Bulletin of Geography. Socio–economic Series No. 23 (2014): 7–24

ISSN 1732–4254 quarterly

BULLETIN OF GEOGRAPHY. SOCIO–ECONOMIC SERIES

journal homepages:
http://www.bulletinofgeography.umk.pl
http://versita.com/bgss

Local public transport planning in Poland – geographical input

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Chaberko, T. and Kretowicz, P., 2014: Local public transport planning in Poland – geographical input. In: Szymańska, D. and Biegańska, J. editors, *Bulletin of Geography. Socio-economic Series,* No. 23, Toruń: Nicolaus Copernicus University Press, pp. 7–24. DOI: http://dx.doi.org/10.2478/bog-2014-0001

Abstract. This paper concentrates on geographical contribution to public transport planning in Poland with a special regard to transport services of general interest. The authors draw on the newly enacted Polish legislative acts concerning public transportation: 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*. According to these legal acts, authorities of the largest local and regional governments in Poland are obliged to prepare public transport plans by March 2014. In order to provide useful guidelines that would ameliorate the preparation of public transportation plans by these authorities, the authors demonstrate some effective examples of geographical analyses utilising sample cases of a medium-sized city (Gdynia) and a medium-sized poviat (Krosno poviat). The authors explain how to delineate the network of public transport of general interest in these administrative units along with route categorisation. Additionally, some principles of the city area division into public transportation sectors – a spatial unit facilitating public transport planning – are presented on the example of Gdynia.

Article details:
Received: 12 June 2013
Revised: 24 July 2013
Accepted: 28 August 2013

Key words:
Poland, Gdynia city,
Krosno poviat,
public transport,
transport planning.

Contents:

1. Introduction

Pursuant to the *Act of 16 December 2010 on public transport* selected local governments in Poland must prepare and follow *sustainable development plans of public transport* (*public transport plans*) which institute numerous regulations to help transport organisers run, manage and finance transport services of general interest. The reasons behind adopting new law include insufficient and/or ineffective provision of public transport services in many Polish poviats and cities. These disadvantages have been widely presented in the literature as negative by-products of liberalisation on the public transport market (Bogdanowicz, 1996; Menes, 2001; Bergel, 2008). The term 'insufficient' denotes poor frequencies, deficiencies of bus and railway runs during off-peak hours, and inadequate routes as compared to the needs and expectations of the local population. The term 'ineffective' means the service provision which is both unreliable and overburdened by high demand. As a result, commercial carriers take over local markets causing chaotic development of suburban bus transport. Polish geographers have frequently investigated the changes of the local public transport markets (Dej, Kołoś, 2009; Kretowicz, 2010).

A public transport plan is expected to maximise the utilisation of bus, tram and train services by improving the frequency of services and spatial coverage of public transport systems. The above legislation is most pertinent to the following types of areas: these of high public transport needs (uncoordinated operation of carriers, lack of intermodal integration, overlapping links and routes, inadequate stop locations, high variation of needs and preferences), and these of low public transport needs (suffering from deficiencies or absence of bus/railway links as a result of low profitability) (Chaberko, Kretowicz, 2011). Such areas are most predisposed for public transport of general interest, i.e. non-commercial segment of public transport services organised and financed by a public body.

The demand for public transport services is shaped by the intensity and patterns of commuting, school travels and distribution of services versus places of residence. In Poland, 2.3 million people commute to work located beyond their gmina of residence on a daily basis (Dojazdy do pracy..., 2010). The types of main trip attractions are incorporated into the *Regulation of 25 May 2011 on the detailed scope of sustainable development plan of public transport* and reflected by the term 'public utility institutions'. Considering social structure of underserved areas, transport services of general interest should above all concern these of high proportion of economically disadvantaged population who cannot afford to purchase and utilise cars, and the persons with reduced mobility (the disabled, the elderly, etc.). The most disadvantaged localities include these located peripherally, i.e. far from major roads and railways, often near voivodeship and poviat administrative borders. Besides, service provision gaps frequently occur in the regions of dispersed settlement and numerous small localities.

The main goal of this paper is to provide practical guidelines for local governments in order to support public transport planning on a local level with an aid of geographical analyses. First, the authors review the definitions of public transport services of general interest in the Polish law. Next, they propound fundamental rules to divide urban area into public transport sectors. Finally, they demonstrate how to delineate the network of transport services of general interest in poviats and cities on the examples of the city of Gdynia and the Krosno poviat. All the above issues remain in keeping with geographical and spatial analyses, which are necessary for public transport planning on a local and regional level alongside the transport modelling techniques.

2. Public transport network of general interest

Introducing services of general interest the main objective the European Union has been to direct structural policies to prevent vulnerable social groups or regions from being excluded from access to essential services (White Paper on services of general interest, 2004). These services are universal as the authorities must deliver them irrespective of low profitability on the free market. For this reason, accessibility, affordability and sufficient quality remain at the core for their provision. The main goal of public transport organisers regarding delivering services of general interest is to counteract social exclusion and devise a policy to tackle their causes. L. Pickup and G. Giuliano (2005) suggest three factors among the causes of social exclusion where transport policy has a clear influence: poor access to services, hopelessness resulting from health or disability problems exacerbated by transport barriers, and polarised or fragmented communities affected by mobility disadvantage.

According to the fundamental legal acts concerning local governments in Poland, gmina, poviat and voivodeship authorities are responsible for satisfying collective community needs in the field of public transport. Pursuant to the *Act of 20 December 1996 on public utilities management* these needs must be satisfied constantly and incessantly by service of which provision is to be ensured by these authorities. Having been defined in this fashion, services of general interest also incorporate regional and local public transport. Transport services of general interest are defined in the *Act of 16 December 2010 on public transport* as the services available universally and delivered by the publicly-subsidised transport operator in order to constantly and incessantly satisfy population needs. The Lisbon Treaty signed in 2007 by the 27 EU Member States recognises so-called services of general economic interest (SGEI). These services are delivered obligatorily with respect to equality and solidarity and are served *as closely as possible to the needs of the users*. It seems that the most important hallmarks of services of general interest are mentioned only in the latter document: affordability (regardless of service profitability) and mandatory provision especially when entities operating on the free market fail to fulfil community service. These characteristics indicate that public transport is principally prejudiced in favour of local inhabitants while private transport rarely operates in unprofitable conditions and avoids serving certain areas and most disadvantaged groups of population.

Concerning the above, organisation and financing of public transport by a public body is required to satisfy the needs of all inhabitants sufficiently and universally. Nevertheless, public funds must not be equivalent to economic benefits for carriers, as states the article 107 of *The Treaty on the Functioning of the European Union*. Such aid granted by the state or local government would disturb free competition. Simultaneously, the state financial support cannot be selective, i.e. directed to the one privileged carrier. The only exception that proves the rule concerns refunds paid to the operator to offset losses incurred by providing unprofitable services. This refund not only covers net costs accumulated by the carrier through discharging public service obligations, but also takes into account the revenue generated thereby and a reasonable income (The Regulation (EC) No. 1370/2007..., 2007). All of the above regulations have been adopted by the *Act of 16 December 2010 on public transport* and operate as a common law in Poland.

3. Public transport services of general interest in cities

Although the domain of public transport planning intertwines with the urban transport modelling techniques, it concentrates on different goals. The main product of the urban transport engineering is a transport model constructed in order to facilitate vehicle and passenger flows, harmonise individual and public transport and optimise costs and benefits of the transport system by travel demand forecasting; hence the focus is on traffic management embracing all users. In this paper, attention is given to public transport, i.e. one part of mass transport (excluding taxi, school transport and worker transport) that comes under the *Act of 16 December 2010 on public transport* (Krych, Kaczkowski, 2010). The authors are particularly interested in public

transport services of general interest as a non-commercial segment of public transport.

According to the above *Act* and the *Regulation of 25 May 2011 on the detailed scope of sustainable development plan of public transport* the foremost element of this plan includes a transport network to be served by carriers delivering public transport services of general interest. Originally, these services are to be available universally, being delivered constantly and incessantly by a public transport operator subordinate to a public transport organiser. In large cities public transport has been operating according to this model since the early 1990s, but presently this obligation concerns all municipalities, especially those where authorities wish to run transport services of general interest.

For the purposes of delivering services of general interest it is crucial to determine the range and shape of a transport network in accordance with the needs of all inhabitants. Assumedly, this network should embrace all residential areas in an attempt to retain the distance of convenient walk for the great majority of population from the residence to bus/tram/train stops under 300-400 metres, and in special cases under 500 metres in urban areas (Majewski, Beim, 2008) as well as 750-1000 metres in rural areas (Fitzpatrick et al., 1996). The shape of urban transport network of general interest ought to facilitate movements between city districts and the city centre along the routes served by the operator of public transport whereas the shape of a poviat public transport network is to increase the access to poviat and gmina seats for all of the inhabitants.

Although the term 'the network of public transport of general interest' is fairly new in the legal system of Poland, such networks have existed in cities for years demarcated by the lines served by urban public transport carrier(s). Hence, the cities that already run regular urban public transport would not need to delineate a new network. It is assumed that this network is pre-established by existing bus, tram and trolleybus lines. However, the preparation of a public transport plan creates a good opportunity to analyse and evaluate this network and, if necessary, reconstruct it or make the necessary changes adjusting its shape to the rapidly changing urban environment. It is particularly essential to examine whether some distant urban areas or city hinterlands remain underserved by public transport regardless of high local demand. Such situation is common as new residential areas or housing estates, new workplaces or large service areas are presently being located far from the city centres. Moreover, it is not enough to determine the range and shape of a transport network of general interest as the vehicles must run with a well-adjusted frequency to the local demand in order to deliver transport services effectively. Thereunder, the choices of minimum and maximum frequencies, i.e. the construction of timetables for day and week peak and off-peak times, are an imperative for the optimal performance of public transport.

4. Public transport sectors

The terms 'traffic analysis zone' or 'transport analysis zone' (TAZ) as well as 'traffic analysis district' (TAD) have been coined by transport planners as the basic geographic units for the purposes of transport forecasting and modelling. A group of combined TAZs creates a traffic analysis district. The most accurate definition of TAZs and methods of their delineation are proposed by the US National Cooperative Highway Research Program (1998). This definition reads: *Geographic areas dividing the planning region into relatively similar areas of land use and land activity. Zones represent the origins and destinations of travel activity within the region… every household, place of employment, shopping center, and other activity… are first aggregated into zones and then further simplified into a single node called a centroid.*

In the USA, these zones are created by combining census blocks using a set of rational criteria to make socio-economic data for each zone always available. Hence, a traffic analysis zone (TAZ) is defined by the US Census Bureau as a special area delineated by the state and/or local transport officials for tabulating traffic-related data, especially journey-to-work and place-of-work statistics (US Census Bureau, 2012). TAZs are utilised in the popular four-step transport model procedure, which includes trip generation (travels generated by every zone by destination), trip distribution (travels generated from every zone to every other zone by destination), mode choice or modal split (for each pair

of zones) and route assignment (between the origin zone and destination zone by a particular mode to a route). The US National Cooperative Highway Research Program (2012) has recently issued a report that comprehensively guides transport planners though the whole process. This institution argues that despite numerous recent extensions, the traditional four-step model will continue to be used for many years, especially in the small- and medium-sized urban areas.

There have been numerous approaches to divide regions into traffic analysis zones in Poland ranging from manual (Analiza ruchu w gminie Łomianki..., 2008) to the GPS and GIS-based software tools (Celiński et al., 2009; Szarata, 2010). It is desirable to utilise a large number of traffic analysis zones in transport planning and engineering in order to increase precision of the modelling procedure (Celiński et al., 2009). This number is cost-dependent and thus changeable – for example, during the 2005 research, the city of Warsaw was divided into 774 traffic analysis zones and thousands of passengers and households were interviewed in order to conduct proper analyses (Warszawskie badanie ruchu, 2005). The Upper Silesian region was divided into 185 traffic analysis zones during the latest comprehensive traffic analyses (Karoń et al., 2010). The transport modelling techniques have been also used in smaller spatial scales such as a site level in order to detect changes in passenger flows near large commercial investments (Szarata, 2010).

Geographical reference to traffic analysis zones requires utilising geographical criteria in their delineation. Most TAZs in Poland are outlined drawing on demographic and land use data. The authors suggest public transport sector as a major unit for delineation of a public transport network of general interest. This unit would facilitate rational local public transport planning according to the *Act of 16 December 2010 on public transport*. Similar sectors have been used recently in transport strategies and plans designed by the main towns of regions, e.g. Koszalin (2007), Olsztyn (2010) and Piotrków Trybunalski (2012), although no criteria for their demarcation have been mentioned. The main goal of the public transport sector is to enhance precision and transfer public transport of general interest planning to a lower level of administrative division. The authors utilise geographical criteria in their delineation alongside the TAZ, which remains the major unit in traffic forecasts and modelling. The latter analyses are also mandatory for a public transport plan (Jastrzębski, 2009). In unison with the main aim of this paper, the authors underline practical solutions and suggest simple methods within financial and organisational reach of local governments.

A complex spatial structure of large cities and numerous public transport routes make it impossible to plan public transport of general interest in a city without dividing it into smaller units. This division should be performed according to such criteria as land use and concentration of potential demand. Importantly, public transport sectors ought to be possibly most homogenous and encompass areas with passengers travelling towards one place, node or main artery. The boundaries of public transport sectors must correspond to the functions of particular districts (e.g. residential, commercial, industrial) and existing obstacles (e.g. natural barriers such as rivers, hills, lakes). Unfortunately, it is hard to delineate public transport sectors based on these criteria, as the shape of public transport sectors does not correspond to the existing administrative borders (census blocks, districts, housing estates etc.). Worse still, only administrative areas offer statistical data necessary to conduct further analyses (e.g. demographic and social data). To sum up, the main criteria to delineate public transport sectors include: (a) the shape of transport network – connected with the main routes (roads, arteries, railways) which determine passenger flows; (b) functional criteria – connected with districts of various functions (city centre, commercial district, industrial district, residential areas); (c) morphologic criteria- connected with districts of diverse development and land use (densely populated city centre, large housing estates, old rural areas incorporated into the city, suburbia); (d) natural and man-made barriers – rivers, hills, mountain ranges, railways, ports; (e) administrative criteria – public transport sectors must correspond to administrative division (districts, census tracts, housing estates, other units).

A few general rules regarding the above criteria can be formulated. The boundaries of public transport sectors must not coincide with the main transport arteries and go perpendicular to natural or man-made barriers. Although the first four crite-

ria are most suitable, in practice the administrative criterion is most utilised. This situation results from the availability of demographic, social and economic data collected for administrative units. Therefore, traffic analysis zones are often coincident with census tracts or urban units and boundaries of public transport sectors correspond to district boundaries. When demarcated in this manner, public transport sectors rarely run optimal to the existing public transport routes.

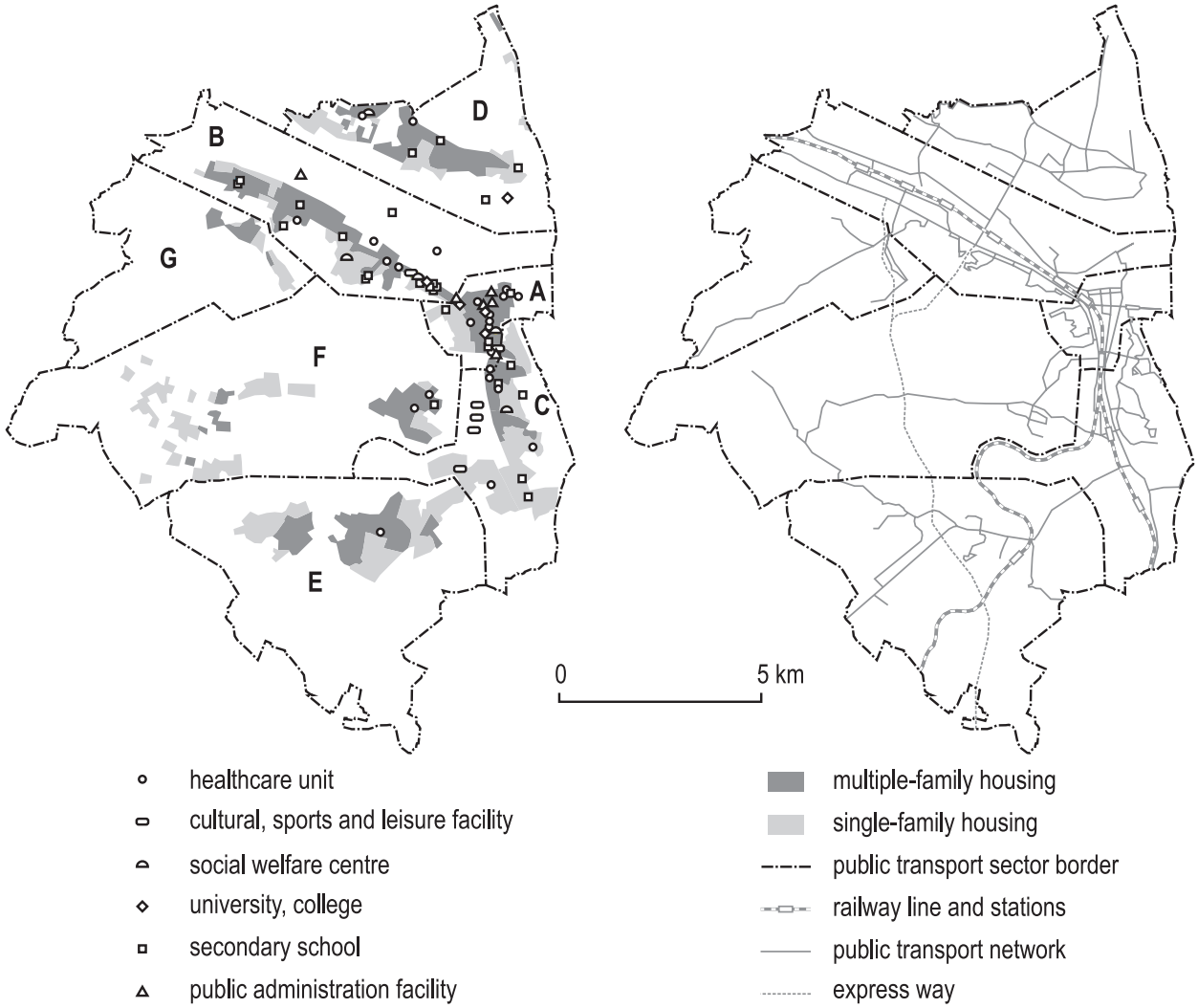

Fig. 1. Division of Gdynia into public transport sectors

Source: Authors' own work

Figure 1 presents a sample division of the city of Gdynia into seven public transport sectors. The functional city centre is distinguished as the main service area where the major routes meet (A). The public transport sectors B and C encompass densely built-up residential and industrial areas. These sectors are delineated according to the course of the main routes from the city centre and the Rapid Urban Railway – the most important route in the entire urban area of the Tri-City (Gdańsk, Gdynia, Sopot). Residential districts with multi-family housing located to the north of the city centre and isolated by the port basin and harbour form the public transport sector D. The sector E embraces large housing estates distant from the city centre but linked with the central area by the main artery through the sector C. The sector F is the least uniform of all as it covers a large housing estate lo-

cated nearby the city centre, housing subdivisions and former rural areas located in the western part of the city. Yet still, all this area is served by one main road leading to the city centre. The boundary between the sectors F and C is delineated along the railway route – this does not contradict the above rules as the route remains of little importance for public transport in Gdynia and should be regarded rather as a barrier than a major conduit. There are only two smaller housing estates in the sector G – the majority of travels from this sector occur along one road leading mostly through the sector B.

5. Categorisation of public transport routes in Gdynia

The main goal of a public transport plan is not to design or redesign transport routes and timetables it details. However, this document should determine universal standards of transport services delivered within the network of general interest. These standards include, e.g. frequencies of bus, tram and train runs and other parameters. In order to ascribe appropriate frequencies to particular sections of routes, these sections need to be categorised. Each category would have different frequency standards (measured in minutes) separately for peak hours, off-peak hours and weekends. Other parameters that may come in handy include utilisation of low-floor means of public transport. Route categorisation is not a mandatory element of a public transport plan; however it seems to be a simple, useful and practical solution for municipal authorities while making decisions on the spatial distribution of public transport services of general interest.

The first stage of planning requires appropriate data gathered for each public transport sector (e.g. the socio-demographic structure of the local population, spatial structure, main functions, land use, public transport routes that run through each sector and current transport provision). The main traffic generators (trip attractions), such as large job providers, service areas, schools and universities, hospitals and shopping centres, should also be taken into account. As one of the principal objectives incorporated in the *Act of 16 December 2010 on public transport* is to satisfy the needs of the disabled, it is mandatory to approximate their number in each sector and determine common destinations of their journeys.

The main part in planning a network of transport services of general interest embraces the minimum and maximum frequencies of bus, tram and train runs along different routes (sections of routes). This can only be done by means of passenger flow counts as well as in-vehicle and household surveys conducted among local population (Travel Survey Manual, 1996). The results of this research enable transport planners to attribute accurate frequencies to each category. It seems practical to utilise three to four categories. The first category encompasses the main public transport routes in a sector that link the largest housing estates with the city centre or other important travel destinations located outside this sector. The second category embraces supplementary routes (crucial for inter-district transport), other routes to the city centre, alternatively feeder routes. The third and fourth categories include routes significant only for one sector linking the least populous areas with the main routes, interchange nodes or district centres. The sample characteristics for further route categorisation within a transport network of general interest is presented in Table 1 on the example of public transport of the sector D in Gdynia. Obviously, this table may be extended as more information is gathered, e.g. from the public running records or other sources.

The most significant element of the spatial development of Gdynia regarding public transport in the sector D are large housing estates, which give this part of the city a residential character. The densely built-up area contrasts with the single-family housing located on the fringes of large housing estates. There are also some small areas of residential function located to the north, while the southern part of the sector D comprises extensive industrial area (the port and shipyard). The most important institution in the area includes a university complex (Gdynia Maritime University).

Figure 2 presents a sample categorisation of routes within the public transport sector D in Gdynia for the purposes of a transport network of general interest. With the results of the surveys among the population and public transport users in Gdynia, it is possible to assign frequencies to the route categories that form the network of general in-

terest. Table 2 presents only sample frequencies (real values should be based upon aforementioned surveys) in order to depict the outcome of route categorisation.

Table 1. Spatial and socio-economic characteristics of the public transport sector D in Gdynia for the purpose of route categorisation (simplified, data for 2010)

Element	Description
Location	Northern section of the city. Districts: Pogórze, Obłuże, Oksywie and Babie Doły. Also northern parts of Śródmieście (city central districts)
Spatial development	Southern part: industrial and port area, central part: large housing estates and single-family housing located in the fringes, dispersed single-family housing in the northern part of the area
Functions and main traffic generators	Residential function (bedroom community), port and industrial function – southern sector (shipyard, container terminal, heat and power station); Maritime University, maritime terminal, sea passenger terminal, naval base, four secondary schools, two healthcare units, social welfare centre)
Socio-demographic population structure	High population density (except northern part of the area), stable population dynamics (population increase in Oksywie), high or average share of workers
Disabled persons in the area	7 thousand persons, average share, travel destinations: two healthcare units, social welfae centre

Source: Authors' own work

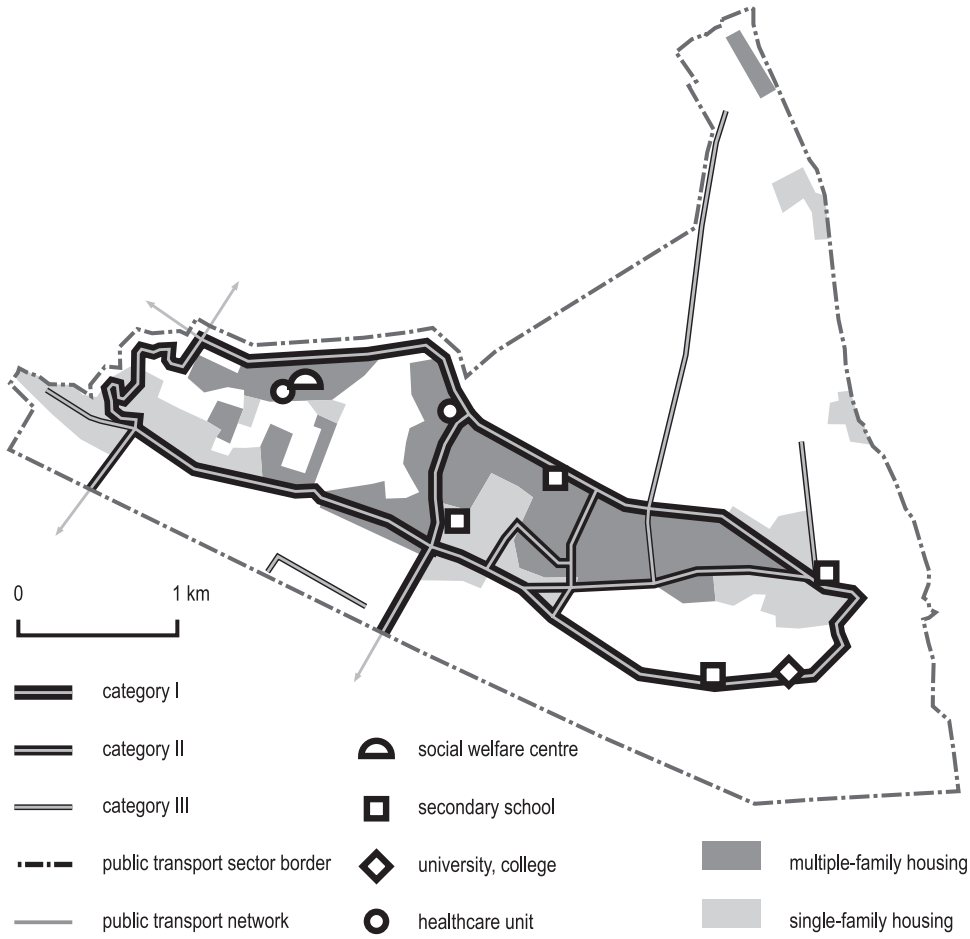

Fig. 2. Route categorisation in the public transport sector D in Gdynia for the purpose of transport network of general interest on the city level

Source: Authors' own work

Table 2. Sample route categorisation in the public transport sector D in Gdynia

Category	Category characteristics	Frequency (minutes)		Frequency weekend (minutes)	Priority n low-floor vehicles
		peak	off-peak		
I	Main routes linking large housing estates and the university campus with the city centre	minimum 5	7.5-10	10	high
II	Supplementary lines (within public transport sector) and the route to Rapid Urban Railway	10-15	15-30	15-30	low
III	Lines serving low population density areas, without large traffic generators	15-30	45	45-60	low

Source: Authors' own work

The following route categorisation in the public sector D in Gdynia is suggested: (a) category I of high frequencies – links large housing estates and the city centre plus one route serving the Gdynia Maritime University (possibly with options concerning academic year and holidays); (b) category II of moderate frequencies – includes routes within housing estates which link more distant parts of these estates to the main roads, plus one route to the south-western part of the city linking the sector D with an interchange node allowing passengers to transfer to the Rapid Urban Railway; (c) category III of low frequencies – includes routes to smaller single-family housing estates of the lowest demand for public transport. Priority in the utilisation of low-floor vehicles is granted to the category I as it shows the highest passenger flows serving the routes by the medical and social assistance centres. No priority in those terms is granted to the category III as these routes serve less populated areas of higher car-utilisation and the lowest concentration of persons of reduced mobility.

The decisions concerning vehicle frequencies included in the public transport plans for each fragment of the transport network of general interest for different peak and off-peak hours and days must be obligatory for public transport organisers during the vehicle routing and timetable construction. The operator of public transport would only provide services of general interest based on the contract made with the organiser. This carrier is not to interfere with routes and timetables.

6. Public transport network of general interest in poviats

According to the new law regarding public transport new functions have been ceded upon poviats, namely organisation, management and planning of public transportation. These responsibilities are new for this unit of administrative division, yet poviat authorities have performed some tasks connected the with management and control since the *Act of 5 June 1998 on poviat government* and the *Act of 6 September 2001 on road transport* have come into force.

It is plain that new obligations are particularly focused on the areas located within poviat boundaries where public transport demand is not fully satisfied by the free market. These areas include sparsely populated and peripherally located localities underserved (or not served at all) by the public and commercial bus and railway carriers. The inhabitants of these areas used to be protected by the still current *Act of 25 September 1981 on state enterprises*, which unfortunately lost its significance along with the transformation of urban public carriers and local State Bus Companies (PKS- *Przedsiębiorstwo Komunickacji Samochodowej*) into commercial companies. This legislation, among other things, obliges the state to subsidy unprofitable public transport links run by the public companies. However, the number of privatised, commercialised or communalised PKS companies has been increasing consistently since

the late 1990s (Taylor, Ciechański, 2008, 2010). As a result, these companies have gradually limited, suspended or discontinued the most unprofitable links and bus runs (Kretowicz, 2009, 2010). For this reason, the problem of public transport of general interest is given precedence by the newly-enacted legal acts. The main aim of the new regulations with respect to poviats is to provide sufficient access to public transport for those most economically deprived and the persons of reduced mobility living in un(der)served and peripheral areas. The other objective, namely coordination, integration and control over the scattered supply and provision of proper passenger information, is more significant in urban and metropolitan areas, although it may still be vital for densely populated rural areas located in the southern and south-eastern parts of Poland.

Organisation of public transport on a poviat level can bring numerous benefits to the local population and municipal authorities. When organised and planned locally, public transport improves accessibility to the poviat and gminas seats, enhances home-to-work passenger flows and helps satisfy everyday needs of the population residing far from the community centres. Accordingly, transport services of general interest in peripheral areas prevent transport and social exclusion (especially among households with no individual transport), as well as encourage inhabitants to transfer from their own vehicles to the public modes of travel. This policy limits costs of everyday travelling, reduces traffic bottleneck effects, especially in the entrance roads to the larger towns and cities, and to some extent solves parking problems in the poviat seats.

7. Poviats opposed to public transport obligations

As stated previously, the *Act of 16 December 2010 on public transport* burdens poviat governments with a number of new responsibilities, which have never been realised by these public bodies. Hitherto, the poviat responsibilities concerning public transport have included license and permit issuing, carriers control, accounting and distribution of state subsidies to the carriers on account of concessionary fares. Importantly, the regulatory functions performed by poviat authorities on a local public transport market are limited, yet these elements introduced regulatory competition in the early 2000s. Additionally, the only mandatory document loosely connected with public transport planning is so-called *public transport market analysis* prepared by poviats either with the introduction of new lines or once a year. This analysis is not of strictly planning character, but it is utilised to justify the decisions to grant or reverse permits to run public transport services. As evidenced in 2011 by the Supreme Audit Office of Poland, as many as 89% poviats failed to prepare *public transport market analysis* regularly, and most prepared this document negligently (Informacja o wynikach kontroli..., 2011).

In light of the new legislation, poviats become public transport organisers and take over the organisation, management and planning of public transport on a local level. Notably, poviats may also become the organisers of public transport of general interest. If they intend to run transport services of general interest, these most populous (of at least 80,000 inhabitants) or their unions (of at least 120,000 inhabitants), have to prepare a sustainable public transport development plan. Preparation of this plan coupled with organisation and financing of public transport may overload poviats' capabilities and strain their budgets. Consequently, most poviats will probably not be interested in organising public transport services of general interest. There is also a common contention that the demand for public transport within a poviat territory can be fully satisfied by the free market and no additional aid from local governments is necessary. At all events, if new obligations do not entail extra funds from the state budget, the poviat transport of general interest will not be run on a large scale.

These few poviat authorities which do plan to organise and finance public transport of general interest, must take a public transport plan very seriously. If they fail to prepare this document before March 2014, there is a risk that financing of public transport of general interest will be limited (no contracts with public transport operators for a period longer than 3 years). In addition, the regulations concerning reduced-fare rides are going to change – they are to be different for the routes served by transport of general interest. If poviat governments do not decide to run these services, the local pop-

ulation may lose the opportunity to utilise reduced-fare tickets (available only from operators delivering services of general interest).

Irrespective of the above, public transport plans are not expected to radically change this segment of the public transport market that is not a service of general interest (Szczerbaciuk, 2012).

8. Network of public transport of general interest in the Krosno poviat

Large cities are best prepared to perform the role of a public transport organiser as they have been delivering public transport services by means of subservient authorities established and appointed to organise public transport in urban areas since the 1990s. For this reason, urban network of public transport of general interest is practically intact and coincides with the lines served by urban carrier(s). Delineation of such a network in poviats remains a challenge. There is no one simple 'way' of how to include routes to the network although a few general directions can be distinguished. Thus, the network of public transport of general interest might include: (a) all routes which are currently and regularly served by any mean of public transport; (b) all routes currently served by a public carrier – this concerns poviats with their own public transport run by an urban carrier in the town (city) and beyond its limits; (c) only the routes of the greatest importance for poviats, i.e. these linking gminas' seats with poviat seats of the largest passenger flows; (d) only the routes in localities which have never been served by public transportation or these deprived thereof in recent years; (e) a combination of the above.

The decision on the direction or combination of the above characteristics optimal for a particular poviat should be based on the passenger flow counts and demand forecasts. Until now, poviats neither have been obligated nor have they needed to conduct such a research. Hence, the authorities cannot utilise any previous information or data (as opposed to the cities). For this reason, poviats can only rely on the data provided by public transport carriers (if these operate in the area) whereas it is difficult to obtain reliable and consistent data on passenger flows (e.g. according to the ticket sales data) from every private carrier.

It is highly probable that complex research and traffic counts to measure actual and potential transport demand will be too expensive for most of poviat budgets. Hence, such field studies conducted in unison with the public transport plan significantly increase its total cost. Instead, geographic research to some extent may replace costly analyses. In order to determine the demand for public transport (including the transport services of general interest) and significance of routes poviat officials may utilise: (a) population distribution analysis (population density) on a locality level; (b) distribution of main job providers, middle and high schools and other trip generators along with an estimation of daily commuting and travels; (c) analysis of residence and travel destination of persons of reduced mobility; (d) analysis of the current public transport offer (all public and private carriers); (e) recognition of the 'transport exclusion' phenomenon, i.e. localities with no or very poor public transport as measured by a number of daily and weekend links; (f) marketing analyses via internet in order to evaluate current opinions on public transport operation and passenger behaviour (travel directions, modal split); (g) household survey concerning travel behaviour conducted on a representative sample of population. In rural areas this research can be done in a form of school or village council survey, or any other mass contact with local populations.

The aforementioned research fields include the distribution of large job providers along with their range and intensity of commuting. An example of such examination is presented in Figure 3 for the Krosno poviat.

In order to perform this analysis, the data have been collected about the location of large companies (by localities and employment, extracted from the Local Databank of the Central Statistical Office of Poland) and the employees' locality of residence (data provided by the companies). There is a significant dominance of the poviat seat on the local labour market in the Krosno poviat – 2/3 of all enterprises of above 50 workers are located in Krosno. The most intense commuting concerns the gminas adjoining the town boundary and in some localities amounts to 200 persons per 1,000 inhabitants.

This figure is lower in gminas located in the south-eastern (Iwonicz-Zdrój and Rymanów gminas) and western (Jedlicze gmina) parts of the poviat. This is owed to the higher number of jobs available in these gminas because of the employment in the oil industry (Jedlicze oil refinery) and tourist resorts (hotels and boarding houses located in Iwonicz-Zdrój and Rymanów-Zdrój).

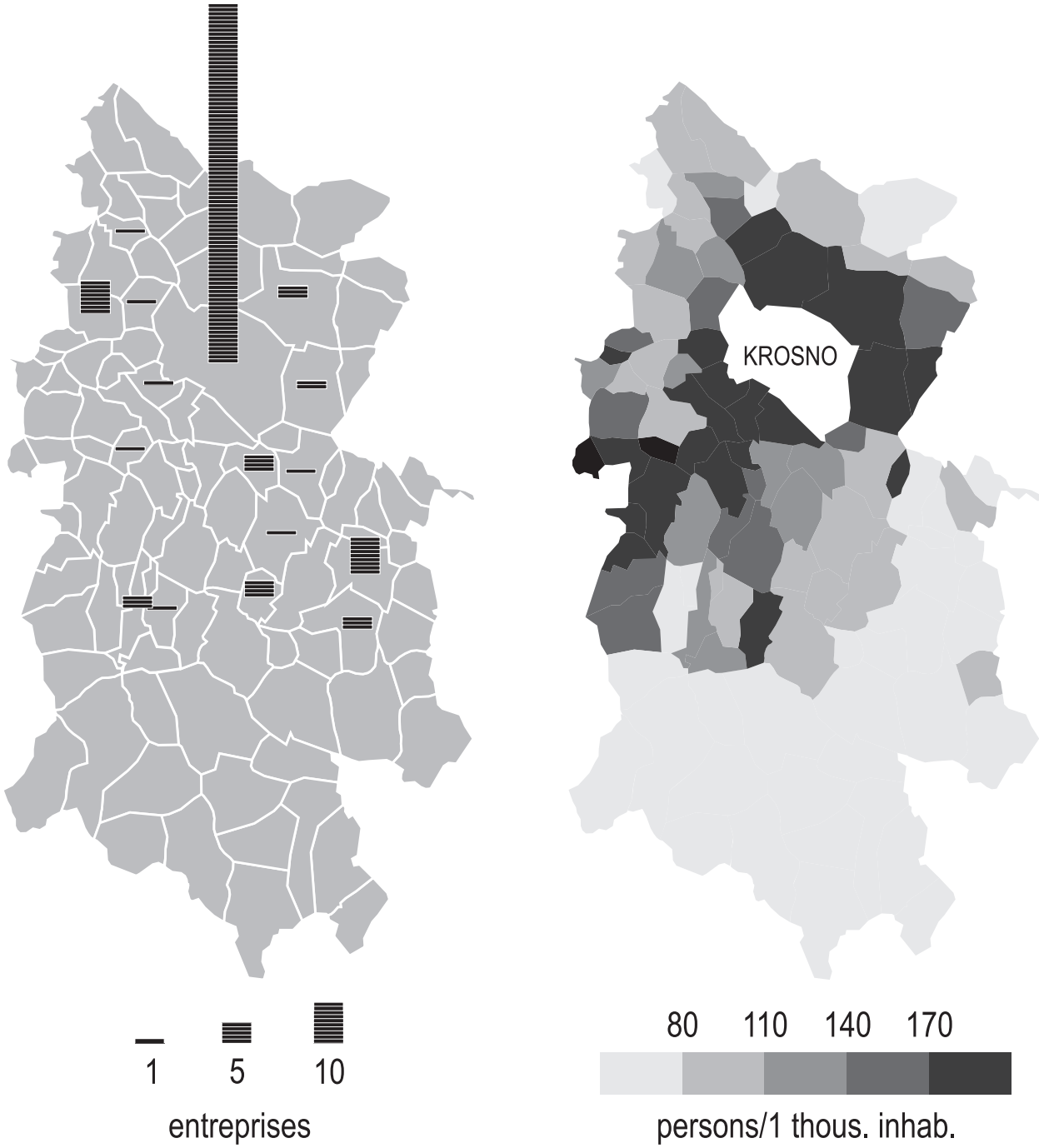

Fig. 3. Number of the employed by enterprises of above 50 workers (left) and commuting intensity to Krosno (right) in the localities of the Krosno poviat (data for 2010)

Source: Authors' own work based on the Local Databank of the Central Statistical Office of Poland and Kaczkowski (2008)

This type of analysis enables transport planners to estimate potential commuter flows, however, when unsupported with car ownership or car utilisation data, it fails to recognise the number of commuters making use of public transport. The survey conducted on a representative sample of commuters (e.g. in the companies) makes it possible to expand the reasoning to the entire local population. When supplemented with information on travels to school (available in school records), this data provides the most important and regular passenger flows in this poviat. Similar analysis can be performed for other smaller towns in the area, which would render the overall depiction of the most significant passenger flows there.

9. Categorisation of public transport routes in the Krosno poviat

There is no need to divide poviats into public transport sectors as gminas reflect functional catchment areas on a local scale and localities can be regarded as public transport zones. The first stage of planning requires appropriate data collected for each gmina. This geographically referenced data include the socio-demographic population composition, spatial structure and development, the main functions and land use etc., as well as the public transport routes that run through each gmina. The main traffic generators (trip attractions), such as large job providers, service areas, schools and universities, hospitals and shopping centres, should also be taken into account. As one of the principal objectives incorporated in the *Act of 16 December 2010 on public transport* is to satisfy the needs of the disabled, it is mandatory to discern their number in each sector and determine common destinations of their journeys. The above information should be supplemented with the current provision of public and private bus and railway carriers.

The authors employ an example of the Chorkówka gmina located to the east of Krosno. The sample depiction of the preliminary characteristics for further route categorisation is presented in Table 3 and Figure 4. Obviously, the table may be extended as more information is gathered, e.g. from public running records or other external sources. As in the case of Gdynia, this categorisation plays a major role in delineating a transport network of general interest. Table 4 presents only sample frequencies (the real values should be based upon population surveys and traffic counts) in order to depict the outcome of route categorisation.

Table 3. Simplified organisation of spatial and socio-economic characteristics of the Chorkówka gmina for the purpose of route categorisation (data for 2010)

Element	Description
Basic information	13,432 inhabitants, population density: 174.3 persons per km^2, 14 localities
Spatial development	New residential single-family housing in the localities adjoining Krosno (suburbanisation processes), the remaining part of the Chorkówka gmina – dispersed single-family homesteads, good availability to healthcare units, uneven distribution of secondary schools (intense school travels)
Functions and main traffic generators	Agricultural and service function of the gmina, the absence of large job providers (intense commuting to Krosno), indispensable coordination between school transport and public transport of general interest)
Socio-demographic population structure	Population increase in the eastern part of the gmina (Krosno's suburban zone), high population density, average share of the elderly as compared to the whole poviat

Source: Authors' own work

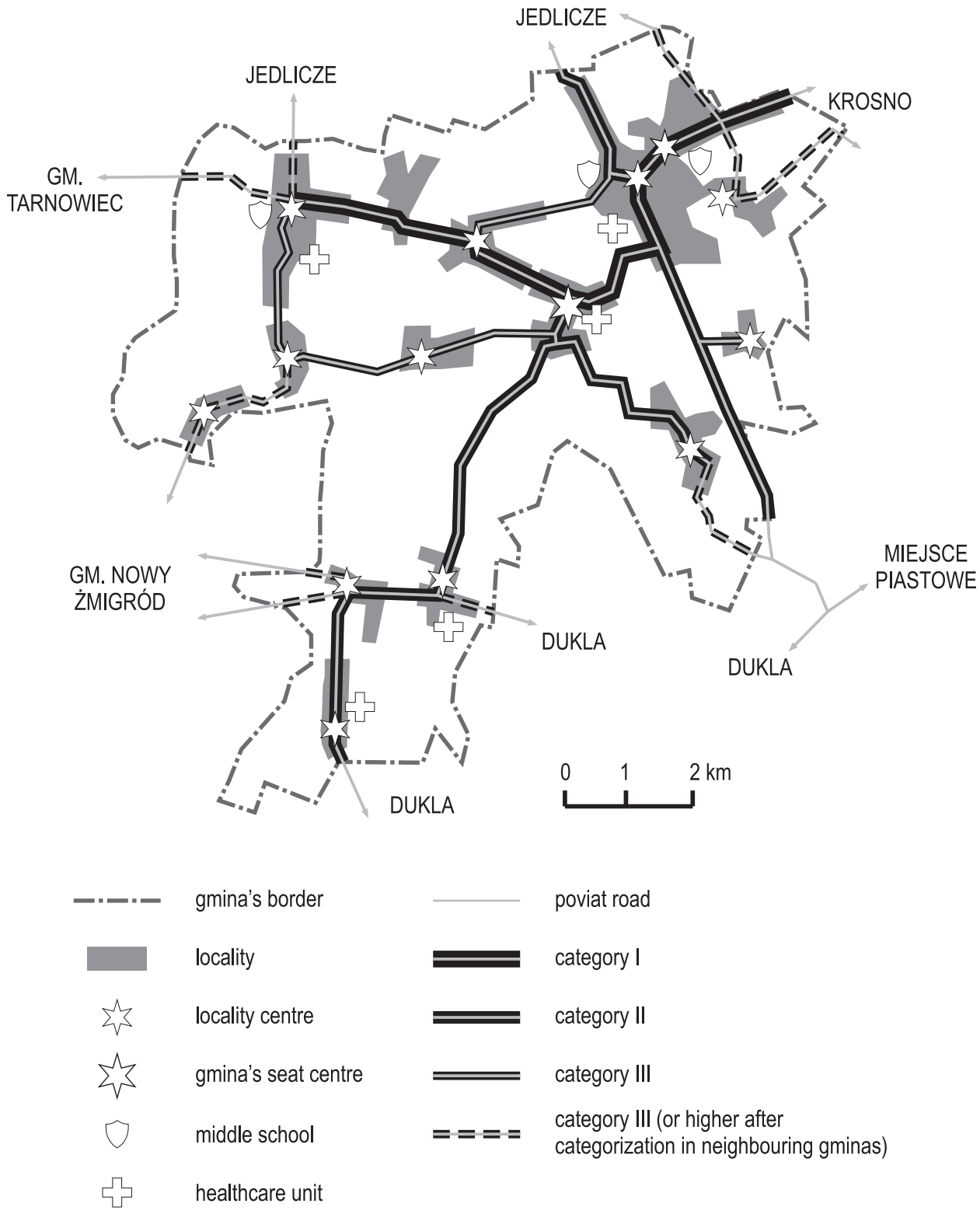

Fig. 4. Route categorisation for the purpose of transport network of general interest on a poviat level

Source: Authors' own work

Table 4. Sample route categorisation in the Chorkówka gmina

Category	Category characteristics	Public transport of general interest			
		peak	off-peak	evenings	weekends
I	Main routes linking the largest localities with Krosno, running through localities inhabited by 55% of the gmina's total population	No	Supplementary only	Supplementary only	Supplementary only
II	Lines serving large localities located off the main roads and the major links with other gminas	No	Supplementary only	Yes	Yes
III	Lines serving the smallest localities in the gmina located off the main roads and utilised by commercial carriers	Yes	Optionally	Optionally	Optionally

Source: Authors' own work

The main part in planning a network of transport services of general interest embraces the minimum and maximum frequencies of bus, tram and train lines. This can only be done by means of passenger flow counts as well as in-vehicle and household surveys conducted among local population. These surveys have not been widely performed for poviats. The results of this research enable transport planners to attribute accurate frequencies to each category.

It seems practical to utilise three to four categories. The first category encompasses the main public transport routes in a gmina which link the largest localities with the poviat seat or other important travel destinations located outside this gmina. The second category is to embrace supplementary routes, but crucial for inter-gmina transport or alternative routes to the poviat seat. The third and fourth categories include the routes significant only for one sector linking the least populated areas with the main routes, interchange nodes or the gmina seat. The sample depiction of preliminary characteristics for further categorisation of routes included in the transport network of general interest is presented in Figure 4 by means of the Chorkówka gmina, which adjoins the town of Krosno.

The main goal of public transport of general interest is to supplement the existing commercial bus transport. This supplementation is considered as directing vehicles of public carriers to the routes underserved or served inefficiently by the commercial carriers. For the major category I the role of publicly-funded transport should be only to support commercial carriers in off-peak hours (in the mornings, afternoons, evenings, at the weekends). The routes of category II are to link gminas with other larger localities and other gminas (excluding Krosno). Along these routes public transport of general interest should also reinforce public transport in off-peak periods, and provide bus transport to the routes affected by severe scarcity of evening and weekend bus runs.

The smallest localities in the Chorkówka community located along the unserved or underserved routes by commercial carriers are included into category III or IV. The role of public transport of general interest is to provide a 'minimum' number of bus runs to prevent these localities from transport exclusion. Accordingly, publicly-funded carrier should deliver transport services in the most important times of the day: morning and afternoon peaks (commuting and school travels). If the poviat finances allow, these services should also be provided in off-peak hours and weekends.

10. Conclusions

The new legislative acts concerning public transportation pose a challenge to local authorities as they oblige them to plan, organise and manage the public transport market. These public bodies have not been fully prepared to perform such

functions. Transport services of general interest remain of great importance for local population (especially these deprived of public transport links). Even having acquired the necessary funds to finance provision of public transport of general interest its planning and decisions on spatial distribution in the area are difficult. Worse still, a public transport plan can be prepared in many ways as no uniform directives are included in the legislation (especially the extent and level of detail of its mandatory sections). It seems that the preparation of this document may be successfully supported by geographic analyses with the utilisation of simple methods and available data. This especially concerns geographic elements significant for the preparation of the plan. The main method includes cataloguing characteristics of spatial development, infrastructure, population structures and public transport services in the area under consideration. This kind of analysis enables the planners to demarcate problem areas of insufficient transport provision and identify the main passenger flows; thus, when supported with traffic counts, surveys and marketing analysis, the descriptive part of a public transport plan remains a foundation of decision-making in the following sections.

A different approach should be used for cities as compared to poviats, although in the aforementioned legislation there are no separate regulations concerning administrative units. In the crucial part of the plan – the delineation of a network of public transport services of general interest – the authors suggest route categorisation with basic standards ascribed to each category. The mere delineation is not expected to be complex in cities (requires minor changes) whereas in poviats such network must be demarcated manually. For the latter areas, the authors propose public transport services of general interest as complementary to commercial public transportation aimed predominantly at certain places or off-peak hours.

To recap, the role of geographers in public transport planning is most recommended and at least as much justified as the participation of other specialists in the entire process, i.e. transport engineers, economists and lawyers – all collaborating with a local government. By investigating a range of different spatial phenomena (natural environment, demographic and socio-economic population structures coupled with the transport organisation in space), geographers tackle them most comprehensively and provide a synthetic foundation for further analyses.

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