make it full of traps.

Unfortunately, the contemporary literature does not offer any detailed description of how to implement NT properly. Van der Zee and Vanneste (2015) state that the promising theoretical claims of the potential benefits of networked collaboration in tourist destinations are supported by empirical evidence only to a limited extent. According to these authors, there are two explanations for the lack of empirically proven benefits. First, progress is hampered by failing to integrate the field of tourism network studies, as there are different sub-fields of research. These sub-fields

apply different approaches towards tourism networks, from both theoretical and methodological perspectives. There is little cross-fertilisation between the sub-fields and integrative studies are still scarce. Secondly, while many studies show interesting and promising findings, the field would make greater progress if researchers more systematically reflected on the relationship between network goals and projected outcomes, and on the most suitable methodology to test the effects of the required network development in a comprehensive way (Van der Zee and Vanneste, 2015, p. 46).

While keeping in mind that networking theory stands for a very wide and diversified idea used by representatives of different sciences to analyse really different phenomena, one might be surprised that most authors who search for inspiration in NT to carry out tourism destination analysis, find it in only one approach. Regarding a destination as a unit of market competition focuses the attention of researchers on problems of efficiency and management and, as a consequence, on implementing mainly the achievements of business network analysis. According to the broad division outlined by Newman (2003, p. 168), however, business networks are only one kind (other examples might be the Internet, neural networks, metabolic networks, food webs, distribution networks such as blood vessels or postal delivery routes, networks of citations between papers, and many others) of many different networks present in the contemporary world which are analysed using networking methods. These networks are the subject of interest of different scientists including engineering scientists, physicians, mathematicians, geographers, and sociologists. To some extent, once the present review of the approaches using NT in the literature devoted to the topic of tourism was undertaken, the achievements of business networks analysis formed the principal outcome. We are aware of this limitation and as one of the important directions for future studies, it is to be pointed out that the scope of analysis of tourism destinations must be widened using the methods developed in other approaches to network analysis.

This paper points out some major problems in implementing NT in tourism destinations analysis; however, further research should also include the search for the best solution and, at the same time, the constraints presented here must be respected. These constraints can also be seen as consequences of a more general problem than the problems themselves. This more general problem is the too direct implementation of business networks theory. As presented here, tourism destinations perceived as networks of actors are very specific and they have some features which might not be observed in business networks of other kinds, even those in tourism, like the airlines alliances. That is why this paper is a call for a general theory of tourism destinations networks, which should be created on the bases of contemporary business networks theory but supplemented as well by the achievements of the analysis of networks of different types, as well as by contributions from different sciences dealing with the topic. This seems to be a very challenging task and requires the joint efforts of many researchers and time.

Another problem is associated with the fact that as the basic theory, NT is diversified and parts of it are not fully coherent – they combine many different approaches, and they also contain their consequences in the tourism area. Future research, however, should be more focused on specific features of tourism destinations instead of looking for other sub-theories of NT which would be more promising if adapted. A general theory of destination networking is missing and

filling this gap should be regarded as a long-term target for researchers involved in this topic. Otherwise, the networking approach is going to be just another promising concept with no sound explanations, and it will be used only in research on small fragments of the complex issue of destinations.

Finally, one should remember that while the networking approach is nowadays perceived as one of the most promising approaches to tourism destinations, it still cannot be perceived as the only possible approach. On the contrary, having implemented the very idea into tourism research, the achievements of other approaches presented in the first part of this paper can be integrated into it. Also, the network perspective can be very useful for researchers using other approaches, as it helps in perceiving the details of destination structure. For example, the networking perspective might be a good solution for analysing sociological issues in destinations and the economic benefits of tourism development, as well as in examining management structures and processes, in particular planning.

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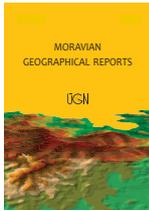
# Air charter leisure traffic and organised tourism in Poland: Are charters passé?

Zbigniew TAYLOR [a] [*]

## Abstract

*Data from a number of tourism and transport sources are used in this analysis, concentrating on Poland: the largest tour operators and areas in which air carriers are likely to have the greatest impact. The top 25 air charter carriers identified are examined closely in terms of connections, and the geographical characteristics of these links are highlighted. The research reveals substantial differences in models of air leisure traffic between Western Europe and Poland. These are of a quantitative, but also a qualitative nature, and reflect the disparate levels of affluence of societies, different mobility patterns, and various experiences, adventures and demands on the part of travellers. Overall, charter traffic in Poland is still seen to be flourishing, while that in Western Europe is in relative decline.*

***Key words:*** *transport for tourism, passenger traffic, air charters, tour operators, package holidays, tourism exporting economy, Poland*

## 1. Introduction

In Poland, it is possible to observe a dramatic development of tourist traffic (and a breakthrough in mobility overall) since the fall of communism at the turn of the 1990s – with the travel involved being both domestic and international. This development would not have been possible without a parallel increase in the carriage capacity characterising the transport companies that serve the tour operators active in the market. An absolute majority of cases of tourism organised by Polish tour operators involves the use of aircraft (these taking 45.7% of tourists and accounting for 47.7% of the turnover) as the primary means, along with possibly one or more other means (with 44.3% of tourists and 48.8% of the turnover[1]).

According to several authors (e.g. Doganis, 2006, 2010; Graham et al., 2008; Buck and Ley, 2004), charter airlines are seen as a declining sector in the short- and medium-haul markets because they cannot survive competition from the low-cost carriers (LCCs). Such statements, however, typically come from Western contributors, who neglect specific trends in emerging markets like the Central Eastern European countries. As a result, the work detailed in this paper aims to fill this gap, considering Poland as a case study.

In the mass tourist traffic organised by the largest tour operators, the flights occurring mainly take the form of charters. Tour operators located in Poland above all organise standard tours to popular localities on terms of special interest, incentive tours (travel), or (mostly) inclusive tours – flight packages organised with the use of a special discount fare available for this type of travel only[2]. It can therefore be said, with some simplification, that charter flights almost exclusively serve organised mass foreign outward tourism, while – on the other hand – not all tourist flights take the form of charters. It is in fact estimated that about 90% of all tour-operators' customers use charter flights (leaving aside customers' own access, e.g. by car or aeroplane).

The purpose of this paper is to provide an in-depth insight into Poland's air charter traffic and its nature when compared with the matured markets of Western Europe. To that end, the remainder of this paper is organised as follows.

[a] Stanisław Leszczycki Institute of Geography and Spatial Organisation, Polish Academy of Sciences, Warsaw, Poland (*corresponding author: Z. Taylor, e-mail: *z.taylor@twarda.pan.pl*)

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[1] Author's calculations, based on various sources (cf. Section 3 of this paper). This refers to all data, unless otherwise stated.

[2] The growth of inclusive tour charters contributed significantly to the development of tourism in Spain from the 1960s onwards, and in other Mediterranean countries during the 1970s and early 1980s. Besides the most common inclusive tour charters, the literature also mentions one-stop inclusive tour charters, charters for special events, and common purpose charters (including charters for one's own use and charters for affinity groups) (Gardzińska and Meyer, 2008).

Section 2 reviews the literature, while Section 3 describes the data used and provides details on the methodology. The main part of the paper is then Section 4, which presents an analysis of the largest air charter carriers and the principal destinations of charter flights from/to Poland, respectively. Finally, some discussion is engaged in Section 5 and conclusions arrived at in Section 6.

## 2. Theoretical framework

Tourism is inevitably connected with the movement of human beings in space. The meeting of needs in this regard implies a change of place of stay, and therefore the generation of demand for transport. It is estimated that tourism in Europe is responsible for 15 to 20% of passenger-km accounted for by surface transport, and in air transport this share is much greater (Peteers et al., 2007). This is also the case for Poland, where significant growth in tourist traffic, domestic as well as international, has been observed since 1990.

"Transport provision is a permissive factor in much tourist/recreation development, itself a product of increasing mobility, leisure time and affluence" (Halsall, 1992, p. 175). In relation to the supply side of tourism transport, Hall (2008, p.199) distinguishes four general functions: "(1) linking the source market with the host destination; (2) providing mobility and access within a destination area/region/country; (3) providing mobility and access within an actual tourism attraction; and (4) facilitating travel along a recreational route, where both the transport form and nature of the route may combine or act singly to provide the tourism experience." In this paper, the focus will be on the first of these functions of transport.

Wheatcroft (1998) analyses the global relationship between the airline industry and tourism, seeing this as a mixture of technological factors, market pressures and regulatory policies. Bieger and Wittmer (2006) in turn approach tourism as a stimulator in air transport, while Graham et al. (2008) discuss the implications of the aviation industry for leisure travel on a worldwide scale. Hall (1999) explores two sets of conceptual issues at the interface between transport and tourism:

1. transport as a culture gatekeeper to host-tourist interaction; and

2. the role of tourist mobility at the local level and its impact on inequality and externality effects. The first issue is in fact a borrowing of Ioannides's concept of tour operators as gatekeepers of tourism (Ioannides, 1998).

In the context of this paper, many studies have analysed transport, especially aviation, albeit without any special reference to tourism. Prideaux (2000) identifies the significance of the transport system in destination development, concluding that those without airport facilities are largely restricted to markets accessible by car, while air travel is a key element in the winning of new markets beyond the reasonable reach thereof.

Issues relating to the low-cost airlines have dominated the literature recently, however, since "LCC growth has been at the expense of the full service/legacy carriers and, even more

so, of the charter airlines" (Graham, 2008, p. 232). Low-cost carriers (LCCs) are a reflection of the liberalisation of air transport. Since the liberalisation of the intra-European market, airline competition has increased in most parts of Europe, especially due to the penetration of LCCs into a wider array of airports. "Taking advantage of the new freedom of access to the market, various airlines structured themselves to the low-cost model, which consists of making maximum use of their aircraft and of the work force, reducing the costs related to comfort and making use where possible of various incentives offered by governments (...). Reducing costs allows them to offer low fares" (Dobruszkes, 2009b, p. 423). Low wages, low incomes and the weakness of the flag carriers are among the elements favouring the development of LCCs in CEE countries (Dobruszkes, 2006).

As Dobruszkes and Mondou (2013, p. 30) write: "LCCs tend to cannibalize the charter business on short- and medium-haul markets". Francis et al. (2006) examine and characterise the factors which have encouraged or inhibited the spatial and temporal spread of LCCs in different countries of the world. The dynamic expansion of European LCCs is discussed as a contradiction inherent in the relationships between air transport and sustainability by Graham and Shaw (2008). Dobruszkes (2009b, 2013, 2014) analyses how European low-cost carriers have adapted and developed their networks to the CEE countries as a result of the liberalisation of air space parallel to EU enlargement in 2004.

The world's charter services are gradually being replaced by scheduled operations as a result of air transport deregulation/liberalisation.[3] The situation in Europe is similar "but the sheer scale of the continent's charter market has meant that this remains large. Much of the European charter market involves short to medium distance journeys, with the average sector flown by the larger charter carriers being typically around 2,500 km" (Williams, 2008, p.85). In the case of some major leisure routes to the Mediterranean, over 90 per cent of passengers travel on charter flights (Doganis, 2006, p. 184). As Williams further writes, "the charter airlines owned by [European] tour operators accounted for 42 per cent of (...) aircraft" in 2007 (Williams, 2008, p. 90), though in the case of Poland this share has been much smaller. More information on the air transport market in CEE countries, including Poland, can be found in a recently published paper by Jankiewicz and Huderek-Glapska (2016).

For the purpose of this paper, a matter of crucial importance is an understanding of the aviation market in terms of the comparison of costs borne by various types of air operators. Barrett estimated a charter product's costs "to range between 32 per cent and 37 per cent of the costs of the traditional scheduled airline product" (Barrett, 2008, p. 104). Doganis – in a cascade analysis of the London-Athens route – estimated even larger savings of 69 per cent, for a charter operation over a full-service scheduled carrier, and of 10 per cent when the comparison is with LCCs (Doganis, 2006). A given charter airline's costs per passenger amount to only 46 per cent of scheduled costs (Doganis, 2010). The major cost advantages of charters lie in their usage of larger and more economical aircraft, fuller

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[3] "In spite of the existence of a few differences (e.g. deregulation may take place within a country whereas liberalisation across countries), these last two terms are often used interchangeably" (Graham et al., 2008, p. 370). Some treat liberalisation, however, as "a misnomer for re-regulation, the replacement of one set of interventionist rules by another more flexible set" (Graham, 1998, p.88).

daily utilisation of aircraft (flights also through the night), close matching between capacity offered and demand, higher passenger load factors and very low sales or advertising costs (Doganis, 2006). "It is apparent that the combination of larger aircraft, longer flight sectors, greater aircraft and crew utilisation, high seating configurations and higher load factors provides the typical charter airline with significantly lower costs per passenger carried than scheduled airlines" (Williams, 2008, p. 96). Moreover, distribution costs are virtually non-existent for the charter airlines, since these are taken on by the tour operators. As Buck and Lei (2004, p. 74) write, "from the start, cost reduction has been the primary aim of charter operations". Therefore, the savings of charters are also greater than those achieved by LCCs.

## 3. Sources, methods of data collection and processing

Despite the existence of at least several institutions involved in the collection of data on companies, there is no single proper and reliable base on tour operators and carriers – a circumstance that has necessitated the creation of dedicated databases.

The basic sources in the creation of a homogeneous base of tour operators have been single items of information on enterprises included in Hoppenstedt Bonnier Information Polska (HBI). On the basis of these, a list of 398 enterprises with main and additional[4] activities characterised by code 6,330 of the European Classification of Activities (Activity of tourist agencies, pilots and tour guides; remaining tourist activity) – and with an annual turnover above one million zloties[5] – has been drawn up. This list was then perforce reduced as a consequence of the bankruptcy or closure of 20 tour operators in the years 2010–2012, as checked in the Central Register of Tourist Agencies and Tourist Brokers (Centralna Ewidencja Organizatorów Turystyki i Pośredników Turystycznych, abbreviated to CEOTiPT), and compared with reports in the periodical Wiadomości Turystyczne (Wiadomości Turystyczne, 2012; 2013).

The final list consists of the largest tour operators (38 entities, i.e. 1.2% of their total number) with annual turnover from the organisation of tourism exceeding 10 million zloties (as of 2012). The list has been updated and supplemented with certain missing information, on the basis of the aforementioned Touroperatorzy reports, as well as data and information from the National Registry (Krajowy Rejestr Sądowy, KRS). The latter is made available by the firm InfoVeriti (2013). Annual reports of larger companies and official websites of entities have also been taken into account. All calculations and generalisations in this paper concern data on the top 38 tour operators, from which further conclusions have been drawn.

The second database comprises charter carriers. The basis for this has been provided by the list of the 25 most important air charter carriers running flights from/to Poland, as published by the country's Civil Aviation Authority (Urząd Lotnictwa Cywilnego, ULC). Catalogues and websites of tour operators cooperating with selected carriers have been used for supplementary information.

In the case of a lack of official data, connections between the tour operator researched and carriers have been looked for using key words (a combination of the tour operator's name with the means of transport, or names of carriers) in Polish and English languages. In this case, commonly-used Internet browsers have been used. Information on air carriers has been supplemented using data from InfoVeriti (where registration is in Poland) and from press materials, websites and the annual reports of entities (where registration is in Poland and abroad). The database, despite featuring a relatively small number of air carriers (just 25), encompasses an absolute majority of the passengers served at Polish airports. Other carriers, despite their presence in large numbers, actually participate in carriage at minimum levels only. Therefore, given that Dobruszkes and Mondou (2013, p. 33) write that "there are few available data sources for charter airlines services", the author of this paper is in a relatively fortunate situation, especially given the fact that some additional information on the geographical distribution of flights is available (cf. Section 4).

## 4. Results

### 4.1 Air charter carriers in the service of Polish tour operators

While scheduled air traffic takes part to only some unidentified extent in the servicing of the Polish tourist market, charter traffic serves foreign tourist flights almost exclusively. The difference between the number of all passengers on charter flights (3,295,488[6]) and charter flights in international traffic is 128,515 people only (these calculations are based on data for Polish airports, collected by the country's Civil Aviation Authority (ULC)). This difference reflects commissioned flights, flights for firms, as well as the necessity for the supply/retrieval of certain participants on excursions to/from hubs prior to departures abroad.

"Charter airlines predominantly serve leisure routes on a weekly basis, carrying clients for tour operators" (Buck and Lei, 2004, p. 72). The charter market is extremely seasonal, achieving a maximum during the summer holidays (July–September) and a minimum in winter (December–February). The charter market is also very much differentiated, and characterised by variations in operations and ownership. The absolute majority of charter carriers is in private hands.

According to the ULC data, a dominant share among charter lines in the Polish market is taken by 25 carriers (multiple flights entailing the regular systematic transfer of customers), with these together servicing some 96.8% of all passengers. The remaining 3.2% of passengers are served by as many as 101 charter carriers, sometimes very exotic. It may be supposed that the cooperation between tour operators and the latter firms is of a more incidental nature (one can call them ad hoc charters), not being based around permanent agreements at least. Table 1 gives a concise characterisation of carriers, and of the tour operators cooperating with them. Unlike the case of scheduled air traffic, in an absolute majority of cases it has been possible to determine which tour operators collaborate with which charter carriers.

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[4] Some entities, while actually active in organising tourist events, may nevertheless be registered under a completely different category of activity.

[5] € 1 ≈ 4.0–4.3 zloties (2012).

[6] For comparison: there were 9,915,229 passengers in LCC traffic, and 10,863,918 in scheduled traffic excluding LCCs (2012).

| Carrier | Place of registration | Type of activity (airlines) | Ownership form | Founded | Charter passengers on the Polish market (%) | Passenger fleet (total) | Tour operators in Poland served |
|---|---|---|---|---|---|---|---|
| Enter Air[a] | Warsaw (PL) | charter | private | 2009 | 981,698 (30.54) | 12 | Itaka, Alfa Star, Neckermann Polska, Rainbow Tours, Grecos Holiday, Viva Club Polska, GTI Travel Polska, 7islands, Wygoda Travel (with affiliate Comfort Club), Otium Polska, TUI Poland, Wezyr Holidays, Exim Tours, Sun & Fun Holidays, Easy Travel |
| Travel Service a.s. | Prague (CZ) | scheduled & charter | private | 1997 | 587,492 (18.28) | 27 | Itaka, Exim Tours, TUI Poland, Neckermann Polska, Sun & Fun Holidays, Ecco Holiday, Grecos Holiday, Wezyr Holidays, Viva Club Polska, 7islands, Easy Travel |
| Small Planet Airlines | Vilnius (LT) | charter | private | 2008 | 239,539 (7.45) | 10 | TUI Poland, Alfa Star, Neckermann Polska, Exim Tours, Wezyr Holidays, Viva Club Polska, GTI Travel Polska, 7islands, Easy Travel |
| OLT Express Poland[b] | Warsaw (PL) | scheduled & charter | private | 2011 | 188,577 (5.87) | 11 | Sun & Fun Holidays, TUI Poland, Alfa Star, Itaka, Wezyr Holidays, Rainbow Tours and others |
| Travel Service Polska[c] | Warsaw (PL) | charter | private | 2011 | 184,457 (5.74) | 1 | GTI Travel Polska, Wygoda Travel (with affiliate Comfort Club) |
| Bingo Airways[d] | Warsaw (PL) | charter | private | 2011 | 173,274 (5.39) | 2 | Itaka, Exim Tours, Sun & Fun Holidays, Wezyr Holidays, Viva Club Polska, GTI Travel Polska, Easy Travel |
| LOT Polish Airlines + EuroLOT | Warsaw (PL) | scheduled & charter | state | 1929 | 101,638 (3.16) | 37+24 | Itaka, Rainbow Tours, Neckermann Polska, Exim Tours, Ecco Holiday + Ecco Travel, Furnel Travel International, Wezyr Holidays, Almatur Polska, Trade & Travel Company, Grecos Holiday, Oasis Tours, Viva Club Polska, Active Travel, Espace Trans, Delta Travel, Top Travel Incentives |
| Nouvelair | Monastir (TN) | scheduled & charter | private | 1989 | 101,037 (3.14) | 13 | TUI Poland, Neckermann Polska, Exim Tours, Wezyr Holidays, Viva Club Polska |
| Pegasus Airlines | İstanbul (TR) | scheduled | private | 1990 | 91,261 (2.84) | 40 | Wezyr Holidays, GTI Travel Polska |
| SprintAir | Warsaw (PL) | scheduled & charter | private | 2003 | 84,916 (2.64) | 3[e] | Wezyr Holidays, Oasis Tours |
| Air Cairo[f] | Cairo (EG) | charter | state | 2003 | 84,344 (2.62) | 4 | Alfa Star, Exim Tours, Bee & Free, Wezyr Holidays, Viva Club Polska |
| Nesma Airlines | Cairo (EG) | charter | private | 2010 | 54,633 (1.70) | 3 | Alfa Star |

Tab. 1: *The charter air carriers servicing Polish tour operators (as of 31ˢᵗ December 2012)*
Notes: [a] *ownership of two main and many small shareholders;* [b] *activity terminated on 31ˢᵗ July 2012;* [c] *under the ownership of Travel Service a.s.;* [d] *under the ownership of the Vademecum company + two shareholders;* [e] *plus 14 cargo aircraft;* [f] *60% shares of Egypt Air;* [g] *activity started up in April 2012;* [h] *under the ownership of the Thomas Cook Group.*
Sources: *Author's elaboration, mainly on the basis of: (1) data of Poland's Civil Aviation Authority (ULC, 2014); (2) catalogues and websites of tour operators; (3) websites of carriers; (4) InfoVeriti (2013)*

| Carrier | Place of registration | Type of activity (airlines) | Ownership form | Founded | Charter passengers on the Polish market (%) | Passenger fleet (total) | Tour operators in Poland served |
|---|---|---|---|---|---|---|---|
| Sky Airlines | Antalya (TR) | charter | private | 2000 | 47,144 (1.47) | 7 | TUI Poland, Wezyr Holidays, GTI Travel Polska |
| Corendon Airlines | Antalya (TR) | low-cost | private | 2004 | 30,647 (0.95) | 6 | Bee & Free, Grecos Holidays |
| YES Airways | Warsaw (PL) | charter | private | 2011 | 28,674 (0.89) | 3 | Itaka, Exim Tours, Sun & Fun Holidays, Wezyr Holidays, Viva Club Polska, GTI Travel Polska, Easy Travel |
| Bulgarian Air Charter | Sofia (BG) | charter | private | 2000 | 26,446 (0.82) | 8 | BTH Gama |
| Aegean Airlines | Athens (GR) | scheduled & charter | private | 1987 | 18,583 (0.58) | 29 | TUI Poland, Ecco Holiday, Grecos Holiday |
| Arkia Israeli Airlines | Tel-Aviv (IL) | scheduled & charter | private | 1949 | 18,499 (0.58) | 8 | no data |
| Freebird Airlines | İstanbul (TR) | charter | private | 2000 | 13,450 (0.42) | 7 | Wezyr Holidays |
| El Al Israel Airlines | Tel-Aviv (IL) | scheduled | state-private | 1948 | 12,135 (0.38) | 38 | Trade & Travel Company |
| Air Arabia | Sharjah (AE) | low-cost | state-private | 2003 | 10,965 (0.34) | 31 | Wezyr Holidays |
| Israir Airlines | Tel-Aviv (IL) | scheduled | private | 1989 | 10,018 (0.31) | 4 | no data |
| Onur Air | İstanbul (TR) | low-cost & charter | private | 1992 | 8,968 (0.28) | 26 | TUI Poland, Ecco Holiday |
| Syphax Airlines[g] | Sfax (TN) | hybrid | private | 2011 | 7,590 (0.24) | 2 | Wezyr Holidays |
| Thomas Cook Airlines[h] | Manchester (GB) | charter | private | 1999 | 4,858 (0.15) | 32 | Neckermann Polska |
| Other carriers (101) | × | various | × | × | 103,284 (3.21) | × | various |

*Tab. 1: continued*

The largest share among the charter carriers is that taken by the private Polish Enter Air, which serves more than 30.5% of all passengers and cooperates with at least 16 large tour operators. What is of interest here is that a turnover of some 750 million zloties is achieved on the basis of a fleet consisting of just 12 aircraft. Besides the Polish market, the line is also present in France (with a base at Paris-Charles de Gaulle Airport), in the Czech Republic (Prague Ruzyně Airport), and to some extent also in Italy and Spain. Annually, Enter Air carries about 1.5 million passengers, including 981,698 on connections to/from Poland. The aircraft are therefore in the air for a much longer time than their scheduled counterparts – as was noted by Williams (2001).

A large (18.3%) share in the servicing of the Polish charter market has been taken by the Czech-based private carrier Travel Service, as well as its affiliate Travel Service Polska (5.7%). The two carriers cooperate with a dozen or so tour operators but – interestingly – each deals with a different set. The Lithuanian private charter carrier Small Planet Airlines also takes a substantial share (7.5%) in the servicing of passengers in Poland. Active for several months only,

OLT Express Poland carried 5.9% of all passengers in 2012, while the other private Polish airline – Bingo Airways – took 5.4%. Alongside scheduled services, charter flights are also provided by the state-owned LOT Polish Airlines, jointly with its affiliate EuroLOT (with the two combined taking a 3.2% share). The list of the largest charter operators, transporting over 100,000 people, is completed by the Tunisian Nouvelair (3.1%). The remaining smaller charter carriers are mainly from reception countries, such as Egypt, Turkey, Greece, Bulgaria, Israel and the United Arab Emirates.

As may already be seen, it is charter carrier airlines from Central and Eastern Europe that prevail here, Polish companies most of all. The Polish carriers' share is 61.8% of passengers, and this is of course a much higher figure than in the case of the scheduled flights (34.6%). This is mainly the result of the activities of Enter Air, OLT Express Poland, Travel Service Polska, Bingo Airways, LOT Polish Airlines + EuroLOT, SprintAir, and YES Airways.

A specific feature of the Polish market is also seen in the fact that a majority of passengers (78.5%) are served by domestic charter carriers, and not in their role as providers of scheduled services, but performing charter operations only. All those using Lithuanian and Egyptian carriers are also customers of charter operators, though the opposite situation applies in the case of the Czech and Tunisian carriers, wherein only scheduled operators offer charter flights.

Just as charter carriers are first and foremost private companies, so the majority of customers are also passengers of private operators. Exceptions are Egypt, Israel and Poland, in which private airlines transport 39.3, 70.2 and 94.2% of passengers, respectively.

### 4.2 The main destinations of charter flights from Poland in 2012

Data provided on a webpage of the Civil Aviation Authority (2014), used in conjunction with a report entitled Loty czarterowe z Polski – lato 2012, drawn up by the tanie-loty.pl Booking Centre (Tanie loty, 2012), allow considerable familiarity with the main directions of charter flights from/to Poland to be gained, and in relation to several aspects.

Where do Polish tourists using international charter connections within mass organised tourist traffic fly to? Like travellers from other parts of Europe, they mainly take charter flights from Poland in a southerly direction, to the Mediterranean, Red Sea, Black Sea and Canary Islands. The spatial distribution of the most attractive destinations, however, is far from regular – with the visible majority of localities in the eastern part of the basin. Thus, the largest flows of tourists lead to the Egyptian Hurghada and Sharm el-Sheikh, as well as Turkish Antalya (Tab. 2, Fig. 1). Such a concentration of passenger charter flights probably reflects the choice of destinations located by warm seas, but also offering competitive prices.

The remaining (several percent) shares of passengers on charter flights from Poland have other centres located within the same geographical area (Tab. 2). In the eastern part of the Mediterranean, one can distinguish Heraklion (Iraklion) on Crete, Tel-Aviv, Greek Rhodes and Kos, and Turkish Bodrum. In the western part of the Black Sea the main destinations are Bulgarian Burgas and Varna, and on the coast of the Red Sea (apart from Hurghada and Sharm el-Sheikh), the relatively new leisure centre of Marsa Alam. On the southern coast of the Mediterranean it is Enfidha and Monastir in Tunisia that

| Destination | Passengers | |
|---|---|---|
| | Number | Percentage |
| Hurghada | 416,575 | 13.15 |
| Antalya | 399,637 | 12.62 |
| Sharm el-Sheikh | 268,590 | 8.48 |
| Enfidha | 143,956 | 4.55 |
| Heraklion (Iraklion, Crete) | 128,210 | 4.05 |
| Fuerteventura | 120,657 | 3.81 |
| Tel-Aviv | 110,722 | 3.50 |
| Burgas | 102,114 | 3.22 |
| Rhodes | 98,489 | 3.11 |
| Tenerife | 98,274 | 3.10 |
| Bodrum | 87,285 | 2.76 |
| Marsa Alam | 72,540 | 2.29 |
| Palma de Mallorca | 68,806 | 2.17 |
| Kos | 60,856 | 1.92 |
| Chania (Khania, Crete) | 55,643 | 1.76 |
| Monastir | 53,217 | 1.68 |
| Varna | 52,754 | 1.67 |
| Dalaman | 51,013 | 1.61 |
| Kerkyra | 49,996 | 1.58 |
| Izmir | 47,806 | 1.51 |
| Zakynthos | 45,555 | 1.44 |
| Las Palmas | 44,939 | 1.42 |
| Agadir | 39,216 | 1.24 |
| Lanzarote | 38,224 | 1.21 |
| Barcelona | 36,398 | 1.15 |
| Other airports | 475,500 | 15.01 |
| Total (international traffic) | 3,166,972 | 100.00 |

*Tab. 2: Passengers served at Polish airports on international charter flights, categorised by destination (in 2012). Source: Civil Aviation Authority (ULC, 2014)*

*Fig. 1: Main destinations of charter flights from Poland by numbers of passengers carried*
*Source: ULC (2014); author's elaboration*

dominate, and in the west Palma de Mallorca and Barcelona. Finally, a last concentration embraces the Canary Islands and Moroccan Agadir. More important destinations on the Canary Islands are Fuerteventura and Tenerife, while more minor ones are Las Palmas and Lanzarote. By-and-large, the main directions taken by charter flights point explicitly to the domination of typical leisure trips (the so-called sun, sea and sand destinations) where mass organised tourist traffic is concerned.

The report Loty czarterowe z Polski – lato 2012 – as mentioned above – makes possible a closer look at charter flight departures from individual Polish airports. And although ten airports offering charter flights in the summer of 2012 are included, differences in the methodology of data collection unfortunately denote a lack of full comparability of the information. For this reason, a more detailed characterisation will confine itself to charter flights from central Warsaw's Chopin Airport, as well as the regional Bydgoszcz Airport. The eight other airports included in the report provided information on tour operators, some even on frequencies of flights, but not on carriers serving individual connections.

Warsaw Chopin Airport has at its disposal the fullest offering of charter flights of any Polish airport. In 2012, 1.4 million passengers used charter flights from Warsaw Airport. This is despite the fact that charter passengers represent a small minority of all the (9.6 million) travellers served at that airport. They were able to choose from among 49 different charter connections in the summer of that year (Fig. 2). A dozen or so carriers provided charter flights on behalf of the majority of the Polish tour operators. The most common destinations were Egyptian Hurghada and Turkish Antalya, as served by seven carriers each, and then Egyptian Sharm

el-Sheikh, served by six operators. Five charter carriers provided services to Cretan Heraklion (Iraklion) and Bulgarian Burgas and Varna. Other destinations were served by smaller numbers of carriers.

What are the origins of the carriers serving charter connections from Warsaw (Fig. 3)? The majority of the airlines in fact come either from Poland (Enter Air, LOT Polish Airlines, OLT Express Poland, Travel Service Polska, Bingo Airways and SprintAir), or from the neighbouring Czech Republic (Travel Service) and Lithuania (Small Planet Airlines). Then there are the cases of Bulgaria (only in the case of Varna does Bulgarian Air Charter also fly), Croatia, Cyprus, Egypt (Air Cairo and Nesma Airlines also fly to Hurghada and Sharm el-Sheikh), Georgia, Greece, Israel, Italy, Morocco, Portugal and Spain. Only the links with Malta and Ukraine are served by airlines from the destination countries (Air Malta and Air Onix, respectively). In the case of Turkey, besides the Polish and Lithuanian carriers, there are also three Turkish operators providing connections (Pegasus Airlines, Sky Airlines, Corendon Airlines), while the two Polish lines flying to Tunisia are joined by the Tunisian Nouvelair and Syphax Airlines.

Bydgoszcz Airport is one of the smallest regional airports in Poland, serving a total of just 358,052 passengers (2012). This airport offers its travellers few scheduled connections, in that the only carrier providing regular foreign flights is the Irish low-cost Ryanair. The network of connections is enriched by charter flights, of which there were ten in the summer season in 2012, made use of by 32,186 passengers in total. Thanks to the charter connections, the inhabitants of the city of Bydgoszcz and the hinterland area can travel to the Canary Islands, Greece, Croatia, Bulgaria, Tunisia, Turkey and Egypt (Fig. 4).
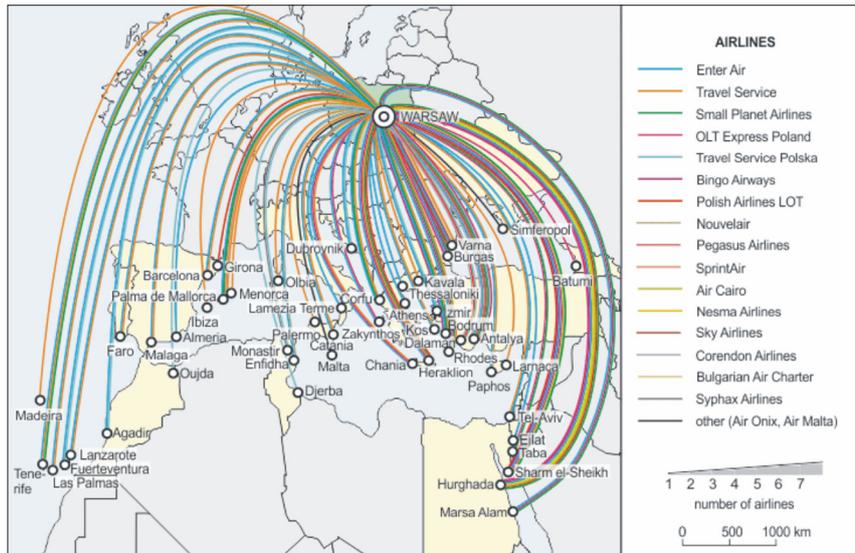
*Fig. 2: Main destinations of charter flights from Warsaw by numbers of carriers serving the connection*
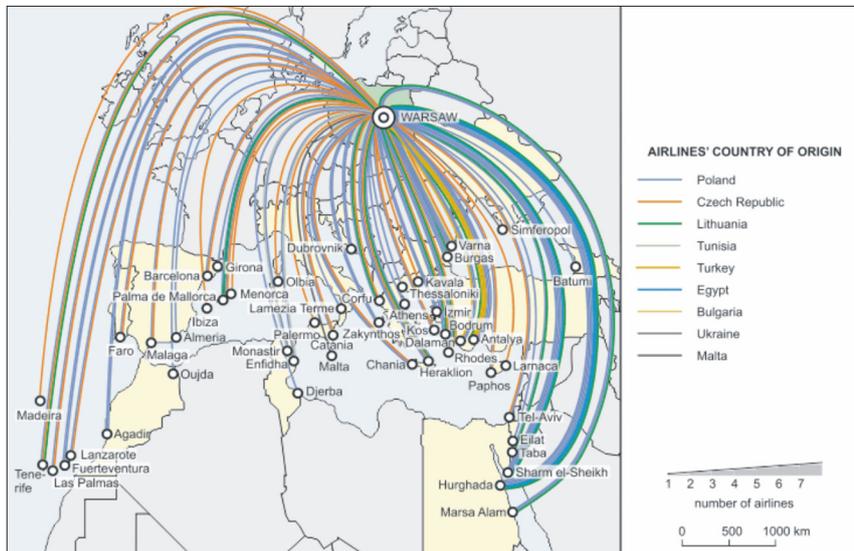*Source: Tanie loty (2012); author's elaboration*



*Fig. 3: Main destinations of charter flights from Warsaw by numbers of carriers serving the connection and country of registration. Source: Tanie loty (2012); author's elaboration*
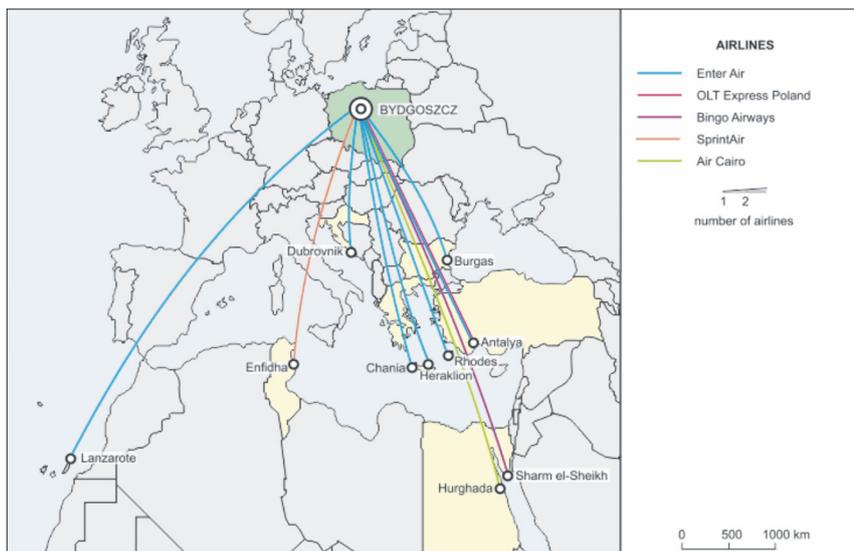


*Fig. 4. Main destinations of charter flights from Bydgoszcz by numbers of carriers serving the connection*
*Source: Tanie loty (2012); author's elaboration*

In summer, excursions from Bydgoszcz are offered by TUI Poland, Rainbow Tours, Itaka, Oasis Tours, Grecos Holiday, GTI Travel Poland, Exim Tours, Alfa Star, Neckermann Polska, Wezyr Holidays and 7islands, as well as by Triada and Sky Club, which have since closed down (in 2012). Tour operators use the services of five carriers providing charter flights, i.e. Air Cairo, Enter Air, Bingo Airways, SprintAir and OLT Express Poland. With the exception of the Egyptian Air Cairo, all of these are Polish carriers.

## 5. Discussion

In 2009, Dobruszkes wrote: "the market between Central Europe and the tourist destinations of southern Europe has not been sufficiently developed to date to give rise to any significant competition" (Dobruszkes, 2009a, p. 35). Moreover, the direction of the bulk of flights (north to south, and back) explains the relatively limited involvement of the low-costs in the servicing of organised tourist traffic. As is known from elsewhere, the majority of low-cost connections with Poland take a completely different course, namely in the east-west direction (Dobruszkes, 2009b; Pijet-Migoń, 2012), and therefore cannot serve mass organised tourist traffic very readily. In this case, low-cost carriers serve quite different segments of the market, namely gainful employment, visiting friends and relatives, and individual tourism – first and foremost. Thus, localities in the UK, Ireland, Norway or Germany, for example, are much more common destinations among passengers of LCCs. In this respect a great difference between West European and Polish markets emerges when comparisons are made, although the situation may change sooner or later.

Information on the tour operators and their various carriers confirms the extreme price-sensitivity of the Polish tourist market, and thus accounts for the great popularity of the cheapest carriers coming in to the market and seeking to draw immediate attention with their lower fares. As Martín et al. (2008, p. 214) write, "many leisure travellers are likely to choose the lowest-priced carrier, regardless of service quality". As already mentioned, among aircraft services, the cheapest are charter flights, hence their extreme popularity with Polish customers. And this is a substantial difference when compared with the more affluent societies of Western and Northern Europe in which low-cost carriers play a much greater role in carriage to leisure centres in the Mediterranean area as conceived broadly. There are certain common operational and economic features, but also obvious advantages of LCCs when compared with traditional charters, i.e. greater flexibility of departure days and times, and hence a move away from the one- or two-week travel and packages offered by tour operators (Doganis, 2006, p. 186), though these of course come at a price.

As has been noted, the situation may change in the future, with the growing affluence of Polish society. As Graham (2006, p. 20) says: "In the less-developed economies, it is likely that economic growth will still play a significant role in stimulating travel growth of new travellers beyond the level of GDP growth". One should also remember here that rather a large number of Poles spend their vacation in their own country, but may one day become customers of charter flights, first and foremost. A comparison of numbers of passengers on charter flights in Poland and in Western European countries indicates that the former market remains very far from saturation at this stage. For example, in the UK in the early 2000s, charters alone carried over 30 million travellers, i.e. 29 per cent of passengers carried by all UK airlines (...)

between European countries (Buck and Lei, 2004, p. 72). This reflects the fact that the Polish market for international leisure travel by air is relatively underdeveloped, while its British counterpart is fully mature.

Thus, although "most European countries have experienced a decline in passenger demand for charter flights" and "further decline is inevitable, as LCCs expand their networks across Europe and further afield" (Williams, 2008, p. 101) – this need not be the case for Poland. Yet in 2007, the number of charter links from/to Poland did not meet the demand for carriage exerted by tour operators (Gardzińska and Meyer, 2008, p. 138). Therefore, the possible decline could potentially be connected with, among other things, the natural choice of a younger and better-educated generation of consumers (whose tastes and expectations change) and the growing affluence of Polish society. Williams foresees a replacement of package tour charter flights by LCCs on most short-haul markets (Williams, 2008, p. 101), but this has a price which will not necessarily be appreciated by potential customers. To complicate the situation even more, a majority of charter airlines used by Polish tour operators (with the above mentioned exception of TUI Poland and Neckermann Polska) are not vertically integrated with each other in the manner seen to be very common in Western Europe.

Moreover, charter carriers and tour operators are now moving towards 'dynamic packaging', offering customers "a much higher level of flexibility, both in relation to the flight, and also in terms of holiday accommodation and duration of stay" (Doganis, 2006, p. 187). In future, Doganis sees charters as generating "most of their business from the denser, short-haul, inclusive-tour markets and from long-haul routes" (Doganis, 2006, p. 195), but smaller charter airlines may find it difficult to survive in the longer term. Therefore, there is a future for series charters, if perhaps a more limited one. The most probable future scenario sees simultaneous parallel coexistence of charter airlines and LCCs, albeit with respective shares in passenger traffic that remain difficult to foresee.

## 6. Conclusions

These days the aeroplane plays the decisive role in the servicing of mass organised tourist traffic. This statement is above all true when related to foreign outward tourism, and charter flights which prevail among instances of travel organised by Polish tour operators.

The number of registered charter carriers used by tour operators with headquarters in Poland alone is 126, but collaboration with a large number has been on an occasional basis at best. It is apparently usual for carrier companies to hail from Central Europe or the Mediterranean basin area. Information on cooperation between individual tour operators and charter air carriers can be confirmed.

Home carriers besides LOT Polish Airlines, in practice limit their activities to charter flights. The largest of these is Enter Air, with its fleet of 12 passenger aircraft. The remaining companies play a much more limited role, with fleets not exceeding 5 aeroplanes each (Bingo Airways and SprintAir, not to mention YES Airways incorporated by OLT Express Poland, which together with OLT Express Regional ceased trading in mid-2012). One company is an affiliate of the Czech-scheduled and charter Travel Service a.s. operator (Travel Service Polska). The presence of separate viable, or even vibrant air charter companies that are not part of large tour operators seems to be something of a regional speciality.

Polish air carriers other than LOT Polish Airlines are exclusively privately-owned. LOT is a company with a long tradition (founded 1929), but the majority of Poland's private charter carriers have only recently entered the market. Moreover, the segment of charter carriers has thus far been seen to be under continuous transformation.

Large tour operators of foreign origin (e.g. Neckermann Polska of the Thomas Cook Group, TUI Poland – an affiliate of TUI Travel plc) have their own airlines (Thomas Cook Airlines, Condor Airlines, etc.). The vertical integration is to lower transaction costs and uncertainty, while simultaneously synchronising supply and demand along the entire supply chain of products. It therefore helps with the achievement of their own objectives, but also makes surpluses available to competing tour operators. Sometimes tour operators own not only an air carrier, but also shares in other transport companies (capital links between TUI and Air Berlin, for example). Therefore, the situations of 'native' and 'foreign' origin tour operators seem to differ.

In the Polish market we also observe airlines belonging to tour operators that are not directly engaged more widely in other activity (e.g. Globalia Tourism, Gropo Iberostar and Balkan Holiday).

The Polish tour operators requiring charter flights mainly utilise domestic carriers, as well as one or two significant ones from neighbouring countries (the Czech Republic and Lithuania). Moreover, it is quite common for use to be made of air carriers in reception countries (Turkey, Tunisia, Egypt, Israel, Greece and Bulgaria). Beyond Europe and the Mediterranean basin, the only significant charter carrier is the low-cost Air Arabia, with headquarters in the United Arab Emirates.

There are also charter flights of the LCCs (Turkish Corendon Airlines and Onur Air, and the already-mentioned Air Arabia), but this is not a frequent phenomenon. At least some scheduled low-costs take part on a limited scale in the servicing of organised tourist traffic (e.g. Wizz Air, easyJet and Norwegian Air Shuttle), which reflects their above-mentioned servicing of other segments of the market. Taking into account the greater flexibility of the LCCs, however, this situation may change in the future.

## Acknowledgment

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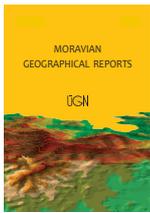
# Anytime? Anywhere? The seasonality of flight offers in Central Europe

Stanislav KRAFT [a] [*], Denisa HAVLÍKOVÁ [a]

## Abstract

*Air transport can be considered as the most dynamic transport mode during recent decades. It is an important but also responsive indicator of global social, economic, political and cultural cooperation in different areas. For this reason, air transport is a unique source of various aspects of international relations. The principal goal of this study is an analysis of seasonality in the offer of flights in Central Europe during 2014, considering the different positions and functions of the airports within the air transport system. Ten airports from the Central European region are monitored in the analysis in terms of fluctuations in flight offers and offered destinations. A synthesis of these patterns is presented as a typology of the surveyed airports using the Ossan triangle. This paper clearly shows the different patterns of the spatial and temporal organization of air transport in Central Europe.*

***Key words:*** *air transport, seasonality, typology of airports, Central Europe*

## 1. Introduction

The rapid development of air transport since the 1970s represents one of the most important signs of the development of modern transport systems in the post-industrial period. It is also considered a significant sign of globalisation processes, as the development of air transport has enabled efficient and rapid very long-range exchanges of persons and goods (Debbage, 1994; Goetz and Graham, 2004). Since the 1970s, continuous growth has been observed in the number of transported persons and goods, growth in transport performance, as well as in the average distance covered by air transport. Such recent abrupt growth was only hindered, albeit temporarily, by recent economic crises, especially recognised in 1997/1998 and 2008 (Dobruszkes and Van Hamme, 2011). Generally speaking, the economic crises had a stronger effect on the volume of transport in goods than in the transport of persons. Apart from those general trends, air transport has seen major organisational changes that have been caused by its deregulation and liberalisation. The joint effects of these changes include the development of airline hubs, the concentration of flight connections by major airlines, the development of airline alliances, as well as the development of low-cost carriers (LCCs) and secondary airports (Thompson, 2002). As such, the deregulation of air transport can be recognised as the most important change in the spatial organisation of air transport: in fact, Alderighi et al. (2005) claim that such changes were influenced by a number of spatial causes and effects.

Central Europe represents a specific area in the development of air transport. It consists of well-developed countries with a high share of air transport (Germany, Austria), as well as former socialist countries with recent rapid growth of air transport (Poland, Czech Republic, Slovakia and Hungary). The latter states witnessed many years of control by the communist regime: air transport was not a priority transport mode, which was reflected in its not being particularly important. The dramatic political, economic, social and cultural changes after the fall of the Iron Curtain in 1989 and 1990, however, did highlight the role of air transport in the transport market. The principal reasons included the opportunity to travel to Western countries, the growth of international tourism, the increase in available income and the integration into international economic structures. The accession of these countries to the European Union in 2004 was the final expansion of the liberalised air transport market to Central Europe (Jankiewicz and Huderek-Glapska, 2016): hence, air transport registered a very dynamic development in the number of transported persons and goods (Grenčíková et al., 2011). The air transport market in Central Europe also became attractive to foreign airlines, although several authors, such as Dobruszkes (2009), claim that the area was a rather secondary market for those airlines. The arrival of major competing airlines and LCCs in this market did bring problems to some of the traditional national airlines. This is documented by the bankruptcy of the Hungarian flag carrier Malév, which went out of business in 2012.

[a] Department of Geography, University of South Bohemia in České Budějovice, Czech Republic (*corresponding author: S. Kraft, email: *kraft@pf.jcu.cz*)

The Central European air transport market currently shows rather considerable dynamics which are the result of its geopolitical location, recent history and contemporary integration tendencies. The development of smaller and secondary airports in the region delivered direct consequences in the better accessibility of air transport; on the other hand, it did cause major fluctuations in the seasonal offer of flights. The fluctuations are typically related to the high season of tourism (Reichard, 1988; Wensveen, 2007). Therefore, some airports tended to see considerable change in the number of flights and the structure of carriers, as well as offers of available destinations during the year. For example, smaller airports usually show a higher frequency of flights in the summer months than in other seasons. Those trends, however, are also recognised in major airports where both regular and charter flights are made.

The overall topic is quite complicated as it results from an accumulation of several conditions (e.g. the position and function of the airport, the strategies adopted by individual airports and carriers, etc.). The topic of seasonal fluctuation in the offer of flights is therefore one of the major research areas from a geographic point of view (Papatheodorou, 2002; Page, 2005). This discussion indicates that Central Europe represents a unique space for research on changes in air transport, as the processes occurred quite recently and rather very quickly: general discussions are presented by Pucher (1999) and Jankiewicz and Huderek-Glapska (2016).

This paper has several aims. It focuses on an examination of the offer of air transport in selected airports in the Central European region. The principal goal is an analysis of seasonality in the offer of flights during 2014 considering the different positions and functions of the airports within the air transport system. The subject airports are Frankfurt-Hahn (HHN), Rostock-Laage (RLG), Salzburg (SZG), Prague (PRG), Pardubice (PED), Brno (BRQ), Vienna (VIE), Bratislava (BTS), Warsaw (WAW) and Debrecen (DEB). The authors also focus on changes in the accessibility of destinations throughout the year, as well as structural characteristics of the airports from the perspective of services by low-cost and traditional network carriers. The monitored fluctuations assist in the interpretation of the differences and fluctuations in the seasonal offer of flights from the airports. The article is a contribution to the current state of knowledge on the impact of organisational changes in air transport on individual airports and regions.

As the research explores Central European countries, it also monitors the current organisation of air transport in the capitalist and former socialist countries in the region. The current situation is seen as part of the overall post-socialist transformations of the region, which have affected the development of transport after 1990, as well as building new relationships between Western and Central Europe (Ivy, 1995). The findings of the study therefore can be useful for geographers, for regional economists, transport scientists, spatial planners, tourism experts, environmentalists and many others.

The structure of this article is as follows: the general introduction is followed by discussions of the theoretical background. The authors primarily focus on contemporary changes in the configuration of major airlines and LCCs. Other topics that are explored are the specific developments of air transport in Central Europe and the relationships between air transport and tourism. The analytical section presents the principal findings of the study, focusing on an analysis

of seasonality in the offer of flights in selected airports in Central Europe. Changes in the accessibility of destinations during the year and in the structure of flight offers from the perspective of type of carrier are also discussed. The airports have been selected to reflect the natural differences in their functions in the air transport system (major airline hubs, regional airports, etc.). Seasonal fluctuations in the offer of air transport and the corresponding changes in the accessibility of final destinations are the basics for a typology of the airports in terms of their function in the air transport system. The conclusions present a synthesis of the issues being addressed and recommendations for further research.

## 2. Current changes in the organisation of air transport and its spatial impacts

In the past five decades, the air transport system has undergone major changes which have affected its current spatial organisation. These changes have been caused primarily by the deregulation and liberalisation of air transport. The deregulation was typical mainly for the United States where the goal of deregulation was the elimination of regulation controls (e.g. ticket prices). The liberalisation (typical for the European Union) of air transport represents a number of measures that permit airlines to offer flights to any destination, in any country and at any price (Seidenglanz, 2010). This also affected by a major change, as prior to deregulation, the air transport market in a country was typically closed and it would be controlled by one flag carrier. Furthermore, flag carriers would receive support from the country's budget. Prior to deregulation, international air transport was for the most part based on the existence of bilateral contracts between individual countries. As flag carriers did not feel any danger from competitors, air transport was rather expensive before deregulation (Burghouwt and Huys, 2003). Gradual deregulation is related to the introduction of freedom to air transport. Currently, nine ICAO freedoms of the air have been defined (e.g. to transport passengers in a foreign country, etc.).

Deregulation of air transport started in the late 1970s in the United States and in the 1990s in the European Union. The gradual enlargement of the European Union also expanded the free air transport market in Europe. As such, the deregulation of air transport delivered a single free air transport market which instigated changes in the spatial configuration of air transport. The free access of carriers to the market caused competition to increase, which in turn delivered higher efficiency and a reduction of prices in air transport. The increased competition did have a number of positive and negative consequences however: in particular, the increased detrimental effects on the environment caused by the higher frequency of air transport (Dobruszkes, 2006). Such effects are critical in stating that in spite of the overall liberalisation and deregulation of the air transport system, it shows some prevailing deficiencies. Dobruszkes argues that the most serious deficiencies include problems in allocating airport time, complicated supervision over airlines, the financial problems of some airlines and airports, and the fact that about 80% of airlines departing from airports in the European Union are used by one or two carriers.

A general observation can be made that a direct effect of deregulation was the concentration of air transport in hub-and-spoke networks. This is typical for major network carriers who usually possess a large market share. The principle of hub-and-spoke networks uses large airports as the hubs, which act like points where passengers change

planes on long-range international flights. Thus, the hubs also concentrate on flights from smaller (spoke) airports. Therefore, the hub-and-spoke networks have enabled spatial flexibility of air transport where passengers can fly to any destination from anywhere, even at the expense of having to change planes at a hub airport. Major airlines also further benefit from the fact that this type of network generates considerable savings related to the higher density of traffic at the hub airports. On a global level, the hub-and-spoke system caused a higher concentration of air transport to a small number of airline hubs (in Europe, these include Frankfurt, Paris, London, Amsterdam, etc.).

In turn, these developments contributed to the growing differences in connections between individual parts of the world (Burghouwt, 2007). Core macroregions of the world have a rather higher rate of connection, which leads to strengthening their mutual relations (Derruder and Witlox, 2008). On the other hand, the impact of centralisation of air transport in the world's peripheral regions (especially Africa) has been much lower, contributing to their partial marginalisation. Therefore, air transport has on a global level become a mode that expands core-periphery polarisation (Goetz and Sutton, 1997). One of the results of the introduction of the hub-and-spoke system is the higher frequency of air transport and higher efficiency of air transport operations from the airlines' perspectives (Dobruszkes, 2009). The advantages of major airlines grew even further when the nationwide hub-and-spoke networks were connected to computerised reservation and loyalty programs (Rodrigue et al., 2013).

Another major sign of deregulation in air transport is the emergence of LCCs, as they are a direct result of the birth of a free market in air transport. LCCs push to maximise their profits by reducing costs and services offered. The essential tools for maximising profit includes the usage for the maximum capacity of planes, absence of in-flight refreshments, fees for any other services, as well as a higher orientation to small regional airports. In particular, their input dwells on the lower fees the airlines are required to pay there. Southwest Airlines in the United States was historically the first company to have introduced the LCCs concept. It served as a model upon which other airlines modified their business strategies. Ireland's Ryanair is an example of this in Europe (Francis et al., 2006). The configuration of the airline networks of LCCs seems to resemble the point-to-point networks, although some LCCs also adopted the hub-and-spoke networks. The reality, however, is considerably much more complex as LCCs are a highly heterogeneous group of carriers who often differ in their business and spatial strategies. The central point-to-point system has all airports mutually connected, so that passengers can fly from one airport to another directly, without having to change at a hub or getting off their plane at all (Reggiani et al., 2009): passengers value highly the point-to-point flights because they have reduced their overall travel time by removing intermediate landings (Cook and Goodwin, 2008).

The changes mentioned above in the configuration of air transport have also had a considerable impact on society. Not only have the past several decades seen a higher intensity of air transport, they have also witnessed an abrupt development of tourism as a whole. The relationship between the advancement of air transport and tourism is therefore a popular topic of geographic studies (e.g. Page, 2005; Button et al., 1998). The deregulation of air transport and the changes related thereto (especially the price reduction of airplane tickets) have brought about better accessibility to air transport (Dobruszkes et al., 2016). The most visible changes in the offer of air travel are particularly present in the high season in tourism (July and August). The changes are demonstrated by the considerable growth of airplane tickets (with the highest prices being from June to August and in December), as well as by the higher frequency of flights being offered. A characteristic trait in the seasonality of the offer of flights in Central Europe is the noticeably higher offer of flights in the summer months, which connect metropolitan areas with touristic destinations in Southern Europe and North Africa (Peeters et al., 2007). A second important feature is that a substantial part of flight offers during the summer season is served by charter and low-cost carriers.

## 3. The recent development of air transport in Central Europe

Air transport in Central European countries has witnessed very specific developments. The full deregulation of air transport in the region did not occur until 2004, the year that ten, for the most part post-socialist, countries joined the European Union. This was the end of the stage of liberalisation and deregulation of air transport in Central Europe, as free air space expanded from Western Europe. It is interesting that changes in the spatial configuration of air transport took a very short time to complete. Accession to the European Union and the corresponding reorganisation of air transport delivered an abrupt development of new phenomena: expansion of LCCs and the development of secondary airports (Graham and Shaw, 2008; Seidenglanz, 2011). Although individual airlines adopted various strategies in their expansion to the deregulated space of Central Europe, the region on the whole demonstrated the building of better connections of its airports to airports in Western Europe (Gábor, 2009). Charter flights are still typical for air transport in Central Europe (mainly for the eastern part) and their share of the market is still relatively high. In comparison, the importance of charter flights declined in Western Europe under the pressure of LCCs (Dobruszkes, 2009). Similar to most regions in Europe, air transport in Central Europe was hit by the economic crisis after 2008. A principal result was the advent of fiercer competition between individual airlines (alliances and LCCs), the reduction in the number of regular and charter flights, and the bankruptcy of several airlines (see further: Dobruszkes and Van Hamme, 2011; Oprea, 2010).

A major change in the development of air travel in Central Europe was the expansion of LCCs. The most important changes with LCCs included the better accessibility of air transport in the region and changes in the organisation of airlines (see also: Graham and Dennis, 2010). This can also be documented by the offer of seat capacities of flights in Central Europe (Tab. 1). This table clearly indicates that Wizz Air and Ryanair, two LCCs, hold the second and third positions, respectively, of the 10 largest airlines offering seating capacity in Central Europe. This is also supported by the fact that, while in 2000 the seating capacity offered by LCCs were unimportant, the seating capacity offered by these companies in 2009 amounted to nearly half of the capacity offered in Europe overall (Seidenglanz, 2010). In this respect, Turnock (2003) states that the expansion of LCCs and the general growth of importance in air transport in Central and Eastern Europe, are some of the most important signs of the post-socialist transformation of these countries.

| Rank | Operating Airline | Available Seats | % Share | 2012/2013 Change (%) |
|------|-------------------|-----------------|---------|----------------------|
| 1 | Aeroflot | 18,483,574 | 13.7 | 19.2 |
| 2 | Wizz Air | 7,582,440 | 5.6 | 8.3 |
| 3 | Ryanair | 7,492,527 | 5.6 | 19.3 |
| 4 | UTair | 7,237,252 | 5.4 | 3.0 |
| 5 | Transaero Airlines | 7,214,813 | 5.3 | 24.0 |
| 6 | S7 Airlines | 6,332,116 | 4.7 | 15.3 |
| 7 | Rossiya Airlines | 4,573,038 | 3.4 | 15.2 |
| 8 | Lufthansa | 3,647,713 | 2.7 | 7.2 |
| 9 | LOT Polish Airlines | 3,429,724 | 2.5 | − 9.9 |
| 10 | Ukraine International Airlines | 3,313,129 | 2.5 | 101.0 |

Tab. 1: Available seat capacity within and from Central and Eastern Europe in 2013
Source: OAG aviation, www.oag.com

Dramatic changes in the development in air transport are quite typical for former socialist countries. Data provided by EUROSTAT indicates that the position of Central Europe has relatively improved in terms of the number of passengers travelling by air. While in 2004, Central Europe registered less than 19.7% of the entire European air transport market, the share of Central Europe for 2014 grew to 20.6%. The entire Central European region has reported changes in the period 2004–2014 that were better than the average in the development of the number of passengers travelling by air. Of course, the leading market in Central Europe is Germany with over 186 million passengers transported by air in 2014. The number of people carried by air transport grew in Germany constantly from 2003, although it was temporary influenced by the economic crises in 2008 and 2009. Relatively, the largest growth in the number of passengers, however, was recorded in Poland where the value has more than quadrupled over 10 years (Fig. 1). Tłoczyński (2016) states that the principal reasons for such growth includes the expansion of LCCs in Poland (especially Ryanair, easyJet, Wizz Air) and the relative size of Poland's market, including the potential for domestic flights.

## 4. Data and Methods

A vast database of historical data from the flightstats.com server is used for the analysis of seasonality in the offer of air transport in Central Europe. Information on air transport was collated from the on-line offer of flights from the airports' official statistics. Therefore, information is used on the number of flights offered, but they may differ in capacity. As data on the number of passengers boarding flights on individual lines is not available (it represents the strategies and business secrets of the carriers), some authors use the data on available seat capacity (e.g. Suau-Sanchez and Burghouwt, 2011). Basically, this is due to the differences in the capacity of various airplane types; however, the offered seating capacity and the offered number of flights show a very high rate of correlation. Thus we used the data on the number of flights as it is sufficient for the purposes of this research. All the data used refer to 2014. Given the time constraints of data collection, three days were monitored in each month (Tuesdays, Saturdays and Sundays). Special attention was given to days preceding important holidays (Easter, Christmas, and days in the summer holiday period), as elevated general demand for flight tickets is assumed, which affects both the price and offer of flights.

One crucial question for the entire research project is the selection of monitored airports. We are focussed on an analysis of the seasonality of flight offers with respect to airports in the Central European region. The delimitation of Central Europe is quite a difficult question because of different understandings. We presume that for the research, it may be interesting to hypothesize that Central Europe can be seen as a bridge between Eastern and Western Europe
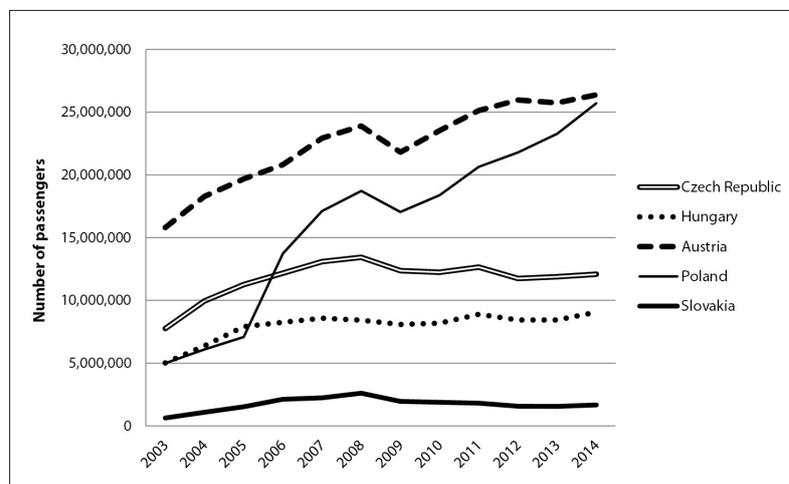


Fig. 1: Number of passengers carried by air transport in Central Europe (except Germany).
Source: Eurostat – Transport Statistics (http://ec.europa.eu/eurostat)

(see for example, Bláha and Nováček, 2016). We understand Central Europe as a set of countries with common historical, geographical and cultural features, and represent this as Germany, Austria, the Czech Republic, Poland, Hungary and Slovakia. The airports were selected purposively, as the focus was on major airports acting as international hubs (Vienna, Prague and Warsaw) and minor airports providing connection to the hubs (Debrecen, Bratislava, Rostock-Laage, Pardubice, Brno, Frankfurt-Hahn and Salzburg). Some important hubs are missing (e.g. Budapest), but the purpose of the research is to analyse the fluctuation in flight offers for different types of airports.

Although selection is always subjective, the authors are convinced it is also sufficiently representative. Airports from all Central European states are represented, including the more developed states (Germany and Austria) with a relatively strong tradition of air transport, and the less developed states (the Czech Republic, Poland, Slovakia and Hungary). The purpose was to identify which airports focused on seasonal flights and which had an offer of flights that was more balanced throughout the year. An integral part of the design was also an analysis of the presence of major airlines (network carriers) and LCCs offering individual flights from the airports. This information is crucial to understanding the importance of airports in the Central European air transport system, as well as for the interpretation of the findings. The different spatial strategies of LCCs and network carriers have been pointed out in previous studies (Francis et al., 2006). The final monitored parameters for the selected Central European airports are the changes in the accessibility of final destinations from the airports, inside and outside the high seasons. Changes in accessibility receive adequate attention because charter flights are often offered in the summer months; these flights in many cases expand the accessibility of the final destination.

The first part of the analysis primarily focuses on the basic structural characteristics of the airports from the perspective of an individual flight offer, the structure of the carriers and the development of their seasonal fluctuations. Subsequently, the analysis of seasonal changes in the availability of final destinations from the airports is presented. The results of these partial analyses are seen in a typology of the monitored airports from the perspective of the offered flights and the type of carriers, using the Ossan Triangle.

## 5. The seasonality of flight offers at selected airports

Seasonal fluctuation in the offer of air transport is a natural and frequent phenomenon, as it is affected by the logical higher demand for air transport by tourists in the summer months. There may be great differences in seasonality, however, when one takes into account individual airports. This also indicates the orientation of the airports and carriers in specific segments of the customer markets of air transport. A major research question is thus whether seasonal fluctuation is typical for smaller airports or for the airline hubs. A subsequent question is whether a higher seasonality rate is primarily typical for the LCCs or, conversely, for traditional network airlines. Hence, we have also included an analysis of seasonality expressed as a function of the type of carrier.

The monitored airports clearly differ in the number of flights they offer, as well as in the number of carriers as classified above. The basic specifications of the airports

are shown in Table 2 and Figure 2. The table indicates that the highest number of flights throughout the year is offered in Vienna, Warsaw and Prague. For 2014, the highest number of departures was offered by Vienna, with nearly 23 thousand flights during the specified period (see section 4). The number of flights offered by Prague and Warsaw is approximately 10 thousand per year. All three airports can be considered major international hubs with a wide offer of flights and available final destinations, and they are primarily served by major airlines (Sellner and Nagl, 2010). From the group of analysed airports, Salzburg and Frankfurt-Hahn can be classified as mid-size, with 1,800 and 900 departures per year, respectively. On the other hand, smaller airports are located in Brno, Pardubice, Bratislava, Debrecen and Rostock. What matters, though, is that all of them do possess specific positions in the Central European system of air transport. The key determinants of their size/importance are especially the population size of the regions, the position of the airport in the air transport system, the accessibility of airports, etc.

The monitored airports are also specific in terms of the seasonality in the number of flights they offer (Figs 2 and 3) and this may have various manifestations. The generally accepted notion that the highest number of flights can be recorded particularly in the summer months can be confirmed only from some of the airports. "Typical" seasonal development of the number of flights offered (with the peak in the summer months and a rather constant offer of flights for the rest of the year) is seen in the major airports of Central Europe (Vienna, Prague and Warsaw). It is the result of a combination of the offer of air transport (network carriers), charter flights related to the tourist season, and the higher frequency of flights of LCCs. Prague Airport, for example, offers a rather balanced number of flights throughout the year at approximately 700 flights (during the monitored period); however, the number of flights offered in the peak of the tourist season approaches 1,000. Vienna Airport shows similar parameters (maximum number of flights from June to September), as well as Warsaw (the maximum being available from June to October). All three of these airports present the passengers with a wide offer of destinations in Europe and worldwide (see below). It is worth noting, however, that the number of flights offered in Central Europe's airports somewhat fluctuates even in the peak of the tourist season. Another interesting fact is that,

| Airport | IATA Code | Passengers | Flight operations |
|---|---|---|---|
| Vienna | VIE | 22,483,158 | 230,781 |
| Prague | PRG | 11,149,926 | 125,437 |
| Warsaw | WAW | 10,590,473 | 121,913 |
| Frankfurt-Hahn | HHN | 2,447,140 | 22,152 |
| Salzburg | SZG | 1,819,520 | 19,335 |
| Bratislava | BTS | 1,355,625 | 21,481 |
| Brno | BRQ | 486,134 | 32,216 |
| Pardubice | PED | 150,056 | 2,188 |
| Rostock-Laage | RLG | 169,946 | no data |
| Debrecen | DEB | 172,219 | 1,350 |

*Tab. 2: Basic statistics of selected airports in 2014*
*Source: Annual Reports of Airports*

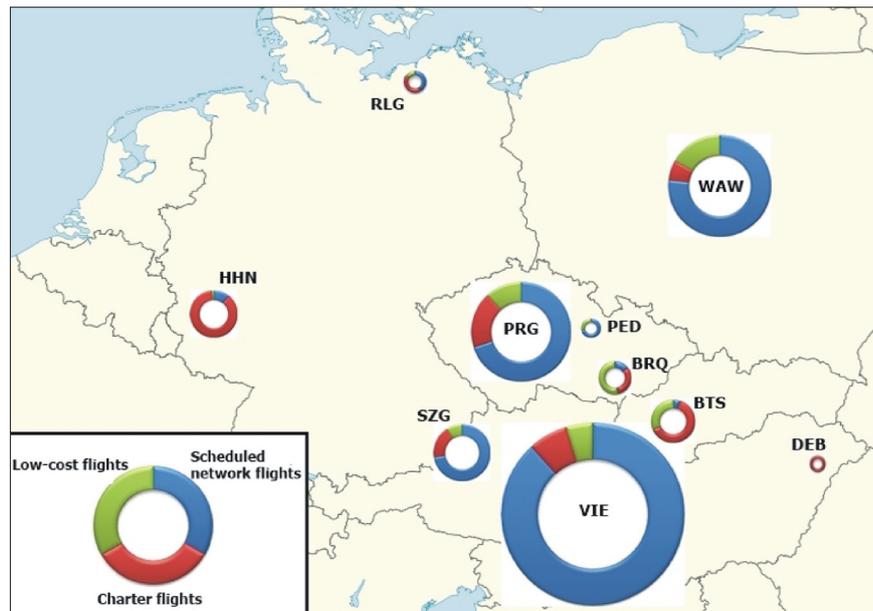*Fig. 2: Structure of offered flights for the selected airports in 2014*
*Sources: Historical Flight Status (flightstats.com); authors' calculations*

compared to earlier studies (e.g. Reichard, 1988) the peak of the tourist season extends to September, even into October. Such a development is probably related to the changes in the offer of tourist destinations and travel agencies, who are using these favourable months to promote cheaper holidays in Europe and other nearby destinations, i.e. last-minute holidays. All of these large airports are mainly served by scheduled network flights, while the share of low-cost and charter flights is rather low.

In a quite different and largely heterogeneous group are the smaller of the monitored airports. The heterogeneity is in most cases demonstrated as seasonality in the offers of the airlines and, of course, in the structure of offered flights. A more apparent seasonality in the offers of airlines is especially shown by Brno Airport. This airport recorded, in 2014, a record-breaking increase in passengers using both charter lines, most often served by a Travel Service carrier (to Antalya, Burgas, Heraklion) and in regular lines to Stansted (by Ryanair) and Luton (Wizz Air). A similar fluctuation in the offer of flights in the summer is seen at Frankfurt-Hahn Airport. Although rather distant, the airport primarily serves as an alternative to the busy Frankfurt International airport (IATA: FRA). It is serviced, for the most part, by LCCs (Ryanair, Wizz Air, SunExpress). Considering its position, the airport focuses on offering airlines to tourist destinations in East and Southern Europe and North Africa. Those destinations are especially popular in the peak tourist season in the summer months.

A less dominant seasonality in the offer of flights is seen in the case of Bratislava Airport. Although the airport is often referred to as secondary to Vienna, it recorded in 2014 an approximate 5% decrease in the number of checked-in passengers; this was attributed to the cancellation of the lines to Bristol (Ryanair), Oslo and Copenhagen (Norwegian), in particular. Other negative factors were the European Union's sanctions against Russia (the number of checked-in passengers dropped to 50% of the 2013 numbers), and the bankruptcy of the Air Onix airline from Ukraine after military conflicts broke out in the eastern part of that country. Similar to the case of Brno Airport,

moreover, the year 2014 did not witness an increase in the number of passengers travelling on non-regular lines (especially to Bulgaria and Greece). Salzburg Airport shows a similar progress of seasonality in the offer of flights. This airport has a strong preference for destinations in Western Europe (Germany, the UK, the Netherlands); however, in the summer months it also offers frequent flights to Turkey, Spain and Egypt. Charter flights amount to over one-quarter of all aviation activity there. Most of these airports are dependent on LCCs and charter flights as shown in Figure 2. Low-cost and charter flights are crucial for their viability. The vast majority of flights are carried by low-cost and charter flights, and this is typical for example for airports in Brno and Bratislava, in contrast to the dominance of scheduled network flights at the Vienna airport. These airports thus serve as complementary airports to the Vienna hub airport, but they mostly offer cheaper flights in the summer seasons.

The last group of airports are typically small and they have a specific seasonal offer of airlines. An example may be the airport Rostock-Laage, which is usually used for domestic German flights (Cologne, Bonn, Munich, Stuttgart). The impact of the summer season is very small as the airport registers seasonal summer flights rather scarcely and in the form of charter flights (Mallorca, Crete, Rhodes, Varna or Burgas). Similarly, Debrecen Airport, which predominantly serves Wizz Air flights, has only a minor increase in the number of offered flights in the summer months. This airport focuses on lines connecting destinations in Western and Southern Europe (Luton, Eindhoven, Milano, etc.). Only rarely does it offer seasonal flights to tourist destinations (Korfu, Antalya). Pardubice Airport, as in the case of Bratislava, was seriously struck in 2014 by the sanctions the European Union adopted against Russia (continuously from March 2014) as it was considerably oriented to a Russian clientele. Although there had been a minor increase in the number of passengers arriving from Russia in 2014 compared to 2013 (97 thousand in 2013, 98 thousand in 2014), the number of passengers on charter flights was reduced considerably (54 thousand in 2013, 24 thousand
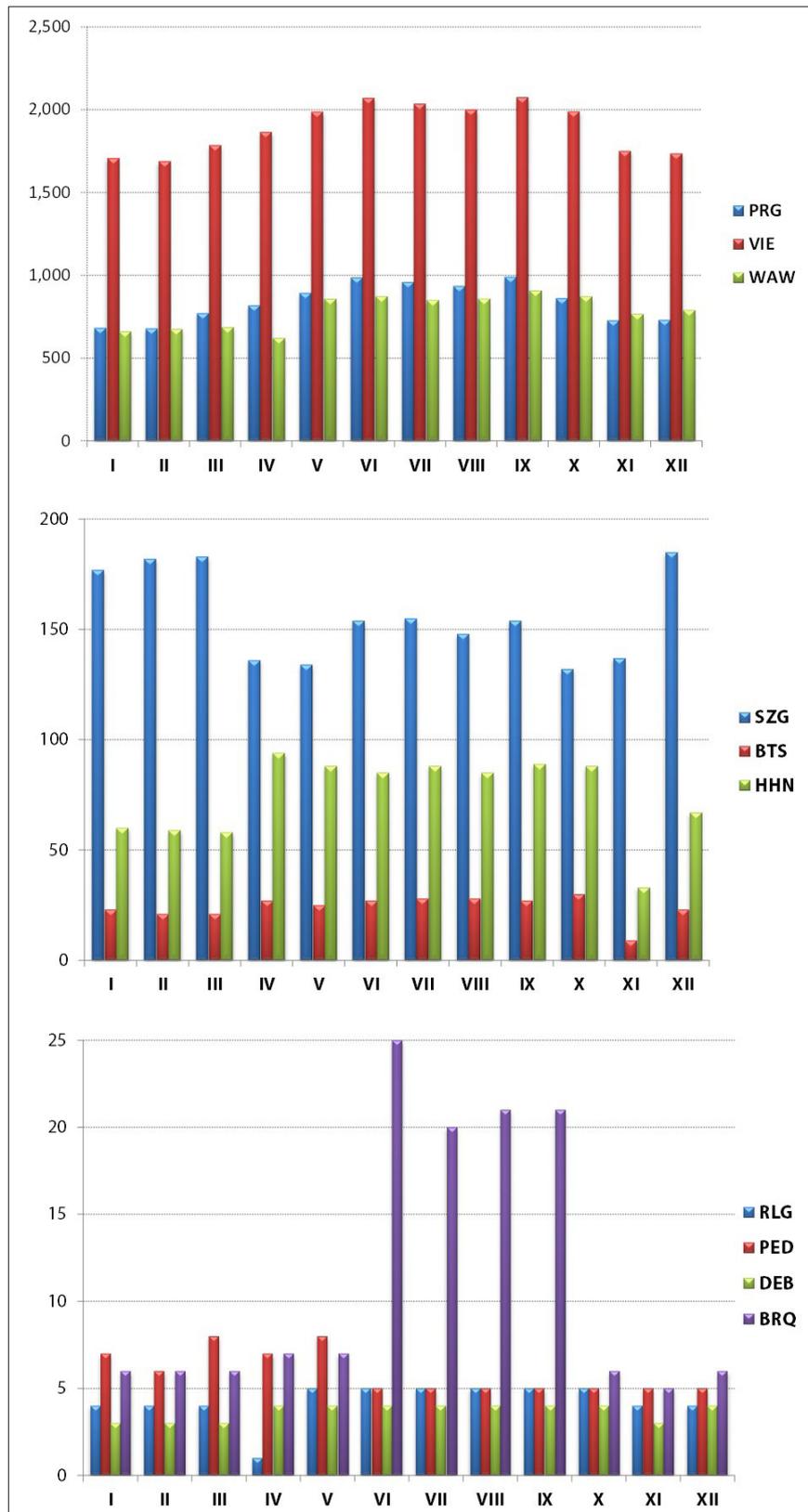
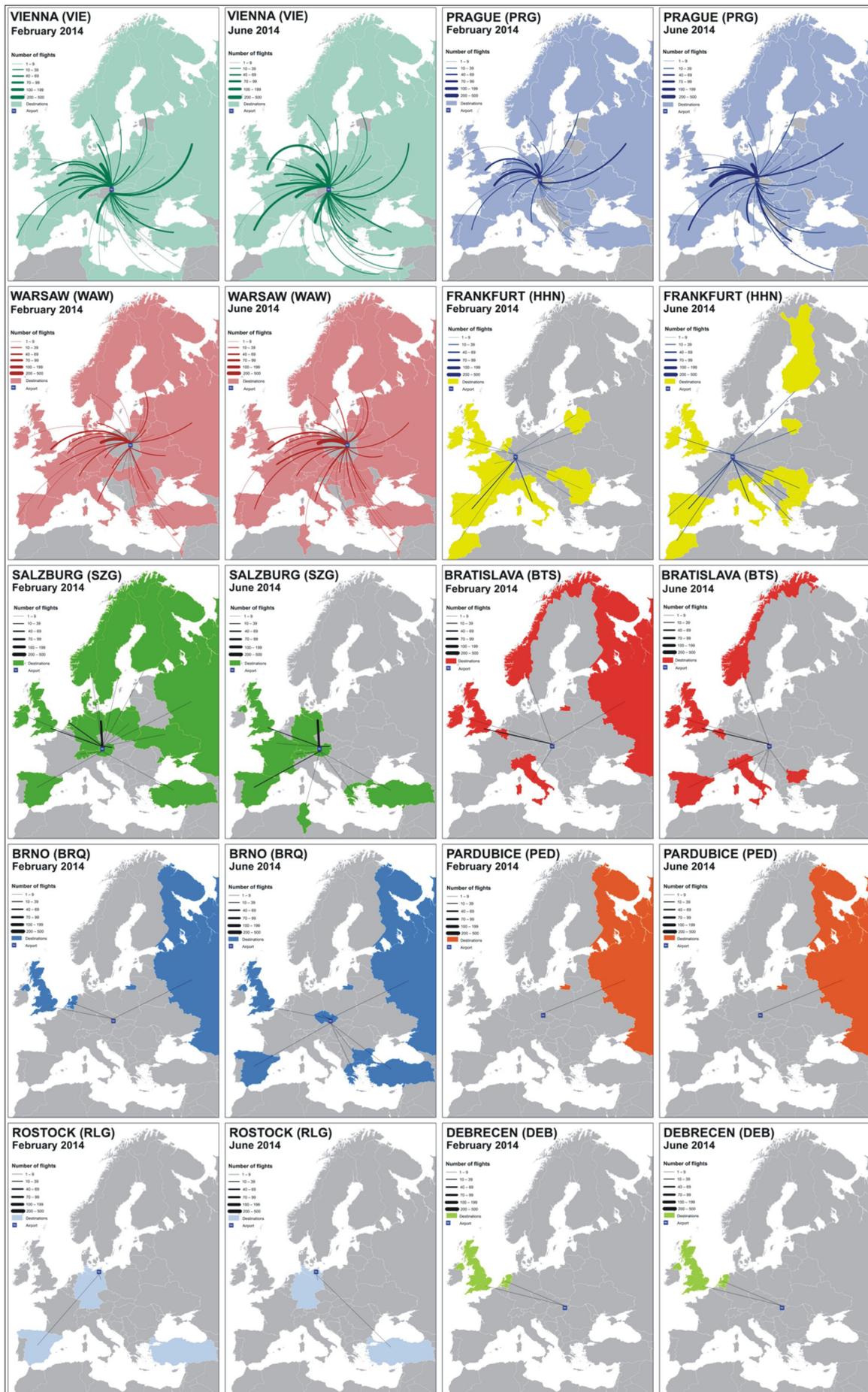*Fig. 3: Number of flight offers in the monitored airports during the year 2014*
*Sources: Historical Flight Status (flightstats.com); authors' calculations*

in 2014). Another negative influence was the termination of the Kogalymavia airline and the reduction in the number of flights from Moscow, Saint Petersburg and Yekaterinburg (Transaero Airlines). Based on this historic development, the airport decided to predominantly focus on flights to traditional tourist destinations (Rhodos, Burgas, Podgorica).

## 6. Seasonal changes in the accessibility of destinations

We consider seasonal changes in the accessibility of destinations as another key manifestation of the different spatial strategies employed by individual carriers and

*Fig. 4: Accessible destinations from the monitored airports during the year 2014*
*Sources: Historical Flight Status (flightstats.com), authors' calculations*

airports. Given the derivations from the major fluctuations in the offer of air transport demonstrated above, assumptions can be made about the considerable changes in the accessibility of destinations occurring during the year. It can also be assumed that the peak tourist season period sees a certain intensification of air transport between the monitored airports in Central Europe with destinations in Southern Europe and North Africa. Those regions represent traditional tourist destinations for the inhabitants of Central European countries. Moreover, users of air transport also consider the accessibility of final destinations as one of the principal attributes of the attractiveness of an airport from their point of view.

Changes in the accessibility of final destinations are also largely affected by the size and importance of the monitored airport, or by the orientation of key airline carriers on specific segments of their customers. Therefore, a rather stable network of accessible destinations is, again, seen in the major airports in Vienna, Prague and Warsaw. Disregarding very minor exceptions, it can be stated that all of the airports mentioned above offer flights to all countries in Europe. This also attests to their importance in the Central European region as well as to their important position in air transport in Europe. The share of non-European flights is rather low: 13.1%, 12.9% and 8.8% in Prague, Vienna and Warsaw, respectively. This segment of flights was clearly dominated by flights to Asian destinations (Turkey, Thailand, the USA and Japan). As far as flights within Europe are concerned, a larger share was taken by flights directed to Germany, the UK, Russia, France and Italy. This is logical as those regions represent important resources and destinations for both business and pleasure trips for Central European travellers.

Changes in the accessibility of final destinations between the peak (June 2014) and off-peak (February 2014) tourist seasons are shown in Figure 4. It is clear that the accessibility of final destinations in Vienna, Prague and Warsaw airports show little variation during the season; nonetheless, an observation can be made about the considerable increase in the number of flights to Southern and South-Eastern Europe in June 2014. Greece is a fitting example of the situation. Vienna Airport prepared the departures for a total of 9 airplanes in February 2014, while the number grew to 61 in June 2014. The largest fluctuations from the airports in Prague and Warsaw during the season, however, are typical for flights to Croatia, Greece and Bulgaria. For a very long time, those countries have been popular summer holiday destinations. An interesting fact is that, at the same time, concerning flights to destinations in Western and Southern Europe in the summer. The largest increments are then seen in the connections between large cities in Central Europe and Turkey, Tunisia and Egypt. Those trends are very closely related to the changes in demand for key tourist destinations. Vice versa, relatively the smallest seasonal differences in the offer are related to the flights bound for Northern Europe. There are rather prominent differences in the connections with Russia, with the peak being presently in the summer.

The highly heterogeneous set of smaller airports in Central Europe, then, show some large differences in the offer of final destinations during the period of interest. Some of the airports have also shown that inside the peak tourist season, they offer a lower number of flights (see above) together with fewer destinations. Salzburg Airport documents this situation reliably. This airport proves that there are major changes in the offer of accessible destinations in the summer months.

In 2014, the majority of flights departed for Germany, Austria, the UK and the Netherlands. The airport also had a rather intensive exchange with Norway, Sweden, Russia and Spain. For the month of June 2014, on the other hand, there was a major re-orientation of flights. Germany remained the most intensive country for destinations, with major improvements in connections with Spain (especially the Canary Islands), Turkey and Greece. But there was also some limitation on flights to Northern Europe and other regions. Disregarding certain exceptions (Debrecen and Pardubice), observations can be made about the "traditional" East-West orientation of flights (Dobruzskes, 2009) changing, in the summer months, into an orientation towards Southern and South-Eastern Europe, Turkey and North Africa (Egypt, Tunisia). The specific examples of Debrecen and Pardubice airports in 2014 basically showed a unilateral orientation to the UK and the Netherlands (Debrecen) or Russia (Pardubice). It can also be assumed that for the summer season of 2014, the directional orientation of charter flights was affected by the sanctions imposed by the European Union on Russia, as mentioned above.

## 7. A typology of airports based on flight offers

This final part of the assessment of airports in Central Europe presents a typology of the airports based on the offer of air transport. Previously, we have demonstrated that the chosen airports constitute a largely heterogeneous group, with various sizes, offers of final destinations, seasonal fluctuations, etc. A typology of these airports has been established using the Ossan triangle: based on the orientation of flights, the share of LCCs, and the number of airlines. The purpose of the typology is to establish the principles and specifics of the airports in terms of orientation to their customer pools.

The different strategies and foci of individual airports with respect to their customer pools can be documented using Figure 5, which clearly shows the principal characteristics of the monitored airports in terms of the directional orientation of flights. A striking feature is the quite balanced positions of the three major airports (Vienna, Prague and Warsaw). It is assumed that the airports have a similar focus in terms of the directional orientation of flights, which basically makes them direct competitors. As traditional network carriers primarily concentrate there, these airports are especially oriented on connections to major hubs in Western Europe (London, Paris, Frankfurt-am-Main and Amsterdam), which act as changing points for connections from Central Europe with destinations outside Europe (especially North America and Asia).

The share of LCCs fluctuates from 10 to 20%. Therefore, the airports in Vienna, Prague and Warsaw often act as Central Europe's sub-hubs for connections to Western Europe. At the same time, they represent important locations for air transport within Central Europe (from 35 to 50% of flights). The share of flights outside Europe is rather low in this respect (approximately 15%); the primary cause is the necessity to change flights in any of Central Europe's hubs. An equivalent model applies to Salzburg Airport which shows similar data in directional orientation of flights while displaying a higher rate of flights within Central Europe (nearly 72%). This is especially attributable to the fact that it is Austria's second largest airport, which gives it an important position in domestic transport. Therefore, the most populated flights are bound to Vienna, Frankfurt, Zurich and Düsseldorf.
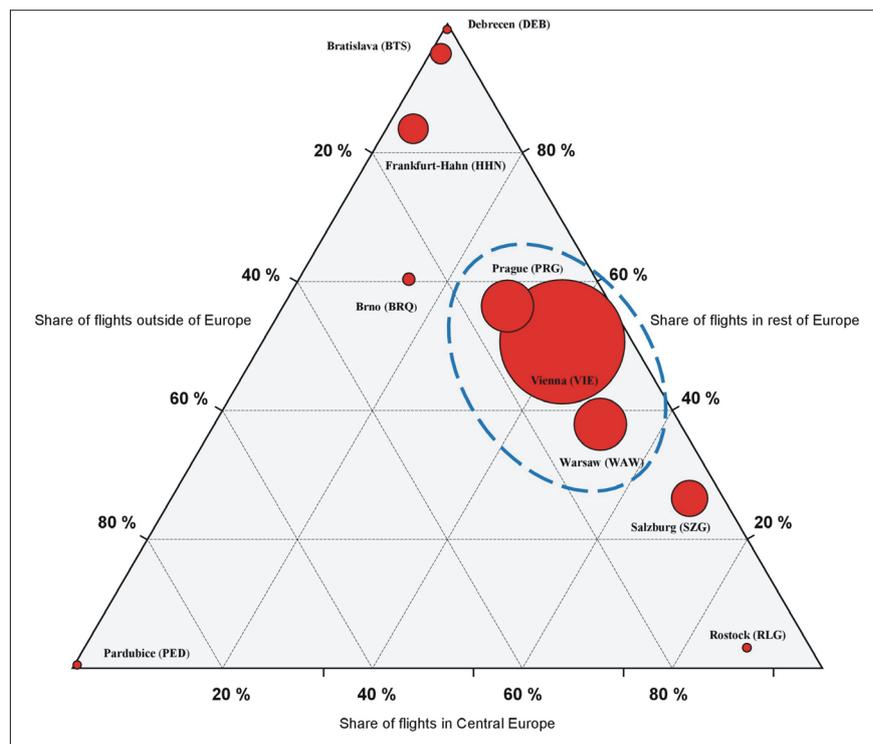
*Fig. 5: Typology of the monitored airports using the Ossan triangle*
*Sources: Historical Flight Status (flightstats.com), authors' calculations*

The remaining airports represent a highly heterogeneous group of airports with a very specific position within the air transport system of Europe. This is documented by their varying characteristics in the directional orientation of flights. The heterogeneity of the smaller airports results from a number of underlying causes: the size of the airport, their importance in air transport in Europe, the proximity to the nearest major airports, the position of the airport, and the type of carriers operating from the airport. Pardubice serves as an illustration of an airport that was solely oriented on flights to/from Russia, even in 2014. During the year, it did not offer any other destinations, which manifested itself negatively in the reduction of total passenger count in 2014. An interesting point is that this airport was only served by network carriers.

On the other hand, Debrecen in that year focused exclusively on securing air lines with the UK and the Netherlands. Bratislava Airport showed similar results, but its primary benefit is its proximity to Vienna Airport and the frequent bus lines between the two. That is why Bratislava tends to be typically serviced by LCCs and charter carriers (their share in the overall number of flights amounts to over 90%). They especially provide flights to Western Europe. Moreover, in the summer months a higher number of flights (especially charter flights) to destinations in Southern (Spain, Italy) and South-Eastern Europe (Bulgaria) are registered. As in the previous case, the evidence suggests that this airport only offers a small percentage of flights bound for Eastern European destinations (less than 2%). This is caused by the relative proximity and competition of other types of transport (bus and railway), which are on a very good level in most of these countries (see discussion in Pucher, 1999). Different conditions apply to Frankfurt-Hahn, which also offers a minimum share of flights to Central Europe (only the lines to Hungary operated by Wizz Air). This airport serves as an alternative airport with a rather high number of final destinations. Specifically in the summer months, a

large proportion of the flights are bound for Spain, Portugal and Italy. In a rather independent category is Brno Airport which especially focuses on destinations in Western Europe and Russia. A quite different profile is that of Rostock-Laage airport, which, unlike the other researched airports, focuses on connections to other German airports to provide domestic travel. The results of the analyses on the typology of the airports in terms of the offer of flights show considerable correspondence, as well as differences between the airports. They are subject to a number of factors which are dominated by the position of the airport in the air transport system, geopolitical positions, the specifics of the carriers, etc., as indicated above. These factors should be addressed by further research.

## 8. Conclusions

Central Europe has a very specific position in the European system of air transport. Some relatively unique reasons for this are the integration of former socialist countries into the single, liberalised and deregulated European airline market, and the building of new connections with Western Europe. These changes, initiated in 2004, have had a major impact on the position of air transport in the region. The findings of this study show that the former socialist countries of Central Europe have established very intensive connections with Western Europe by frequent air transport, which promotes further social, economic and cultural integration with the West. Evidence also suggests that the spatial configuration of flights from Central Europe is primarily westbound. The East, and especially Russia, is also an important market. Although these countries are mainly oriented to western markets, they are also strongly connected with Russia: in particular, some small airports are dependent on customers from/to Russia. A number of airports in Central Europe showed a very strong orientation on customers from the East in 2014, and the East-West direction is most important

in the current configuration of flights from Central Europe. This clear orientation, however, does change in a number of respects during the peak tourist season in the summer months. It is logically caused by the higher demand for tourist destinations in Southern and South-Eastern Europe, North Africa (Egypt, Tunisia) and the Near East (primarily Turkey). Therefore, many airports in Central Europe are oriented also in a North-South direction during the summer season. This becomes obvious especially in smaller airports with a higher rate of LCCs and charter flights.

As shown above, charter flights are still typical for the Central European region. Their role is not replaceable. Their importance can be seen mainly during the summer season, when providing cheaper alternatives for connections of Central European countries with popular holiday destinations in Southern Europe, the Near East and North Africa. The strong position of charter flights can be seen mainly by airports in the eastern part of Central Europe (especially in the Czech Republic and Poland). Another factor that needs to be added is the rather strong orientation of large hub airports on frequent connections with South-Eastern Europe. On the contrary, connections to Northern Europe are rather scarce. The north of the continent has stronger economic and cultural connections to Western Europe; however, it represents an area of potential expansion for airlines. Moreover, Northern Europe is not a typical destination for spending summer holidays for customers from the Central Europe – it is quite an expensive destination.

Smaller airports show a stronger specialisation in selected destinations and/or specific segments of the customer market (e.g. charter flights), etc. A number of airports depend on the presence of one or more carriers who, for the most part, define the spatial orientation of flights departing from that airport. A good example is Debrecen Airport, which is predominantly served by Wizz Air. In general, it can be observed that smaller regional airports do establish a highly heterogeneous group of airports in many ways. Some of the airports benefit from their proximity to important European hubs and from the accelerated importance to LCCs (e.g. Bratislava), others serve as secondary airports for domestic flights (e.g. Rostock-Laage). Airports in Bratislava and Brno are strongly dependent on charter flights, and they profit especially from proximity to the Vienna hub airport. They serve as secondary airports with rather complementary functions. From the issue of seasonality affecting the offer of flights, this is a rather heterogeneous group: some of the airports exhibit a clear orientation towards the peak tourist season, while others show nearly no impact of the summer.

The deregulation and liberalisation of air transport, which appeared after a number of the East European countries joined the EU, has basically changed the map of air transport. Since 2004, the concentration of airlines, the establishment of hubs, the optimisation of airlines and transition to the hub-and-spoke arrangements, are all factors that have delivered a considerable amount of asymmetry to the air transport network. The asymmetry is logical in many respects as the hubs have become natural centres of air transport with high potential for development. The exclusive hierarchy position of all major airports considered here (Vienna, Prague and Warsaw) deserves a positive assessment as they became, over time, major centres of air transport of European importance. On the other hand, it was the establishment of the main European hubs (Amsterdam, London, Paris, Madrid, etc.) as important global air connections which have considerably limited the position of Central Europe. Hence, the monitored

airports have a very low share of flights outside Europe (see discussions in Thompson, 2002; Dobruzkes, 2006). There is some potential for development, however, through the identification of new destinations, especially in Asia. One example is the expansion of Hainan Airlines to establish connections between Prague and Beijing. The strong hierarchy arrangement of air transport in Central Europe, to a certain extent, defines the potential of development of other airports. In order to protect themselves from the competition of major airlines concentrated in the hubs, smaller carriers often seek smaller airports, usually with a strong orientation on specific segments of the customer market.

One interesting question that has so far received little attention in the research literature is the impact of the European Union's sanctions against Russia on air transport in Central Europe. As mentioned above, Russia was an important area on which a number of rather small airports in Central Europe focused prior to 2014. The imposition of sanctions in March 2014 considerably limited the opportunities to travel. A number of airports focusing on Russian clients experienced serious problems. Preliminary observations show that individual airports often adopted various strategies to mitigate the impact of sanctions on Russia and the reduction of checked-in passengers arriving from Russia and the Far East. Those defensive strategies should be examined by research in the future, as they quite clearly point to the actual dependence of air transport on political decisions.

## Acknowledgement

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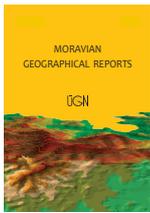
# The spatial concentration of immigrant pupils at primary and lower secondary schools in the Czech Republic

Jiří HASMAN [a], Yvona KOSTELECKÁ [b], David HÁNA [b] *

## Abstract

*Since the fall of the Iron Curtain and especially since joining the European Union, the Czech Republic has become a country with a sharply growing number of immigrants, who more and more often are coming to the country with the purpose of settling long term and starting a family. This change places demands on society as a whole but also on particular areas such as the education system, which needs to integrate these children successfully and ensure that they are provided with quality education. The experiences of countries with a long history of migration have shown a negative correlation between the extent of concentration of non-citizen pupils in a school and their academic performance. Such a relationship is explored in this article which examines the degree of concentration of non-citizen pupils at Czech primary and lower secondary schools both in terms of concentration in individual regions, as the spatial distribution of immigrants tends to be very unequal, and in terms of concentrations at particular schools within individual regions. The article shows that despite a current growing concentration of non-citizen students in some regions, there is not clear evidence to confirm a growing segregation at particular schools.*

**Keywords:** *spatial concentration; immigrants; primary and lower secondary schools; Czech Republic.*

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## 1. Introduction

Migration has always been a natural part of the lives of humans. In the history of humankind, individuals, groups, and whole nations have migrated for various reasons. Never, however, have so many people lived outside the land of their birth as they do now. Today, migration is a major, worldwide phenomenon. International data from 2013 published in the UN's International Migration Report (UN, 2013) indicate that between 1990 and 2013 the number of migrants[1] rose from 155 million to 232 million, which is an increase of almost 50%.

Large migrant populations place demands on the countries affected by emigration, which have to cope with the losses to their skilled labour force, and on host societies as well, as migration impacts their social climate and their political, cultural, and demographic conditions. It is therefore no surprise that countries adopt various measures in efforts to minimise the potential negative impacts of migration and

strengthen its positive aspects. The success of migration is influenced by a variety of factors. One of the important factors is the historical experience individual countries have with migration, which is reflected in particular migration policies and oftentimes, also in the degree of acceptance with which migrants are received by the host society.

Different countries have had a variety of different historical experiences with migration. In the history of some countries (for example the United States, Canada and Australia), migration has played an important role both in shaping the modern face of those nations and later in their continued development (Freeman, 1995), and in reinforcing their position in the world system (Wallerstein, 1974). Other countries have had different experiences. For example, for several centuries Western European states were sources of migration and gained experience with immigration much later. They became destinations for mass migrations after the Second World

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[a] Department of Social Geography and Regional Development, Faculty of Science, Charles University in Prague, Czech Republic

[b] Institute for Professional Development, Faculty of Education, Charles University in Prague, Czech Republic, (*corresponding author: D. Hána, e-mail: *david.hana@pedf.cuni.cz*)

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[1] According to the UN (2013) report, a migrant is a person who was born in a country other than the one he/she lives in or has the status of foreign national in the country he/she lives in.

War when less skilled immigrants, mostly from less advanced European states and former colonies, began arriving in these countries (Freeman, 1995) to saturate a demand for labour during the post-war economic boom.

The Czech Republic, like other states in what is referred to as the New Europe, has a very different migration history. In modern history, these countries went through a long period of stagnation owing to the political situation. After the fall of the Iron Curtain, these countries passed through a period of economic and political transformation followed by relatively rapid economic growth. These recent developments, together with these countries' accession to the European Union, increased their appeal and helped turn them into new destinations of immigration. With this they entered a new period in their history, acquiring their own particular experience with migration. In connection with the growing number of immigrants, the issue of integration has become a political priority. Expert studies on this issue are thus a valuable source of information and material for actors at various decision-making levels, ranging from teachers, employees in state administrations and to politicians. In Western countries extensive research has been systematically devoted to this subject for more than half a century and has been presented in an equally extensive body of expert literature (e.g. Alba and Nee, 2005; Foner and Alba, 2008; Massey, 2008; Portes et al., 2005; Schneeweis, 2011, 2013, 2015; Zhou and Cai, 2008). This is the result of the lengthy experience other countries have with migration and the conviction that a successful migration policy has a crucial impact on various spheres of society, as well as a fundamental influence on the socio-political climate in the country. In the Czech Republic, where higher rates of immigration only began to be registered in the 1990s and especially after 2004, the literature on this phenomenon and its impact on individuals and society has been expanding rapidly in recent years (Drbohlav, 2011; Drbohlav et al., 2007, 2010; Drbohlav and Uherek, 2007; Janská, 2007; Lachmanová, 2007; Novotný et al., 2007; Papoušková, 2007).

Given the relatively short period of time during which migration has been the subject of research in the Czech Republic, it is clear that it has not yet been possible to sufficiently cover every aspect of the process of integrating migrants into the host society and to the extent that the subject warrants. One relatively overlooked area of research is the integration of non-citizen pupils into the education system. Many studies on the integration of non-citizen pupils focus on the development of communication skills in the Czech language (e.g. Hájková, 2014, 2015; Jančařík and Kostelecká, 2015; Kostelecká et al., 2013, 2014, 2015; Vodičková and Kostelecká, 2014, 2016) and the integration of students in the classroom (Braun et al., 2015), among others.

There are however no studies on the concentration of non-citizen pupils in schools, a topic frequently discussed in the international literature (Cebolla-Boado and Garrido-Medina, 2011; Gorad, 2009; Johnston et al., 2008; Pedraja-Chaparro et al., 2016; Ruoff, 2006; Schneeweis, 2011, 2013, 2015). The experiences of countries with a long history of migration have shown a negative relationship between the extent of concentration of non-citizen pupils in a school and their academic performance (e.g. Schneeweis, 2013). To study this topic in the Czech context

should be of great interest as the situation in the Czech Republic is somewhat specific. Unlike in most advanced countries, parents have the right to choose what school their children attend irrespective of their place of residence – as long as the school of choice has sufficient capacity[2]. By their choices, then, parents can affect significantly the degree of concentration of non-citizen pupils at schools, potentially contributing to the segregation of migrants.

This article has three main goals:

1. The first is to analyse the spatial distribution of non-citizen pupils in the Czech Republic and to examine how this situation has evolved over time. The spatial distribution of pupils, both relevant groups of non-citizens by country of origin and non-citizens in total, will be examined at various spatial levels in order to reveal and to describe its main characteristics. This will set the stage for the second goal;

2. The second goal is to determine the degree of concentration of non-citizen pupils at individual schools and to identify how it has changed over time. The key questions are whether the increasing number of non-citizen pupils in the Czech school system is leading to their growing concentration in specific schools, and whether this eventual growth is mainly due to changes in their spatial concentration, or to other factors such as parental choice of school within a geographical region. Another important question is whether a tendency can be observed at some schools to specialise in the integration of pupils from certain source countries. The existence of such schools may serve as an identifier of the process of segregation of different ethnic groups from each other, which may be considered a 'risk factor' in the process of integration; and

3. Finally, the third goal is to verify the observations made at larger geographical scales by carrying out case studies of selected towns (Říčany, Mladá Boleslav, Karlovy Vary, Teplice, Tachov) and two boroughs in Prague (Prague 13 and 14). These case studies should allow us to analyse in detail the changing ethnic composition of individual schools in selected types of neighbourhoods, and thereby to observe the effects of the spatial concentration of non-citizens, parental choice, and Tiebout sorting.

## 2. The Czech Republic as a new immigration country

Among the countries of the New Europe, the Czech Republic occupies an exceptional position as it is the most attractive destination for migration in this region (Čermák and Janská, 2011; Drbohlav, 2011). In the past the situation was different. Even though the country was throughout its history a multi-ethnic area with a large German-speaking population, in the post-war period (following the expulsion of the Sudeten Germans) the situation changed dramatically and it became an ethnically almost homogeneous country. Although net migration in the Czech part of Czechoslovakia was positive after World War II, the total number of immigrants was very low (ČSÚ, 2012a). After the Velvet Revolution in 1989, political circumstances changed dramatically. As a consequence, amendments were gradually made to the state's migration policy which supported

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[2] Schools are obliged to give priority to enrolling students from their own district.

immigration and led to an increase in the number of migrants who were attracted by the rapidly growing economy. The main increase occurred after 2004 when the Czech Republic joined the European Union. While in 2003 there were only 240,000 non-citizens registered as residing in the Czech Republic, in 2008 there were 438,000 non-citizens in the country. There are currently about 465,000 non-citizens in the Czech Republic (ČSÚ, 2015a), which is equal to approximately 4.5% of the population. But it is not the number of non-citizens alone that is increasing but also the number that plan to settle permanently, start a family, and raise children in the Czech Republic. The country is becoming a destination for migration. It must nevertheless be pointed out that despite the changes and relatively sharp rise in the number of non-citizens in the country in recent decades, the share of non-citizens in the Czech Republic is still below the EU average.

There are several aspects of migration to the Czech Republic which should be mentioned:

- Economic factors play a major role in encouraging immigration to the Czech Republic, especially the structure of the economy and the availability of jobs. This is because economic labour migration is the dominant form of immigration (Čermák and Janská, 2011; Drbohlav, 2011; Janská et al., 2014).

- Unlike most European countries, the majority of non-citizens in the Czech Republic come from a limited number of countries – non-citizens from the four largest groups altogether make up almost 65% of the total number of non-citizens. Most immigrants come from Ukraine (106,000), Slovakia (102,000), Vietnam (57,000) and Russia (57,000).

- The nationality and ethnic composition of non-citizens in the Czech Republic reflects the country's specific history and the linguistic proximity between Czech and the languages of some source countries. Ukrainians, Slovaks, Russians and Poles come from Slavic-speaking post-socialist countries, while the substantial amount of immigration from Vietnam follows from a past wave of labour migration in the 1980s that occurred on the basis of bilateral international agreements at that time (Drbohlav, 2011; Janská et al., 2014).

- The age structure of non-citizens in the Czech Republic is distinct from that of the majority population. There is a larger share (almost 40%) of young people in the 25–39 productive age group among non-citizens (ČSÚ, 2014a), in contrast to one-quarter of the majority population (ČSÚ, 2014b). Despite this, there is also a smaller share of children in the non-citizen population (4.5% compared to 3.2% in the case of majority population: ČSÚ, 2014a), which is in contrast to the situation in most Western countries. The most likely reason for this situation is the different structure of source countries. While quite a large share of immigrants to Western countries comes from developing countries with high fertility, a significant proportion of Czech immigrants come from Eastern Europe, which is a region with extremely low fertility. This (and the fact that their motives for migration to the Czech Republic are primarily economic) means that they have relatively few children, especially in the case of Ukrainians and Slovaks. In contrast, the highest numbers of children born to non-citizens in the Czech Republic are born to Vietnamese parents intending to settle long term in the country and to start a family (Kostelecká et al., 2015).

- A final important factor is the spatial behaviour of non-citizens in the Czech Republic. Immigrants tend to settle in cities and their suburbs, especially in the metropolitan area of Prague, where approximately one-third of all foreign nationals live. Popular immigrant destinations are towns that have successful industrial enterprises, as well as the border region with neighbouring Germany. Despite this, some of the phenomena that have been witnessed abroad as commonly accompanying immigration have not been observed. Most notably this refers to the tendency towards residential segregation of immigrants in urban areas and the formation of large ethnic neighbourhoods. These phenomena are far less apparent in the Czech Republic than they are in Western European countries (for example Drbohlav, 2011).

## 3. Concentrated populations of non-citizen pupils at particular schools: A factor in the integration process

Given the generally increasing migration rates, scholars and experts have directed their attention to identifying the factors that encourage successful integration, and understanding and explaining why the integration process is more successful among some individuals and groups than others. The potential and the risks that come with migration also vary widely depending on different spatial factors. Many studies have shown that the environment in which people live has an effect on a variety of different aspects of their lives, including their academic performance and educational attainment, social behaviours, health, work, and social mobility (see, e.g. Durlauf, 2005, Galster, 2012; van Ham and Manley, 2012a, 2012b, 2013).

A similar discussion is also underway in the field of education. The question is to what extent the degree of concentration of non-citizen students in schools affects their academic performances and thereby the entire process of integration. Some studies show a negative correlation between the level of concentration of non-citizen students in a school and their academic performance (e.g. Schneeweis, 2013; Pedraja-Chaparro et al., 2016). Analysing the situation in Vienna between 1980 and 2001, Schneeweis (2013) concluded that a larger concentration of minorities in a school has a negative impact on the academic performance of those minority students. This is especially true when the immigrants concentrated in a school are from the same ethnic background. Schneeweis did not demonstrate, however, that a large concentration of immigrant children in a school negatively impacts the performance of students from the majority population. Similarly, Pedraja-Chaparro et al. (2016), studying the situation in Spain, found a negative correlation between the share of immigrants in a school and their academic performance. They also discovered, however, that if the share of immigrant students is more than 15%, the performance of the other students from majority backgrounds is also negatively affected. Concerns about the potential negative effects of large concentrations of immigrant students led many advanced countries with large immigrant populations to try to develop an educational system that would prevent the emergence of schools with very high proportions of immigrant students.

Fulfilling this idea at the elementary level of the education system, however, may be constrained by two fundamental factors: the composition of the population

(ethnic, cultural and social) in the locality of the school, and whether or not school choice is an option in the society. While the education system can have only an indirect and limited influence on the composition of the population in a school district[3], school choice at the primary school level is directly defined in the education laws of individual countries[4]. In theory, the right to choose schools can either support integration or increase segregation (Riedel et al., 2010). Current studies nevertheless indicate that in practice school choice tends to have the effect of increasing the social and ethnic segregation of primary school pupils (Burgess and Briggs, 2006; Riedel et al., 2010).

One reason that this occurs is that when the school choice option is open to parents they prefer those educational opportunities that seem to be the most efficient, the aim being to obtain the best educational outcome for lower costs. The costs of the school choice option can be represented by tuition and travel expenses (Riedel et al., 2010), while its possible benefits are usually seen as the possibility to choose the socio-economic and ethnic composition of the school population, a good educational environment in the school, the similarity between the norms and values of the school and those of the family, and the school with an overall better performance of pupils (see, e.g. Riedel et al., 2010). It is apparent, moreover, that some of these benefits are linked to others. For example, schools with a large share of pupils from socially and economically advantaged backgrounds usually have better overall outcomes and fewer disciplinary/behavioural problems among pupils and attract talented and motivated pupils (see, e.g. Opdenakker and van Damme, 2001; Thrupp and Lupton, 2006). Parents then also naturally tend to avoid schools with a large percentage of pupils from disadvantaged backgrounds (Rieder et al., 2010). Black (1999) has shown that in some cases parents are even willing to pay higher rents in order to live in a locality where the school boasts better results among its pupils. Choosing schools is more important for parents from a higher socio-economic background (see, e.g. Bourdieu, 1983). Their economic, social and cultural capital gives them more opportunities to choose the 'right' schools than parents with lower incomes, who tend to favour schools that are in the proximity of their homes in order to minimise transportation costs (Riedel et al., 2010). These parents also tend to place less emphasis on the school's academic standards (Hastings et al., 2006).

Some scholars believe that differences in the composition of the student populations at public schools are not just the result of the social and ethnic composition of a neighbourhood and parental choices, but also of the number of school districts that exist in a locality. More accessible school districts tend to lead to a more homogeneous school population in a given district. The literature often describes this as the 'Tiebout model' or 'Tiebout sorting', as explained, for example, in Urguiola (2005) and Riedel

et al. (2010). This model is based on the principle that when the selection of services and public goods in a locality is sufficient enough for every individual to choose what suits her/him best, people then demonstrate their preferences for particular services and public goods in a manner that in the literature is referred to as 'voting with one's feet'. The advantage of this model is that it allows individual providers of public goods and services to compete with each other, and this can have a positive effect on the quality of public goods and services and the selection users have to choose from, so that each person can choose what suits her/him best. A constraint on how this model functions is peoples' willingness to move or to commute to obtain the goods and services they prefer, as well as a sufficient degree of knowledge about their quality.

These research studies show that in the international literature the spatial distribution of immigrants and their concentration in schools are issues that receive considerable attention because they are important factors in determining the successful integration of immigrants. For the present there is still a lack of Czech studies on the degree of concentration of non-citizen pupils in schools. This article seeks to fill in this gap and to explore the situation in the Czech Republic as one of the countries of the New Europe.

## 4. The spatial distribution of non-citizen pupils at primary and lower secondary schools by country of origin

### 4.1 Methodology and delimitation of non-citizens' origins

Before proceeding to analyse the concentration of non-citizen pupils[5] at Czech primary and lower secondary schools[6], it is first necessary to look at their spatial concentration at the level of the various types of territorial units in the country (regions, administrative districts of municipalities with extended powers, the boroughs of Prague). An analysis was conducted on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2005/2006, 2007/2008, 2009/2010, 2011/2012, 2013/14).

Owing to the small numbers of non-citizen pupils from some groups enrolled in Czech schools, separate analyses of the spatial distributions were carried out only for the nine countries whose citizens represent the largest numbers of non-citizen pupils at these types of schools. The numbers of pupils from other countries were merged into macro-regional groups; countries analysed separately were not then included as parts of these groups (for example, data for post-Soviet countries do not include data for Russia, Ukraine, and Moldova). A complete list of the pupils' background countries and regions, including size of these groups is presented in Table 1. As

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[3] In some countries people make their choices about where to live guided by the quality of schools in the locality. Significant differences in the quality of schools thus encourage residential segregation.

[4] In many advanced countries parents can only enrol their children in the primary school designated for their district (e.g. France, UK, Germany, the United States, etc.). The option of enrolling in some other school is limited to special cases.

[5] Non-citizens are defined as persons whose citizenship is other than Czech; individual immigrant groups are therefore defined as groups of students with the same citizenship. Data for some countries were missing from the database of the Ministry of Education, Youth and Sport; however, the only more significant gaps are for Serbia and Montenegro for the year 2005.

[6] School attendance in the Czech education system is compulsory for children between the ages of 6 and 15 and it has two stages: the five-year primary level (ISCED 1) and the four-year lower secondary level of education (ISCED 2); 11% of children (who are defined as the most gifted) nonetheless pass through the lower secondary level at highly selective multi-year gymnasia or academies.

one can see in the last two rows, the number of non-citizen pupils increased continuously due to constant immigration. In contrast, the number of native pupils steadily decreased at first and then slightly increased again; these trends were driven by the demographic situation in the Czech Republic.

### 4.2 The basic parameters of the spatial distribution of non-citizen pupils

In order to obtain basic information on the current spatial distribution of non-citizen pupils at primary and lower secondary schools, we analysed data for the years 2005 and 2013. Figure 1 shows the share of non-citizen pupils at all these schools in the given year for the level of the administrative districts of municipalities with extended powers (hereafter ADMEPs), which were used because in size[7] and definition they best correspond to the country's natural geographical regions. The data indicate that the spatial distribution of non-citizen pupils replicates the migration trajectories of adult immigrants that have been described elsewhere in the Czech literature (Čermák and Janská, 2011; Drbohlav et al., 2010; Janská et al., 2014). This is logical because children of this age usually follow their parents[8]. It can thus be claimed that the spatial distribution of non-citizen pupils is determined by the spatial behaviour of their parents. The map shows the dominant position of Prague, as well as the 'West-East' gradient: the latter refers to the fact that the number of non-citizen pupils decreases the further east in the country one goes. Significantly larger shares are found in prospering industrial centres (e.g. Pilsen, Mladá Boleslav) and Brno, as well as in the metropolitan area of Prague.

If we compare the maps for both years, the largest increases in the share of non-citizen pupils were observed in the metropolitan area of Prague and in the development axis between the growing industrial centres of Pilsen, Mladá Boleslav (both with expanding transport industry) and Liberec. Nevertheless, the map also shows a slight tendency towards de-concentration as the share of non-citizen pupils slightly decreased in the most western regions and, conversely, there has been an increase in the territory of Moravia and in particular in the Brno agglomeration.

This basic picture of the spatial distribution of non-citizen pupils, however, does not tell us anything about the specific spatial behaviour of individual groups. It is well known that there are significant differences between immigrant groups in this respect (see, e.g. Hasman, 2014). Although it is beyond the scope of this paper to provide any

| Country of pupils' origin | 2005 | 2007 | 2009 | 2011 | 2013 |
|---|---|---|---|---|---|
| Bulgaria | 126 | 145 | 208 | 257 | 337 |
| China | 177 | 242 | 264 | 281 | 276 |
| Moldova | 180 | 217 | 270 | 304 | 305 |
| Mongolia | 291 | 347 | 445 | 457 | 350 |
| Poland | 150 | 182 | 220 | 250 | 274 |
| Russia | 940 | 905 | 1,161 | 1,244 | 1,263 |
| Slovakia | 2,074 | 2,455 | 2,805 | 3,161 | 3,439 |
| Ukraine | 2,708 | 2,957 | 3,170 | 3,392 | 3,589 |
| Vietnam | 3,473 | 3,373 | 3,171 | 2,852 | 2,906 |
| Other Asia | 62 | 129 | 132 | 144 | 172 |
| Post-Soviet countries | 736 | 684 | 638 | 622 | 630 |
| Northern Africa and the Middle East | 176 | 178 | 201 | 190 | 230 |
| North America | 120 | 129 | 113 | 112 | 108 |
| Sub-Saharan Africa | 55 | 45 | 48 | 45 | 47 |
| Central and Eastern Europe | 471 | 590 | 614 | 622 | 722 |
| Western Europe | 360 | 349 | 352 | 350 | 400 |
| Latin America | 24 | 22 | 18 | 22 | 29 |
| Oceania (incl. Australia) | 3 | 10 | 9 | 10 | 8 |
| Total Immigrant population | 12,283 | 12,960 | 13,839 | 14,316 | 15,090 |
| **Czech Republic** | **904,296** | **831,900** | **780,620** | **780,298** | **812,545** |

*Tab. 1: Countries of pupils' origin and the size of the individual groups in the analysis*
*Source: Authors' calculations based on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2005/2006, 2007/2008, 2009/2010, 2011/2012, 2013/2014). The values show the numbers of pupils with citizenship from the given country (or region) in given year.*

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[7] Given the very small average size of Czech municipalities, the variation of indicators at this level would have been too large and the map would have looked like a complex mosaic. By contrast, a regional breakdown would have offered too little detail of the spatial patterns.

[8] An exception is represented by labour immigrants, who usually travel to the destination country without their children. In the Czech Republic this mainly applies to two groups: Ukrainians and Western Europeans. Because they both settle at a higher rate in Prague, the shares of pupils from these two country groups in Prague is much smaller than what would otherwise correspond to their population sizes.
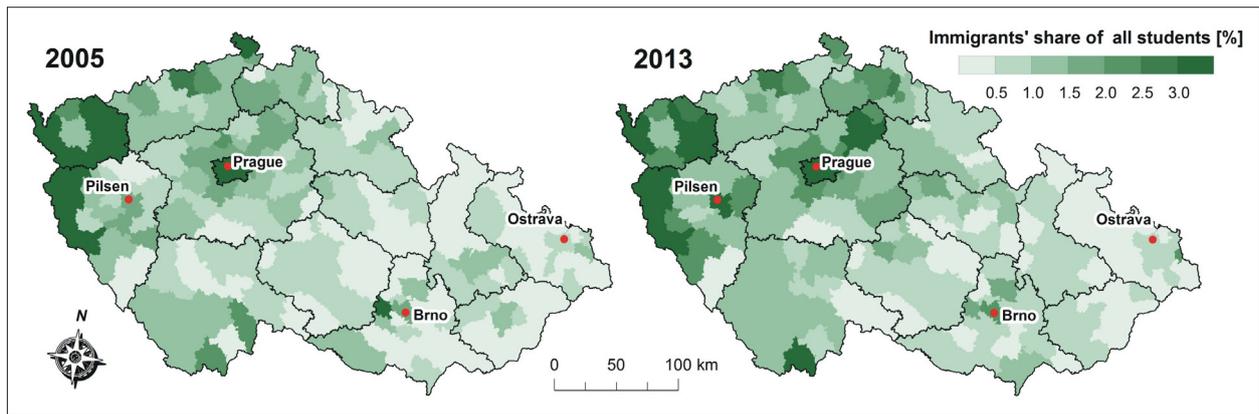
*Fig. 1: The share of non-citizen pupils at primary and lower secondary schools in relation to the total number of pupils at the schools in ADMEPs in 2005 and 2013*
*Source: Authors' calculations based on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2005/2006 and 2013/2014)*

deeper analysis, we shall present at least the basic trends in the spatial distributions of individual immigrant groups between the 2005/2006 and 2013/2014 school years. Given that we are focusing mainly on the level of concentration, we calculated two indicators of the spatial concentration of individual groups during the period of observation. The results are presented in Figure 2: the X axis represents the percentage of pupils from the given group attending a school in Prague (as the key immigration city), and the Y axis is the Gini coefficient of concentration[9], which indicates how evenly the given group is distributed across

individual ADMEPs. Figure 2 confirms that there are large differences between individual groups in terms of the degree of spatial concentration. For example, the Gini coefficient of concentration in 2013 was 0.385 in the case of Slovak pupils, but more than 0.8 in the case of pupils from China or Sub-Saharan Africa. As one would expect, there is a positive linear relationship between the two indicators, which is particularly evident in the year 2013 (see the red squares). Some groups in this figure, however, lie outside the main (regression) axis. This is particularly the case for Mongols and Poles, which have relatively high Gini coefficients, but
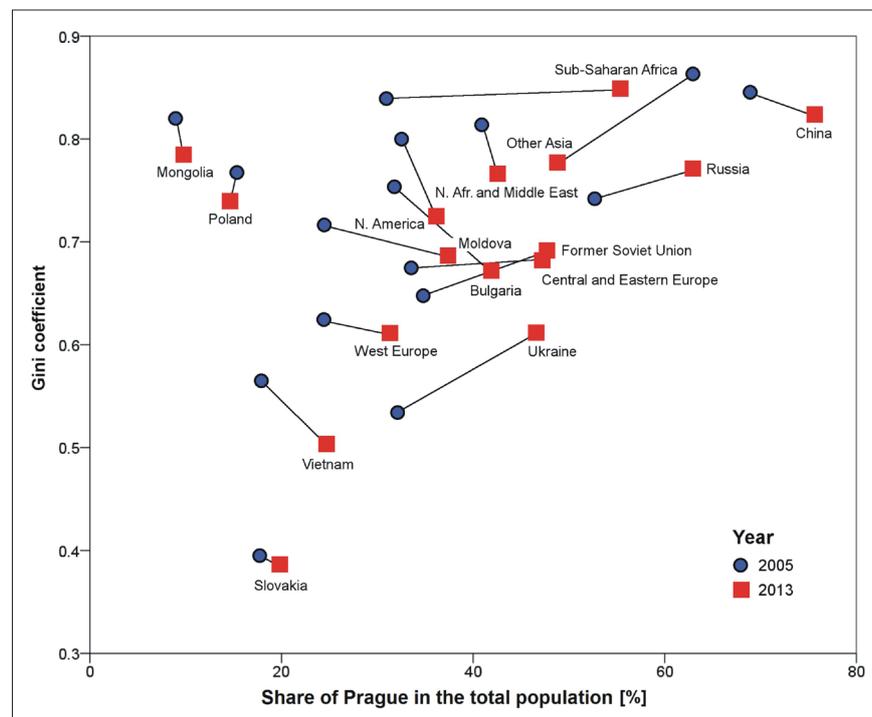


*Fig. 2: The spatial concentration of non-citizen pupils between 2005 and 2013. Source: Authors' calculations based on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2005/2006 and 2013/2014). Note: Groups from Oceania and Latin America are not shown owing to the very small number of pupils from these groups.*

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[9] The Gini coefficient of concentration has the range (0–1), where zero indicates the given phenomenon occurs evenly across all units, and one indicates that the phenomenon is concentrated in one unit. In the case of the student populations considered, a higher Gini coefficient of concentration indicates greater spatial concentration of non-citizen pupils at the level under analysis.

their concentration with respect to Prague is relatively low, which indicates that these groups are concentrated, but elsewhere than in Prague.

If we look at spatial concentration over time, two contradictory phenomena can be observed among most groups: a decreasing Gini coefficient and a growing share of non-citizen pupils in Prague (Fig. 2). As our data show[10], over the course of the period under observation most groups typically settled in Prague and then they began to settle in the suburbs around Prague (and Brno) or in the regions along the German border. A different trend, however, was observed among the groups from the former Soviet Union, the largest of which are the Ukrainians and Russians. Although these groups have also increased their representation in the Prague metropolitan area, they are much more concentrated directly to the capital city and, contrary to the other groups, their Gini coefficients increased (Fig. 2). Besides that, they established a secondary concentration in northwest Bohemia. By contrast the lowest level of concentration is observed among two specific groups: Slovaks and Vietnamese. For a long time Slovaks shared a state with the Czechs and the two groups are culturally very similar; therefore, their spatial behaviours are most like those of the domestic population. The Vietnamese community members largely work in retail trade networks and as a result they tend to settle in every region (Janská et al., 2014), but they favour regions close to the western border, which are frequently visited by the inhabitants of nearby wealthier states.

To conclude this section, the trends in the concentration of non-citizen pupils as a whole (Tab. 2) can be described. First, the lowest Gini coefficients are observed in the boroughs of Prague. This is consistent with the findings of Drbohlav (2011) that Prague, in this respect, differs from Western metropolitan areas where, by contrast, immigrants tend to settle much more in certain neighbourhoods[11]. Secondly, the Gini coefficient at every administrative level examined in this analysis increased during the period under observation, a finding that differs from preceding findings that showed declining concentrations of all groups defined by country of origin (Fig. 2). There are two possible explanations for this inconsistency:

1. Individual groups, as they grow in size, expand over time into multiple regions, but at the same time most groups have a tendency to spread to the same regions, where they may become increasingly concentrated.

This trend can be demonstrated by the example of the Poles: Gini coefficients for this group decreased at every administrative level, but at the same time the places of their concentration shifted considerably from the border regions, areas where there are not too many other non-citizens, primarily to Central Bohemia, region where there are concentrations of other groups. In this way, Polish pupils contributed to increasing the concentration of non-citizens in localities and schools already the most exposed to non-citizens; and

2. Although there was a spatial de-concentration of most groups, with the exception of the Slovaks (where the changes were minimal) and the Vietnamese, these groups represented only a small share of the total number of non-citizens. Conversely, a strong process of concentration occurred among Ukrainians and Russians (the first and fourth largest groups in 2013): the large share of Ukrainians and Russians among non-citizens explains why the Gini coefficients for the whole population of non-citizens in Table 2 increased, even if the Gini coefficients calculated separately for most groups decreased over the observed period (see Fig. 2).

## 5. The concentration of non-citizen pupils at schools

The analysis of the spatial distribution of non-citizen pupils in the Czech Republic completed, we now focus on determining the degree of their concentration at individual schools. The aim is to identify how the number of non-citizen pupils at schools has changed over time in relation to total student populations, and whether there is a tendency at any of the schools to specialise in the integration of pupils from particular source countries (a tendency that has been found in studies abroad, e.g. Riedel et al., 2010), or whether the schools tend to integrate pupils from every background.

For the initial analysis we again drew on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2005/2006 and 2013/2014). Our analysis did not cover all schools, but only those in which some non-citizen pupils were enrolled during the period under observation. Figure 3 shows the statistical distribution of the share of non-citizen pupils at schools for the years 2005 and 2013. In both years the distribution was highly right skewed as most of the schools fall within the category in which non-citizen pupils make

| Administrative level | Number of units | Gini coefficient/Years | | | | |
|---|---|---|---|---|---|---|
| | | 2005 | 2007 | 2009 | 2011 | 2013 |
| Regions | 14 | 0.373 | 0.382 | 0.391 | 0.373 | 0.406 |
| ADMEPs | 206 | 0.456 | 0.462 | 0.463 | 0.463 | 0.471 |
| Boroughs of Prague | 22 | 0.156 | 0.141 | 0.164 | 0.160 | 0.164 |

*Tab. 2: Trends in the Gini coefficient for the concentration of non-citizen pupils at various administrative levels*
*Source: Authors' calculations based on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2005/2006, 2007/2008, 2009/2010, 2011/2012, 2013/2014)*
*Note: The data correspond to the values of the Gini coefficient measured at the territorial unit indicated in the first column*

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[10] Limited space sadly does not allow us to show maps for distinct migrant groups; however, the authors will provide these maps upon request.

[11] A direct comparison of the degree of spatial concentration between Prague and Western cities is however very difficult as this value is highly dependent on the scale of territorial units.
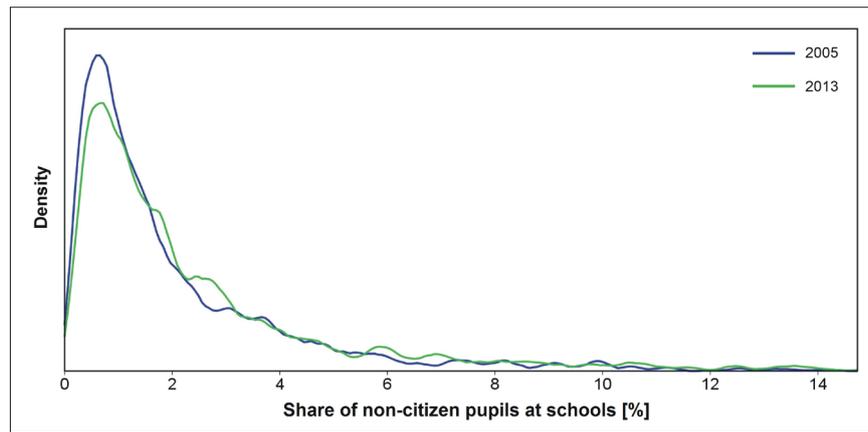
*Fig. 3: The distribution of the share of non-citizen pupils as a percentage of all pupils at the Czech primary and lower secondary school in 2005 and 2013: kernel density estimates*
*Source: Authors' calculations based on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2013/2014)*

up 0.5–1% of all pupils (this is the case of more than one-fifth of all schools)[12]. The share of schools with a small percentage of non-citizen pupils, however, decreased between 2005 and 2013, while the number of schools with a large percentage of them increased. Moreover, the share of schools with at least one non-citizen pupil declined from 54.5% to 49.3%, despite the fact that the number of such pupils increased between 2005 and 2013. This indicates that the concentration of non-citizen pupils at schools somewhat increased over the observed period.

The increased concentration of non-citizen pupils at schools may partly be the result of the growing spatial concentration of non-citizen pupils (see above). In order to test this, we conducted an analysis using a decomposition of the Theil index (for more, including the formula used, see Netrdová and Nosek, 2009; Novotný, 2007; Novotný et al., 2014). The Theil index is an index of concentration much like the Gini coefficient, but it has a major advantage: not only can it measure changes in the overall concentration of non-citizen pupils at schools (0 minimum concentration, ln $n$ maximum, where $n$ represents the total number of cases), but it can also be used to calculate to what extent differences between individual regions (in this case ADMEPs) contribute to this concentration and how much concentration there is within these regions (that is, non-spatial concentration at schools within individual ADMEPs, given by parental choice). Table 3 shows the

results of this analysis. In the first row we can see that the overall level of concentration declined at first and then was steadily increasing over the observed period. The source of this increase is explained by the decomposition result: concentration within the regions decreased sharply between 2005 and 2007 from 0.327 to 0.298, which explains the initial decline in overall concentration. After that the level of concentration within the regions remained almost without change, which means that the increase in overall concentration is due to changes in the spatial distribution of non-citizens and not to parental choice. As we can actually see in the third row, values of the between-regional component of the Theil index were continually increasing. This is not surprising and corresponds to the Gini coefficients in Table 2. To sum up, the results of the Theil decomposition show that the increase in the concentration of non-citizen pupils at schools apparent in Figure 3 is due to growing spatial (between-regional) concentration, not by the concentration of non-citizens to schools within the geographical regions.

We shall now try to determine whether non-citizen pupils at any given school tend to be mostly from the same migrant group or whether there is a variety of migrant groups at the school. Table 4 shows the number of different groups at a school (based on the division presented in Tab. 1) in relation to the percentage of all non-citizen pupils in school in 2005 and 2013. It is important to note that the schools

| Year | 2005 | 2007 | 2009 | 2011 | 2013 |
|---|---|---|---|---|---|
| Theil's coefficient – altogether | 0.471 | 0.449 | 0.462 | 0.474 | 0.485 |
| Inequality within ADMEPs | 0.327 | 0.298 | 0.294 | 0.295 | 0.300 |
| Inequality between ADMEPs | 0.143 | 0.152 | 0.168 | 0.178 | 0.184 |
| Inequality within ADMEPs (%) | 69.6 | 66.3 | 63.6 | 62.4 | 62.0 |

*Tab. 3: The concentration of non-citizen pupils at schools measured with the Theil index*
*Source: Authors' calculations using the EasyStat 1.0 program (Novotný et al., 2014) based on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2005/2006, 2007/2008, 2009/2010, 2011/2012, 2013/14)*
*Note: The figures for both components are after deducting the stochastic component (see Novotný et al., 2014). The index was calculated from the shares of non-citizen pupils at schools weighted by school size*

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[12] It may be surprising to find that the share of schools on the left side of the distribution (0–0.5%) is small. This is largely due to a mathematical distortion, however, as only schools with more than 200 pupils can have a share of non-citizen pupils less than 0.5%, and naturally the number of such schools is limited.

| Share of non-citizen pupils of the total number of pupils at the school [%] | Number of groups of non-citizen pupils at individual schools [%] | | | | | | |
|---|---|---|---|---|---|---|---|
| **2005** | **1** | **2** | **3** | **4** | **5–6** | **7–8** | **> 8** |
| 0.01–0.99 | 59.2 | 25.1 | 11.5 | 3.7 | 0.4 | 0.0 | 0.0 |
| 1.00–1.99 | 32.3 | 23.7 | 21.7 | 12.4 | 9.4 | 0.6 | 0.0 |
| 2.00–2.99 | 21.4 | 17.0 | 19.2 | 18.3 | 18.3 | 4.8 | 0.9 |
| 3.00–4.99 | 33.2 | 9.0 | 13.5 | 12.3 | 18.4 | 10.7 | 2.9 |
| 5.00–9.99 | 31.0 | 7.0 | 6.3 | 10.6 | 19.7 | 15.5 | 9.9 |
| 10–100 | 40.8 | 20.4 | 8.2 | 2.0 | 14.3 | 12.2 | 2.0 |
| **2013** | **1** | **2** | **3** | **4** | **5–6** | **7–8** | **> 8** |
| 0.01–0.99 | 65.6 | 23.5 | 8.1 | 2.4 | 0.4 | 0.0 | 0.0 |
| 1.00–1.99 | 30.6 | 26.9 | 21.0 | 12.4 | 8.6 | 0.5 | 0.0 |
| 2.00–2.99 | 25.7 | 17.4 | 13.2 | 18.8 | 22.2 | 2.4 | 0.3 |
| 3.00–4.99 | 30.4 | 13.0 | 13.3 | 10.4 | 18.9 | 11.5 | 2.6 |
| 5.00–9.99 | 23.0 | 13.6 | 3.7 | 6.3 | 15.7 | 24.6 | 13.1 |
| 10–100 | 16.7 | 11.5 | 1.3 | 3.8 | 14.1 | 11.5 | 41.0 |

*Tab. 4. The number of different groups of non-citizen pupils at individual schools in 2005 and 2013*
*Source: Authors' calculations based on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2005/2006 and 2013/2014*

in the first row have just several (and often just one) non-citizen pupils in the student population, so it is almost impossible for there to be more than one immigrant group at the school; in the case of smaller schools, this applies to some extent also to the second and third rows.

Nevertheless, a basic statistical relation can be noticed in the table: the larger the share of non-citizen pupils at a school, the greater the number of different immigrant groups there tend to be at the school. In 2005, however, in 60% of schools where the share of non-citizen pupils exceeded one-tenth of all pupils, no more than two different migrant groups attended the school. This indicates that schools with non-citizen pupils from a large number of different backgrounds were rare (with some exception of schools with 5–8 groups). The figures from 2013 document the remarkable change: 41% of these schools had pupils from more than eight of the groups included in this study. This finding is even more interesting when we compare it to 2005, when there were almost no such schools.

It would be interesting to know what kinds of schools fall into this category. The data 'speak clearly' on this: 56 out of 65 of these schools are in Prague and they are all large; they have at least 160 pupils and 53 of them have more than 300 pupils. The changes are evidently a direct consequence of the ongoing process of spatial concentration of non-citizen pupils that was mentioned in the first part of this section. Immigrants from all immigrant groups are concentrated primarily in Prague, but unlike in many big Western cities the different groups in Prague are not centred in specific parts of the city, and further evidence of this is that the schools with large shares of immigrants are located in various areas around the city. Logically, then, the non-citizen pupils at schools with large shares of immigrants will come from various different backgrounds. This situation is something entirely new, however, as in 2005 very few schools were in this situation and just a small number of groups tended to dominate the non-citizen population at a school; schools were thus more 'specialised' in teaching specific groups than they are today.

### 5.1 The concentration of non-citizen pupils at schools: case studies

The analysis described above revealed the main trends in the concentration of non-citizen pupils at schools, but the reliability of these findings needs to be tested by a change in scale, and this we shall do in the case studies of selected towns (Říčany, Mladá Boleslav, Karlovy Vary, Teplice, Tachov) and two boroughs in Prague (Prague 13 and 14), where a total of 77 schools are located.

For this study, we favoured mid-sized towns in order to minimise the role of the distance to a school on school choice and so that there would be both a sufficient number of schools within the unit of study and a sufficient number of non-citizen pupils. Therefore, the selection was limited to areas with a relatively large share of immigrants in which parents could freely choose between schools and where 'Tiebout sorting' could also be easily possible. Another criterion was the attempt to select towns with different socio-economic conditions in various parts of Bohemia. No Moravian towns were included in the study, as the only towns with a sufficient number of resident immigrants are Brno, which is too large for the study, and Český Těšín, where the situation is 'distorted' by its location on the Polish border.

Studies were carried out in the boroughs of Prague 13 Stodůlky, Jinonice, Třebonice, Řeporyje) and Prague 14 (Hloubětín, Kyje, Černý Most, Hostavice), two boroughs with the largest shares of non-citizen pupils among their resident populations. The high share of non-citizen pupils (11.6% and 8.2% of the local student population, respectively) is an advantage for the analysis of the boroughs in Prague. A disadvantage, however, is that within a city it is no problem for parents to exercise their right to choose their children's school. Consequently, pupils living in one borough may easily attend school in another one. Unlike the towns, where the right to choose a school is limited by geographical constraints and additional commuting costs, the boroughs of Prague are not self-contained units in this respect. It is therefore difficult to capture those pupils who live in the boroughs analysed but study elsewhere.

We analysed trends in the number of both Czech and non-citizen pupils at all schools in these selected cases, but due to limited space we can only present the main findings.

The first case study was in Říčany, a rapidly growing town in the immediate suburban area of Prague. The town's growth is also apparent in the increasing number of schools in recent years and the increasing number of non-citizen pupils attending them. Almost all of them are concentrated in the three large schools, while among the six smallest schools there is only one non-citizen pupil. Immigrants seem therefore to prefer to send their children to large schools where there is a more anonymous environment and which also have some experience with non-citizen pupils. At none of the three large schools is there any substantial concentration of such pupils. The question is whether the findings for Říčany are not distorted by the fact that the town is located within commuting distance of Prague, so some parents may instead choose to send their children to a school in Prague.

Another town included in the study was Mladá Boleslav, one of the most prosperous towns in the Czech Republic, and the location of the biggest car plant in the country. The abundance of job opportunities has attracted many new immigrants and this is reflected in the number of non-citizen pupils enrolled in local schools. They are very evenly distributed across schools in Mladá Boleslav, even when looked at by country of origin. There is only one exception, where the total number of pupils fell almost by half in the eight-year period, while the number of non-citizen pupils (and hence also their concentration at this school) increased significantly. A closer look at the data shows that most of them are of Slovak background (40 pupils).

A very different situation exists in the town of Karlovy Vary, which is well known for a higher concentration of immigrants (especially from Russia and other Post-Soviet countries). Although their number did not change significantly during the period under observation, due to decreasing number of native pupils the share of non-citizen pupils increased. In 2005 the largest share of non-citizen pupils (29%), two-thirds of whom were of Russian background, were enrolled at one small school, which was later closed. At present, most non-citizen pupils are enrolled at two schools which in 2005 had stood out as having a large share of them, but during the eight-year period the shares at these schools continued to increase while they tended to stagnate at the others.

A closer look at the data shows that the situation developed quite differently at each school. The first of them was the largest one in the city (610 pupils) and it had long tended to have a concentration of pupils from post-Soviet countries (including Russia and Ukraine). While the share of non-citizen pupils is on the rise here, the total number of pupils sharply decreased to only 358 pupils in 2013, which may be a sign of the process referred to in the literature above (e.g. Kostelecká et al., 2013), where a large share of non-citizen pupils at a school may lead parents not to enrol their children in that school. This practice has been described in various studies outside the Czech Republic (e.g. Lankford and Wyckoff, 2001; Söderström and Uusitalo, 2005).

The situation at the second school was different as the number of Czech students barely changed and the share of non-citizen pupils grew very slightly. In 2005 almost all the non-citizen pupils there were of Vietnamese background, but between 2005 and 2013 there was a significant decrease in

the number of Vietnamese in the town, which had an impact on this school, but it then attracted non-citizen pupils from other backgrounds, in most cases Russia and Ukraine.

The town of Teplice also witnessed a substantial increase in the share of non-citizen pupils. This increase was very unevenly distributed among the schools in the town and the largest share of non-citizen pupils in Teplice was observed at two middle-sized schools in 2005. Both schools then experienced the biggest relative decrease in the number of Czech pupils in the town, so the share of non-citizen pupils increased further. As in the case of Karlovy Vary, our data for Teplice again signal that when the number of non-citizen children at a school is high Czech parents are less willing to send their children there.

Another town in the study, Tachov, occupied a very peripheral location geographically in the socialist period, but this has changed since the Western borders were opened. There are three main non-citizen groups here: Vietnamese, Ukrainians and Slovaks. While the number of pupils from the first two groups has decreased over time, the number of Slovaks has increased. In 2005 there was only a small share of non-citizen pupils at the two largest schools in the town, but the majority of them were attending one medium-size school, while at the two largest schools there were much smaller shares of non-citizen pupils. This suggested the possible segregation of minorities at one school, but this situation changed over the years, and although the above-mentioned medium-size school was still the school with the largest share of non-citizen pupils in 2013, their share had decreased and its composition had changed by then. Now Slovaks make up the majority of non-citizen pupils, while there are just a few pupils from Ukraine and Vietnam.

Finally, we look at the situation in the two boroughs of Prague: Prague 13 and Prague 14. Both of them witnessed a substantial increase in the share of immigrants among the pupil population, which doubled between 2005 and 2013, an increase that occurred at all schools in the boroughs but one. By contrast, the number of Czech pupils decreased in the majority of schools and despite the influx of non-citizen pupils, the overall numbers of pupils at schools in these boroughs also decreased. This can be partly explained by the fact that in both boroughs the population aged 5–14 declined by 10%. The population trends in these boroughs are different from the trends in Prague in general, where the 5–14 age group is growing quickly, even though the total population and the number of non-citizens are growing at a slower pace. The decreasing number of pupils at the schools, in Prague 13 at least, is not then due to the fact that parents are sending their children elsewhere, but is the result of the overall decrease in the number of children living there, either because they are moving away or owing to low fertility. Now it is mainly immigrants (especially from post-Soviet countries) who are moving into these boroughs and most of them do not have children.

When we look at individual schools in Prague 13, a similar trend is apparent across most of them: as the number of non-citizen pupils rises in most cases, the number of Czech pupils decreases. There was a significant increase in the number of Czech pupils in just three schools; two of them had a very low share of non-citizen pupils. Similarly, all three schools with a growing number of Czech pupils in Prague 14 had below-average shares of non-citizen pupils. In both boroughs five schools had a large share of non-citizens; the number of Czech pupils almost did not change

at two of them (one in each borough). The remaining three schools experienced a substantial drop of Czech pupils (one in Prague 13 and two in Prague 14).

The analysis of the situation at schools in the selected towns and two Prague boroughs revealed some shared trends, despite the specific contexts of the individual localities. We must remember that during the period of observation the number of non-citizen pupils was increasing, while conversely the number of native students was decreasing (Tab. 1). This decrease however was not uniform across all schools as the drop was generally much more apparent in the case of schools with a large share of non-citizen pupils. Even this tendency was not the rule, however, as we can see on the example of the schools in Karlovy Vary or Prague discussed above. Although schools with a large share of non-citizen pupils often experienced this development, others did not. This indicates that other factors prevent a possible outflow of Czech students when the number of non-citizen students rises.

The overall findings of the analysis are summed up on the left side of Table 5, which shows the correlation between an increase/decrease in the number of pupils at schools and the change in the share of non-citizen pupils attending the schools (schools without non-citizen pupils in 2005 or/and in 2013 were removed from the analysis). The figures clearly show that in every territorial unit except Tachov, where the situation was somewhat specific, there were larger decreases of number of pupils from schools where the share of non-citizen pupils was growing the fastest to schools where the number of immigrants had changed little. The level of the correlation was also low for the national level (last row), which, however, is not surprising: parents usually choose to send their children to a school within their territorial unit, so also these relations are valid just for the level of these units.

Admittedly, while this correlation may be a simplification and there may be other important factors that are not taken into account here (e.g. the size of the school: pupils tend most often to leave the largest schools, which is also where the largest numbers of non-citizen pupils are), the relatively high correlation coefficients and their relative consistency across the different environments in various territorial units, suggest that there is genuinely a tendency for Czech

pupils to avoid schools where non-citizen pupils tend to enrol. But as a comparison of the Gini coefficients (calculated in the same manner as in section 3) in the next two columns in Table 5 shows, the overall level of concentration of non-citizen pupils at schools within most of the territorial units in the analysis did not increase significantly between 2005 and 2013. This is primarily due to increases in the numbers of non-citizen pupils at those schools where in 2005 there had been very few or none at all. While in 2005 non-citizen pupils accounted for less than 3% of pupils at 54% of schools, in 2013 it was only at 41% of schools. These proportions thus support the conclusions from Table 3 that the growing concentration of non-citizen pupils at schools that is shown in Figure 3 is more the result of the changing spatial distribution of immigrants than their concentration within relatively closed geographical units. This can be also confirmed by the fact that Gini coefficient for the Czech Republic as a whole (bottom row) is much higher than for each territorial unit. This is because this figure combines both concentrations between regions and within them. The Gini coefficients can also be used to compare the degree of concentration across individual territorial units. We can see that the highest concentration was observed in Karlovy Vary and Teplice, two towns in northwest Bohemia where we found some schools that had a large share of non-citizen pupils and simultaneously a decreasing number of native pupils.

## 6. Conclusions

This study of the regional distribution of non-citizen pupils at primary and lower secondary schools in the Czech Republic showed that during the period under observation, 2005 to 2013, the numbers of non-citizen pupils grew. Although most groups became more geographically dispersed, pupils from post-Soviet countries were an exception as a slight but stable increase in the spatial concentration of this group was observed during this period. Given that such students form the largest groups of non-citizens at schools, the effect of this process was to increase the spatial concentration of all non-citizen pupils generally in several regions, mainly in the metropolitan areas of Prague and Brno. The analysis of the data indicates that the spatial

| Town | Pearson correlation coefficient | Gini coefficient of concentration | |
|---|---|---|---|
| | | 2005 | 2013 |
| Říčany | − 0.948 | 0.219 | 0.381 |
| Mladá Boleslav | − 0.512 | 0.419 | 0.292 |
| Karlovy Vary | − 0.584 | 0.439 | 0.429 |
| Teplice | − 0.553 | 0.388 | 0.419 |
| Tachov | 0.556 | 0.378 | 0.142 |
| Prague 13 | − 0.347 | 0.328 | 0.350 |
| Prague 14 | − 0.654 | 0.239 | 0.227 |
| Czech Republic | − 0.139 | 0.643 | 0.623 |

*Tab. 5: The relationship between the changing number of non-citizen pupils at a school and the total size of the school and the concentration trend.*
*Source: Authors' calculations based on data from the Ministry of Education, Youth and Sport (Statistical Yearbook on Education – Performance Indicators 2005/2006 and 2013/2014.*
*Note: The Pearson correlation coefficient indicates the relationship between the index of change in the total number of all pupils at the schools in the given territorial unit (number of pupils in 2013 divided by the number of pupils in 2005) and the change in the percentage of non-citizen pupils at these schools. The Gini coefficient indicates the degree of concentration of non-citizen pupils at schools in the given territorial unit; it is weighted by the size of schools*

behaviours of non-citizen pupils replicates that of the adult population, which has been described elsewhere in the Czech literature (Čermák and Janská, 2011; Drbohlav et al., 2010; Janská et al., 2014). This finding is logical because children in this age group usually follow their parents.

While the spatial behaviours of adult immigrants largely reflect their economic interests, the distribution of non-citizen pupils is the result of the combined effect of two key factors: the spatial distribution of immigrants in general, and the school choices of non-citizen and native parents. Experience outside the Czech Republic tells us that in many cases when parents have the option to choose their children's school this contributes to the ethnic and social segregation of pupils and leads to more ethnically homogeneous schools (e.g. Riedel et al., 2010). Some studies have even drawn attention to the fact that parents with higher socio-economic status try to assert their choice of school even in countries where there are restrictions on doing so.

As noted above, the Czech Republic is one of the countries where parents have the right to choose the school for their children that best conforms to their preferences, as long as there is sufficient capacity at the school, after pupils from the local district have enrolled. Given what we know from international studies about how school choice often reinforces the process of ethnic and social segregation, we had some concerns about whether an increasing share of non-citizens among pupils would lead to the segregation of non-citizen pupils at Czech schools. Nevertheless, this analysis showed that while there are signs of an increase in the concentration of non-citizen pupils at schools, the level of concentration is not yet alarming. The analysis also indicates that the increasing concentration in schools is likely due to the growing spatial concentration of non-citizens rather than to the fact that parents have options to choose schools.

This analysis has also confirmed that schools do not 'specialise' in one immigrant group – at schools with a larger share of non-citizen pupils they are always members of several different groups. This trend towards greater heterogeneity in schools moreover appears to have a strengthening tendency over time, and this is particularly true of large schools in Prague, which (unlike in 2005) are attended by numerous pupils from various backgrounds. This indicates that for the time being the Czech capital (unlike many Western metropolitan areas) is not witnessing any process of segregation of non-citizen pupils by origin into certain localities.

On the other hand, a closer look at the situation in the selected case study towns showed that in some cases developments in Czech schools resembles some trends described in the international literature. Schools with an increasing number or a large share of non-citizen pupils sometimes see this growth accompanied by a decrease in the total number of native pupils, as their parents withdraw them from these schools. It is not explicitly clear, however, at what percentage of non-citizen pupils at a school this withdrawal occurs. This phenomenon may occur in concert with many other factors, however, such as the size of the municipality in which the school is located, the availability and quality of other educational institutions within commuting distance, the quality of the school, and, last but not least, the origin and social composition of the school's students. To unequivocally confirm the assumption that the parents of native pupils withdraw their children from schools where there are large shares

of non-citizen pupils, we would have to carry out other in-depth analyses (minimally with the parents, of course) that lie outside the scope of this article. This analysis of data on the distribution of non-citizen pupils at primary and lower secondary schools revealed that some trends witnessed in countries with long histories of migration are not yet in evidence in the Czech Republic. There is not a noticeable trend in Czech urban areas or schools towards the concentration or segregation of non-citizens or to the emergence of large ethnic neighbourhoods or schools with a majority of non-citizen pupils. It is possible that if preventive measures aimed at supporting the integration of migrants are not introduced, in time the developments in the Czech Republic could mimic the migration experiences of Western countries with all the same risks, but just with a slight delay (Čermák and Janská, 2011; Drbohlav, 2011). It is possible that some reasons why there is relatively little concentration or segregation of migrants, are the Czech Republic's brief experience of migration to the present, as well as the still lower immigration rates than those observed in Western Europe.

## Acknowledgement

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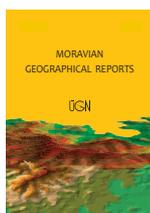
# Population potential within the urban environment and intra-urban railway network opportunities in Bratislava (Slovakia)

Pavol Ďurček [a] [*], Marcel Horňák [a]

## Abstract

*Urban environments in post-socialist cities have generated new challenges for urban planners and decision makers. As one example, the transport infrastructure of Bratislava has not been adjusted with respect to increasing mobility and the transit problems of its intra-urban environment. An upgrading of the conventional railway networks within the city is one of the major opportunities which might considerably improve public transit capacities available for both intra-urban and regional (suburban) transport flows of passengers. Relevant studies on the population potential of residents supporting such upgrades are still lacking. In addition, a detailed database on population distributions within the intra-urban environments of Slovak cities is not yet available. Therefore, this paper attempts to introduce one of the possible methodological approaches leading to an estimation of population potential as an elementary precondition of intra-urban railway traffic effectiveness, in a society where a detailed database on population distribution is not available.*

*Keywords: accessibility, population potential, intra-urban railway transport, GIS, Bratislava, Slovakia*

## 1. Introduction

Intra-urban transport networks and their upgrading represent one of the pressing issues discussed in geographic, economic and other scientific periodicals. In Bratislava (the capital city of Slovakia), debates on upgrading the city transport system have recently become very frequent, too. As a result of this, a new Master Transport Plan of the Capital City was elaborated and approved by the city authorities in 2015.

Bratislava is a typical example of a post-socialist city, searching for tools and policies aimed at coping with growing intra-urban mobility demands and flows. Moreover, according to recent studies (e.g. Šveda, 2011; Hardi, 2012), the intensification of suburbanisation processes in the Bratislava region after 2000 has generated a growth of commuter flows between the city and its hinterland. In addition, considering growing transit traffic (especially road transit) passing through the urbanised area of Bratislava, the imbalance between increasing mobility and traffic demands and the limited capacity of the urban transport infrastructure has been increasing constantly (CDV, 2016).

Our intention is to demonstrate one of the possible approaches to intra-urban transport infrastructure accessibility research to show some of the opportunities for

the practical utilisation of scientific geographical research within a GIS environment. Michniak (2003) distinguishes among three basic elements of accessibility: (1) accessibility as represented by an individual, community or any other group of persons; (2) the constitution of an accessibility object (the target site): and (3) a transport link between initial and target points of accessibility carried out in existing transport networks. This paper is principally focused on the first element, while the latter ones play only marginal roles in our study.

The main aim of the paper is the quantification of the size of the population residing in sites adjacent to railway stations located in Bratislava city. Such a quantification process may result in a more accurate estimation of populations concentrated near railway stations, which allows for the definition of the potential of the stations for intra-urban traffic purposes more precisely. Recent discussions on policies aimed at a higher involvement of railway network capacities in intra-urban passenger transport performance in Bratislava have inspired us to show and employ one of the possible methodological approaches to the issue. In this study, two different approaches or variants will be shown: in addition to the existing railway stations' potential for intra-

[a] Department of Human Geography and Demography, Faculty of Natural Sciences, Comenius University in Bratislava, Slovakia (*corresponding author: P. Durček, email: *durcek@fns.uniba.sk*)

urban transport, the potential of railway stations planned in Bratislava's railway network upgrading projects will be considered. The potential of railway stations was calculated as the number of inhabitants residing within 15 minutes travel time from the nearest railway station. The resident populations within the 15-minutes interval will be scanned for two different modes of transport: walking and using public transport. We assume that within a densely urbanised environment, these two modes of transport play a basic role in everyday access to intra-urban railway nodes and stations (Brons et al., 2009).

Unlike most Western European cities, Bratislava has still not developed a relevant infrastructure suitable for the daily use of bicycles in passenger traffic. Passenger car transport was not considered because the existing railway stations in Bratislava are usually not equipped with sufficient car parking capacities. Additionally, Bratislava has not developed a system of park-and-ride (hereinafter P&R) capacities adjacent to railway stations so far (according to CDV 2016, the P&R sites are supposed to be at the terminal stops of tram lines). Our approach is rather simplified, but our main intention is to verify a scientific method to facilitate an accurate assessment of the resident population potential related to an intra-urban transport network in a society where a population register database has not been developed.

## 2. Theoretical background

### 2.1 Accessibility to transport infrastructure in scientific research

The phenomenon of accessibility has been examined frequently in various studies. The methodology used in accessibility research and the graphical visualisation of population potential related to transport networks have been elaborated in numerous scientific papers and studies (see e.g. Brainard et al., 1997; Kwan, 1998; Jiang et al., 1999; Geurs and Ritsema van Eck, 2001). The above-mentioned issues are also subject to systematic research in Slovakia, where several valuable studies emerged. For instance, Križan and Gurňák (2008) describe a wide spectrum of cartographic tools for the assessment and visualisation of accessibility measures, preceded by studies presenting some of the cartographic methods of accessibility evaluation published by Kusendová and Szabová (1998) and Kusendová (2002).

Several previously published application studies showing detailed analyses of existing transportation systems and networks were also valuable for our research. Questions of the optimal accessibility of public transport in comparison with individual transport were disputed by Morris et al. (1979) and later by numerous studies (such as Handy and Niemeier, 1997; Geurs and Van Wee, 2004; Boruta and Ivan, 2010; Ivan and Tesla, 2015). With respect to conditions in Slovakia, Hejhalová (2010) tried to evaluate standards of public transport service quality and availability at a regional scale, emphasising the importance of public transport upgrading to improve its attractiveness. Special attention has also been paid to the process of the formation of integrated public transport networks, which is considerably belated compared to Western European countries (Bulíček and Mojžiš, 2008; Bulíček, 2008).

The accessibility to railway networks has been subject to research from various perspectives as well. A seminal study was carried out by Kotovaara et al. (2011), who examined how population increase/decrease might be affected

by accessibility to both railways and road networks. General methods assessing railway network accessibility and population distribution in relationship to railway infrastructure have been verified by numerous studies (see for example, Zhang et al., 1998; Horňák, 2004; Willigers et al., 2007; Horňák, 2008). In Slovakia and the Czech Republic, several studies on the accessibility of railways at the national level have appeared (Horňák, 2003; 2004; Michniak, 2006; Pšenka, 2009), including railway network distribution assessment in relationship to economic activities (Horák et al., 2004; Michniak, 2014). A special focus on accessibility in public transport infrastructure was presented in several important studies by Givoni and Rietveld (2007), Brons et al. (2009), Marada and Květoň (2010) and Boruta and Ivan (2010).

The intra-urban accessibility of infrastructure is the focus of this paper. Following some classical studies (e.g. Hanson and Schwab, 1987; Helling, 1998; Kwan, 1998), the accessibility of transport elements (and specifically of public transport networks) has been analysed and applied in Bratislava. The first assessment of intra-urban accessibility of railway stations within the city of Bratislava by means of GIS tools was carried out by Križan and Tolmáči (2008a). Two different accessibility measures were applied by these authors to examine the overall accessibility of railway stations from individual urban statistical units, enriched by a field questionnaire survey. The detailed population distribution related to the railway network was not shown in that paper, however, due to the missing detailed database of residential addresses. The analysis utilised 2001 census data, which allowed only a rough picture of population distribution in the urban environment, as the census data relate to statistical units covering often quite large intra-urban areas. Nevertheless, the above-mentioned study is a valuable example of a GIS-based analysis, even though the lack of accurate data led to limited results.

In addition, specific attention should be paid to the research by Kraft and Blažek (2012), who applied an approach to intra-urban public transport network accessibility in the city of České Budějovice (Czech Republic). The calculation of public transport network nodes accessibility within the urban environment used in this case was similar to what is applied in the current project. The main difference lies in the data sources on population distribution within the area of the city, as a detailed database on residential addresses (undisclosed data from the domicile register) was available for České Budějovice. With this database, the authors had a perfect opportunity to show the distribution of the city's residents and to analyse their accessibility to the urban transportation system.

As shown above, the accuracy of input data has a considerable effect on the final results, if the intra-urban accessibility of transport infrastructure is taken into consideration. In contrast with national or regional level studies, the measurement of an intra-urban level of accessibility requires specific detailed input data. Following Kraft and Blažek (2012), but lacking sufficiently detailed data, we elaborate a method leading to more accurate results. Hence, a lot of attention is paid to database creation and methodology in this paper.

### 2.2 Railway systems in the service of intra-urban traffic demands

Generally, rail networks (both conventional railways as well as segregated urban rails) in urban areas in Europe and North America have their roots basically in the 19th century

industrial revolution, when the development of railways became an inevitable precondition of economic development, encouraging an unprecedented growth of metropolitan areas. The renaissance of rail systems within large urban areas was seen in the second half of the 20th century as one of the efficient solutions to tackle rising traffic congestion (Docherty et al., 2008); however, as claimed by Lane (2008), the urban rail redevelopments in American and European metropolitan areas rest on significantly different priorities.

The process of urban rail network revitalisation has been seen worldwide, although some infrastructure-related specifics may be observed in relationship with traditional national or local policies, which led to the development of more or less peculiar rail technologies applied in individual countries or cities. In some metropolitan areas, redevelopment of existing rail systems has been crucial (e. g. the S-bahn network in Berlin: Peters, 2010). Elsewhere (for example in British cities), the redevelopment of existing rail networks has been accompanied by a vast construction of new rail system (Edwards and Mackett, 1996). The development of rail systems in the environment of what was the former Czechoslovakia has recently been well documented by Seidenglanz et al. (2016), who emphasise that the Czechoslovak metropolitan areas (including Bratislava) witnessed a considerable development of light rail systems (based on fast urban trams) typical for many other European areas.

The impact of the intra-urban locations of inter-city railway stations on their surrounding urban environments may be immense (Ahlfeldt, 2011). As indicated by Peters (2009, p. 177), "the high-profile redevelopment of central rail stations and their surrounding areas in major cities… underlines the reinvigorated significance of rail-based infrastructures in the post-modern, postindustrial, post-Fordist urban regional fabric". This aspect of inter-city railway nodes is not in the scope of this study. Nevertheless, we want to emphasise that by strengthening the position of conventional railway stations within the urban environment of Bratislava, the redevelopment of the neighbouring areas could bring further benefits for the city. The process of a full integration of conventional railways into the public transport network in the city of Bratislava has been a matter of numerous political discussions. To date, however, no definitive planning document has been produced on a final solution for the conventional railway network. According to an official announcement of the national railway network operator (Železnice Slovenskej republiky), the process of elaboration of a feasibility study on the railway nodes of Bratislava has been launched recently (www.zsr.sk).

## 3. Research methodology

### 3.1 Database preparation

MAPZEN (2015) is an Internet portal where databases on transport networks and land-use categories are available, even for highly urbanised areas. This internet source is utilised also by the well-known OpenStreetMap portal (2015). For our purposes, the following map layers were downloaded in Shapefile (SHP) format (as of February 1st, 2015): existing buildings layer; transport networks layer (pedestrian walkways, roads, railways, etc.); and land-use layer and administrative units. A map layer of basic residential units (BRU, administered by the Statistical Office of the Slovak Republic as elementary statistical units), adopted from the study of Garajová (2015), was utilised as the second input database. This map layer included data on population sizes in individual BRUs (as of May 21st, 2011), based on the official 2011 population census, published in Štatistický lexikón obcí Slovenskej republiky 2011 (Podmanická et al., 2014).

All steps leading to the development of the source database as described below have been executed in the ArcGis 10.1 environment. The selection of geo-referenced data covering the territory of Bratislava city was the very first step, utilising the "CLIP" tool. From source map layers, we defined the administrative territory of Bratislava city using the proper map layer of administrative borderlines.

Two main elements were crucial in the process of input database adaptation. First, detailed spatial data on the resident population distribution were necessary. These data allowed us to identify the number of residents living in particular accessibility zones surrounding railway stations in the city. Second, to derive realistic distances to measure accessibility to individual railway stations, relevant communication lines (pathways and public city transport networks) were identified.

The steps leading to an accurate estimation of the population sizes were as follows. Data on the location (addresses) of residents are permanently collected by the Central Population Register, which has already initiated the development of a so-called "address points" database covering the number of citizens residing at each address. This database is not available to the public, however, as its development is still in progress. Hence, we decided to apply a spatial approximation approach to create our own original database of the resident population distribution. To achieve this, map layers of existing buildings and BRUs[1] (including numbers of inhabitants as of 2011) were used. The basic principle in this approximation rests on the number of residents related to individual buildings. In this simple procedure, we had to face several problems. Not all buildings in the urban area are residential. Numerous buildings serve as industrial structures, shopping centres, schools, offices, etc. To distinguish among the principal functions of each building, the purpose of use attributed to each building in the map layer was used[2]. Based on this, buildings utilised primarily for residential purposes were selected for further data processing[3]. The selection procedure is schematically shown in Figure 1. In the following step, the layer of residential buildings was merged with the layer of BRUs using the "Join Data" tool.

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[1] The BRU layer represents the most detailed freely available database on population distribution in the urban environment of Bratislava.

[2] abandoned; apartments; barn; bridge; bunker; cabin; castle; cathedral; civic; collapsed; commercial; construction; container; detached; dormitory; garage; garages; greenhouse; hangar; hospital; hotel; house; houseboat; hut; chapel; church; industrial; kindergarten; manufacture; monastery; office; palace; post office; primary; public; residential; restaurant; retail; roof; ruins; shelter; shop; school; stadium; store; supermarket; terrace; theatre; tower; train station; transportation; university; utility; warehouse; other.
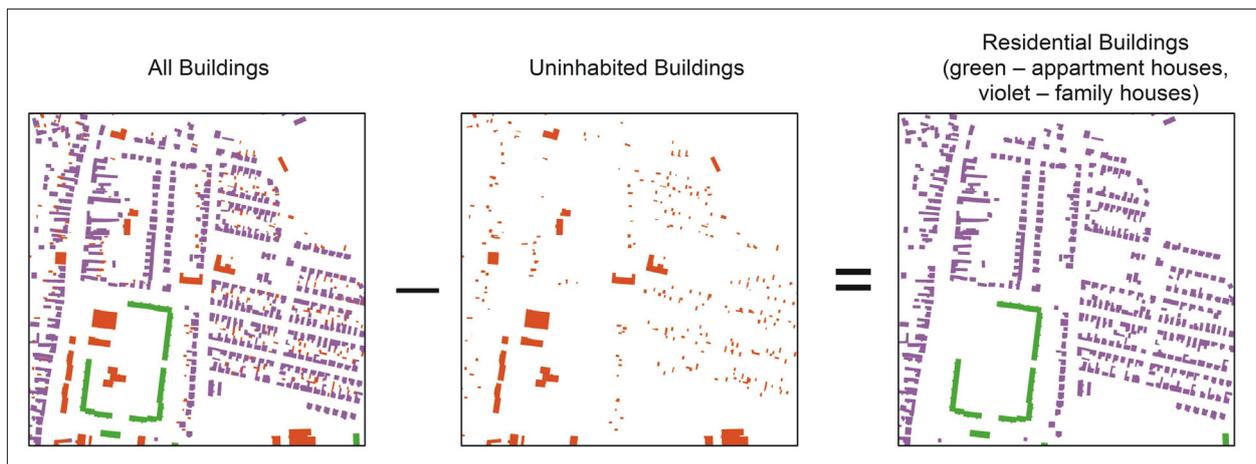
[3] apartments; house; residential

*Fig. 1: Scheme on the selection of residential buildings*
*Source: MAPZEN 2015, authors' compilation*

The redistribution of the population numbers of each BRU into individual residential buildings was carried out based on the proportionate area of each building. Applying the "Calculate geometry" tool, the area (m$^2$) of the plot of each residential building was calculated. The difference in the number of flats and floors (and thus residents) between standard family houses and apartment blocks may be significant, however, and so an estimation of the number of floors was carried out. No such official database is available; therefore we decided to estimate the number of floors based on a coefficient derived from a database of the internet portal ASB (2014). According to this database, the number of floors in a multi-storey apartment building in Bratislava ranges from 3 to 35, but 9 on average, while family houses have 2 floors on average. Therefore, the ground floor area of apartment houses and family houses was multiplied by 9 and 2, respectively. In the next step, the number of inhabitants residing in each BRU was distributed proportionally into residential buildings according to the following equation:

$$PO_{ij} = R_{ij} \cdot \frac{PO_j}{\sum_j R_{ij}}$$

where $PO_{ij}$ = number of residents in building $i$ located in basic residential unit (BRU) $j$, $R_{ij}$ = ground-plot area of building $i$ located in BRU $j$ (area after multiplying), and $PO_j$ = total number of residents of BRU $j$.

Having estimated the numbers of residents per residential building, a centroid for each building was generated by using the "Feature to Point" tool. In the following steps, the centroids are referred to as centres of population masses residing in respective buildings.

The way in which proper communication/mobility networks within the city were handled in this analysis is as follows. Unlike the above description of estimating population distribution, no approximation was necessary. Current map layers of communication networks in Bratislava were downloaded from the MAPZEN portal.

The source data for the map layer contains 27 types[4] of networks in total. For our purposes, only selected types were considered.

Following the main objectives of the paper, only two types of transport were used to measure accessibility of railway stations. We did not include individual car transport, as its use in intra-urban environments of middle-sized and large cities (including the city of Bratislava) is quite limited (Gardner and Abraham, 2007; Givoni and Rietveld, 2007), especially if access to railway stations is considered (lack of parking capacities). Based on this argument, network segments utilised by public city transport[5] and footpaths[6] for pedestrians were extracted for further examination. This step is illustrated by Figure 2.

### 3.2 Methods

The methods applied in this paper cover three main aspects: (1) methods focused on the selection of specific accessibility zones will be explained; (2) the delimitation of particular accessibility zones and identification of population masses within the zones will be described; and (3) different variants of the locations of railway stations will be subjected to research.

The population potential for intra-urban railway transport has been estimated as the mass of population residing near railway stations. To do this, the question of adequate distance ("What is near?") was resolved first for both ways of accessing the railway station, i.e. on foot as well as by city public transport. Based on studies by various authors (e.g. Hensher, 2001; Seidenglanz et al., 2016), for those travelling daily by high-capacity intra-urban networks (metro, light railways, etc.) an acceptable time-accessibility to the nearest station is usually up to 15 minutes, which can also be applied to the territory of Bratislava. Within the 15-minutes time-interval, an average walking speed of 4 km/hour allows one cover about 1,000 metres. This distance will be used to generate walking distance belts around the railway stations. For public transport accessibility, the same time interval (15 minutes) was applied, but accessibility of the inner-city

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[4] bridleway; cycleway; disused; footway; living street; motorway; motorway link; path; pedestrian; pier; primary; primary link; raceway; rail; residential road; secondary; secondary link; service; steps; tertiary; tertiary link; track; tram; trunk; trunk link; unclassified

[5] motorway; motorway link; primary; primary link; residential road; secondary; secondary link; tertiary; tertiary link; tram

[6] footway; living street; path; pedestrian; pier; service; steps
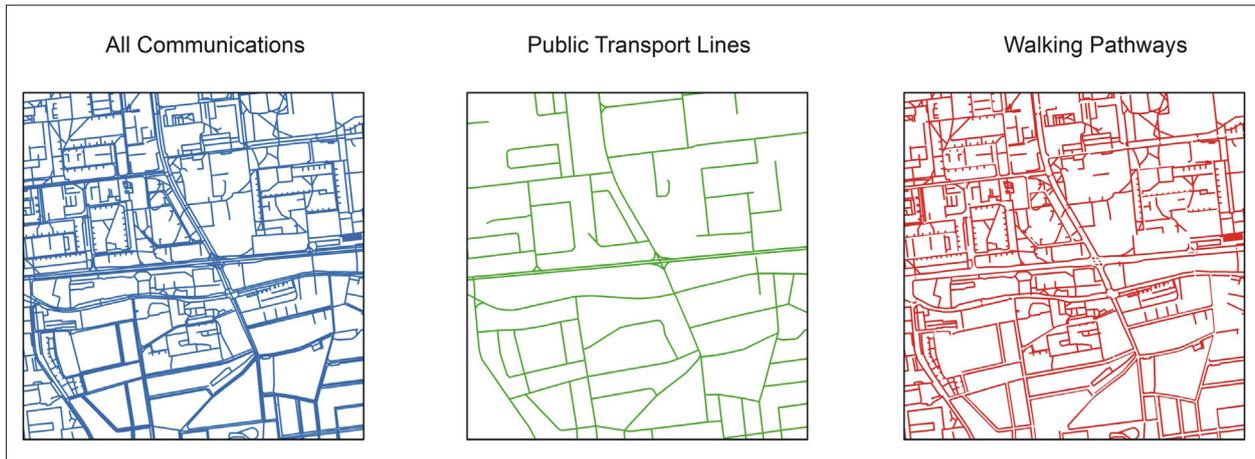
*Fig. 2: The selection of proper ground communication networks available for pedestrians and by means of public transport. Source: MAPZEN 2015, authors' compilation*

public transport stops was taken into consideration, too. The scheme in Figure 3 shows the process of accessibility zone delimitation in a simplified form.

Again, a walking time of 5 minutes necessary to reach the nearest public transport stop was considered (according to Hejhalová, 2010). For transfer between inner-city transport and train, the same time was taken into account (in Bratislava, railway and inner-city transport networks – including trams – have not been integrated at present: they use fully separated infrastructure), as recommended by Hejhalová (2010). Finally, the rest of the 15 minutes covers a 5-minutes journey on a bus/trolleybus/tram within the inner city public transport network. The estimation of average travel speed (24 km/h) by means of the city public transport was based on real-time measurement carried out on public transport vehicles (see Annex 1). At an average speed of 24 km per hour and with a 5 minutes journey, an accessibility belt width reaches to about 2 km. This distance was detected in the existing ground communication network.

The technical details of the creation of individual buffer zones can now be detailed. Within the GIS environment of ArcGis 10.1, layers of railway stations, city public transport network and footpaths were uploaded for further analyses.

To generate individual accessibility buffer zones, tools included in the "Network Analyst" package were utilised. For a further analysis of both layers, a so-called Active Network Dataset was created through the "Built Network Dataset" tool. Such a geo-statistical database consists of junctions and edges, where edges represent communication links and junctions the real nodes in the networks. The transformation of the network is illustrated in Figure 4.

After creation of the Active Network Dataset, the delimitation of accessibility zones was carried out. At the first step, locations of interest ('Facilities') were set in the database, represented by a layer of points where each point is located in the centre of the railyard of each station. Subsequently, via the "Analysis Settings" tab, the accessibility values for both buffer zones were set through the "Properties" choice within the "Service Area" solver. For walking travellers, a distance of 1,000 metres[7] was used and analogously, a distance of 2,000 metres[8] was applied for city public transport users. The following settings were applied through the "Polygon Generation" settings tab, where the choice of "Generalised" was selected. For the "Trim Polygon" tool, distances of 100 metres and 300 metres were applied for footpaths and for the city public transport
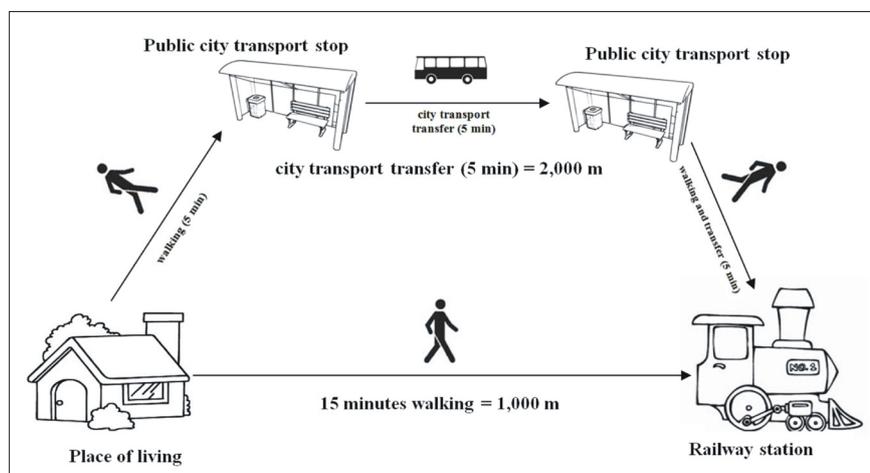


*Fig. 3: The process of delimitation of accessibility zones around railway stations applying both walking and public transport transfers. Source: authors' compilation*

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[7] 1,000 m distance is equal to 15 minutes of walking at a speed of 4km/h

[8] 2,000 m distance is equal to 5 minutes of journey by city public transport at speed of 24 km/h

network, respectively. In the "Multiple Facilities Options", the item "Not Overlapping" was selected. In "Overlap Type", the "Ring" tool was used. After all settings, individual buffer zones of accessibility were generated via the "Solve" command. Figure 5 demonstrates the whole process.

Through the "Export Data" command, a separate map layer of buffer zones was created. A map layer of residential buildings (represented by points with respective population masses) was uploaded into ArcGis software. From this layer, only buildings located within the individual accessibility zones were selected using the "Select by Location" tool. The final summarisation of all inhabitants residing in the buildings located in particular accessibility zones revealed the masses of population in individual zones surrounding relevant railway stations.

Finally, we should explain the principles used in the selection of railway stations network variants which were used for the delimitation of accessibility zones. The main goal of this paper is the estimation of the population potential of conventional railways for intra-urban public transport purposes. Hence, our intention was to cover two variants of the railway station network. The first variant includes the existing network of railway stations used currently for intra-urban transportation[9].

The second variant includes all projects of future railway stations in the west-east railway axis that have already been elaborated. For all of these projects, locations of future stations have already been approved in a project titled "ŽSR, Terminály integrovanej osobnej prepravy v Bratislave, úsek Devínska Nová Ves–Bratislava-Hlavná stanica–Podunajské
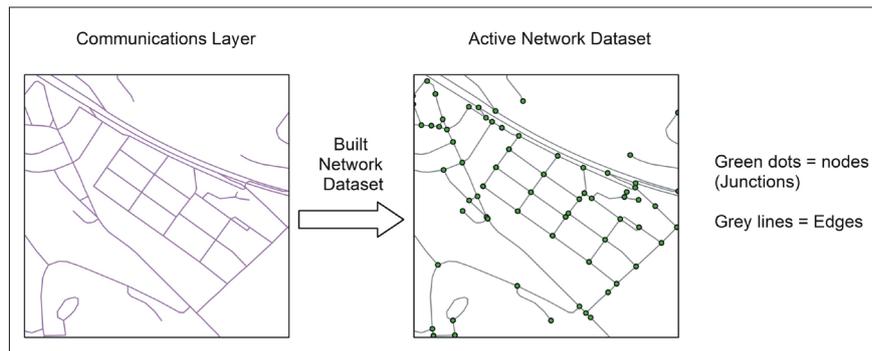


*Fig. 4: An example of Active Network Dataset generation.*
*Source: MAPZEN 2015, authors' compilation*
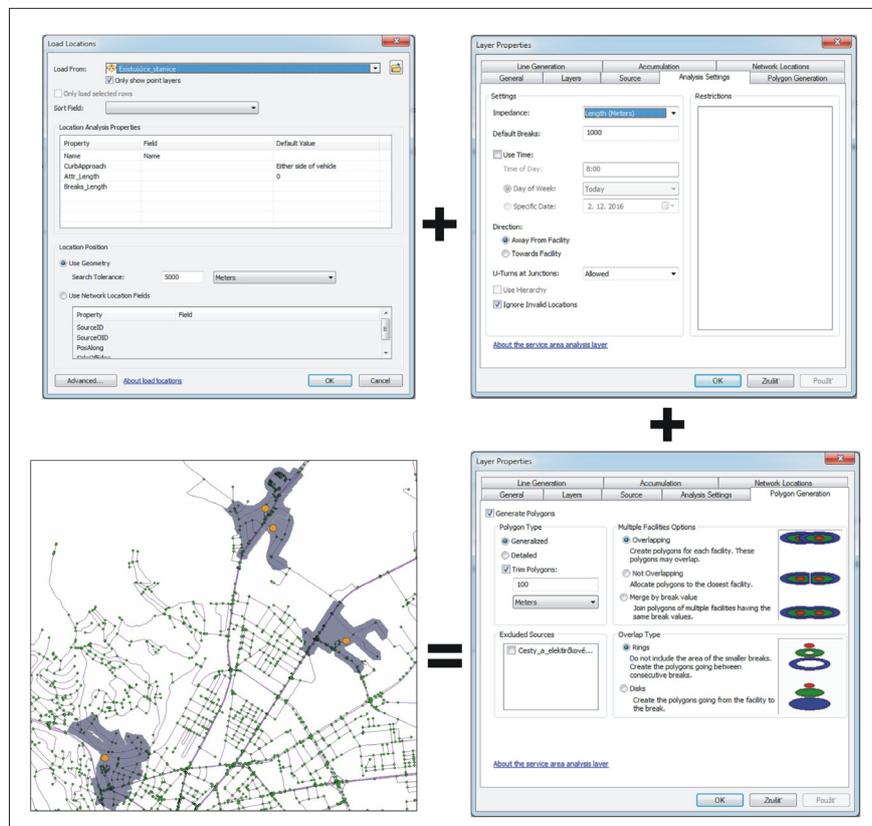


*Fig. 5: The setting of a "New Service Area".*
*Source: MAPZEN 2015, authors' compilation*

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[9] A railway station serving for intra-urban transport is a station located within the urban area of Bratislava, with a currently-operated direct train connection to any other railway station in Bratislava

Biskupice (Terminals of integrated passenger transport in Bratislava, section Devínska Nová Ves–Bratislava-Hlavná stanica–Podunajské Biskupice)", realised by Railways of the Slovak Republic (the state railway infrastructure manager, see ŽSR…, 2016). The railway passenger terminals covered by this project are recently in various stages of preparation. Furthermore, except for these planned stations, we included also other existing stations that are not used for intra-urban transportation currently. Figure 6 illustrates the locations of railway stations in the city in both variants of railway network development. For each variant and for each station, accessibility zones were generated with their relevant numbers of residents.

We admit that the methodology described above rests on a rather simplified model. Certain simplifications may lead to results that can raise some questions and doubts. In contrast, we are trying to develop a method for the measurement of the population potential for transport networks in a social environment where detailed statistics on the resident population based on a domicile register database are still not available. Undoubtedly, with appropriate tools and data, individual steps of our approach may be developed further to gain more accurate results.

## 4. Empirical analysis and findings

The accessibility of existing intra-urban railway stations is shown in Table 1. Our analyses reveal that over 27% of the residents of Bratislava are located up to 15 minutes to the nearest station, but only 7% are within a walking distance. The proportions seem to be rather low, but a detailed assessment (see Fig. 7) provides some explanation.

Not surprisingly, the greatest population concentration is observed around Bratislava-Hlavná stanica (Bratislava-Central station), as it is located near the city centre. This accessibility zone covers densely urbanised built-up districts with both family houses and apartment houses, which correspond with high resident population density. Although the accessibility zone of the Lamač station (see Tab. 2) embraces a large portion of transit corridors and grassed and forested areas, the high-rise apartment houses in the neighbourhood are home to numerous residents. Similarly, Podunajské Biskupice station covers partly a bare land, with a high potential for residential development in the future. Nové Mesto station might play the role of a secondary central station (Whitehand, 1967), as it is located in the neighbourhood of a business district, shopping zone and industrial district.
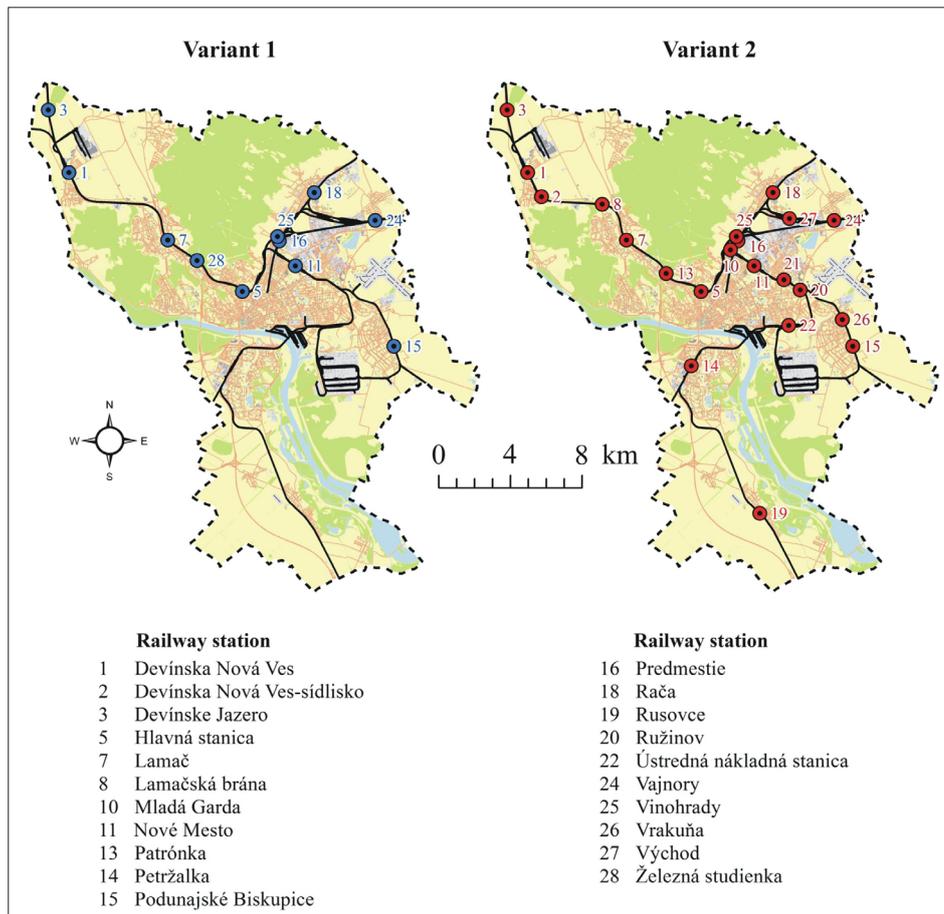


*Fig. 6: The location of railway stations in Bratislava: Two variants*
*Sources: Location of railway stations: CDV, 2016, ŽSR, 2016; Map layers: MAPZEN, 2015*
*Notes: 1 – The currently existing stations of Východ, Petržalka, Ústredná nákladná stanica, Rusovce were included in Variant 2 only, as these stations are not currently serviced by any passenger trains providing connection within Bratislava; 2 – Železná studienka Station is not included in Variant 2 because projected Patrónka Station will be located nearby (approximately 1,000 metres). Patrónka station will enable both better connections to the city public transport network and will be located in an area with higher population concentration. According to CDV (2016), Železná studienka Station will play only a marginal role in the railway network, operating only for occasional trains and tourist services These were the main reasons why this station was not included in Variant 2; 3 – stations "Filiálka" and "Letisko" were excluded, as the TEN-T 17 project had been suspended).*

Other stations (such as Rača, Železná studienka or Devínska Nová Ves) are positioned in neighbourhoods on the outskirts of the city with less concentrated and partly sparsely populated residential districts. Some of these areas are former rural settlements integrated into the city structure in the process of intensive urbanisation in the 20th century, or they represent suburban neighbourhoods (especially Devínske jazero or Vajnory stations) within the city's administrative area, where family houses are the dominant form of housing (see Šveda, 2011). Vinohrady

| Railway stations | Accessibility zones – numbers of residents | | | | | |
| | 0–1,000 m | | 1,001–2,000 m | | Total (0–2,000 m) | |
| | abs. | rel. (%) | abs. | rel. (%) | abs. | rel. (%) |
|---|---|---|---|---|---|---|
| Devínska Nová Ves | 2,392 | 0.58 | 3,562 | 0.87 | 5,956 | 1.45 |
| Devínske Jazero | 0 | 0.00 | 52 | 0.01 | 52 | 0.01 |
| Hlavná stanica | 6,663 | 1.62 | 22,332 | 5.43 | 28,995 | 7.05 |
| Lamač | 5,560 | 1.35 | 17,215 | 4.19 | 22,776 | 5.54 |
| Nové Mesto | 2,130 | 0.52 | 12,255 | 2.98 | 14,385 | 3.50 |
| Podunajské Biskupice | 2,682 | 0.65 | 13,945 | 3.39 | 16,627 | 4.04 |
| Predmestie | 2,111 | 0.51 | 281 | 0.07 | 2,392 | 0.58 |
| Rača | 4,063 | 0.99 | 8,908 | 2.17 | 12,970 | 3.15 |
| Vajnory | 1,688 | 0.41 | 1,351 | 0.33 | 3,039 | 0.74 |
| Vinohrady | 347 | 0.08 | 3,240 | 0.79 | 3,587 | 0.87 |
| Železná studienka | 240 | 0.06 | 1,082 | 0.26 | 1,322 | 0.32 |
| **Total – existing stations** | **27,866** | **6.78** | **84,224** | **20.48** | **112,089** | **27.26** |

*Tab. 1: Number of residents in particular accessibility belts surrounding railway stations currently serviced by intra-urban passenger trains (Variant 1). Source: authors' calculations based on the 2011 population census*
*Notes: Abs. = absolute numbers; Rel. = relative proportions. Relative values are derived from the total population of Bratislava*
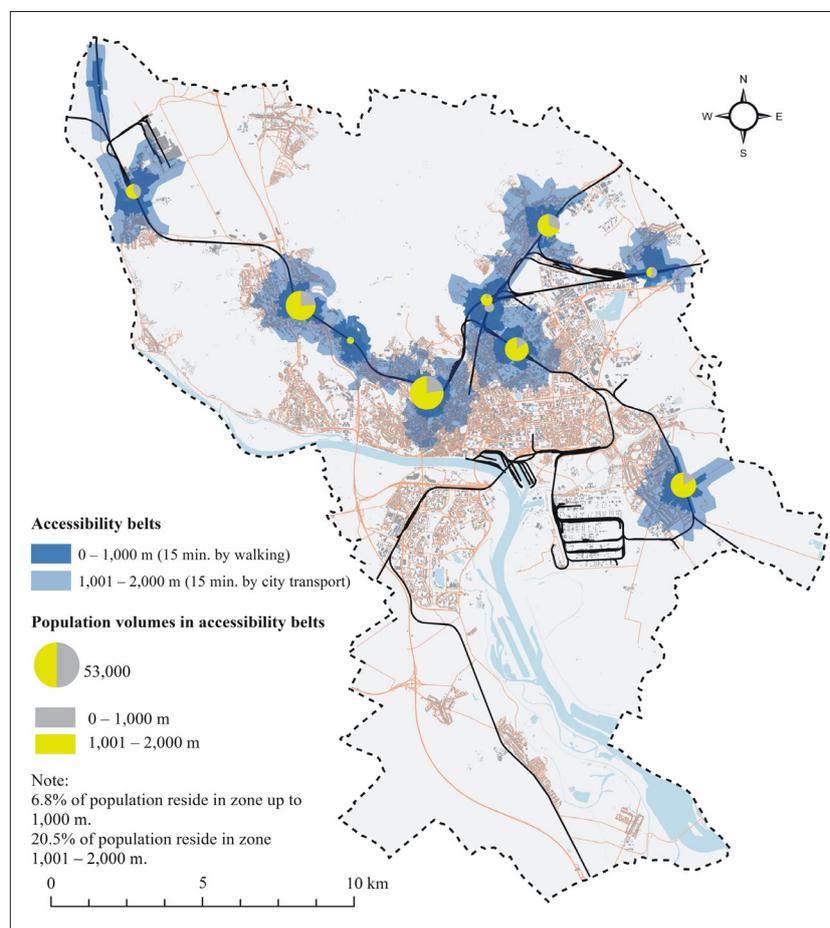


*Fig. 7: The accessibility of railway stations currently serviced by intra-urban passenger trains (text: Variant 1)*
*Sources: Locations of railway stations: CDV, 2016; ŽSR…, 2016; Map layers: MAPZEN, 2015.*

and Predmestie stations are surrounded by more or less industrial districts but they have a high potential as public transport transfer nodes.

As stated above, the attractiveness of some of the existing railway stations in Bratislava is limited by their position. Some of them are positioned in sparsely populated districts or in locations with poor access for numerous residents (peripheral locations, industrial districts, bare areas). On the other hand, stations located in the city districts to the south (see Fig. 8) lack any access to railway stations, but this is due to the fact that no passenger trains are operated in this part of the intra-urban railway network. The only station serviced with regular passenger trains is Bratislava-Petržalka, but this station is the terminal for regional expresses to/from Austria (Vienna) and there is currently not a single passenger train link from this station to the rest of the city area.

The hypothetical future network of conventional railway stations, based on a combination of all existing stations and future projected stations, can now be considered. Table 2 reveals the hypothetical potential of resident populations in accessibility zones generated for such stations. Compared to the existing configuration of railway stations and applying the same time accessibility zones (15 minutes), the overall population served would be more or less two-fold. In relative numbers, over 50% of the city population would

reside in locations with a good access to railway stations. We should emphasise that the number of residents living in a comfortable 15-minute walking distance to the nearest station would increase considerably.

A general territorial picture of the hypothetical constellation of stations is presented in Figure 8. Evidently, the greatest potential for the resident populations can be observed in Petržalka, where the potential expressed by population mass would be even higher than for the Central station due to the large concentration of high-rise apartment houses. Any improvement of the high-capacity rail link with the city centre would improve the transport accessibility of Petržalka (Seidenglanz et al., 2016). Similarly, the projected Vrakuňa station might potentially have a high attractiveness due to housing developments in its neighbourhood.

The future Trnávka and Ružinov stations might profit from their positions in residential neighbourhoods characterised by both family and apartment houses. Moreover, large shopping areas and traditional industrial districts are located nearby. The projected Ružinov station will probably become a public-transport junction. The high attractiveness of the existing Lamač station will probably be reinforced in the future as this station might act as a principal public transport junction in the north-western sector of the city, allowing transfers between regional trains and city transport (trams).

| Railway stations | Accessibility zones – numbers of residents | | | | | |
| | 0–1,000 m | | 1,001–2,000 m | | Total (0–2,000 m) | |
| | abs. | rel. (%) | abs. | rel. (%) | abs. | rel. (%) |
|---|---|---|---|---|---|---|
| Devínska Nová Ves | 2,392 | 0.58 | 457 | 0.11 | 2,853 | 0.69 |
| *Devínska Nová Ves-sídlisko* | *9,561* | *2.32* | *560* | *0.14* | *10,120* | *2.46* |
| Devínske Jazero | 0 | 0.00 | 52 | 0.01 | 52 | 0.01 |
| Hlavná stanica | 6,663 | 1.62 | 18,554 | 4.51 | 25,216 | 6.13 |
| Lamač | 5,560 | 1.35 | 14,288 | 3.47 | 19,848 | 4.83 |
| *Lamačská brána* | *151* | *0.04* | *12,055* | *2.93* | *12,206* | *2.97* |
| *Mladá Garda* | *3,235* | *0.79* | *3,122* | *0.76* | *6,357* | *1.55* |
| Nové Mesto | 2,130 | 0.52 | 6,894 | 1.68 | 9,024 | 2.19 |
| *Patrónka* | *1,843* | *0.45* | *3,708* | *0.90* | *5,551* | *1.35* |
| Petržalka | 17,717 | 4.31 | 24,276 | 5.90 | 41,993 | 10.21 |
| Podunajské Biskupice | 2,682 | 0.65 | 5,165 | 1.26 | 7,846 | 1.91 |
| Predmestie | 1,217 | 0.30 | 188 | 0.05 | 1,405 | 0.34 |
| *Rača* | *4,063* | *0.99* | *8,910* | *2.17* | *12,973* | *3.15* |
| *Rusovce* | *1,460* | *0.35* | *892* | *0.22* | *2,351* | *0.57* |
| *Ružinov* | *3,194* | *0.78* | *6,995* | *1.70* | *10,190* | *2.48* |
| *Trnávka* | *9,849* | *2.39* | *4,771* | *1.16* | *14,620* | *3.56* |
| *Ústredná nákladná stanica* | *983* | *0.24* | *7,076* | *1.72* | *8,059* | *1.96* |
| Vajnory | 1,688 | 0.41 | 1,351 | 0.33 | 3,039 | 0.74 |
| Vinohrady | 345 | 0.08 | 2,610 | 0.63 | 2,956 | 0.72 |
| *Vrakuňa* | *10,396* | *2.53* | *12,116* | *2.95* | *22,512* | *5.47* |
| *Východ* | *1,484* | *0.36* | *866* | *0.21* | *2,350* | *0.57* |
| **Total** | **86,614** | **21.06** | **134,905** | **32.81** | **221,519** | **53.87** |

*Tab. 2: Number of residents in particular accessibility belts surrounding railway stations after upgrading of the city railway network (Variant 2). Source: authors' calculations based on the 2011 population census*
*Notes: Abs. = absolute numbers. Rel. = relative proportions; Relative values are derived from the total population of Bratislava; Stations in italics indicate projected stations and existing stations currently excluded from intra-urban railway transport.*
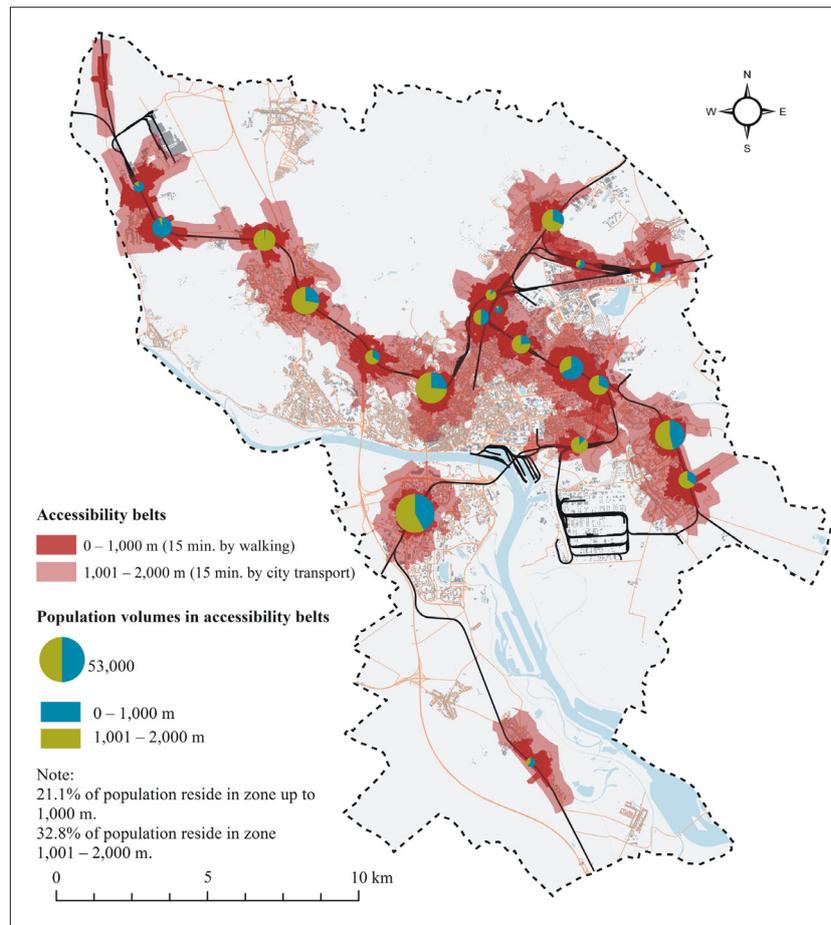
*Fig. 8: Accessibility of railway stations after upgrading of the city railway network (Variant 2)*
*Sources: Location of railway stations: CDV, 2016; ŽSR…, 2016; Map layers: MAPZEN, 2015*

The rest of the new (projected) stations will either serve as public-transport transfer junctions (such as the projected Patrónka or Mladá Garda stations) or improve accessibility of some peripheral (suburban) districts of the city (Východ and Rusovce stations).

To summarise the projected configuration of railway stations in Bratislava, the possible improvement of accessibility stems basically from two different facts. First, the projected new stations (along the west-east intra-urban railway corridor) will considerably cover districts with high housing concentrations. Second, linking the southern radial railway with the city centre and the operation of intra-urban trains might improve the efficiency of railway connections between the densely populated Petržalka and northern and eastern districts.

## 5. Conclusions

Two main conclusions can be drawn from this project. First, we introduced an innovative approach to research on population distributions within an urban micro-environment. Second, the railway station network accessibility within the intra-urban area of Bratislava city was analysed here using our innovative approach.

The first finding concerns our approach aimed at detecting population distributions based on an existing residential buildings database. In countries like Slovakia, where an address points database concept has not been fully introduced or validated, this approach may be a helpful tool applicable to different fields of research (such

as the distribution of employment opportunities, the spatial distribution of secondary school or university students, etc.). Kraft and Blažek (2012) state that these parameters are important if commuting to work or schools is researched, but the distribution of these activities in real space is hazy and very difficult to monitor. Our approach was applied to the railway infrastructure accessibility issue analysed in an urban environment, where a physical communication network was used to generate accessibility zones. The GIS package of Arc GIS 10.1 proved to be useful for our purposes.

Applications of this method are quite universal and may be fruitful in attempts aimed at the detection of accessibility zones to various points of interest (such as food stores, emergency centres, etc.). Similar attempts to detect various accessibility attributes related to the location of points of interest (such as transport points or services) have already been applied to the urban environment of Bratislava (see e.g. Kusendová and Štepitová, 2001; Križan and Tolmáči, 2008b; Križan, 2009; Križan et al., 2015) but without a relevant analytical approach to the actual distribution of the city residents.

Secondly, the empirical output of our research might be useful for a broader discussion on the effectiveness of existing and projected rail networks in the city of Bratislava, for bulky intra-urban (or regional) passenger transportation purposes. To show a possible shift between the existing and presumed constellation of conventional railway infrastructure in Bratislava, we made an effort to show different variants of the railway network accessibility. Currently, about one-quarter of Bratislava's population resides within

a 15 minutes time accessibility (by either public transport or walking) to the nearest conventional railway station. If all currently projected railway stations are put into operation, this proportion could exceed 50% of the population, with considerable improvement of walking distance accessibility. In particular, the southern residential district of Petržalka would benefit from such an improvement.

Nevertheless, the territorial configuration of the existing railway infrastructure in the intra-urban environment of Bratislava city currently allows comfortable access to railways only for a limited portion of the city's area (even though the length of railway networks in the intra-urban area reaches over 80 km). The projected upgrading of the city's railway network and the construction of new stations will improve the accessibility of railway infrastructure for many, but some parts of the city will still remain in poor accessibility conditions. This is surely the case for the Central Business District of Bratislava recently developed east of the city centre. Many authors (Ira, 2003; Korec, 2013) believe that this part of the city will increasingly become attractive for bulky commuter flows. The TEN-T 17 project of an underground railway corridor, which was supposed to improve railway accessibility to this part of the city, has recently been suspended (Horváth, 2012). The residential district of Bratislava-Karlova Ves in the western part of Bratislava is far from being connected to conventional railways, but here the shortage of railways is well compensated by an efficient light city train (tram) service. A certain upgrading of the tram network in the city is already under way. The remaining parts of the city (such as Bratislava-Čunovo, Bratislava-Jarovce, Bratislava-Záhorská Ves, Bratislava-Devín) will not see any considerable improvement of accessibility to railway stations in the forthcoming decades, but these districts are perceived as the periphery of the city (Slavík et al., 2011) and they are sparsely populated with low concentrations of residents.

The current paper presents only partial outputs for the problems, as the potential of the intra-urban railway infrastructure remains unsolved. Directions of flows potentially exploitable in the city railway network, as well as the attractiveness of individual railway stations, still remain untouched by further research.

The limitations of the current study are as follows:

- some disputable reliability of the 2011 population census in Slovakia;
- the census data may be outdated (as of 2011) and some locations with dynamic housing development might have witnessed considerable population changes;
- population masses calculated for the projected constellation of intra-urban railway network were based on the 2011 census data, omitting any detailed population forecast;
- errors concerning residential building identification: some of the buildings may be used also for other purposes (such as retailing business or small enterprises in the basements of the buildings);
- schematic conversion of population masses of BRUs onto residential buildings;
- simplification concerning the calculation of residential areas derived from ground-plot areas of individual buildings (including the average numbers of floors); and
- consideration of ideal mobility conditions within the urban environment, based on average walking speed, not respecting possible barriers and the variable capacities of communication linkages.

| Trajectory (initial point–target point) | Time (min) | Distance (km) | Speed (km/h) |
|---|---|---|---|
| Hlavná stanica–Botanická | 14 | 5.7 | 26.3 |
| Hlavná stanica–Zochová | 5 | 1.6 | 19.2 |
| Račianskemýto–ŽST Vinohrady | 8 | 3.4 | 22.7 |
| Vyšehradská–Aupark | 12 | 5.0 | 25.0 |
| SAV–VW | 25 | 15.6 | 33.4 |
| Hlavná stanica–Autobusová stanica | 10 | 3.1 | 18.6 |
| Hlavná stanica–Nové SND | 13 | 4.0 | 18.5 |
| Čilížska–Cintorín Vrakuňa | 8 | 3.5 | 26.3 |
| Trnavské mýto–Cintorín slávičie údolie | 19 | 7.0 | 22.1 |
| Most SNP–Trnavské mýto | 12 | 2.9 | 13.4 |
| Park kultúry a oddychu–Račianske mýto | 12 | 3.5 | 16.2 |
| Trnavské mýto–Zlaté piesky | 14 | 5.6 | 22.4 |
| ŽST Vinohrady–Komisárky | 12 | 4.5 | 22.5 |
| Karlova Ves–Pri kríži | 10 | 3.9 | 23.4 |
| Patrónka–Lamač | 11 | 5.5 | 25.4 |
| Štefana Králika–Hradištná | 3 | 1.3 | 26.0 |
| Cintorín slávičie údolie–Molecová | 8 | 3.2 | 24.0 |
| Zlaté piesky–Vajnory-konečná | 11 | 5.1 | 27.8 |
| AVION-IKEA–Zimný štadión | 13 | 3.9 | 16.7 |
| **Total/Average** | **220** | **88.3** | **24.1** |

*Annex 1: Travel speed of public transport based on authors' empirical research. Source: authors' field measurements*
*Notes: detection carried out between 10:00–11:30 a. m., working days of Tuesday, Wednesday and Thursday; only direct connections (without interchanges) were recorded*

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# REVIEWERS OF PAPERS OF THE 2016 VOLUME

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