

## Geographical input to local public transport planning in Poland

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**Abstract.** This paper addresses geographical contributions to public transport planning in Poland according to the newly adopted legislation: the *Act of 16 December 2010 on public transport* and the *Regulation of 25 May 2011 on the detailed scope of sustainable development plan of public transport*. The authors investigate the application of geographical approach to public transport planning on the local level and its perspectives with a special regard to a *public transport plan* as the main document introduced by law in order to aid local governments in organising and managing transport services of general interest. This paper also prompts geographers to pay more attention to the ongoing changes in the legislature concerning public transport and encourages them to get involved in public transport planning both in practice and through scientific research. The authors present a few examples of preliminary selected areas deprived of appropriate public transport, hence predisposed for transport of general interest.

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## 1. Introduction

Public transport can be perceived and analysed from a range of different perspectives. Transport engineers investigate technical and infrastructural determinants of public transport while economic aspects of public and non-public carriers operation fall within the domain of transport economics. Accordingly, the shape of public transport system, its organisation and policy all draw on the achievements of such domains as management, law and public administration. Finally, the scope and diversity of passenger preferences, their expectations and demands belong to the marketing specialists. All of the above domains meet in practice of public transport as carriers utilise its various means to make profits by serving local population. In order to reach social and economic objectives simultaneously, a public governing body needs to organise, plan, manage and control the local public transport market. These responsibilities have not been imposed upon local governments in Poland until recently, when the *Act of 16 December 2010 on public transport* came into force. Nevertheless, socio-economic and marketing analyses have been widely utilised to support decision-making in urban transport and have helped local governments to optimise profitability of public operators since the political transformation (Wyszomirski, Grzelec 1998). Presently, this task remains under the auspices of urban or municipal public transport authorities. These bodies have started to emerge since the 1990s taking the place of the state-owned transport companies.

According to Litman (2006) transport planners must manage information flows, including its gathering, organising and distribution, as well as anticipate questions and provide accurate and understandable data, using visual presentations (maps, graphs, tables, etc.), and appropriate examples. This indicates that transport planning is spatial in nature and comprises numerous geographical aspects of which the most important include the land use structure and location. While there is a growing interest in linking spatial planning with transport system (Salas-Olmedo, 2008; Faron, 2010), geographical input to transport planning in Poland has been predominantly manifested by transport ac-

cessibility (Kozłak, 2009), especially at the national scale as a contribution to state or regional transport policy (Komornicki et al., 2010; Guzik et al., 2010; Guzik, 2011).

Transport planning on a local level includes urban or rural demographic and spatial evolution translated in space by both the breadth and amplitude of movements; thus, employment and attraction zones are the most important elements shaping the local spatial organisation (Rodrigue et al., 2009). Public transport planning has an inherent spatial reference as the demand is scattered in space, and the supply has to cover space in order to make profits (non-public operators' principle) and provide services (public operators' principle). Linking demand with supply in space clearly refers to Ullman's (1980) purely geographical conception of spatial interaction and reflects practical application of geography in transport planning.

## 2. Local public transport planning in the *Act of public transport*

The *Act of 16 December 2010 on public transport* entrusts local and regional governments with organisation, planning and management of public transport. Hence, town (gmina), powiat and voivodeship authorities greatly expand their responsibilities, as they become so-called organisers of public transport. The functions of transport organisers on a local level can be carried out in the following manners: independently (by a dedicated department of the municipal government), through a local transport authority (predominantly in large cities), through a public company directly subordinate to the local government (public utility, limited liability or joint-stock company) or by joining a transport association.

Moreover, local officials must face upon additional obligations if they decide to introduce so-called transport services of general interest. According to the EU's *White paper on services of general interest* these services ought to remain under the auspice of regional and local authorities. Gmina and powiat officials are obligated to define, organise, finance and monitor services of general interest (White paper on services of general interest, 2004). The transport

services of general interest are also mentioned in a ground document for the Polish legislation, namely the Regulation (EC) No. 1370/2007 of the European Parliament and the Council of 23 October 2007 *on public passenger transport services by rail and by road and repealing Council Regulations (EEC)*. This regulation implies that these services are not to be commercial, but would operate under public service obligations; thus, they can be more numerous, safer, of higher quality and provided at lower costs than those that market forces alone would have allowed (van de Velde, 2008). As the profitability of such services is low, the operators would have their losses refunded by local or regional governments.

In larger gminas and powiats which intend to run transport services of general interest the entire public transport must come under the *sustainable development plan of public transport* (i.e. *public transport plan*). According to the *Act of 16 December 2010 on public transport*, this document is mandatory for: towns (>50,000 inhabitants), powiats and inter-municipal associations (>80,000 inhabitants), inter-powiat associations (>120,000 inhabitants) and all sixteen voivodeships in Poland or their associations.

By enacting a public transport plan municipal authorities introduce a new local law which is valid only within a particular municipality and remains subservient to the state law (Dąbek, 2007). Consequently, a public transport plan becomes the second planning document, alongside the land use zoning law, officially operating on a local level in Poland. The land use zoning and public transport plan formulate rules of management and activity within a particular area, thus they are both executive acts. The former includes directives of zoning, land development and planning permissions (Leoński et al., 2012) while the latter is to regulate the operation of road and railway carriers with the purpose to provide sufficient services to the local population. Importantly, the land use zoning law applies to every entity and the whole area it has been designed for. Analogically, the transport plan should encompass all the public and commercial carriers operating in the area covered by the public transport plan. In practice, this is only partially possible and only in a few aspects of carriers' operation.

It is difficult to predict the requirements set by the public transport plan for commercial carriers who provide services on their own risk without hav-

ing their unprofitable operation refunded. Certainly, the public transport plan can list bus stops and integrated interchange nodes for the use of public and commercial carriers. This plan may also encourage operators to participate in a common system of passenger information and suggest the means to create voluntary and mutual cooperation among all carriers or with public transport organiser in order to promote integration of public transport. Unfortunately, a public transport plan would not fully regulate the scope and range of commercial carriers' operation. Admittedly, it is optionally possible to delimit commercial transport network, but no interference of public transport organiser in their timetables and routes is to be allowed (Grounds for the draft act of public transport, 2010). These problems are to be regulated by *confirmation of registration* that in 2017 will replace the existing permissions issued by local governments. Thereby, it is not likely for commercial transport to change radically and a public transport plan will not fix the entire public transport market.

### 3. Public transport plan

The main obligatory sections of a public transport plan are listed in the article 12 item 1 of the *Act of 16 December 2010 on public transport*, whereas auxiliary elements vital for this document are mentioned in item 2. The detailed guidelines on how to prepare a public transport plan can be found in the *Regulation of 25 May 2011 on the detailed scope of sustainable development plan of public transport*. Notably, the legislator has given great flexibility to the groundwork detail and interpretation of elements mandatory for the process of the public transport planning. This concerns both the degree of extensiveness as well as the support with data, analyses and field surveys. For this reason, documents prepared by local authorities will be very different from one another depending on the funds devoted to this obligation or other determinants (whether self-prepared or commissioned to a consulting company). Hence, some plans will be short and scanty with a structure based on the aforementioned regulation while others – more extensive introducing regulations substantiated with large-scale traffic counts, field surveys and variant travel demand forecasts.

Obviously, not the volume, but practicality, utility and impact on decision-making reflect the quality of public transport plans. These fully functional ones would include decisions that give priority to passengers and their needs as well as promote public transport organisation in the form of an integrated system, especially in the areas of high competition.

One of the basic requirements of contemporary public transport is its accordance with the concept of sustainable development. This concept includes environmentally friendly means of transport and promotes various modes of travel (with the priority given to railway transport) organised in an integrated system. This is consistent with the definition provided by The Council of Transport Ministers of the European Union, which defines sustainable public transport as affordable, operating fairly and efficiently, offering choice of transport mode, supporting a competitive economy, and balancing regional development (Goldman, Gorham, 2006). In theory, and according to wide expectations, public transport plans are also to counteract chaotic development of private transport and coordinate public transport in voivodeships, poviats and gminas with a special regard to metropolitan areas. Indeed, such general rules in a transport system as introduction of interchange nodes and unification of the passenger information system could succeed in encouraging non-public carriers to follow at least some regulations incorporated in public transport plans.

However, this document will not bring revolutionary changes in public transport on a local level as all the aforementioned regulations neither apply to every administrative unit nor encompass the routes located beyond the network of public transport of general interest. Moreover, as the local law stated by a public transport plan applies only to operators of public transport (i.e. these offering services of general interest), coordination between all carriers is unlikely to happen.

#### **4. Principles and goals of a public transport plan from a spatial perspective**

The regulations ingrained in the *Act of 16 December 2010 on public transport* attempt to tackle the

following problems of Poland's public transport: (a) private carriers, who in some regions dominate local public transport market, are not interested in providing services for the areas of low population density as being unprofitable; (b) the model based on liberalisation of the transport market is incapable of providing optimal and sustainable public transport services (Chaberko, Kretowicz 2011).

One of the most important goals of the above legislation is to introduce public transport planning as a foundation of decision-making and aid to organisation and management of public transit on a local level. This goal is to be accomplished by means of a public transport plan whose main mandatory elements are listed in Table 1 as required by the article 12 items 1 and 2 of the *Act of 16 December 2010 on public transport* and the *Regulation of 25 May 2011 on the detailed scope of sustainable development plan of public transport*.

The principles of public transport come down to a system of mutual relations between the stakeholders present on the public transport market i.e. organisers, operators and passengers. The key regulation of the plan is to determine which transport routes are to be included into the public organisation and financed by a public body. This refers to the network of public transport services of general interest delineated and served in conjunction with the spatially-scattered demand and social interest. For this reason, passengers' needs and preferences remain at the centre of public transport planning. The public transport organiser is obliged to measure and analyse the needs and use this information to organise, manage and co-finance the local public transport market. The operators acting as executors of public transport services (of the desirable standard) provide passengers with reliable information and remain fully transparent as well as subservient to the organiser in order to obtain refunds. The selection of principal routes and links to be offered as services of general interest should also require several external determinants such as the environmental impact, local spatial planning and zoning policy, national transport policy and socio-economic situation of the area.

**Table 1.** Mandatory elements of public transport plan by relevance to geographical sciences

| High   | Partial  | Low or none   |
|--|--|---|
| network of public transport services of general interest (routes)          | preferences on transport mode  | financing of public transport                                       |
| distribution of demand for public transport                                | socio-economic situation of an area  | organisation of public transport market (selection of operators)    |
| land use, land development and zoning on a state, regional and local level | access to bus and railway stops  | desirable standard of public transport services of general interest |
| a map depicting routes of public transport services of general interest    | directions of public transport development   | organisation of passenger information system                        |
| location of public utility services  | the needs of the disabled and persons with reduced mobility and their access to public transport | public transport impact on the natural environment                  |
| population density   |  | international and interregional transport state policy              |
|  |  | profitability of public transport routes                            |
|  |  | capacity of infrastructure (for railway transport)                  |

Source: Authors' own work based on the public transport legislations

## 5. Geographical input to a public transport plan

The following paragraphs present the guidelines on how to prepare the main parts of a public transport plan drawing on the experience of geographical sciences in general and transport geography in particular. As stated previously, these documents may in practice look very different, yet the authors contend that spatial approach is indispensable for these documents in order to formulate proper regulations concerning public transport market on a local level with a special regard to passengers' needs. The authors partially draw on and stay consistent with the achievements of the European Union-supported publications (Towards Sustainable Urban Transport Policies Recommendations for Local Authorities, 2004) and practical approaches (Guidelines. Developing and Implementing a Sustainable Urban Mobility Plan, 2011). As these documents affirm, the sustainable planning process needs to be tailored to the local situation and this requires a crucial step - the definition of the geographical scope of the plan, which should address the spatial and functional influence.

A public transport plan consists of two parts: text and graphics. The text part begins with a vision, i.e. a short description or statement concerning a desirable model of public transport in the future. As it is

widely accepted in most strategic documents, also a public transport plan should formulate the main and supplementary objectives. These objectives ensure provision of sustainable public transport and proclaim the intention to acquire its desirable state, which directly results from the introduced regulations.

The fundamental part of a public transport plan should start with the characteristics of the area under consideration from the demographic, socio-economic and transport perspectives. Hence, it is necessary to include the road and railway network description along with the distribution of stops versus population density, population composition by mobile and immobile groups and location of places and institutions – common destinations of travellers (work, schools and other services). This data should be collected on a city district level, transport sector level, traffic analysis zones (cities) or on a locality level (poviats). The data concerning demographics, spatial development and actual public transport provision must be compared with one another in order to (a) diagnose transport accessibility for local population and (b) demarcate areas un(der)served by the carriers. Geographical literature is abundant with numerous methods investigating accessibility in transport planning (Geurs, van Wee, 2004; Straatemeier, 2008; Vandenbulcke et al., 2009) of which some have been successfully

turned into practical guidelines and good practices for transport planners (Guidance of local transport plans, 2009; Geurs et al., 2012). Depending on the size of an administrative unit the descriptive part of a public transport plan must include information about the largest job providers (employment, commuting directions and patterns), schools (number and residence of schoolchildren, school districts) and other traffic generators, e.g. shopping centres. It is necessary to demarcate the range of spatial influence of the above institutions drawing directly from geographical research on commuting, school travel zones and shopping centre spatial attractiveness (Sikos, Hoffmann, 2005; Zborowski, 2005; Bajerski, 2008). The information about potential demand (trip generation), compared with the location of public institutions (trip destinations) and the transport network, gives a clear depiction of public transport in the area. The data derived from this stage may be used later in the travel demand modelling and forecasting.

Another stage of a public transport plan encompasses the directions of demographic and spatial development in the area under investigation. At this stage, it is required to collect demographic data from previous years and compile demographic forecast or at least determine major trends of population development. This task includes identification of areas within an administrative unit that gain or lose population, and evaluate the scale and dynamics of this process. The directions of spatial development can be found in strategic and planning documents prepared for all administrative units (especially *Studium Uwarunkowań i Kierunków Zagospodarowania Przestrzennego* – Main Strategic Study Concerning Municipal Spatial Development, *Miejscowy Plan Zagospodarowania Przestrzennego* – Land Use Plan, and Long-term Investment Plans). While analysing these documents several characteristics remain of the essence: spatial development of residential areas, new commercial investments (shopping malls) and new employment spaces (e.g. business centres, special economic zones, office centres).

The crucial part of a public transport plan includes analysis of field surveys and questionnaire research that measure travel demand among local population. This kind of research investigates public transport flows and transport mode preferences – a prerequisite of the modal split study. The nec-

essary information can be derived only from in-vehicle counts or questionnaire research conducted by the public transport organiser specifically for the public transport plan. Alternatively, proper data may be drawn from previously conducted research. Such manual measurements are the only source of information that renders it possible to establish frequencies by which means of public transport people would move along particular routes. The results of field surveys are central for frequency management of reduced-demand periods or off-peak hours (evenings and weekends). Essentially, this data must be confronted with the actual public transport offer in the examined administrative unit, which adds to an overall image of underserved areas and helps in their selection. In conjunction with the latter, the possibilities of integration of different carriers and modes of travel along with the operation of the existing interchange nodes should be evaluated.

The second part of a public transport plan includes key regulations to function as a local law in practice. These regulations ought to be entirely consistent with the aforementioned surveys and analyses. The demarcation and distribution of spatially-diverse regulations concerning the network of public transport services of general interest are imperative for this plan and create a promising research turf for geographers. Markedly, in most cities and suburban areas this network is already delineated as it often coincides with routes served by urban public transport carriers. However, a network of public transport of general interest in poviats requires delineation as very few poviats are served by local public carriers. If local authorities wish to run these transport services, their network may encompass routes served by commercial carriers, and perhaps new routes never served by public transport before, but important for local population. As a result, these underserved areas would gain new bus links. Appropriate sections of this network in both towns and poviats should be classified by minimum and maximum frequencies, standards of public transport and other key elements for particular routes.

The following sections of a public transport plan should include other mandatory elements, such as financing, passenger information system and organisation of the public transport market, but most of these do not require geographical analyses. Notably, the unification of timetable symbols is already

legalised by the *Regulation of 25 April 2012 on timetables*. Passenger information system must be specified for the entire network including departure and arrival times, standard fares, reduced fares, rules on location of interchange nodes and integration of different modes of travel. Unfortunately, no legal document mentions good practices such as a nation-wide regular interval timetable as implemented in 1982 in Switzerland (Scheidegger, 2008). Alongside a public transport plan, local governments can prepare a separate document concerning environmental impact assessment, but this requirement is optional.

The regulations of public transport plans should be verified for the conformity with planning documents prepared on the national, regional and local level. These planning documents include: (a) National Spatial Development Concept 2030; (b) Voivodship Spatial Development Plan; (c) the main strategic studies concerning municipal spatial development, land use plans; (d) public transport plans for higher level administrative units and other relevant strategic documents from the transport sector. The results of this comparison should be included in a public transport plan as a separate section.

The graphic section of a public transport plan consists of a map. The *Regulation of 25 May 2011 on the detailed scope of sustainable development plan of public transport* does not suggest a base map, although it indicates that the image must possess a scale bar, numerical scale and administrative borders of the area covered by the plan. The best solution is to use a topographic map similar to these utilised in zoning plans. This map must include the network of public transport of general interest, preferably divided into classes or categories, and location of integrated interchange nodes. Aside the map image, the graphic part must also contain a legend with all symbols and nomenclature consistent with the text part. In the case of a public transport plan for urban areas, the preparation of such a map remains optional.

## **6. Preliminary demarcation of areas to be served by public transport of general interest**

According to the *Regulation of 25 May 2011 on the detailed scope of sustainable development plan*

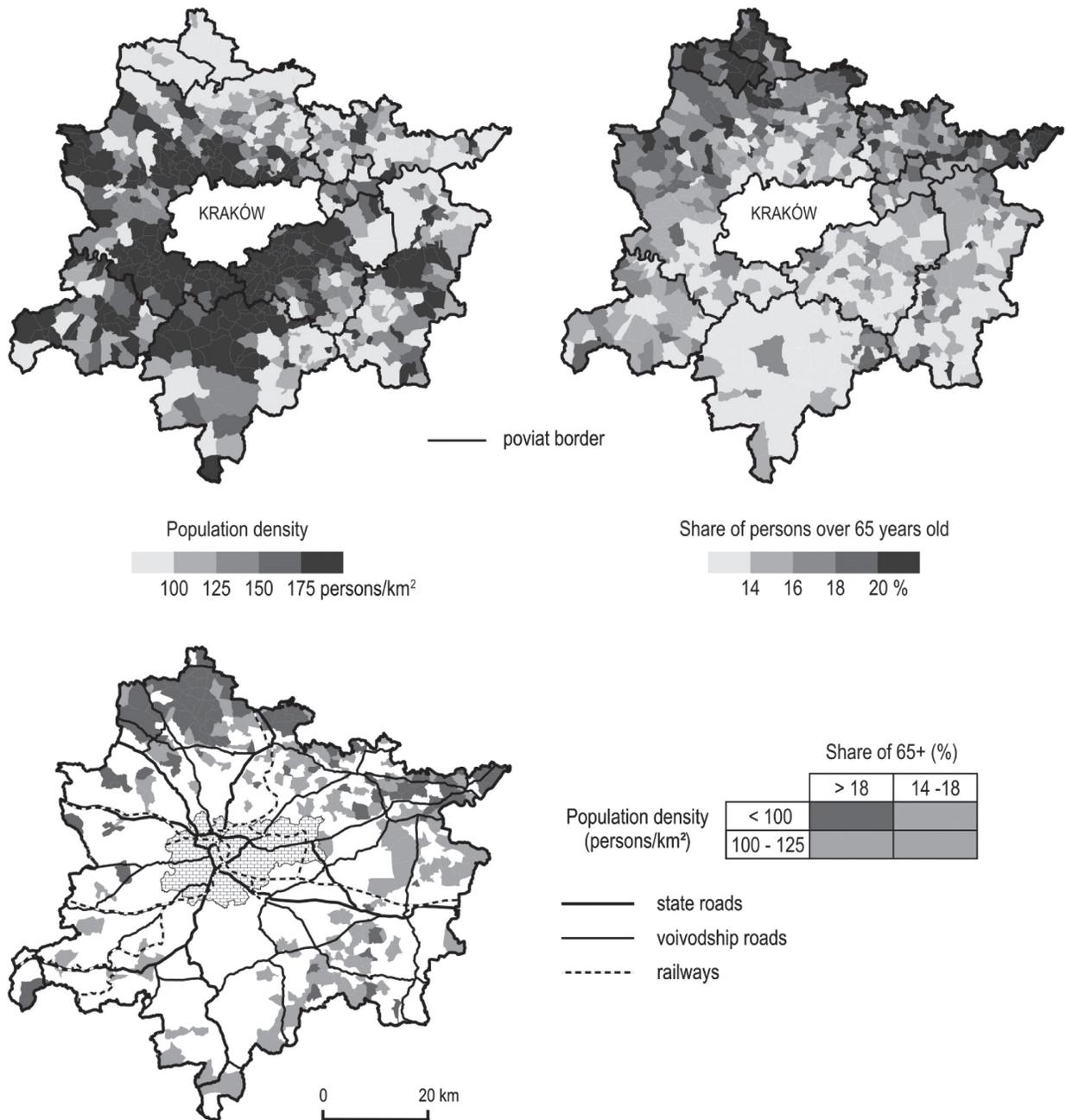
*of public transport* the evaluation of passenger demand requires, among other things, information on population density and residence of persons with reduced mobility.

Households located in the areas of low population density in peripheral regions and far off the main roads are the most vulnerable to transport-related social exclusion (Currie, 2010; Delbocs, Currie, 2011). In many regions of Poland remote rural areas remain underserved by local bus carriers because of low potential profitability. On the other hand, public transport in regions of high population density (cities and suburban areas) often fails to provide sufficient services or these offered are of inappropriate standard. These types of areas are most predisposed for the public transport services of general interest. Irrespective of the location, the most disadvantaged group includes the disabled and persons of reduced mobility, therefore the aforementioned legislations takes special steps to prevent exclusion of the immobile fraction of the population (the disabled, the elderly, etc.) by including their needs both in organisation and planning of public transport.

In order to detect areas predisposed to be covered by public transport services of general interest two examples are employed: a metropolitan area (Kraków metropolitan area) and a medium-sized poviat (Krosno poviat), both located in south-eastern Poland. This part of the country is characterised by exceptionally broad operation of private minibuses. The Krosno poviat covers mountainous municipalities located peripherally to the main roads and major towns and cities. As opposed to the Krosno poviat, Kraków is the second largest city in Poland and attracts commuters from several suburban municipalities (travels to work, schools and other services). These municipalities vary as far as population density and social structure are concerned. The sample analysis presented below shows how to use easily accessible data to detect areas of low population density and high proportion of the 65+ population. The Local Data Bank of the Central Statistical Office of Poland collects the annual data necessary to perform this analysis on a locality level. In order to add, e.g. the disabled to the immobile group of population, the proper data must be collected manually from social security databases (data available for municipalities) or disability-related institutions. Obviously, this also works for oth-

er groups of population such as schoolchildren who rely on public transport. Additionally, the main roads

and railways are marked on the map presented in Fig. 1.



**Fig. 1.** Population density and the share of 65+ population in the Kraków Metropolitan Area (data for 2010, by localities)

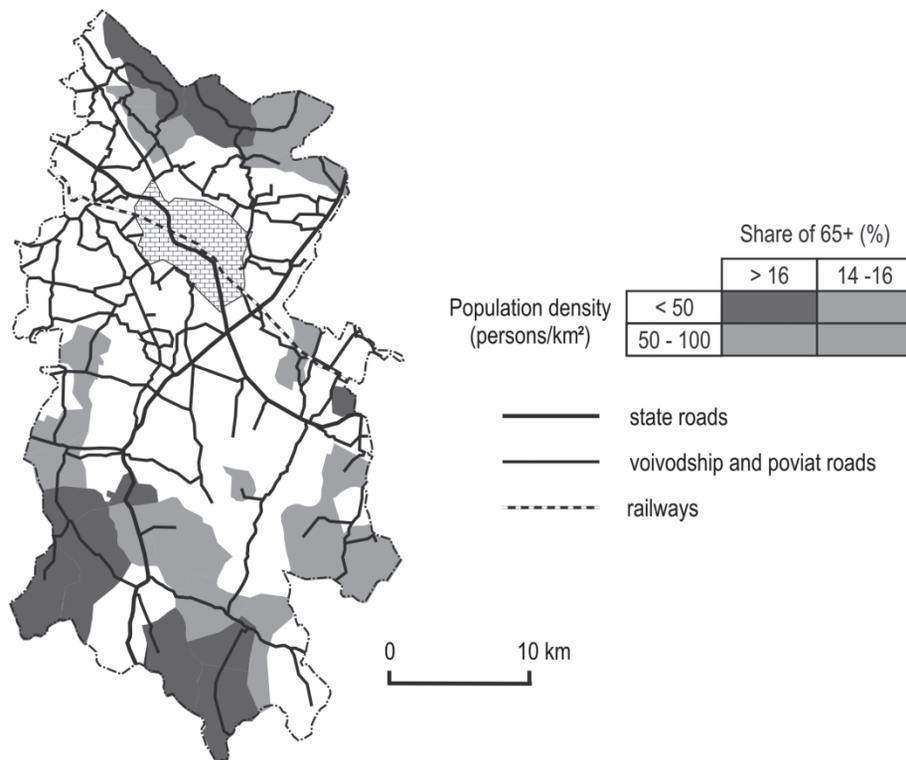
Source: Authors' own work based on the Local Databank of the Central Statistical Office

According to the above assumptions, potentially problem areas can be identified in the Kraków Metropolitan Area (KOM – *Kraków Metropolitan Area*); they include localities of population density below 100 persons per km<sup>2</sup> and the share of the

elderly above 18%. Such compact areas are located in the northern part of the KOM, and most are distant from the main roads well served by public transport. This region is potentially predisposed for transport services of general interest.

Another example concerns the Krosno poviat located in the southern part of the Podkarpackie Voivodeship (Fig. 2). This area possesses both densely populated rural areas and small mountainous localities of very low population density. Ageing does not affect this region as much as it does the KOM, but local population must cover considerable distances to the county seat. Besides, the overall standard of living in the localities far from

Krosno is low. Combining population density with the proportion of the elderly indicates northern and southern parts of this poviat to be the most unprofitable for private carriers (low population density, far from the main roads), which affects chiefly the elderly and the disabled with no individual means of travel. Transport services of general interest could be the only opportunity to travel for people living in the southern part of this poviat.



**Fig. 2.** Population density and the share of 65+ population the Krosno poviat (data for 2010, by localities)

*Source:* Authors' own work based on the Local Databank of the Central Statistical Office

Naturally, population density, the share of the 65+ population and the distance from the main roads are considered only as sample indicators which measure potential transport exclusion. Collecting more detailed data (e.g. about number of the disabled, number of bus links) would enable local governments to evaluate transport exclusion much more precisely. Nevertheless, even the towns and localities far from the main roads in sparsely populated areas of high share of the persons with reduced mobility require special attention in planning public transport of general interest. This kind of preliminary analysis indicates potentially disadvantaged areas. Only full

research on transport demand and analyses of public transport provision enable the planners to fully assess the situation and make best decisions.

## 7. Conclusions

The negative social consequences of the free market forces present in public transport in Poland are expected to be solved by institutionalisation and delegation of public transport planning to local administrative level. Unfortunately, local authorities

burdened with additional responsibilities may not be interested in proficient and reliable preparation of public transport plans. For this reason, geographically-aided elements of transport planning on a local level seems to offer a practical solution and act as a prerequisite in planning public transport according to the requirements by the newly enacted *Act of 16 December 2010 on public transport*. Geographical analyses offer practical and presentable assistance for urban public transport planning with a special regard to socio-demographic makeup of the area covered by the plan.

It seems that the achievements and methods of socio-economic geography in Poland have been neglected in transport planning on a local scale while other disciplines provide numerous and detailed contribution to this level of administrative division. The methodology utilised by transport engineers employs the four-step transport modelling - the concept first implemented in the Detroit Area Transport Study in the 1950s. These methods have been widely used in transport planning in large Polish cities (Warszawskie Badanie Ruchu 2005...; Karoń, et al., 2010), and obligatorily in feasibility studies for large infrastructural investments (Niebieska Księga – Sektor Transportu Publicznego, 2008). The preparation and implementation of the modelling techniques require specialist knowledge, sizeable and manually collected datasets as well as costly software (*Visum, EMME/2*). Thus, it is not expected the four-step model will be used in public transport planning by local authorities of smaller towns and poviats as it is commonly done, e.g. in the United States by Metropolitan Planning Organisations (National Cooperative Highway Research Program, 2012). In Poland, however, public transport, especially in smaller administrative units, may rely on superficial and succinct documents of little practical utility. Surprisingly, most of the sparsely populated poviats are not to be obligatorily covered by a public transport plan because of the statutory limits in the *Act of 16 December 2010 on public transport* (Chaberko, Kretowicz, 2011). In such areas a public transport plan remains optional, but social pressure may encourage local authorities to organise public transport services of general interest. Hence, socio-economic geography and transport planning may productively complement each other in order to effectively plan public transport

services of general interest, tackle transport exclusion in peripheral areas as well as fix transport deficiencies in metropolitan areas.

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