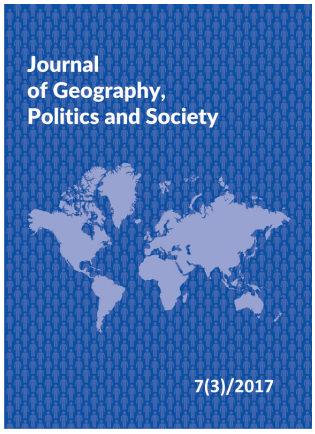

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TRANSPORT IN POLAND DURING THE PERIOD OF ACCESSION TO THE EUROPEAN UNION

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Abstract
Transportation is an important area of the economy. The transport fills a series of tasks daily functioning of the state. The period of the accession of Central and Eastern Europe countries to the European Union, including Poland is the time of intensive investments financed by structural funds. The countries of the region have gained significant resources to improve the infrastructure and operation of most types of transport modes. This article is a review and ordering information on the functioning and development of major modes of transport. It retains the traditional distinction between road, rail, inland waterways and air transport. Quoted statistics for the period 2005-2015 in order to compare changes in transport infrastructure development.

Key words
transport, Poland, European Union, transformation period, changes of transport modes.

1. Introduction

On 1st May 2004 Poland became a member state of the European Union. During the first ten years of the EU membership the Polish transportation system changed significantly. It was an outstanding period in the context of structural, quantitative as well as qualitative changes. Thanks to the structural funds it was possible to develop transport infrastructure in Poland what has reduced the development gap between our country and Western European countries. Nonetheless, not only the investment possibilities, but also legal issues, including liberalization of railway, automobile and aviation markets, had to be introduced. It was also a great chance for Polish entrepreneurs to enter international markets (Pieregud, 2014a; Rosik et. al., 2015b).

The transformation which took place during the analyzed 10-year period is clearly reflected by the number of cars per 1000 people. In 2004 there were 314 such vehicles while in 2015 as much as 539 (Fig. 1).

Table 1 presents a detailed structure of Polish passenger transport in the period of 2005–2015 and its dynamics of changes. In 2005 over 5 million people used means of passenger transport while in 2015 slightly over 4.5 billion. The share of urban transport decreased over the discussed period and

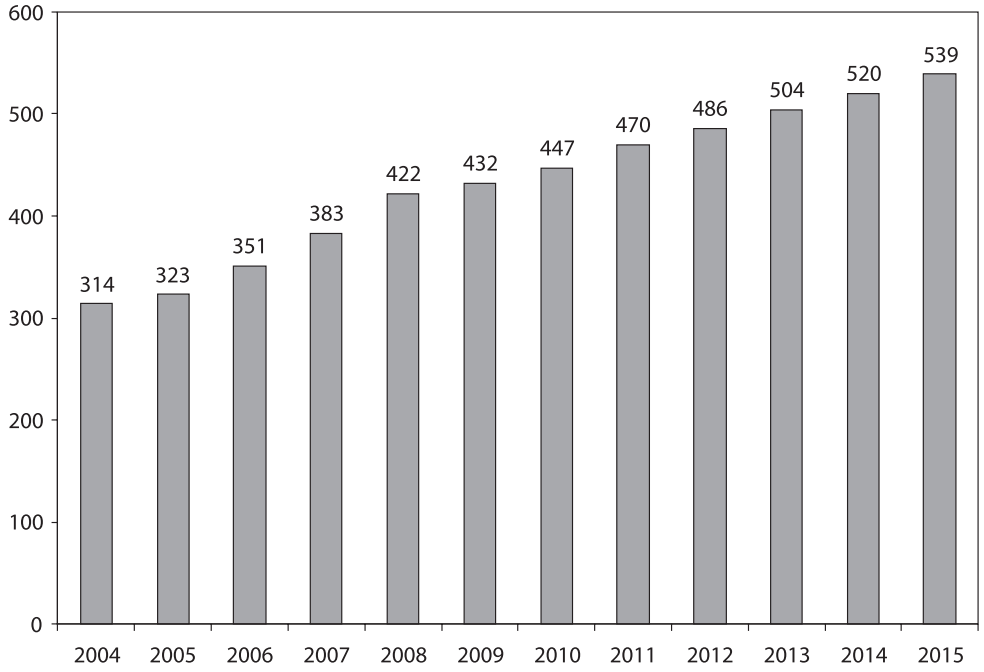

Fig. 1. The number of passenger cars per 1,000 people in 2004–2015

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

Tab. 1. Transport of passengers in 2005–2015

Specification in thous. passengers	2005	2010	2015	2005	2015
	In absolute numbers			In percent	
all passengers	5 134 809	4 883 086	4 547 157	100.0	100.0
in urban transport	4 087 879	4 045 062	3 843 415	79.5	84.5
excluding urban transport	1 046 930	838 024	703 742	20.4	15.5
				100.0	100.0
Railway transport	258 110	261 314	277 321	24.7	39.4
Road transport	782 025	569 652	416 774	74.7	59.2
Maritime transport	714	671	597	0.1	0.1
Inland waterway transport	1 444	1 397	1 762	0.1	0.3
Air transport	8 504	8 273	13 486	15.1	25.7

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

a clear influence of individual transport (passenger cars) is visible. When excluding urban transport from the structure, the share of road transport was dominating. However, the share of railway transport also increased (mainly around agglomerations, e.g. Warsaw) during the analyzed period. Other types of transport, including maritime transport and inland waterway transport, were marginal. A significant change was observed for air transport and its share increased significantly over the period 2005–2015. The share of air transport was 15.1% in 2005 while in 2015 it was 25.7%.

2. Railway transport

Polish railway transport system has a historical background. Due to many years of partitions in different regions of the country different railway systems (different rail gauge) were developed. The dynamics of these systems is also differentiated. The railway systems inherited after the First World War were devastated and, what is more important, heterogeneous. Although many years have passed, Poland is still divided into regions (eastern, north-western and southern) with more and less developed railway networks.

The retrogressive development of railway transport observed after 1989, at times of economic and

Tab. 2. Railway infrastructure in the period of 2005–2015 (as at 31 XII)

Specification	2005	2010	2015
Railway lines operated in km	20 253	20 228	19 231
of which standard gauge	19 843	20 089	19 231
of which electrified	11 884	11 916	11 865
of which single track	11 096	11 353	10 505

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

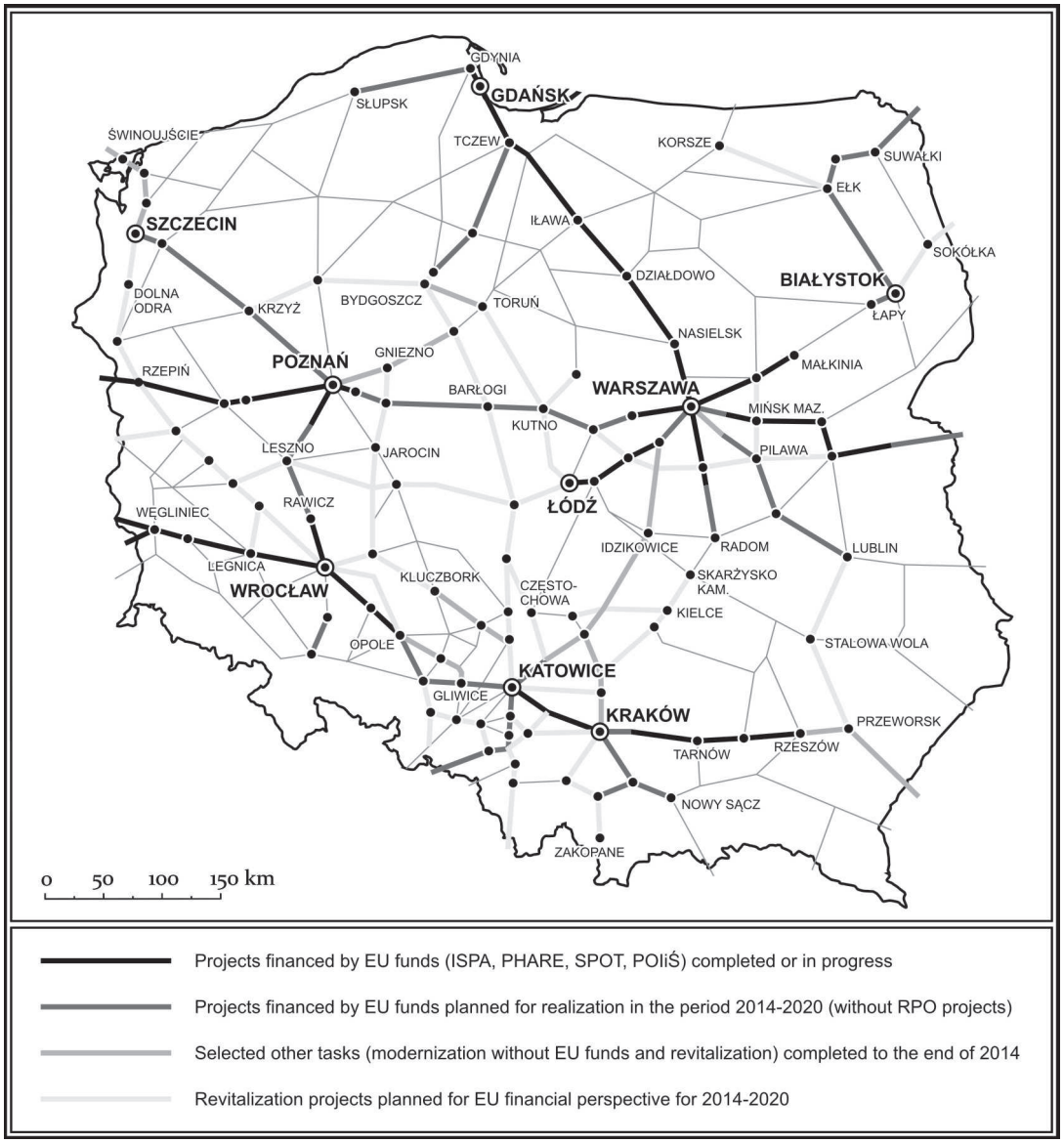

Fig. 2. Main railway infrastructural development projects in Poland

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

political transformation, has balanced the density of railway network in many regions. However, it was the effect of reduction in the length of railway lines in the west while there were no development projects implemented in the east. Table 2 presents a decrease in the number of active railway lines – from 20 thousand km in 2005 to more than 19 thousand km in 2015.

Railway lines in Poland are managed by the PKP company Polskie Linie Kolejowe (PLK) [*Polish Railway Lines*] and the main operators are also Polish companies – PKP Intercity and PolRegio (former PKP Przewozy Regionalne). In many regions local authorities have established local railway operators supplementing agglomeration traffic. Koleje Mazowieckie, Koleje Wielkopolskie, Koleje Dolnośląskie, Koleje

Małopolskie, Koleje Śląskie and Łódzka Kolej Aglomeracyjna consist a group of the largest such entities. In addition to passenger operators, there are numerous cargo operators and the national PKP Cargo is the largest of them.

As it has already been mentioned the main body managing the infrastructure is PKP PLK. In order to get access to Polish railway lines a special fee for carriers has to be paid. The most important international railway lines running through Poland are: E30 (from Germany to Ukraine), E20 (from Germany to Belarus) and E65 (from ports in Gdynia and Gdańsk to the Czech Republic). Polish railway market is one of the largest in Europe. During the last few years the structure of railway services has been changing. There are more than 60 cargo and more than 10 passenger operators exploiting the railway network of more than 19,2 thousand km length (Pieregud, 2014b).

During the analysed period railway infrastructure was a factor negatively influencing development of transport. The expenditures on railway infrastructure grew significantly, from 1 billion zloty in 2004 to 5.3 billion in 2013 and some more in the following years. However, the average speed of trains is still low. What is more, the long-lasting construction works usually discouraged potential passengers.

Figure 2 presents main railway infrastructural development projects in Poland, both implemented and planned. The modernisation projects are presented at the background of the existing railway infrastructure.

3. Road transport

3.1. Road infrastructure

Road transport dominates in Poland and it is a base for the integrated transport system of our country as it fulfils the needs of more than 99% of domestic cargo and passengers transport. More than 85% of cargo is carried by trucks. Moreover, Poland is a transit

Tab. 3. Road transport infrastructure between 2005–2015 (as of 31 XII)

Specification	2005	2010	2015
public roads (urban and non-urban)			
in thous. km	381	406	420
of wich hard surface in thous. km	254	274	291
of which: improved in thous. km	227	250	268
expressways in km	258	675	1 492
motorways in km	552	857	1 559

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

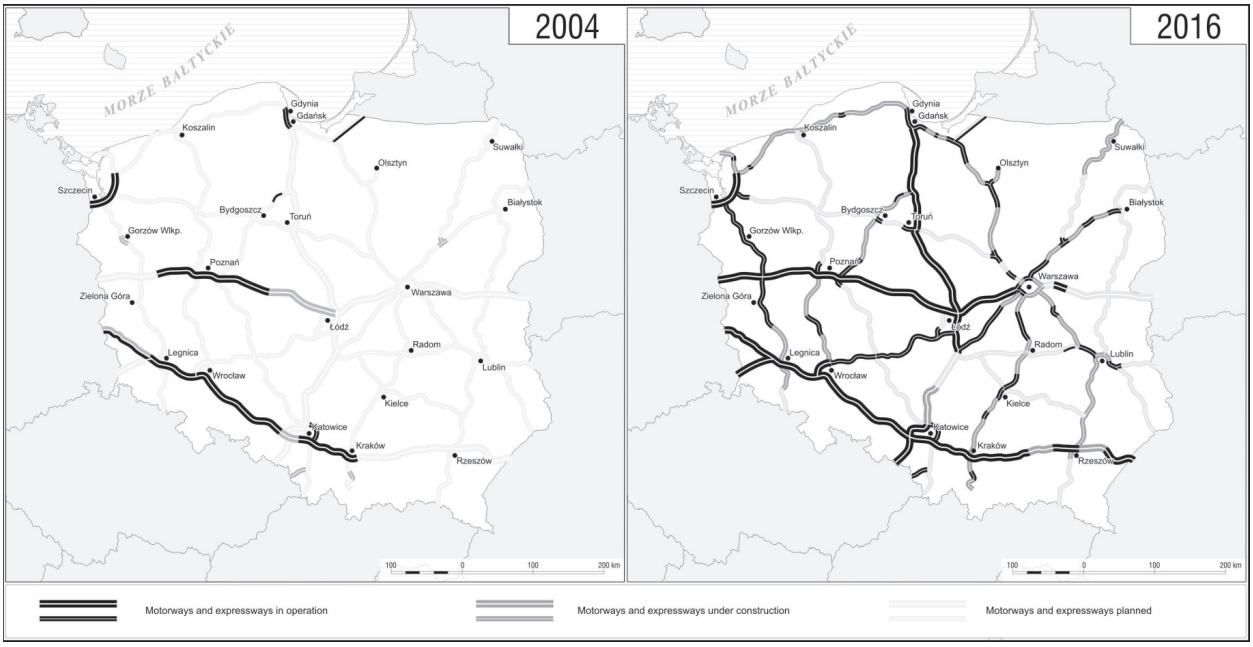

Fig. 3. Changes in road infrastructure between 2004 and 2016 (as of 31 XII)

Source: Own elaboration based on: GDDKiA (The General Directorate for National Roads and Motorways).

country for many carriers travelling between Western and Easterm Europe as well as between the sea ports in the north and the southern Poland.

That is why, special attention has been paid to improving quality of public roads in Poland. According to the report of the Supreme Audit Office (NIK) on road and railway transport published in 2005, only 8% of Polish domestic roads meet the European Union axel-load limit standards (Paprocki, 2014).

In the period of 2004–2016 a considerable percentage of EU funds was spent on improvement of Polish domestic roads quality. The total length of Polish domestic roads grew from 381 thousand km in 2005 to 420 thousand km in 2015 (Tab. 3). Motorways and expressways were the most important part as they are of key significance in both international and regional scales. According to the existing development plans (as at the end of 2016), the projected total length of expressways is to be approx. 7650 km and the length of motorways is to grow from 2000 km to 5650 km (Komornicki et. al., 2013). During the period of 2005–2015 the dynamics of motorways development was as follows: 552 km in 2005, 857 km in 2010 and 1559 km in 2015. Total length of expressways was growing even faster – from 258 km in 2005 to 1492 km in 2015.

Figure 3 presents changes in length of highways and expressways which took place in the period of 2004–2016. The latitudinal layout of the road system is worth mentioning as it perfectly reflects the transit character of Poland. The figure for 2016 shows the actual state of construction of motorways and expressways at the background of the planned road network. Connecting voivodship cities with the capital is considered a key priority.

3.2. Car transport

Road transport plays the most important element of the Polish transport system. This situation is clearly depicted by the number of cars registered in Poland. At the end of 2005 there were only about 17 million vehicles, including approx. 12.5 million passenger cars (Tab. 4). A dynamic growth in the number of cars observed over the next years resulted in reaching the level of 21 million cars in 2015. This growth is mainly the result of importing second-hand cars from Western Europe. At the same time sales of new cars have decreased. However, some legal regulations introduced in the following years have resulted in a decrease in passenger cars imported from abroad.

Not only the number of passenger cars has increased, but the number of other vehicles has also grown, i.e. buses, lorries, motorcycles and others. However, this growth in the number of vehicles is not correlated with an increase in quality of public roads. The pace of infrastructural development is not fast enough in the context of the rapidly growing number of road users. The entire process affects the road congestion.

A significant increase in the number of users of public roads was not associated with an increase in the number of accidents. In this aspect significantly decreased car accidents from more than 48 thous. in 2005 to less than 33 thous. in 2015. Also the number

Tab. 4. Registered road vehicles and tractors in 2005–2015 (as of 31 XII), in thous. units

Specification	2005	2010	2015
Total (road vehicles and tractors)	16 816	23 037	27 409
of which: passenger cars	12 339	17 240	20 723
buses	80	97	110
lorries and road tractors	2 305	2 982	3 428
ballast and agricultural tractors	1 243	1 669	1 703
motorcycles	754	1 013	1 272

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

Tab. 5. Road traffic accidents in 2005–2015 (as of 31 XII)

Specification	2005	2010	2015
Road vehicles in thous. units	48 100	38 832	32 967
per 10 thous. registered motor vehicles and tractors	28.6	16.9	12.0
Road traffic casualties in units	66 635	52 859	42 716
Fatalities	5 444	3 907	2 938
Injured	61 191	48 952	39 778

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

of casualties and victims has decreased significantly (Tab. 5).

3.3. Urban transport

Urban transport in Poland regards mainly buses and trams. The underground system operates only in Warsaw. Over the last few years the majority of structural funds was granted to those cities which invest in development of public transport. Development of those transport systems has been observed, in the context of both infrastructure and fleet (Beister et al, 2015; Wolański, 2014).

Table 6 presents the dynamics of changes in development of public transport lines in the period of 2005–2015, with reference to different types of urban transport. Progress has been observed for all the mentioned in the table types. A significant growth in the length of tram lines is worth mentioning – from 2253 km in 2005 to 2425 km in 2015. It is a result of fulfilling the European Union recommendations on sustainable development of transport in cities. Moreover, high dynamics has been observed in relation to few trolleybus networks. The length of trolleybus lines grew from 258 km in 2005 to 387 km in 2015.

Most Polish cities have urban bus systems. In 19 cities there are also other means of public transportation. Since December 2015 there are 15 tram systems in Polish cities, including 10 with standard gauge and 5 with narrow gauge. Those cities are as follows: Gdańsk, Elbląg, Olsztyn, Grudziądz, Szczecin, Bydgoszcz, Toruń, Gorzów Wielkopolski, Poznań, Łódź (with neighbouring towns), Warszawa, Wrocław, Częstochowa, Katowice (with neighbouring towns) and Kraków. All the above-mentioned cities, except Gorzów Wielkopolski, have used the EU funds in order to modernise their tram systems. In Olsztyn an entirely new tram system was established. It is the only city in Poland where a new tram system has been created for 50 years.

During the analysed period three trolleybus systems were operating (in Gdynia with Sopot, Lublin and Tychy). The share of trolleybus transport in the whole urban transport system is relatively small, but locally trolleybuses play an important role. All the already-mentioned cities have gained structural funds for development of trolleybus transport in the recent years, especially numerous infrastructural projects have been implemented, including construction of a new depot, development of trolleybus lines and power systems (Połom, 2015).

The only one operating underground system in Poland is in Warsaw. The first part of the underground line began operation in 1995 and over the following years more stations were added. The first line was fully operational in 2008. In 2010 construction works on the second underground line started, the first part (7 stations) was opened in 2015.

4. Air transport

Development of air transport in the recent years was connected with the ongoing process of the market deregulation triggered by accession to the European Union (Hoszman, 2014). It is a means of transportation which developed the fastest in the period 2005–2015. In 2005 the number of passengers, both

Tab. 6. Urban transport lines in km between 2005–2015 (as of 31 XII).

Specification	2005	2010	2015
Ground transport	54 029	56 287	56 764
Bus	51 418	53 728	53 952
Tramway	2 253	2 254	2 425
Trolleybus	258	305	387
Metro	17	23	29

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

Tab. 7. Passenger traffic at airports in 2005-2015.

Specification	2005	2010	2015	2005	2010	2015
	From domestic airports			To domestic airports		
	868 164	984 841	1 578 764	837 751	992 079	1 580 391
	From foreign airports			To foreign aiports		
	4 861 860	9 234 901	13 633 398	4 946 296	9 335 840	13 695 880
Total	5 730 024	10 219 742	15 212 162	5 784 047	10 327 919	15 276 271

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

arriving at and departing from Polish airports, was 11.5 million while in 2015 it was slightly less than 30.5 million (Tab. 7).

In Poland there is a relatively dense network of civil airports. Warszawa-Okęcie is the most important one. For many years it was the only intercontinental airport in Poland. Regional airports have undergone vital changes. New runways, terminals and technical rooms have emerged. The fact that Poland was a co-organizer of the 2012 UEFA European Football Championship was an important factor contributing to the air transport development (Pijet-Migoń, 2013). While preparing to this sports event four host cities have gained the necessary transport infrastructure, including modernization of the airports. Large development projects were implemented in Gdańsk, Poznań, Warsaw and Wrocław.

During the analysed period, mainly thanks to the European Union, new civil airports were open in Lublin, Olsztyn and Radom (some existing infrastructure was also used) (Fig. 4). A similar project was implemented in Gdynia where the already existing military infrastructure was used. However, after finishing the construction works, the European Commission questioned the legitimacy of such spending under the Structural Funds and ordered the airport to repay the subsidy granted what made it impossible to open the airport for civil traffic.

The main airlines in Poland are the low-cost carriers, especially Ryanair and Wizzair. Among the traditional airlines there are Polish LOT as well as other European companies, especially Lufthansa and SAS. The main airport for LOT is Warsaw.

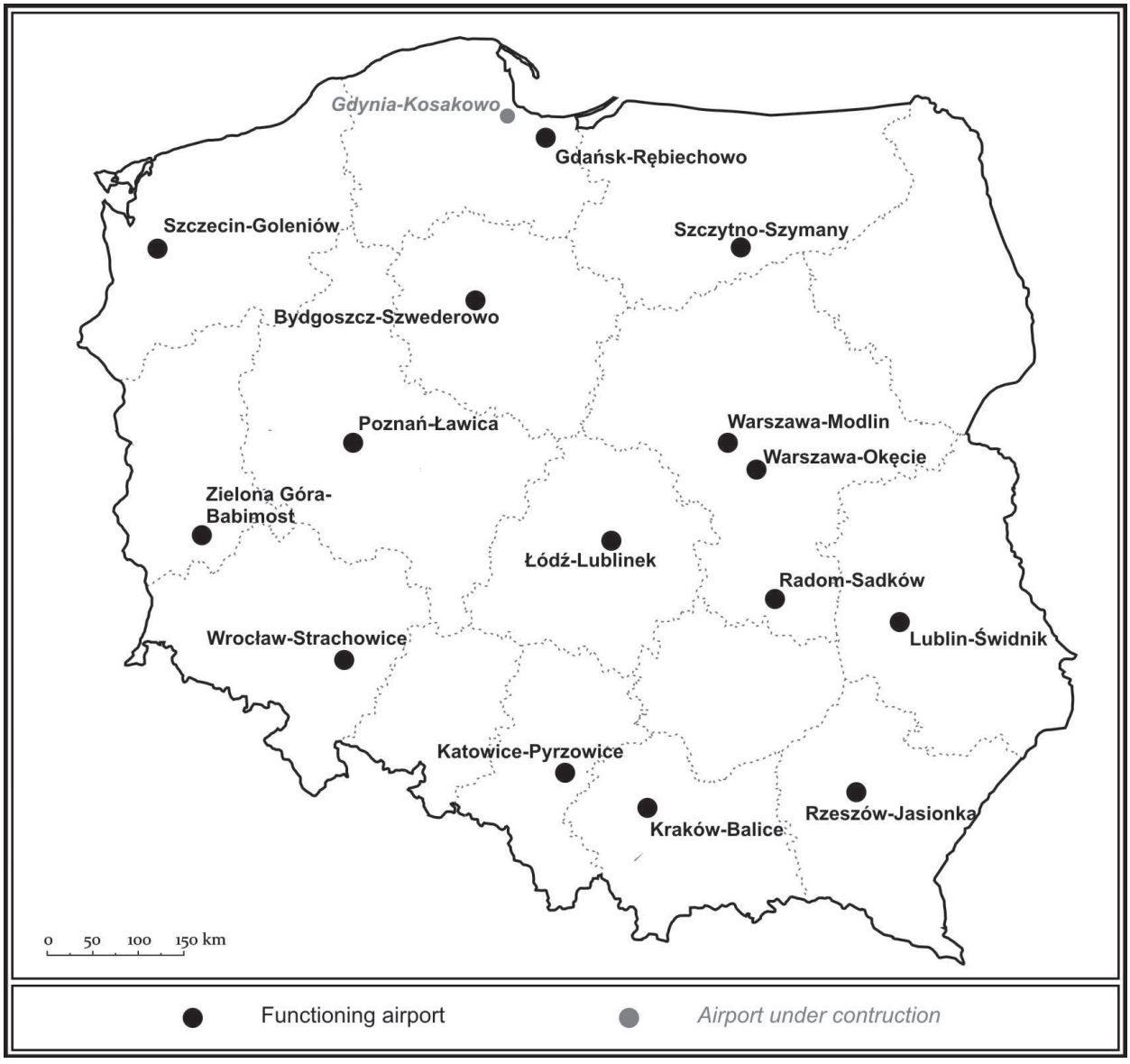

Fig. 4. Localization of airports in 2016 (as of 31 XII)

Source: own elaboration.

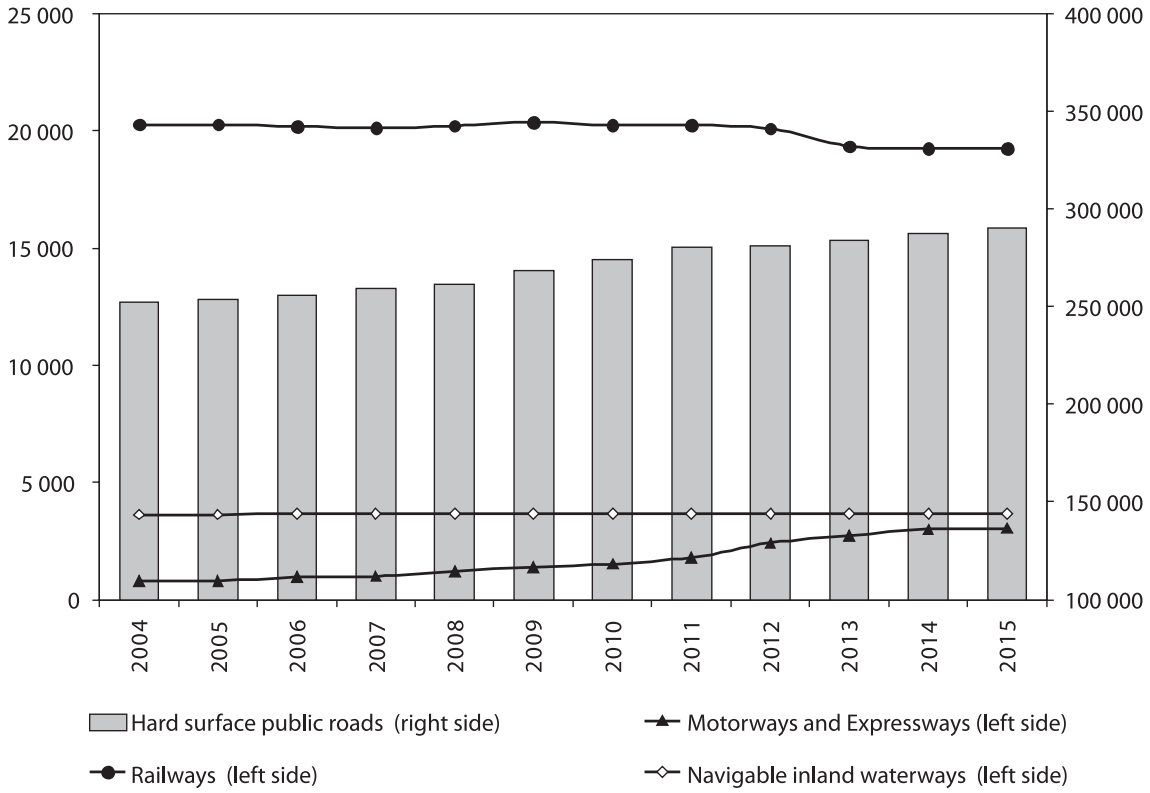

Fig. 5. Comparison of changes of transport modes [km] in Poland in the period of EU accession

Source: Rocznik Statystyczny Rzeczpospolitej Polskiej, 2016; Transport, wyniki działalności w 2015, 2016.

5. Maritime and inland waterways transport

Since Poland has an access to the Baltic Sea, it is obvious that the maritime transport shall be of key meaning. Among the main sea ports of Poland there are Szczecin, Świnoujście, Gdynia and Gdańsk. These four ports are of key importance for the state economy. Other ports like Elbląg, Darłowo Dziwnów, Kołobrzeg, Stepnica, Ustka and Hel have rather small loading berths.

When considering the main sea ports a visible growth in transhipment, which reached 42% of the turnover. The period of 2010–2013 is considered to be the especially good in this context 2013 (Matczak, 2014). In 2013 the limit of 70 million tonnes for all Polish sea port was exceeded for the first time. In comparison, a year before Polish accession to the EU total amount of transhipment was almost 50 million tonnes.

Beside cargo transport, there are also regular ferry connections between domestic and Scandinavian ports. Four carriers operate on routes from Świnoujście to Ystad and Trelleborg, from Gdynia to Karlskrona and from Gdańsk to Nynäshamn, near Stockholm. Among the above-mentioned carriers there are two national ones: Polska Żegluga Bałtycka (Polferries) and Polska Żegluga Morska (Unity Line). The other two companies are private entities Stena Line and TT-Line, well-known on the European market. Development of cheap air transport in the Baltic Sea region has contributed to a decrease in the number of passengers carried by sea. In 2003 there were 1.6 million of passengers while in 2005 and 2007 there were only about 1.2 million of them. Nonetheless, an increase in ro-ro traffic contributed to stabilization of the situation and finally, the passenger traffic has increased to approx. 1.5 million in the recent years (Matczak, 2014).

Inland waterways transport in the least popular means of transport in Poland mainly due to lack of properly regulated natural and artificial waterways. However, a well-developed river network creates a great possibility to develop this type of transportation (2005 year: 3638 km, 2010 year: 3659, 2015 year: 3655). Inland waterways transport has been neglected by many years and there have not been any development projects implemented in the scope of the infrastructure. That is why, a retrogressive development of this type of transport is being observed nowadays. Most river ports are situated on the Odra River – a river being a border between Poland and Germany, which is a country investing in this type of transport. The most important river ports are Gliwice, Kędzierzyn-Koźle and Wrocław.

6. Summary

The period of Poland's membership in the European Union is unprecedented for development of the Polish TSL sector. From 2004 to 2016 many positive quantitative, qualitative and structural changes in Polish transport system took place. Among the most significant quantitative achievements there are four that have to be mentioned: a threefold increase in road performance (Rosik, Goliszek, 2015), a 300% increase in passenger traffic at Polish airports, almost fivefold increase in the number of containers in intermodal railway transport, a sixfold increase in container transhipment in the sea ports. Development of the transport infrastructure comprised construction of 3 thousand km motorways and expressways, modernisation and construction of approx. 13.8 thousand of national, provincial and regional roads, modernisation of about 3 thousand km of railroads (Fig. 5), construction of three new airports and construction a container terminal in the sea port of Gdańsk.

Modernisation of transport in Poland has resulted in improved safety of travelling as well as it has contributed to a significant decrease in the number of accidents and casualties (Rosik et. al., 2015a). The safer the roads, the safer the passengers. However, not only the infrastructure has been improved, but also the fleet. Many new rail vehicles and buses (used in public and regional transport) were purchased. These new vehicles contributed to better perception of the public transport and such actions are in line with the EU public transport policy.

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