

ACCESSIBILITY OF THE RAILWAY NETWORK IN SLOVAKIA

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Abstract: The aim of this study is to point to the state of the railway network and the position of the railway transport in Slovakia; to assess the accessibility of the railway in terms of accessibility of the nearest railway station of passenger transport from the individual communes and to point to regional disparities in the matter. Regional disparities in railway accessibility were assessed based on the maximum distance from the commune to the nearest railway station and based on the mean weighted distance from the commune to the nearest railway station. The effect of closing the passenger transport on 15 regional tracks for the level of railway station accessibility was also assessed.

Key words: accessibility, railway network, railway station, multimodal trip, competitiveness, Slovakia

INTRODUCTION

Spatial movement or mobility as the capacity to move from one place to another is one of the basic activities of population determined by the need of humans to participate in varied activities dispersed in space. Such trips of individual inhabitants normally take place between the place of living (the starting point) and the place of activity (final point) while their nature is as a rule cyclic. The most frequent regular movement of cyclic character is commuting (to work or to school).

Many population's trips from one place to other in advance set place cannot be made as simple trips from the starting point to the final point – they consist of chain of movements. Such trips require a complicated process of selection and decision from different

transport modes with different transport cost and time. In this manner individual transport modes enter into relative competition. The key factors that determine the modal choice are time, price, reliability, and comfort (Gorter et al. 1999).

The existing distance between the starting and the final points can be overcome by means of unimodal (by car) or by means of multimodal transport which is normally the combination of walk and the public transport (bus or train). In this study we will focus on trips, part of which, is the railway transport and a special attention will be paid to the first part of such multimodal trip – the section starting at the place of living as far as the transfer point (node) which railway station is in this case.

Railway station is accessible on foot, on bicycle, a car, public transport or taxi. Each of these transports takes different time and the price differs as well. Meanwhile, these criteria are considered important for the choice.

The railway station is often the place where different transport modes connect and it also is the transfer point from one to another transport mode. The railway station also collects and distributes passengers. For the sake of competitiveness of the public transport with unimodal transport, the shortest time of transport from and to this transfer node and the shortest time possible for the transfer (interconnectivity of the individual transport ways are desirable) (Gorter et al. 1999). In this context, accessibility of the railway station is important.

M.J.N. Keier and P. Rietveld (1999) emphasized the importance of accessibility of the local railway station. The quoted authors consider the acceptable level of railway station accessibility as important factor for successful operation of rail services as the sufficient speed and reliability of the service. Apart from that, access to transport is also considered an important factor for measuring the peripherality of a region (*European Communities* 2004).

If the final point of the trip (for instance certain service) is the locality with high quality infrastructure, which is also accessible from other localities, it will presumably function better and consequently population will more frequently use it. Localities in the neighbourhood of the railway station can be more competitive than the localities in greater distance from the railway station because railway passengers use them.

M. Horňák (2004, 2005) is the author who dealt with accessibility of railway stations in Slovakia. He evaluated distribution of communes with the direct access to the railway (with railway station and passenger transport), while he included communes with the distance of 1.5 km to the nearest railway station in this group. Changes in population distribution in Slovakia with regards to the distance from the railway in 1921 and 1971 studied O. Bašovský and E. Majbová (1977). V. Székely (2004) assessed the relative accessibility of district towns within the railway network based on direct transport connections.

The aim of this study is to point to the state of the railway network and the position of the railway transport in Slovakia; to assess the accessibility of the railway in terms of accessibility of the nearest railway station of passenger transport from the individual communes and to point to regional disparities in the matter. Regional disparities in railway accessibility were assessed based on the maximum distance from the commune to the nearest railway station and based on the mean weighted distance from the commune to the nearest railway station. The effect of closing the passenger transport on 15 regional tracks for the level of railway station accessibility was also assessed.

RAILWAY NETWORK IN SLOVAKIA AND POSITION OF RAILWAYS IN PASSENGER TRANSPORT

The present railway network in Slovakia has developed during 150 years. Natural conditions of the country have greatly influenced the course of lines as did the changing economic and political conditions during the individual political systems that existed in the territory of what is today Slovakia (Austria-Hungary, the First Czechoslovak Republic, Slovak State during the Second World War, the period of socialism, disintegration of the Czechoslovakia, accession of Slovakia to the EU). Nowadays, the membership in the EU is the decisive factor, which manifests in modernization of tracks included into the pan-European transport corridors (Figure 1).

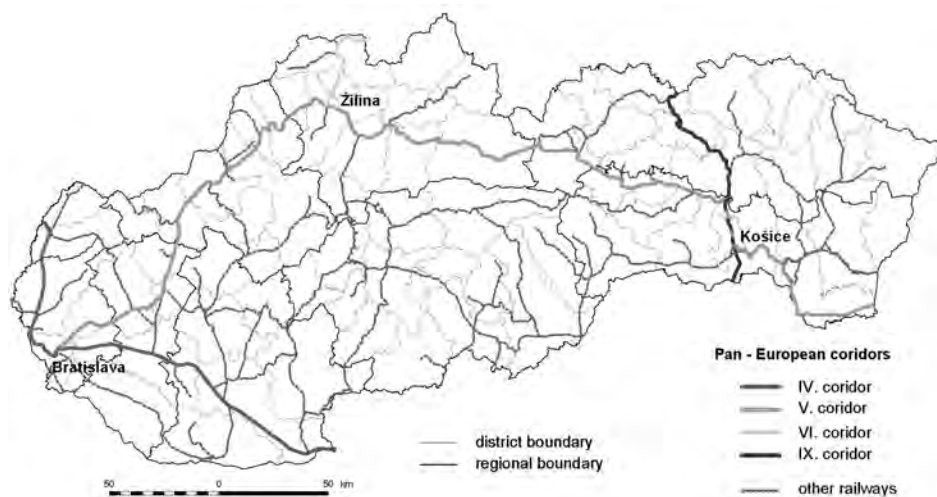


Figure 1. Pan-European transport corridors in the railway network of Slovakia

According to the Statistical Year Book of the Railway Company (*Železničná spoločnosť* 2005) in 2004 Slovakia had 3,660 km of railway lines including 2,640 km of single-track (72.1 %) and 1,020 km (27.9 %) of double and multiple track lines. Classified by the gauge, there are 3,510 km of lines with standard gauge (95.9 %), 100 km (2.7%) of broad gauge and 50 km of narrow gauge lines. The total length of lines includes 2,104 km (57.5%) of not electrified lines and 1,556 km (42.5%) of electrified lines (including AC 25000V/50Hz 737 km (20.1%) a DC 3000V (other) 819 km (22.4%)). The construction length of rails was total 6,881 km.

A comparatively dense network with obsolete technology can characterize infrastructure of the railway transport. The technical basis of the infrastructure is not adequately prepared for the changing conditions and structure of the transport market. This situation is the result of low technological level and quality of railway transport and of neglected maintenance (*Ministerstvo dopravy, pôšt a telekomunikácií Slovenskej republiky* 2006).

The most important change in passenger transport in 1989 is the increase of the individual transport to the detriment of the public transport (Figure 2). While in 1995 their performance was approximately at the same level, in 2004 the performance of public transport represented slightly more than a half of the non-public passenger transport. In public transport public road transport and railway transport experienced a significant decrease. In 1995-2004, the performance of the public railway transport decreased from almost 90 mill. to about 50 mill. passengers a year (see Figure 3).

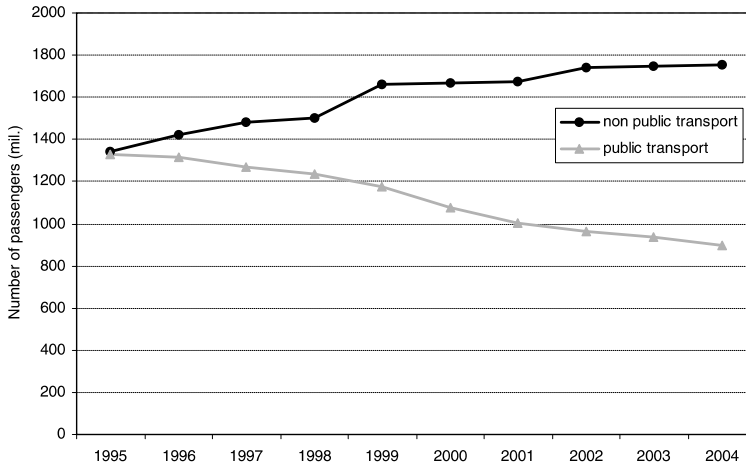


Figure 2. Performances of passenger transport (non public vs. public transports)

Source: <http://www.telecom.gov.sk/externe/idic/index.html>

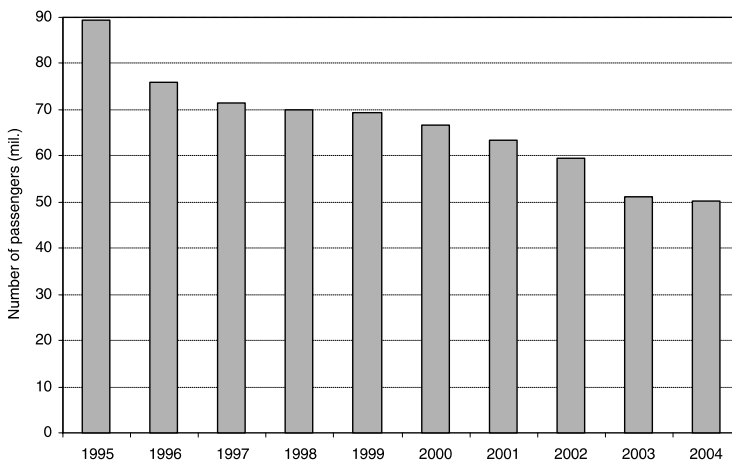


Figure 3. Performances of passenger railway transport

Source: <http://www.telecom.gov.sk/externe/idic/index.html>

ACCESSIBILITY OF THE RAILWAY NETWORK FROM THE INDIVIDUAL COMMUNES IN THE SR

Accessibility of the railway network from the individual communes in the SR was studied on the basis of the distance measured from the centre of the commune to the nearest railway station.

The distance from the commune to the railway station (RS) was computed as the shortest road distance from the commune centre (or the centre of its biggest part) to the nearest RS. Road distances applied were those quoted in the detailed road atlas of the SR at scale 1 : 100 000 (Vašek et al. 1999), where the length of the individual road section is quoted with the precision of 0.5 km. The shortest distance from the centre of the commune to the nearest RS was set at 0.5 km even if the RS was located right in the centre. The attractiveness of the RS (frequency of connections, position of the railway line in the railway network) was not taken into account in the assessment of their accessibility. Figure 4 and Table 1 represent the distribution of population by the distance to the nearest railway station.

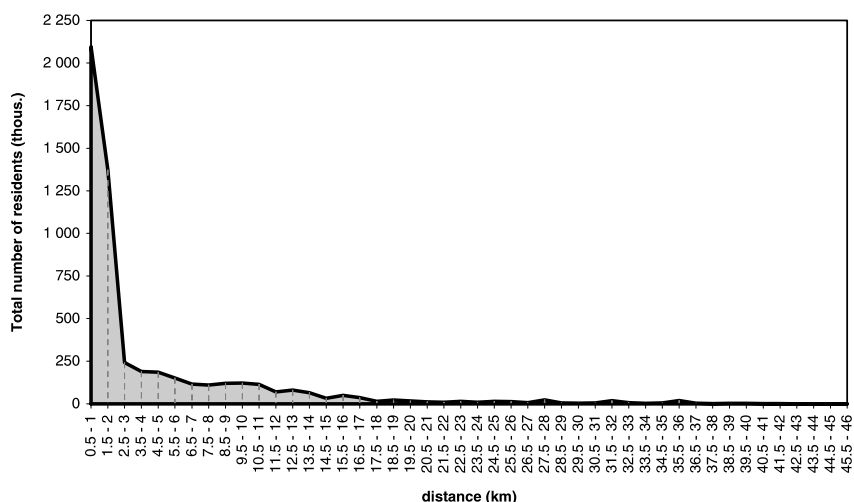


Figure 4. Distribution of residents according to distance to the nearest railway station

If the distance to the nearest railway station according to the distance categories is considered, it is obvious that the largest portion of residents lives in communes where the distance to the nearest RS is below 1 km (almost 39%) followed by the distance category 1.5 – 2,0 km (25.5%). It suggests concentration of population along the railway line with passenger transport. It is possible to conclude that in terms of accessibility, the system of railways seems to have a good prospective to attract passengers from communes with distance to the nearest RS up to 2 km. Three quarters of Slovak population (75.9%) live in the zone below 5 km and 87.5% live in the zone below 10 km. Residents with the distance

of at least 20 km to the nearest RS (3.3%) makes use of railways above all for irregular trips to a longer distance.

Table 1. Distribution of residents according to distance to the nearest railway station

Distance (km)	Number of inhabitants	Percentage of inhabitants
0.5–4.5	3 992 314	74.21
5.0–9.5	661 861	12.30
10.0–14.5	400 772	7.45
15.0–19.5	138 887	2.58
20.0–24.5	58 185	1.08
25.0–29.5	56 757	1.06
30.0–34.5	36 507	0.68
35.0–39.5	30 474	0.57
40.0–46.0	3 698	0.07

Distribution of residents according to the distance to the nearest RS (Figure 5) facilitates identification of potential use of the individual transport modes. In a case of regular travelling by means of railway transport the distance up to 1.5 km can be overcome on foot (cf. Horňák 2004), the distance up to 4.5 km by bicycle and the distance up to 9.5 km by public transport (bus). The distance of 10 km and more to the nearest RS is considered unsuitable from the point of view of railway accessibility for daily commuting. Hence, the residents living in such areas are compelled to use bus transport.

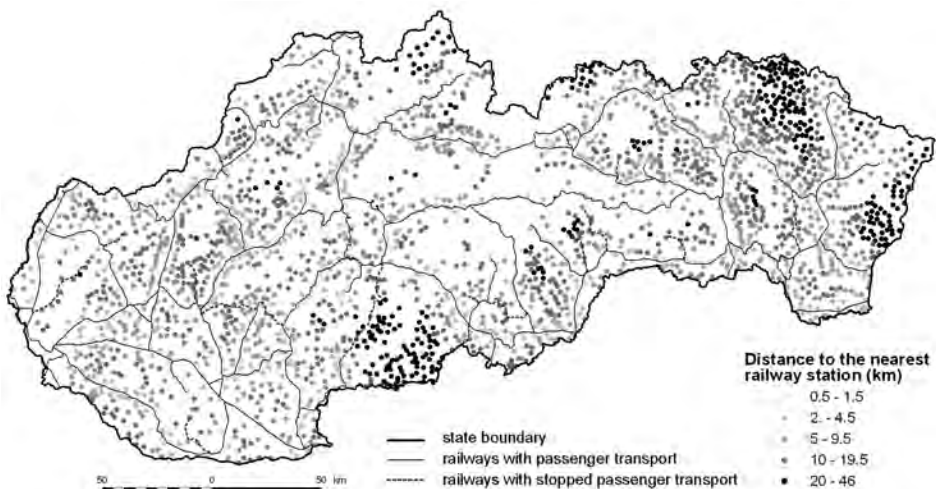


Figure 5. Distance from the commune centre to the nearest railway station

Based on the RS accessibility, the peripheral areas, which contain communes located in the distance of at least 10 km away from the nearest RS, can be identified. There are 1,013 such communes in Slovakia with total number of residents 725 thousand. All communes of districts Veľký Krtíš and Sobrance are at least 10 km away from the nearest RS. More than 90% of population live in communes with unsatisfactory accessibility of railways in districts Stropkov (99.2 %), Svidník (95.7 %) and Námestovo (94.3 %). More than a half of population in districts Krupina (80.5 %) and Levoča (58.9 %) live in the peripheral areas in terms of railway accessibility. On the other side, all population in districts Bratislava, Košice, and Spišská Nová Ves live in distance less than 10 km to the nearest RS.

A very adverse situation in terms of railway accessibility was found in communes that are 20 or more km away from the nearest RS. There are four big areas of this type in Slovakia: in the northern part of eastern Slovakia, next to the Ukrainian border, in the south-western part of central Slovakia and in the northern part of Orava region.

REGIONAL DISPARITIES IN ACCESSIBILITY OF RAILWAYS

Regional disparities in railway accessibility were assessed according to two indicators. The first indicator is the maximum distance between the commune and the nearest RS and the second is the mean weighted distance from the commune to the nearest RS while the number of inhabitants of the individual communes (data were obtained from Population Census 2001) was used as the weight. Regional differences were observed in 72 districts while Bratislava and Košice were considered independent districts although in fact they consist of 4 and 5 districts respectively. In case of Bratislava and Košice, the calculations of the two indicators were based on the division into 22 and 17 urban parts respectively.

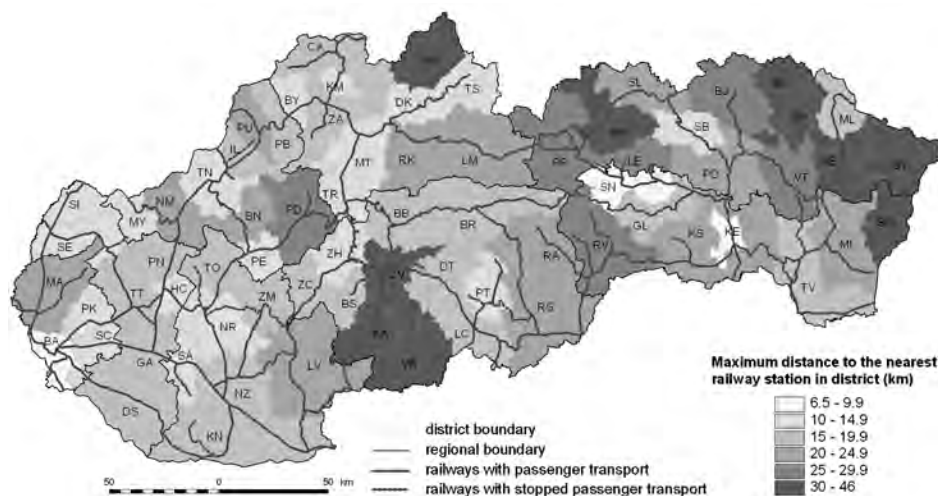


Figure 6. Maximum distance between the commune and the nearest railway station

The most favourable values of maximum distance between the commune and the nearest RS (see Figure 6) are in smaller districts with railway lines such as Bratislava, Košice, Kysucké Nové Mesto, Partizánske, Turčianske Teplice, Tvrdošín, Myjava, Šaľa and other. On the other side, unfavourable values in railway accessibility were found in districts Sobrance, Humenné, Stropkov and Snina in the north-eastern part of Slovakia.

Communes with the shortest distance to the RS of at least 20 km were found in 29 districts; communes where this distance is at least 30 km are in ten districts and in two districts (Veľký Krtíš and Svidník) there are communes situated more than 40 km away of the nearest RS. The absolutely remotest commune in terms of its distance to the RS is Havranec in district Svidník (46 km).

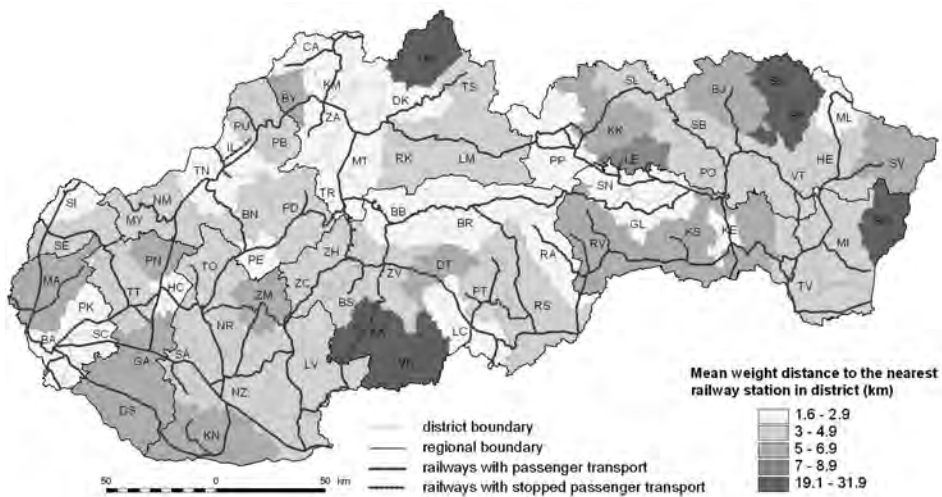


Figure 7. The mean weighted distance from the commune to the nearest railway station

The mean weighted distance represents the mean accessibility of the nearest RS for all district inhabitants (Figure 7). Unfavourable situation in the RS accessibility was found in district Krupina (19.1 km), where the passenger transport ends in town Dudince; then in four districts without railway lines Námestovo (22.3 km), Sobrance (23.5 km), Stropkov (25.2 km), Svidník (25.5 km) and also in district Veľký Krtíš (31.9 km), where the railway line between Slovakia and Hungary exists but it does not operate any passenger transport. Situation of district Levoča (8.9 km) and some bigger districts such as Malacky, Dunajská Streda, Galanta, Komárno, Rožňava, Košice-okolie, Snina is not favourable either. On the other side the best accessibility level of the railway is in region Bratislava and the central and western part of region Žilina.

THE INFLUENCE OF ABOLISHED PASSENGER TRANSPORT ON 15 REGIONAL LINES ON THE RAILWAY ACCESSIBILITY

In February 2003 the Railway Company (ZSSK) closed passenger transport on 25 regional lines while in three of them (Trenčín – Chynorany, Levice – Štúrovo, Zvolen – Čata) buses operated by the Railway Company replaced it. The reason of closure was their financial ineffectiveness. These changes along with the reduction of connections provoked strike of railway workers, which was stopped after several days by judicial order. Operation of lines Žilina – Rajec and Zohor – Záhorská Ves was re-opened after an agreement concluded with the higher administrative territorial unit who reimbursed the loss. In June 2003 ZSSK re-opened operation of 9 from 25 regional lines (Šaľa – Neded, Zlaté Moravce – Úľany nad Žitavou, Hronská Dúbrava – Banská Štiavnica, Plešivec – Muráň, Bánovce nad Ondavou – Veľké Kapušany, Trenčín – Chynorany, Levice – Štúrovo, Šahy – Čata, Žilina – Rajec) and the line Zohor – Záhorská Ves was run by the Bratislavská regionálna koľajová spoločnosť – Bratislava Regional Rail Company (Zachar 2004). But the Railway Company took over the operation of line Zohor – Záhorská Ves on 29 May 2006 and this was accompanied by harmonization of transport, i.e. elimination of bus connections that coincided with trains. These lines are: Zohor – Plavecký Mikuláš, Jablonica – Brezová pod Bradlom, Komárno – Kolárovo, Lužianky – Kozárovce, Zbehy – Radošina, Prievidza – Nitrianske Pravno, Nemšová – Lednické Rovne, Lučenec – Kalonda, Breznička – Katarínska Huta, Poltár – Rimavská Sobota, Plešivec – Slavošovce, Rožňava – Dobšiná, Spišská Nová Ves – Levoča, Moldava nad Bodvou – Medzev, Trebišov – Vranov nad Topľou.

The quoted changes in passenger transport also manifested in the decrease of the railway station accessibility in 25 districts. District Krupina suffered most from closed line, which passed through the whole district in the north-south direction. After this change, the maximum distance between a commune and the nearest RS increased by 22 km and the mean weighted distance from the individual communes to the RS increased by 15.3 km. An important drop of the RS accessibility level was also found in district Rožňava, where in the consequence of closure of two regional lines, the maximum distance increased by 13 km and the mean weighted distance by 3.8 km. Among districts, where these changes manifested most at the level of RS accessibility, are districts Levoča, Malacky, Myjava and Púchov as well.

Regional transport in Slovakia is characterized by a comparatively low quality. Investments went to facilities of the stations above all, instead purchase and renovation of trains. According to Zachar (2004) an efficient functioning of regional transport perhaps requires the transfer of decision-making competencies concerning train connections to self-governments that are able to control only the public bus transport as yet. Railway transport may also need entry of private capital.

CONCLUSION

Incessant decrease of performances of passenger railway transport has been observed recently in the consequence of increased individual car transport and after 2003 also closure of 15 regional railway lines. The main incentive that might interrupt this decline and encourage the development of the railway seems to be the modernization of tracks included into the pan-European corridors with the financial assistance from the EU – although it is a slow process. Along with modernization of trains and provision of passenger reductions, the Railway Company tries to maintain and increase the number of passengers.

Accessibility of railway, as one of important factor for successful operation of rail services, based on the distance between the individual communes and the nearest railway station was assessed in this study. Three quarters (75.9 %) of Slovakia's population live within 5 km distance to the nearest RS and mainly they have chances to make use of the railway for regular travelling. On the contrary, the 10 or more km distance to the nearest RS is considered not satisfactory from the point of view of daily commuting by train. Communes at least 10 km away from the nearest RS are considered peripheral in terms of the railway accessibility. Population living in such area is compelled to use bus transport. The worst railway accessibility, of course, was found in regions where the railway was not constructed (Námestovo, Svidník, Stropkov, Sobrance) and in regions lacking passenger service on existing lines (Krupina, Veľký Krtíš). Closure of passenger service on 15 regional lines in 2003 affected railway accessibility above all in districts Krupina and Rožňava.

The maximum distances to the nearest RS and the mean weighted distances between all communes and the nearest RS at the level of districts (used for the assessment of regional disparities in railway accessibility) can be used as partial quality of life indicators for population in individual districts.

An improved assessment of railway accessibility requires to take into account the position of the RS within the railway network – number of trains that stop at the particular station, number of passengers departing from the RS, etc. as the population instead of making use of the nearest RS may use one on a more important line, or the one with better bus connections. Further research should also assess the accessibility of railway stations where fast trains EuroCity or InterCity stop.

The decision about using railway or bus transport also depends on location of destination (place of human activity) with respect to the RS. If the destination is near a particular RS, the people are willing to go to a distant RS. But if the destination is in greater distance, people prefer to use bus transport as bus stops are more accessible than RSs. This is the reason why localities in the proximity of RS are more competitive than those that are in greater distance. Location of the living place near RS is therefore more advantageous for the regular use of railway transport and the same is true for location of destination.

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