

TRANSPORT ACCESSIBILITY IN EASTERN POLAND

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The purpose of the paper is to assess the current accessibility in the macro-regional and provincial setting of Eastern Poland and the simulation of changes, which may take place owing to the realisation of the large-scale investment programs. The indicator of potential accessibility was used. The analyses and simulations confirmed that there is a need to improve the accessibility of the area, first of all through construction of transport routes of high speed, linking main centres of Eastern Poland with Warsaw, Cracow and Gdansk. Improvement of accessibility within the area of Eastern Poland may be realised also by implementation of investment projects located in other regions, and in particular – in central Poland.

INTRODUCTION

Eastern Poland is a macroregion, which is situated peripherally both on the national and on the European scales. The provinces, which compose the macroregion, belong among the poorest areas in the European Union. In this context, development of transport infrastructure is being mentioned as one of basic instruments of the regional and spatial policy, which may accelerate the development of the area and diminish the negative consequences of its peripherally. The effectiveness of investment projects is increasingly frequently assessed in the perspective of changes in spatial accessibility. This concerns all the geographical scales, from the local to the European one. From the point of view of transport-wise accessibility the specificity of Eastern Poland is reflected, in particular, through:

a) the neighbourhood of the poorly permeable outer boundary of the European Union,

b) high share of the transit traffic, both intra-Union (in the direction of the Baltic states) and the external one,

c) low – even as for Polish conditions – availability of the modern transport infrastructure (very low share of the motorways and expressways, and simultaneous lack of fast train lines and of airports – the latter except for Rzeszów),

d) large share of areas under various forms of nature protection, which makes investment projects in transport more difficult,

e) historically conditioned underdevelopment of the settlement network, one of the essential objectives of the regional policy in this region consisting in the support for the viability of the settlement network.

Due to the abovementioned circumstances, the transport accessibility of the region is low (for a comparison with other parts of Poland, see Komornicki et al., 2008, 2010). Current mechanisms of the macro-scale planning, as well as the manner in which the European cohesion policy is being implemented, are not fully conducive to the overcoming of these negative circumstances. Experiences from the first, and partly also from the second programme perspective of the EU demonstrate that the cohesion policy, despite important financial transfers, also in the transport sector, is not capable of resolving the most important problems of the region, and in particular – its infrastructural separation from the rest of the country. In this situation the need arose of a more in-depth analysis of the problems of the region in question concerning spatial accessibility and the envisaged changes in the accessibility due to the execution of the potential transport-related investment projects.

The *purpose* of the present paper is to assess the current accessibility in the macro-regional and provincial setting and the simulation of changes, which may take place owing to the realisation of the large-scale investment programs and individual undertakings of both national and regional significance.

Studies concerning accessibility are conducted in Europe for many years. Broad analyses on the continental scale were carried out, for instance, within the framework of the ESPON projects (e.g. ESPON 1.2.1 and 1.1.3 projects). The significance of such studies was quite limited until now in Poland. Accessibility was investigated from the standpoints of geography and economics. In both cases, though, it was conceived in a traditional manner as the appearance (density) of the respective infrastructure on a given territory. Studies of the temporal (cumulative), and even more so of the potential accessibility were undertaken relatively rarely. The situation changed during the last 5-6 years. This is partly due to the restart of the investment projects in transport, these projects having been withheld for roughly 20 years. Such projects, especially when co-financed by the European Union, require broadly conceived evaluation studies, both those carried out *ex ante* and *ex post*.

Transport-wise accessibility at the regional level can be studied with a number of methods (Komornicki et al., 2010). Most frequently, one of the four basic methodological approaches is applied:

- accessibility understood as the density of infrastructural network and/or network of public transport, related to units of area or to population (the traditional approach);

- time-wise (cumulative) accessibility, expressed in terms of temporal distance (in minutes) or economic distance to definite centres (nodes of the network), represented most often with the isochrone maps or diagrams, showing cumulative potential (demographic or economic) within the contour of a given isochrone;

- daily accessibility, illustrating the possibility of the return travel to a definite destination (destinations) during one day, considering simultaneously the capacities of the infrastructure and the organisation of traffic in public transportation;

- potential accessibility, showing through the value of a synthetic indicator the sum of relations between all the elements (centres, regions) considered in a given set,

accounting for the travel time and the significance (attractiveness) of the given units in the system (demographic, economic or other kind of potential).

The present report refers to two basic methods, that is – potential accessibility and cumulative (isochrone) accessibility. Additionally, the so-called indicator of effectiveness of the road and railway networks in the provinces of Eastern Poland was calculated.

Five provinces were assumed to constitute the area of Eastern Poland, namely: Warmińsko-mazurskie (Warmian-Masurian), Podlaskie, Lubelskie, Świętokrzyskie and Podkarpackie (Subcarpathian) provinces. These provinces were included in the macro-regional Operational Program of the European Union under the name of Development of Eastern Poland (Fig. 1 – appendix).

SPATIAL ACCESSIBILITY OF EASTERN POLAND IN 2011

As mentioned already, the general potential accessibility of Eastern Poland is low. All of the provinces considered (except for Świętokrzyskie) feature the values of the intermodal transport accessibility indicator (ITAI) that are clearly lower than the national average.

The study of the spatial accessibility at the level of counties was carried out on the basis of the ITAI values. Apart from the province of Świętokrzyskie the obtained values of ITAI are among the lowest in Poland (Table 1). Lower values are observed only in the Zachodniopomorskie (Western Pomeranian) province. Thus, only in the province of Świętokrzyskie the average accessibility of the county node in 2011 exceeded the national average, while in the remaining provinces of Eastern Poland the indicator value ranged between 82.3% and the mere 73.3%. The apparently better position of the province of Świętokrzyskie results largely from its central location and thus smaller geographical distances to many large (demographically and economically strong) centres in the middle of Poland. Some significance ought also to be assigned the advanced construction of the S7 expressway. Its ready segments (Grójec-Jedlińsk and Skarżysko-Kielce) improve accessibility to the Warsaw node, featuring large mass. Hence, accessibility of Warsaw is relatively better from Kielce than from Białystok or Lublin. From among the remaining provinces of the macroregion, relatively the best is the situation of the Podkarpackie (Subcarpathian) province, which benefits by now already to an extent from the terminated part of the motorway A4. Despite the lack of the eastern segment of this motorway, the accessibility from the Podkarpackie (Subcarpathian) province to the strong centres of southern Poland is quite good. Some positive influence on the respective value of the ITAI is also exerted by the quite good technical condition of the railway line Cracow-Rzeszów (having been modernised and featuring higher technical speeds) and the existence of the Rzeszów-Jasionka airport.

The values obtained of the ITAI indicator are the resultant of the distribution of population and economic activity over the national space (as the pre-conditions for the passenger and cargo traffic) and of the location of transport infrastructure – first of all roads of national significance, motorways, as well as modernised, fast railway lines and airports.

Table 1

Average value of ITAI of a county node in a province in 2011

	Voivodeship	WMDT	WMDT in relation to the national average (in %)
1	Śląskie	0,4368	130,5
2	Łódzkie	0,4143	123,8
3	Opolskie	0,3971	118,7
4	Małopolskie	0,3929	117,4
5	Wielkopolskie	0,3663	109,5
6	Świętokrzyskie	0,3638	108,7
7	Mazowieckie	0,3549	106,1
8	Kujawsko-Pomorskie	0,3416	102,1
9	Dolnośląskie	0,3291	98,4
10	Lubuskie	0,3054	91,3
11	Pomorskie	0,284	84,9
12	Podkarpackie	0,2755	82,3
13	Lubelskie	0,2733	81,7
14	Warmińsko-Mazurskie	0,2579	77,1
15	Podlaskie	0,2454	73,3
16	Zachodniopomorskie	0,2349	70,2

Hence, the value of the indicator in a given county depends to a large extent upon the existence (or absence) of the modern infrastructure along the directions towards the largest national metropolises. Decreasing values of the indicator within the peripheries and close to the state boundaries are, therefore, a natural phenomenon. Yet, as such, it constitutes the evidence for the need of making significant transport-related investments on such areas. Geographical distantness of the border-adjacent provinces is a fact and cannot be changed. Similarly, the decongestion of the masses (that is – dispersion of the population and of the business activities), even though theoretically possible, can hardly be achieved through the instruments of regional policy. Even if such a decongestion takes place, it is usually a very lengthy process, for which the preceding development of infrastructure is a necessary condition. In this situation the sole real tool for the change of the potential accessibility on the peripheral areas is constituted by the transport-related investment projects.

The image of the distribution of values of the indicator in Eastern Poland (shown in Fig. 2 – appendix) demonstrates that higher accessibility characterises the counties of the macroregion that are situated closer to the infrastructure ensuring higher speed of travelling to Warsaw, to the region of Cracow and the Upper Silesian conurbation, as well as to Gdańsk. This gives a better position for almost entire area of the province of Świętokrzyskie, the western part of the Podkarpackie (Subcarpathian)

province (the previously mentioned influence of the motorway A4) and the Warmińsko-mazurskie (Warmian-Masurian) province (good access to Gdańsk and A1 motorway). In the case of the north-western part of Lublin region (where higher values of ITAI are also observed) it is the geographical closeness of Warsaw that appears to be the most important (with definite influence being also exerted by the projects along the course of the expressway S7).

All of the provinces considered display strong internal differentiation in terms of values of the ITAI. Values of accessibility change most often on their territories along the West-East direction (this fact applying also to Świętokrzyskie province). The differentiation is relatively the smallest within the province of Podlaskie, which is in the worst position in terms of accessibility. Levels of ITAI exceeding the national average are observed in the entire western and central parts of Świętokrzyskie province, and in the county of Sandomierz, as well as in single counties of Podkarpackie (Subcarpathia), Lubelskie and Warmińsko-mazurskie (Warmia-Masuria) provinces. Virtually all of the counties directly adjacent to the eastern border feature the value of ITAI at the level below 75% of the national average.

Table 2

Values of ITAI for the provinces of Eastern Poland in 2011

	WMDT value	In relation to the national average (Poland = 100%)
Poland	0,3346	–
Lubelskie	0,2733	81,7
Podkarpackie	0,2755	82,3
Podlaskie	0,2454	73,3
Świętokrzyskie	0,3638	108,7
Warmińsko-mazurskie	0,2579	77,1

Table 3 shows the travel times by passenger car and railway between all Polish regional centres. The average value of these times can be interpreted as the degree of integration of the capitals of the eastern provinces with the national settlement system. Among the cities of interest in this study Kielce is integrated most strongly, followed by Lublin and Olsztyn, while Białystok and Rzeszów obviously drag behind. Attention ought also be paid to some of relations between the towns of Eastern Poland and the closest large centres (exceeding half a million inhabitants). In railway transport the shortest time of travel is noted between Kielce and: Cracow (103 minutes), Katowice (122 minutes) and Warsaw (134 minutes). Besides, railway travel times below 2.5 hours (sometimes interpreted as the condition of convenient daily accessibility) are noted for connections between Rzeszów and Cracow, Lublin and Warsaw, as well as between Białystok and Warsaw (143, 147 and 144 minutes, respectively). Olsztyn does not feature any railway connection fitting this standard.

Table 3

Matrix of travel times with passenger car and railway between capitals of provinces (in minutes)

	Białystok	Bydgoszcz	Gdańsk	Gorzów Wielkopolski	Katowice	Kielce	Kraków	Lublin	Łódź	Olsztyn	Opole	Poznań	Rzeszów	Szczecin	Toruń	Warszawa	Wrocław		
Białystok	311	362	388	440	310	278	312	291	255	234	407	325	455	474	312	144	452	445	225
Bydgoszcz	297	101	381	176	381	352	386	201	196	201	338	148	529	210	62	218	293	268	278
Gdańsk	427	191	257	402	513	481	515	494	340	340	478	288	658	318	195	347	433	408	302
Gorzów Wielkopolski	362	331	418	284	402	430	484	443	279	372	305	115	607	138	238	296	260	167	360
Katowice	290	306	384	339	135	122	113	268	180	405	97	287	256	438	334	168	142	302	236
Kielce	377	363	449	329	99	105	103	267	189	165	373	219	246	464	302	134	264	424	285
Kraków	203	341	384	403	286	160	243	267	199	407	210	349	143	498	336	168	285	415	255
Lublin	256	179	266	210	153	224	185	258	258	386	383	328	242	477	315	147	428	448	355
Łódź	186	168	116	347	359	130	185	224	224	281	212	164	342	477	315	111	253	284	285
Olsztyn	394	292	393	243	66	188	111	338	179	385	470	280	550	406	136	239	425	400	427
Poznań	336	126	227	105	292	249	298	313	120	290	211	190	353	339	334	263	45	205	347
Rzeszów	346	428	493	443	172	138	141	150	259	405	225	378	492	149	144	181	145	120	337
Szczecin	489	207	287	77	386	411	401	475	282	361	315	177	515	641	479	311	398	558	272
Toruń	286	46	115	224	303	280	334	297	161	141	285	149	389	240	272	330	294	269	337
Warszawa	140	201	244	294	225	153	239	141	119	155	257	204	252	366	166	166	289	264	284
Wrocław	416	243	344	199	112	234	157	380	195	377	71	149	271	271	259	278	308	301	235
Zielona Góra	417	209	310	93	206	328	251	393	200	370	164	95	365	165	229	284	121	160	320
Average	325	238	298	263	240	244	281	296	196	286	242	216	316	317	228	218	240	247	319

* In the case of provinces of Lubuskie and Kujawsko-pomorskie (Cuiavia-Pomerania) the analyses were performed for the seat of the Provincial Speaker Office (Zielona Góra and Toruń, respectively).

Source: calculations of passenger car travel times were performed on the basis of the traffic model elaborated at the Institute of Geography and Spatial Organization of the Polish Academy of Sciences, while railway travel times were calculated on the basis of official timetables.

Now, in car transport, travel times below 2.5 hours from Kielce are observed for its connection with Cracow, Katowice and Lodz. The limit of 2.5 hours is slightly exceeded on the way to Warsaw. The remaining centres considered note such acceptable travel times for cars only for one large city each (Białystok and Lublin – in connection with Warsaw, Rzeszów with Cracow and Olsztyn with Gdańsk). In the case of Olsztyn the travel time to Warsaw by car is 155 minutes.

Summing up, it can be stated that the sole well network-wise integrated centre is Kielce. Again, let us emphasise that this is mainly the effect of the geographical location of the city, and not of the effective infrastructure. The remaining cities are linked with the metropolitan system (and thereby also with the European one) by the intermediary of just one “principal direction“ (only in the case of Olsztyn there are two such directions). This leads to the conclusion that transport-related investment projects are especially important on these directions. This might, though, also indicate the need of gradual improvement of movement over the alternative directions (e.g. Lublin-Cracow and Rzeszów-Warsaw).

SIMULATION OF CHANGES IN POTENTIAL ACCESSIBILITY OF THE COUNTIES OF EASTERN POLAND

According to the data from the General Board of National Roads and Motorways, in the middle of 2011 there were in Poland 1 428 km of motorways and expressways under construction, of which approximately 389 km in the five provinces of Eastern Poland. This means that around 27% of all the national roads constructed in the years 2011-2014 are situated in Eastern Poland. This share might be considered relatively high, given that the share of these provinces in the population number is 21%. Of these projects, the largest proportion is carried out in the Podkarpackie (Subcarpathian) province (178 km, mainly A4 motorway over the segment Szarów-Ukrainian border) and in Warmińsko-mazurskie (Warmian-Masurian) province (85 km, mainly the consecutive segments of the S7 expressway). There are relatively less such projects underway in Lubelskie province (54 km) and in Podlaskie (49 km). The length of the expressways under construction is the smallest in Świętokrzyskie province (only 24 km, including the already terminated segment of S7 Skarżysko-Kamienna – Występa). The peak length of terminated road segments in Eastern Poland was envisaged for the year 2012 (Table 4). This year was expected to constitute a breakthrough on the national scale, but finalisation of work on 280 km of roads of national significance in Eastern Poland would constitute a visible advance in relation to the current state of road infrastructure in this area.

The most important railroad projects, realised in the framework of the Operational Program Infrastructure and Environment 2007-2013 on the area of Eastern Poland included: modernisation of the railroad line E 30/C-E 30, the segment between Cracow and Rzeszów (with total cost exceeding 3 500 million PLN), modernisation of the railroad line E65/C-E 65 over the segment Warsaw-Gdynia, the areas of LCS Iława, LCS Malbork and LCS Działdowo, and modernisation of the railroad line E 20/C-E 20 on the segment Siedlce-Terespol. The “waiting list” of projects contains also the following items: adaptation of the Central Railway Line to the speed of 250

Table 4

*The expressways and motorways in construction in the Eastern Poland in 2011
(expected date of completion in the years of 2011–2014)*

Section	Voivodeship	Length (km)	Expected date of completion
A4 Rzeszów Zachód – Rzeszów Centralny	podkarpackie	3,5	04/2010 – 10/2011
A4 Rzeszów Centralny – Rzeszów Wschód	podkarpackie	6,9	02/2010 – 08/2011
S7 Skarżysko-Kamienna – Występa	świętokrzyskie	16,7	01/2009 – 04/2011
S7 Elbląg – Pasłęk	warmińsko-mazurskie	14,6	10/2008 – 07/2011
S19 (1x2) Stobierna – Jasionka	podkarpackie	3,8	02/2010 – 09/2011
S19 Jasionka – Rzeszów Wschód	podkarpackie	3,1	02/2010 – 09/2011
S19 Rzeszów Zachód – Świlcza	podkarpackie	5	04/2010 – 10/2011
S74 Kielce – Cedzyna	świętokrzyskie	4,2	04/2009 – 10/2011
S74 Kielce, odcinek miejski	świętokrzyskie	2,7	07/2010 – 10/2011
Eastern Poland (2011)		60,5	
Poland (2011)		280,3	
A4 Radymno – Korczowa	podkarpackie	22,0	11/2009 - 04/2012
A4 Jarosław, w. Wierzbna – Radymno	podkarpackie	25,0	10/2009 – 04/2012
A4 Rzeszów Wschód – Jarosław	podkarpackie	41,2	09/2010 – 05/2012
A4 Krzyż – Dębica Pustynia	podkarpackie	34,8	07/2010 – 06/2012
A4 Dębica Pustynia – Rzeszów Zachodni	podkarpackie	32,8	05/2010 – 06/2012
S19 (1x2) obwodnica Kocka i Woli Skromowskiej	lubelskie	7,7	08/2009 – 04/2012
S8 Jeżewo – Białystok	podlaskie	24,5	08/2009 – 04/2012
S8 obwodnica Zambrowa i Wiśniewa	podlaskie	11,1	11/2009 – 06/2012
S51 obwodnica Olsztynka	warmińsko-mazurskie	6,0	05/2009 – 06/2012
S7 Olsztynek - Nidzica	warmińsko-mazurskie	27,8	04/2009 – 06/2012
S7 Kalsk (Pasłęk) – Miłomłyn	warmińsko-mazurskie	37,0	02/2010 – 07/2012
S12/17 w. Witosa – Piaski	lubelskie	13,8	11/2010 – 11/2012
Eastern Poland (2011)		283,7	
Poland (2011)		982,8	
S12/17 Kurów w. Sielce – w. Bogucin	lubelskie	24,7	03/2011 – 03/2013
S12/17 w. Bogucin – w. Dąbrowica z węzłem	lubelskie	7,3	06/2011 – 06/2013

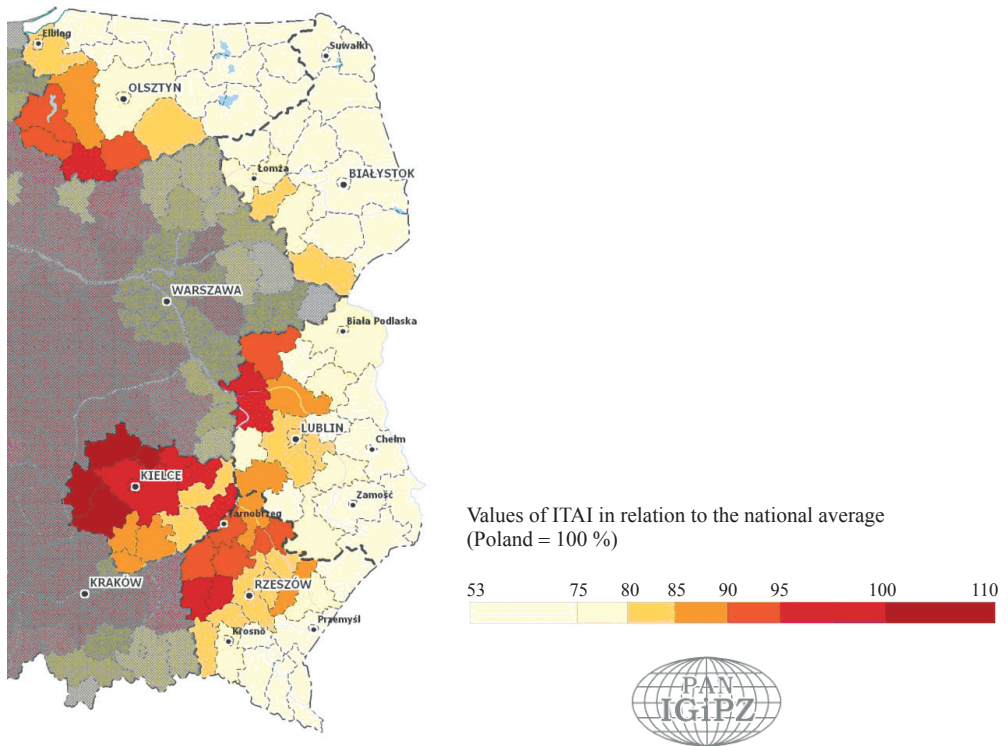


Fig. 1. Values of ITAI in 2011 (average for Poland = 100%)

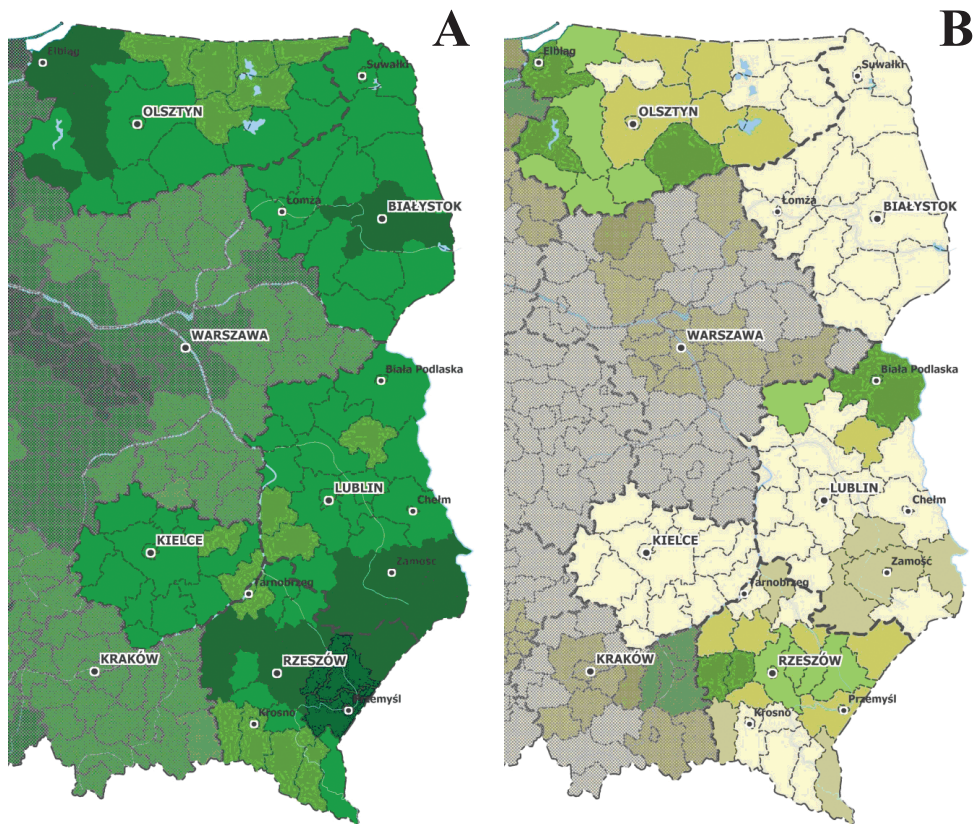


Fig. 2. Changes in the values of the ITAI resulting from the termination of the currently realised road (A) and railway (B) projects

Section	Voivodeship	Length (km)	Expected date of completion
Eastern Poland (2011)		32,0	
Poland (2011)		114,6	
S61 Szkocja-Suwałki Lotnisko	podlaskie	13,0	03/2011 – 09/2014
Eastern Poland (2011)		13,0	
Poland (2011)		50,6	

Source: own elaboration on the basis of data from www.gddkia.gov.pl and www.skyscrapercity.com (as of September 2011)

km/h over the segment Grodzisk Mazowiecki-Zawiercie (planned total cost of this project amounts to more than 3 200 million PLN), modernisation of the railroad line E 75 “Rail Baltica“ Warsaw-Białystok-border with Lithuania, as well as improvement of the quality of transport services through improvement of the technical condition of the railway line no. 91 (E 30) Cracow-Medyka on the segment Rzeszów-Medyka. The segments, which had been put on the “waiting list”, were not accounted for in the simulation of the changes in accessibility. It is worth adding that within the framework of the Regional Operational Programs other, relatively smaller undertakings are being realised concerning railway network. Such projects include, in particular, in Lublin province: modernisation of the railway line no. 30 Łuków-Lublin North over the segment Lubartów-Lublin North, reconstruction of the transport node with modernisation of the railway bridge and the underground passage within the confines of the railway station in Lublin, modernisation of a part of technical infrastructure of the railway line no. 7 Warsaw East-Dorohusk within the confines of the passenger stop Lublin North and the station in Świdnik, meant to improve the transport effectiveness within the agglomeration, as well as modernisation of the railway line no. 63 Dorohusk-Zawadówka Naftobaza (SZ) over the segment between state border and Dorohusk.

The results of simulations of changes in potential accessibility, the ITAI indicator, due to implementation of the transport-related projects, both in road and railway transport, are shown in Fig. 2 (appendix).

The projects concerning road infrastructure shall bring much bigger changes in the accessibility of provinces of Eastern Poland than the railway-related projects (Table 5). This is the consequence of both the magnitude of investments into road projects and the relatively higher intensity of traffic (in freight and – especially – in passenger traffic) in road transport compared to railway transport.

The improvement of accessibility, resulting from investments into the road network, will be the highest in the Podkarpackie (Subcarpathian) province. This province shall be the only one in Eastern Poland featuring the increase of the value of ITAI higher than on the average in Poland (exceeding 5%). The reason of such a significant improvement in Podkarpackie (Subcarpathia) lies mainly in the finalisation of the sole motorway that is under construction in Eastern Poland, A4 (eastern segment stretching between the border with the province of Małopolskie and the boundary with Ukraine). It is clearly seen that the biggest changes in the accessibility, resulting from the con-

Table 5

WMDT change as a result of completion of road and railway being in construction in 2011

	WMDT value		WMDT change	
	Road	Railway	Road	Railway
	In relation to the national average (Poland = 100%)			
Poland	0,3518	0,3352	105,1	100,2
Lubelskie	80,4	81,8	103,5	100,3
Podkarpackie	82,6	82,5	105,5	100,4
Podlaskie	72,3	73,2	103,7	100,0
Świętokrzyskie	106,0	108,6	102,5	100,1
Warmińsko-mazurskie	75,7	77,4	103,3	100,5

struction of the A4 motorway take the spatial shape of a fan, reaching with its southern edge the county of Bieszczady Mts., and with the northern edge – the southern parts of the province of Lublin. The southern parts of the Lublin province shall also benefit from the realisation of the project related to the expressway S17 Kurów-Piaski. Important changes are also observed in the western part of the Warmińsko-mazurskie (Warmian-Masurian) province (the effects of construction of the northern fragment of the expressway S7), and also in the vicinity of Białystok (improvement in the entry to Białystok from the West due to construction of the segment of the expressway S8 Jezewo-Białystok, and improvement resulting from the finalisation of the relatively distant, but exerting significant influence on the province of Podlaskie, A2 motorway segment Stryków-Konotopa, owing to which the accessibility of Podlaskie to the areas of central Poland shall greatly improve). The smallest changes in the nearest years shall concern the area of Masuria (especially the northern part of the region, situated along the border with the Kaliningrad district of the Russian Federation). The sole bigger investment project, related to that area is modernisation of the national road no. 16 and construction of the Elk beltway.

Concerning railroad transport the biggest changes shall be observed in the Warmińsko-mazurskie (Warmian-Masurian) province owing to the project related to the line E65/C-E 65 over the segment Warsaw-Gdynia on the areas of LCS Hława, LCS Malbork and LCS Działdowo. Relatively important changes shall occur also in the Podkarpackie (Subcarpathian) province, where the northern part of the province shall improve its accessibility in a particular manner due to modernisation of the railway line E 30/C-E 30 over the segment Cracow-Rzeszów. Then, the northern areas of the Lublin province shall benefit from the modernisation of the railway line E 20/C-E 20 over the segment Siedlce-Terespol. The remaining areas of Eastern Poland shall not improve significantly their accessibility owing to the realisation of these railway-

related undertakings. Thus, provinces of Podlaskie and Świętokrzyskie shall not improve at all their accessibility in the effect of the current railway projects. It could be concluded that investment into railroad network, even in the form of large projects, give, as compared to those related to roads, relatively point-wise or linear effects in terms of changes in accessibility. On the other hand, road projects, in view of the so-called network effects and the density of the road network bring the consequences in terms of improvement of accessibility over a much bigger territory, which takes often the shape – in the case of individual projects – of a catchment basin or a fan.

CONCLUSIONS AND RECOMMENDATIONS

Transport-wise accessibility (both potential and cumulative) constitutes an important indicator characterising the spatial units of regional and local levels in the perspective of their development capacities. The analyses and simulations conducted demonstrated that the indicators considered are characterised by a significant spatial differentiation. Therefore, these indicators are a useful tool, alternative with respect to the classical indicators (the macroeconomic ones, such as the GDP, but first of all the transport-related ones, such as, for instance, network density, or even the density or magnitude of traffic). The classical transport indicators show, first of all, the level of satisfaction of demand for infrastructure. They do not account for the information content, associated with the role of infrastructure as the element stimulating development (and, simultaneously, demand for infrastructure). That is why, in the context of regional development, the results obtained may be interpreted in several different ways:

- low level of transport accessibility ought to be perceived as a barrier to development; identification of strong connections in space with simultaneous low accessibility provides the evidence for the existence of bottlenecks in the transport system and the need of undertaking investment activity; it may, though, also be interpreted as the premise for the decongestion of definite functions (e.g. public service outlets to be established in better accessible locations);

- high level of accessibility is an important development premise; if, in conditions of good accessibility definite interactions do not take place, this situation can be treated as an indication for undertaking other regional policies stimulating spatial interactions (like, e.g., finding the hinterland for the emerging outlets and institutions); good accessibility might also be interpreted as the justification for concentration of certain functions;

- comparison of the results of simulation of changes in the values of the potential accessibility indicators after the implementation of definite investment projects gives the basis for the assessment of rationality of the concrete development-oriented plans; inclusion of the economic element in the simulations (like, e.g., investment cost) allows also for the comparison of the potential outlays needed to achieve the assumed improvement in accessibility through construction of transport infrastructure or, alternatively, decongestion of services.

In conditions of the here considered macroregion of Eastern Poland the most important direction of interpretation is the identification of the zones of low accessibility, as the barriers to development, including, first of all, the barriers for: (a)

development impulses between central and eastern Poland (linking up of the eastern provincial centres to the network of the largest cities); (b) development impulses between the provincial capitals and their outer zones.

The analysis of potential and cumulative accessibility yields solid prerequisites for formulation of recommendations for the transport policy in the context of setting the stages and priorities in the planning of respective activities on the territory of Eastern Poland. The fundamental conclusion from the analyses performed is the confirmation of the need to improve the accessibility of the area in question, first of all through construction of transport routes of high speed, linking main centres of Eastern Poland, that is – Białystok, Lublin, Rzeszów, Olsztyn and Kielce, with the biggest cities in Poland, primarily with Warsaw, Cracow and the Tri-City (Gdańsk, Gdynia, Sopot). In this perspective the natural priorities are associated with the finalisation of the motorway A4 up to the Polish-Ukrainian border, of the expressway S7 over its entire length from the Tri-City to Rabka, as well as the construction of two expressways, linking Warsaw with Białystok (S8) and with Lublin (S17). The study confirmed also quite clearly the significance of the investments into new bridges over Vistula, this river remaining one of the barriers limiting the accessibility of Eastern Poland.

Conform to the argumentation of the proponents of the so-called new economic geography, owing to the improvement of transport infrastructure of interregional character, there follows the drainage of resources from the poorer regions. This proposition, though, must be treated – in Polish conditions – as debatable, to say the least. The drainage of resources, especially in the form of migration (of population, and hence also of the micro-businesses) from the provinces of Eastern Poland to Warsaw or Cracow, and to other cities of central Poland, has already been taking place for some time and constitutes a natural, hardly controllable process. This process results from the very differences in the levels of economic development, the differences in the capacities of the labour market, and the differences in wages. In the conditions of serious underinvestment and poor spatial accessibility, the improvement of the state of infrastructure might rather act against the course of these processes. It constitutes a necessary (although, naturally, not sufficient) condition for stimulating the external investments. It also causes some migrations to be replaceable by job commuting (sometimes in the flexible work settings, supported by telework), which allows for the preservation of numerous services (including the market-oriented ones) in the locations of residence of the commuters. Besides, development of infrastructure would enable the inhabitants of the areas considered to take advantage of the effects of knowledge diffusion and exchange of experiences, while the entrepreneurs from the territory of Eastern Poland, producing under relatively lower costs would expand, owing to improved infrastructure, the geographical sales markets for their products. The key issue, though, is to strengthen the most important centres of the region by linking them up to the national and European networks. This is the condition for the development of the metropolitan functions in these cities, and thereby – for attaining the competitive positions by them (in the domains of both migrations and commuting) with respect to Warsaw and Cracow.

An important conclusion, resulting from the analyses conducted, is also the observation that improvement of accessibility within the area of Eastern Poland may be realised by implementation of investment projects located in other regions, and in particular – in central Poland. This is demonstrated by the high indicators of effec-

tiveness (in terms of improvement of accessibility in the five provinces considered) for the construction of the motorway A2 between Warsaw and Lodz, and for the finalisation of the Warsaw road node. This observation has its consequences of institutional character and may be translated into the principles of allocation of means in the framework of the cohesion policy in the consecutive programming periods. Adoption of the principle of conditionality, based on the effectiveness of the activities undertaken may signify that the condition for granting direct support is not constituted by investing on the territory receiving the support (as this is the case nowadays), but investing that secures a definite effect on the area receiving the support.

It appears that in view of the macroeconomic and fiscal problems, as well as distant perspective of the membership of Belarus and Ukraine in the structures of the EU, realisation of the border-adjacent road segments, that is – the ones situated to the East of Białystok (S19), Siedlce (A2) and Lublin (S12 and S17) may get delayed to the period after the year 2020. Only the currently constructed motorway A4, and the expressway S61 towards the border with Lithuania in Budzisko, find economic justification, and guarantee improvement of accessibility of towns located within the border areas (Suwałki, Przemysł). Solely the political changes in Belarus and opening up of the Polish-Belarusian border may in a farther perspective result in the need of construction of the expressway in the direction of Grodno (Hrodna) and the motorway A2 from Siedlce towards Brest. Without the necessary political changes in Belarus the intensity of traffic over these road segments shall remain comparable to that on the expressway S22 in the direction of Kaliningrad – that is: marginal or hardly noticeable.

Eastern Poland is an area, where historical circumstances made the role of railway infrastructure relatively lower than that of road infrastructure. Priority in railway transport ought to be assigned, therefore, first of all to the improvement of train accessibility to Warsaw over the directions from Białystok and Lublin, and to the acceleration of activities associated with modernisation of the railway lines connecting Warsaw with the Tri-City, and Cracow with Rzeszów. In the regional traffic highest importance ought to be assigned to the agglomeration-related transport, primarily around Rzeszów and Lublin, so as to increase the radius of influence of these cities in the domain of daily job commuting with public transport. It is, however, worth paying attention to the fact that the simultaneous improvement of the road connections, parallel to the railway lines, given the relatively limited changes in the train speeds, would result in further intermodal shift of demand in the direction of road transport. Besides, agglomeration railways are an effective future-oriented option only under the condition of high quality equipment, adapted to the needs of the 21st century, improvement of infrastructure of railway stations, as well as a change in the image of the railway operators, which may take place only in a further temporal perspective (that is – most probably only after the year 2020). The interviews, conducted by the team of present authors at the self-governmental bodies, e.g. in Sanok with the representatives of the county office, confirm the proposition that railway transport might constitute an alternative for the road transport uniquely under the assumption of existence of fast and comfortable connections. On the other hand, improvement of railway connections with selected important travel destinations, such as, for instance, airports, is definitely recommended. In this perspective the decision on construction of the railway connection between Lublin and the airport in Świdnik ought to be assessed very positively.

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ТРАНСПОРТНА ДОСТЪПНОСТ В ИЗТОЧНА ПОЛША

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(Резюме)

Източна Полша е макрорегион, който заема периферно положение както в национален, така и в европейски мащаб. Провинциите, влизащи в неговия състав, спадат към най-бедните региони в Европейския съюз. В този контекст развитието на транспортната инфраструктура се споменава като един от основните инструменти в регионалната и териториалната политика, който може да ускори развитието на територията и да намали отрицателните последици от периферното ѝ положение. Сегашната транспортна достъпност в района е ниска. Съвременните механизми на макропланиране, както и начинът на провеждане на европейската политика за сближаване в нивото на развитие не дават пълна гаранция за преодоляване на негативните обстоятелства. Ето защо се налага по-задълбочен анализ на проблемите в региона, свързани с териториалната достъпност и предвижданите в нея промени като резултат от изпълнението на бъдещи инвестиционни проекти в сферата на транспорта. Целта на представената статия е да се направи оценка на съществуващата достъпност на ниво макрорегион и провинция и да се разработят модели за евентуалните промени, които могат да настъпят при реализирането на едромасщабни инвестиционни програми и индивидуални дейности от национално и регионално значение. Извършените анализи и разработените модели потвърждават, че се наблюдават съществени териториални различия в разглежданите показатели. Основното заключение е, че е необходимо да се подобри достъпността в изследвания регион чрез създаването на маршрути за високоскоростен транспорт, които свързват важни центрове в Източна Полша, например Бялисток, Люблин, Жешув, Олщин и Киелце, с най-големите градове в страната, особено с Варшава, Краков и тройката градове Гданск, Гдиня и Сопот.

Друг важен извод, който произтича от анализите, е, че подобряването на достъпността в Източна Полша може да се постигне чрез реализирането на инвестиционни проекти в други региони, особено в централна Полша. Това се доказва с високите стойности на показателите за ефективност (подобрена достъпност в петте изследвани провинции) от изграждането на магистрала А2 между Варшава и Лодз и от завършването на пътния възел при Варшава. Наблюдението има своите последствия от институционален характер – да се премине към принципите на разпределение на средства в рамките на политиката за сближаване в нивото на развитие в поредни програмни периоди. Възприемането на принципа на условност, основаващ се на ефективността от предприетите дейности, може да означава, че условието за предоставяне на пряка подкрепа не се свежда до инвестиране на територията, получаваща подкрепа (както става днес), а до инвестиране, което да осигури определен ефект за региона, получаващ подкрепа.