

THE PLACE AND ROLE OF FREIGHT TRANSPORT IN THE POLISH ECONOMY AGAINST THE BACKGROUND OF THE EUROPEAN UNION

Maciej Menes

Abstract:

The article synthetically characterizes the Polish freight transport sector compared to its counterpart in the European Union. The article presents the changes during the years 1990-2019 taking place in the number of various types of transport means used, belonging to Poland and 27 European Union countries. The volume and structure of the freight transport performance of Poland and the European Union as well as the changes taking place in them over the last 30 years were also characterised. The reasons for changes in the structure of freight transport performance in Poland were analysed. Various types of transport infrastructure in Poland were described and analysed, and the changes taking place in it were presented. The impact of EU funds on changes in the transport infrastructure of Poland was also described.

Keywords:

transport infrastructure, transport means, transport work, freight transport, road transport

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Transport is an activity aimed at traversing distances. It enables efficient and effective functioning of each sector of the economy and, along with the socio-economic development of individual regions and countries, is a factor that intensifies development [20].

Transport performs three functions in managing economy:

- consumption function, meaning satisfying transport needs by the transport services provided,
- the production function, meaning satisfying production needs by the providing transport services, that is, by creating conditions for economic activity, its stimulation and influence on the functioning of the market and exchange,
- the integrating function, which allows to integrate the state and society through transport services [20].

The above functions indicate complementary character of transport activity to the rest of the economy. Every manufacturing process requires transport, and the development and complexity of production and goods circulation processes increase both quantitative and qualitative requirements for transport.

Depending on the quantitative and qualitative level of transport development, it may be a factor stimulating socio-economic development or, in the event of failure to keep up with the growing needs of the environment served, a significant barrier to overall development.

The above is confirmed by the entire history of the material development of mankind thus it also refers in particular to the period of transport development after Poland regained its independence in 1918.

Poland's partitions sanctioned in 1815 by the Congress of Vienna, dividing Poland into three parts, severed the administrative and economic ties between them for over 100 years. The provisions of the Vienna Treaty guaranteeing the preservation of Poland's economic unity according to the pre-partition agreement quickly turned into customs barriers, which led to the disintegration of the Polish economy, thus paralyzing internal transport and its importance in international transport [22].

The socio-economic development of the annexed areas was subordinated to the political and economic interests of the partitioning powers.

This also applied to transport, which, apart from the material backwardness in the face of competition from Western European countries entering the era of intensive industrialization, was practically divided into three independent economically oriented areas, and thus into three different non-integrated directions.

Thus, concentric transport networks were developing in the three territories of the country, aimed at the growing centres of industrial production and urban agglomerations of the partitioning states. Transport was treated as a tool for subordinating the Polish economic area to the interests of these countries. The Polish lands were additionally treated by each of the invaders as peripheral areas, which additionally contributed to the growing disproportions in the development of transport in Poland in relation to neighbouring countries.

The consequences of this situation were long-term and deepening, contrary to the mechanization and dynamization of transport observed in the world.

The use of mechanised transport in the 19th century opened a period of development for transport which was qualitatively different from its former history [22].

The introduction as the driving power: the steam engine, electric motor and internal combustion engine, radically changed the transport system of the world, especially of Europe.

New modes of transport emerged:

- rail transport - the first public railway line was put into service in England in 1825, and 25 years later, 38,000 km of railway lines were operated in the world, of which 23 thousand km in Europe, and in 1900 800 thousand km of lines and 286 thousand km of lines respectively [12]
- road transport - the first road vehicle with an internal combustion engine was built in 1884, and as early as 1928, over 25 million motor vehicles were operated worldwide, including over 23 million in the USA, approx. 1.3 million in Great Britain, approx. a million in France, around half a million vehicles in Germany [12]
- air transport which, in a record short period of several years, from 1903, i.e. from the moment of the first successful flight of the Wright brothers' plane, became an integral component of the transport systems of such countries as the USA, Great Britain, Germany and France.

Only two railway lines of essential to-this day importance were built in Poland before 1850, namely the Upper Silesian Railway Wrocław-Opole-Mysłowice, the extended Kraków-Silesian Railway to Kraków, and the Warsaw-Vienna Railway running from Warsaw to Częstochowa, connecting, outside the border of the Kingdom of Poland, with the Krakow Railway.

In the second half of the nineteenth century, the latitudinal direction began to dominate among the railway lines built in Poland, with the growing density of the network in the Prussian and Austrian partitions. The expansion of the railway network in the Kingdom of Poland, in accordance with the Russian defence doctrine, assuming halting the transport development in its borderland, was limited to the construction of several lines connecting Warsaw with the central districts of Russia.

Even worse was the road infrastructure situation. In the second decade of the 19th century, there were only 600 km of paved roads on the Polish territory built in Silesia [20]. In the mid-nineteenth century, the length of these roads increased to 8 thousand km, more than half of which was in the Prussian partition.

Also in terms of roads, the dominant direction was the latitudinal direction, subordinated to the interests of the partitioning powers, exemplified by the roads connecting Berlin with Szczecin, Koszalin, Gdańsk, or Berlin with Poznań [20].

Over a hundred years of colonization economy of the partitioning powers contributed to the deepening of the backwardness of Poland's transport development, the synthesis of which may be the following data: in 1919, Poland had only 7.1 thousand km of railway lines (against a million km of lines in the world, including 380 thousand km of lines in Europe), 22 thousand motor vehicles (with over 25 million vehicles registered in the world, including approx. 3 million vehicles registered in Europe), several seagoing ships with a global fleet of over 50,000 vessels, of which over 90% were already powered by steam engines, a few passenger aircraft with a world fleet of thousands of planes [12].

After twenty years of independence in 1938, Poland had only 63,000 km of paved roads, of which only three thousand kilometres were adapted to car traffic. These roads, like the railway lines, of which 1.7 thousand km were built in the years 1920-1938, were overwhelmingly inherited from the partitioning powers. Despite the ambitious plans (the first program of motorway construction in Poland by Prof. M.W. Nestorowicz, announced in 1936, in its basic outline, coinciding on the post-world war I Polish territory with its modern version), the obstacle was the permanent lack of public funds. The commencement of the construction of motorways was assumed in the next long-term development plan of Poland by Minister E. Kwiatkowski for the years 1940-1954.

In Poland in the 1930s, the expenditure budgeted in the state budget for road construction did not exceed PLN 3 million, which corresponded to the construction costs of about 20 km of roads per year [22].

In 1927 it was estimated that the conversion of 25% of the existing roads into roads suited for cars and the construction of as many new roads with improved surfaces would cost PLN 2.5 billion [22].

Despite enormous efforts (building the Gdynia Port from scratch, building the Central Railway Line connecting Silesia with Gdynia) in the interwar period, it was not possible to overcome the backwardness of the country's transport economy, nor to integrate three independent transport systems into one fully coordinated system.

The effects of the Second World War in the form of both the enormous scale of destruction and territorial changes not only perpetuated but even deepened the country's transport backwardness.

The post-war reconstruction of the country, including transport, subordinated to the economic and political interests of the Russian hegemon, had a fundamental impact on the shape of the Polish transport system. The development of the economy, subordinated to the military goals of the USSR, based primarily on the development of heavy industry and the mining sector, forced, in the first place, the expansion of relatively cheap and mass rail transport, with the simultaneous underinvestment of other modes of transport, including primarily car and air transport dominating in modern market economies.

Inland navigation, despite favourable natural conditions, but with high capital intensity, also could not reach the right place in the country's transport system. The limited availability of capital adversely affected the quantitative development of the country's post-war transport system, which was created practically from scratch. It concerned both the transport infrastructure, rolling stock, as well as methods of work organization and transport technologies. Despite the growing scale and high dynamics of transport services, resulting from the enormous transport intensity of the Polish economy, the country's transport system was increasingly different from modern European transport systems. Only the political transformation of 1989, which set out new rules and directions for the functioning of the Polish economy, brought an opportunity to change these unfavourable tendencies.

The transformations that were taking place were significantly accelerated as a result of the adaptation processes undertaken since the entry into force of the Association Agreement between Poland and the European Communities on February 1, 1994 and the submission by Poland of an official application for membership in the EC on April 8, 1994, which ended on May 1, 2004 with Poland's accession to the European Union.

The initial state (1990) and the effects of the adjustment processes, in the years 1995-2019, of the Polish freight transport to the EU transport are synthetically illustrated by the data in Tables 1-4.

Tab. 1. Summary of basic data characterizing the EU (27) and Poland in the years 1990-2019

Specification	European Union							Poland						
	1990	1995	2000	2005	2010	2015	2019	1990	1995	2000	2005	2010	2015	2019
Population in millions of people	418	372	428	434	441	444	447	38,2	38,3	38,2	38,2	38,5	38,4	38,4
GDP in current prices in billions of USD	6892	8061	8121	12999	15062	15387	15992	64,5	139	171	304	470	478	596
GDP per capita in current prices in thousands of USD	16,5		19	30	34,1	35,6	35,6	1,7	3,6	4,5	8	12,3	12,4	15,2
GDP in current prices in billions of Euro	•	6792	8759	10255	10550	12711	13963	•	106	186	244	355	430	529
Investment outlays on transport infrastructure in billions of Euro	61	94	103	123	121	102(b)	105 (a)	•	0,9	1,2	2,1	7,2	5,7	7,5
Share of inputs per infrastructure in GDP in %	1,2	1,38	1,17	1,19	1,14	0,8(b)	0, 75 (a)	•	0,8	0,7	0,9	1,5	1,5	1,4
Share of revenues from the transport sector in generating GDP, in %	•	4	•	4,6	4,9	4,8	5	•	5,7	6,8	5	5,3	5,5	6,2
Total employment, in millions of people	158	156	168	171	180	182	191	17,5	15,5	15,5	12,9	14,1	14,8	16,1
Employment in transport and warehouse economy, in millions of people	•	6,2	•	7,3	8,3	8,4	10,1	•	0,33	0,4	0,45	0,48	0,77	0,93
Share of employees in transport and warehouse economy	•	3,97	•	4,26	4,61	4,61	5,28		2,12	2,58	3,48	3,4	5,2	5,77
The amount of transport work of the overland freight transport in billions of tkm	1356	1728	1982	2292	2250	2262	2427(a)	137	134	151	196	288	360	477
The amount of transport work of the overland freight transport per capita in tkm/ person	3721		4630	5281	5104	5094	5429(a)	3586	3474	3900	5130	7485	9375	12421
Transport intensity in tkm/1000 dollars at current prices (excluding sea transport)	196	245	244	176	149	147	152(a)	2124	1262	811	803	811	837	901

a) 2018, b) 2014

Source: own compilation based on:

Data for the EU for: [2], years 2010-2019: [3], [9], [5], [18], [23]

Data for Poland: [8], [16], [17], [21]

Tab. 2. Transport infrastructure of the European Union (27) and Poland in the years 1990-2019

Specification	European Union - 27							Poland						
	1990	1995	2000	2005	2010	2015	2018	1990	1995	2000	2005	2010	2015	2019
Road network in thou. of km (1)	2685	3045	3500	4000	4100	4300	5032	218	237	250	254	274	291	307
including the motorways in thou. of km	39,0	44,0	51,3	59,5	67,4	71,9	73,8	0,2	0,2	0,4	0,5	0,9	1,6	1,7
Railway network in thou. of km	221	205	206	201	204	201	201	24,0	22,6	21,6	19,8	20,0	19,2	19,4
including electrified lines in thou. of km	•	•	•	•	•	•	111,6	11,4	11,6	11,7	11,9	11,9	11,7	12,0
including TGV lines in thou. of km	1,0	2,4	2,7	4,5	6,3	7,8	•	0	0	0	0	0	0	0
Pipeline network in thou. of km	19,5	28,5	30,6	31,3	31,2	31,7	31,8	2,0	2,3	2,3	2,3	2,3	2,5	2,5
Inland network of shipping lanes in thou. of km	29,7	37,5	40,0	40,7	40,7	40,9	41,3	4,0	4,0	3,8	3,6	3,7	3,7	3,7

Estimated data acc. to the differentiation of road classification in individual countries

Source: own compilation based on:

Data for the EU for the years 1990-2000: [2], years 2010-2019: [3], [5], [23]

Data for Poland: [16], [17], [21]

Tab. 3. Transport means of the European Union (27) and Poland in the years 1990-2019

Specification	European Union - 27							Poland						
	1990	1995	2000	2005	2010	2015	2019	1990	1995	2000	2005	2010	2015	2019
Trucks in thou. of pcs	15989	20217	24028	27389	31408	32691	34788	1045	1354	1879	2301	2982	3428	3884
Railway carriages for cargo transportation in thou. of pcs (1)	1321	•	904	729	521	409	388	89,9	73,4	97,8	103	89,7	86,4	86,8
Number of ships over 1000 DNT in units	•	7750	8326	10252	11038	11444	12571	247	168	128	118	121	126	138
including ships under national flags of EU countries in pcs.	•	3632	3350	3196	3300	•	2900	247	168	•	•	•	•	6 (2)

1) Data for railways that are UIC members, do not include the operator's private carriages, excluding Denmark and the Netherlands in 2005-2018 and Sweden in 2005-2018

2) 1.01.2019

Source: own compilation based on:

Data on the European Union: [3], [13]

Data on Poland: [16]

Tab. 4. The volume and structure of freight transport performance in the European Union (27) and Poland in the years 1990-2019

Specification	European Union - 27							Poland						
	1990	1995	2000	2005	2010	2015	2018	1990	1995	2000	2005	2010	2015	2019
Total in billions of tkm	1356	2400	2737	3088	3026	3072	3353	137	134	151	196	288	361	477
including: by road transport in billions of tkm	915	1127	1344	1635	1609	1615	1765	40,3	51,5	75	120	214	273	395
by railways in billions of tkm	255	375	388	394	375	396	423	81,8	68,2	54,4	49,9	48,8	50,6	54,6
by inland waterways in billions of tkm	113	122	134	138	155	147	135	1	0,9	1,2	1,3	1	2,2	0,7
by pipelines in billions of tkm	73	104	116	127	111	104	104	13,9	13,5	20,3	25,4	24,2	21,8	19,4
The structure of the transport mode performance in percent														
road transport	67,5	65,2	67,8	71,2	71,5	71,4	72,7	29,4	38,4	49,7	61,0	74,3	75,6	82,8
rail transport	18,8	21,7	19,6	17,2	16,7	17,5	17,4	59,7	50,8	36,1	25,4	16,9	14,0	11,4
inland waterways	8,3	7,0	6,8	6,0	6,9	6,5	5,6	0,7	0,7	0,8	0,7	0,4	0,6	0,1
pipeline transport	5,4	6,0	5,8	5,5	4,9	4,6	4,3	10,2	10,1	13,4	12,9	8,4	6,0	4,0

Source: own compilation based on:

Data on the European Union: [3], [13]

Data on Poland: [16], [17]

They illustrate the scale of backwardness of the Polish economy, particularly in transport, especially when compared with the average data for the 27 EU countries, presented in Tables 1-4.

The data in Table 1 shows that in 1990 the population of Poland accounted for 9.1% of the population potential of the 27 EU countries, and in 2019 8.1% of this potential.

However, the slight decrease in the Polish population potential in relation to the potential of 27 countries (this is confirmed by the demographic crisis of our society) was accompanied by the growth of the Polish economy in relation to the economic potential of the 27. Poland's gross domestic product, calculated in US dollars, increased from 0.9% in 1990, through 2.1% in 2000 to 3.3% in 2019, of the GDP of 27 countries.

It should be emphasized that despite the significant, more than threefold increase in the period of 30 years, the Polish economic potential in relation to the economic potential of the 27 EU countries, remains very modest.

The differentiation of Poland's economic potential and the EU average was smaller in terms of GDP per capita. In Poland, only in 2019 the GDP

value reached 43% of GDP per capita for the EU, and in the previous years this disproportion was even greater (Table 1).

Total employment in Poland in relation to the total number of employed persons in 27 EU countries was characterized by a decrease from 11.07% in 1990, through 9.22% in 2000, to 8.22% in 2015, and an increase in recent years: to 8.84% in 2018-2019.

The highest, over 11% in 1990, share of the total employed in Poland in relation to the total number of employed in 27 EU countries resulted from the full employment system functioning in Poland at that time, and the lowest 7.54% in 2005, from the peak of unemployment in Poland.

In 27 countries, out of 156 million people employed in total in 1995 and 180 million people employed in total in 2010, the employment in transport and warehousing accounted for 6.2 and 8.3 million people, respectively, which accounted for 4-5%, respectively.

The share of people working in transport and warehousing in the total employment in Poland was low and in the years 1990-2010 ranged from 1.5% to 1.8%. Only after 2010, there was a clear increase in the share

of people employed in transport and warehouse management, reaching 5.7% of the total number of employees in 2019, exceeding the EU average of 5.28% at that time.

A much higher share, reaching over 10% (in 1990 and nearly 20% in 2018-2019), characterizes the transport performance of Polish freight transport (excluding sea transport), calculated in ton-kilometres, compared to ton-kilometres provided by freight transport of 27 countries (including intra-EU maritime transport).

The transport performance of the 27 EU countries increased by 80% in the years 1990-2018, from 1,356 billion tkm to 2,427 billion tkm, and the transport performance of Polish inland freight transport in 1990-2019 increased almost threefold (from 137 to 377 billion tkm). This increase varied over time, as in the first comparable periods (1990-1995, 1995-2000) one of the effects of the economic transformation was a deep decline in the transport performance and transport performance. It was only in 2005 that Polish transport production returned to the level of 1990. A practically real increase in the transport performance of Polish freight transport began in the years 2005-2010.

In 2019, the share of transport performance of the Polish inland freight transport (19.6% of the total EU transport performance) was much higher than the share of: population potential (8.6%), economic potential measured by GDP (3.7%), and the number of people employed in total (11.8%), or the number of people employed in transport and storage (9.2%).

The specificity of the Polish economy, in which transport has an exceptionally large share in the creation of GDP, compared to other countries, results on the one hand from the central location of Poland in Europe, and on the other from the strong specialization of Polish companies in this area. The transport performance of international Polish land transport in 2019 exceeded 250 billion tkm, which accounted for over 55% of the transport performance of Polish inland freight transport. On the other hand, it proves the still excessive transport intensity of the Polish economy, which, despite the improvement observed in the analysed period, is still many times higher than the value of the index characterizing the average transport intensity of the EU.

Also unfavourable is the relation of the value of the indicator illustrating the number of tkm performed by Polish and EU freight transport in respect to one inhabitant of the country, which increased from 3,586 tkm in 1990 to 12,421 tkm in 2019, with 3,721 and 5,429 tkm in the entire Union respectively.

The transport performance was carried out based on the transport infrastructure still significantly different from the average for the 27 EU countries in terms of quality and quantity (Table 2).

The network of paved roads in Poland in 2019 amounted to 307 thousand km, accounting for 6.1% of the road network of the entire EU. At the same time, the length of motorways in 2019 in Poland was only 1700 km, which was only 2.3% of the length of motorways in the entire EU.

The uneven distribution of the national road network in Poland is also problematic, with its clear concentration in the south-west and central part of the country. The average density of paved roads in the province Silesia exceeds 160 km/100 square km, while in the provinces Warmia-Masuria and Podlasie, it is only 50 km/100 square km. Additionally, there is no integration of communication routes at the level of higher category roads (expressways and motorways).

The main challenge is to improve the quality of paved road networks, which consist in over 80% of provincial and commune roads, and only 6.3% of national roads, 9.5% of district roads and only 1.35% of motorways and expressways. The surface of 10 455 km of national roads (only over 54% of the entire road network) is adapted to the pressure of 11.5KN/axle required by modern road transport [14].

The following are also weaknesses of the road infrastructure in Poland:

- insufficient network of connections between the south and the north of the country;

- lack of a road network enabling efficient travel in the cities and their surroundings (insufficient number of ring roads, most national and provincial roads running through city or village centres);
- low quality and number of connections between district capitals [15].

Within the 60-minute road isochrone (which can be equated with the range of the labour market), there is 58% of the country's population in relation to district centres [15], which proves that there is still a great need for changes in the road infrastructure connecting these areas.

The fact that the Polish road network has not been adapted to contemporary transport needs is also evidenced by the low level of financial outlays allocated for this purpose. In the years 2000-2019, the length of paved roads in Poland increased by only 23%, while the GDP value increased threefold, and the number of motor vehicles over 2.5 times.

As a result, in 2019 in Poland there were as many as 93 vehicles per 1 km of paved roads, with the EU average of 62 vehicles. Uneven development also applies to the national rail network. It was and is concentrated in the southwestern regions of the country. Podlaskie and Lubelskie districts are characterized by the lowest railway network density. On the other hand, the scale and potential of the Polish railway network - despite its regression in the last 20 years - are still large compared to the EU's rail network. The length of the railway network in Poland has decreased from 24.4 thousand km in 1990 to 19.4 thousand km in 2010, but still accounted for around 10% of the rail network in 27 countries. However, its technical and quality standards are still much lower than in the entire EU. It is still characterized by a low level of electrification. This is deepened by the progressive decapitalization of the Polish railway network, causing further technical limitations related to its use, such as: reducing the speed, length and load of trains. In Poland, the train speed of 160 km/h in 2010 was achieved only on 7% of the length of the operated railway lines, and speeds of 120 km/h on less than 15% of the routes [19].

The Polish railway infrastructure is also characterized by a high percentage of tracks laid on wooden sleepers that have already exceeded their service life, moreover, track systems at stations not adapted to modern needs, poor technical condition of engineering and traffic control facilities, poor condition of turnouts, lack of safe driving control systems, insufficient number of multi-level crossings with roads (there are approximately 14,500 crossings with roads and pedestrian crossings along the lines of the railway lines in use, of which only 20% are equipped with active safety systems) [11].

The lack of TGV lines (train a grande vitesse, i.e. high-speed trains), with already 8,000 km of this type of railway line in EU countries, confirms the low quality level of the Polish rail network compared to the EU (data from 2018).

Research on the mutual accessibility of the largest Polish cities by rail connections shows that no pair of Polish metropolitan centres had a railway connection with a travel time of less than 1 hour, and only in the case of a connection between Krakow and the Upper Silesian agglomeration, the travel time is shorter than 2 hours [10].

The situation is even worse in terms of the network of inland waterways routes, where relatively favourable indicators of international comparisons of the length of the network (the Polish network of 3,700 km, including 2,413 km of regulated and navigable rivers, 644 km of canalised sections of rivers, 344 km of canals and 259 km of navigable lakes) corresponds to less than 13% of the network of inland navigation routes in 27 countries, and is accompanied by the low quality of Polish waterways. Poland has a network, or rather sections of waterways, with the standards required by modern shipping, which is only a few hundred kilometres long. Parameters of a class IV and V waterway, that is, allowing the navigation of vessels over 1000 tons, has less than 200 km of navigable waterways, that is approx. 5.5% of their total length [19]. Moreover, unlike the rail network and, above all, the road network, not only important activities are missing, but even real plans for the development of this network.

As for the potential in maritime transport, there are four large seaports in Poland: Gdańsk, Gdynia, Szczecin and Świnoujście. They belong to the trans-European transport network. Inland navigation includes 57 smaller ports and harbours [19].

Compared to the EU, Poland has sufficient maritime accessibility. There are approx. 1,200 ports and marinas in the entire Community, that gives an average EUR 6.6 billion of EU exports and imports per port and marina, while in Poland it is EUR 4.2 billion per port. [1]

The weakness of Polish seaports is their remoteness from ocean shipping routes, as well as the low density and quality of land transport connections with major economic centres and their hinterland [19].

The basic problems of the existing port infrastructure include: too shallow depths of port basins, insufficient permissible load on reloading quays, significant decapitalization of other port infrastructure elements [19].

Regarding the potential of aviation infrastructure, there is one national airport in Warsaw and 14 regional airports serving regular passenger flights on the territory of Poland, with approx. 500 such airports in the EU countries (of which 291 served over 10 million passengers per year). In 2019, the register of the Polish Civil Aviation Authority included 64 civil airports, 133 airplane landing pads and 316 helicopter landing pads, including 218 hospital and 98 private ones [7].

Compared to other modes of transport, the air transport infrastructure, in the part concerning 15 airports serving regular air transport, is relatively modern.

The infrastructure for road and rail connections needs to be expanded, thus increasing the accessibility to the existing airports. Until now, only airports in Kraków and Warsaw have rail connections, and higher-class airports have road connections in Kraków, Gdańsk and Katowice.

Poland's transport potential in terms of infrastructure compared to the EU (average for 27 countries) is still worse. On the other hand, the comparison of Polish transport with the EU in terms of the rolling stock used (in particular the car fleet) is more favourable (Table 3).

The Polish truck fleet (including road tractors) in 2019 had 3.88 million vehicles, which accounted for over 11% of the corresponding EU fleet, with a share of less than 7% in 1990. It is worth emphasizing here that this park, especially in the group of high-tonnage vehicles over 12 tons of GVW, serving mainly international transport, is one of the most modern in Europe.

An even higher share characterises the Polish freight railway carriages fleet, which increased from 7% in 1990 to approx. 23% in 2018-2019. Unfortunately, most of these carriages are coal ones, and the share of specialist carriages in this group fluctuates only at the level of 10-15% [19].

The increase in the share of the Polish freight railway carriages fleet in relation to the EU carriage fleet resulted from a much deeper than in Poland decrease in the number of freight carriages in these countries (from 1.3 million units in 1990, through 0.9 million units in 2000 to 388,000 units in 2018). At that time, the number of freight carriages in Poland decreased from only 89,000 to 87,000 pieces.

Despite such a radical reduction in the number of railway carriages, the EU rail transport recorded an increase in transport: from 255 billion tkm in 1990 to 477 billion in 2018. (Table 4) This proves the introduced technological and organizational changes, which improved work efficiency in this sector.

Polish rail transport, at that time, decreased from around 82 billion tkm to around 55 billion tkm. At the same time, road transport in Poland was characterized by dynamic development (an increase from 40 billion tkm in 1990 to 75 billion tkm in 2000 and to 395 billion tkm in 2019). These disproportions in the uneven development of individual modes of transport caused in the fact that the share of rail transport in global transport performance fell from less than 60% in 1990 to 11.4% in 2019, i.e. below the level characteristic for the entire EU (on average – 17%).

At the same time, the share of freight turnover by the road transport of Polish inland freight transport increased from 29.5% in 1990 to 82.8% in 2019, exceeding the average EU level of approximately 70% at that time.

In other modes of transport included in land transport, there was a relative balance in the share of transport performance compared to the EU. Such a situation exists in a pipeline transport – a 5-6% share in the EU countries (27) and a 4-6% share in Poland in 2018-2019 (with a 10-13% share in 1990-2005). On the other hand, it should be noted that the Polish inland waterway shipping is permanently way apart from the EU average, the share of which in the transport performance decreased from 0.7% in 1990 to 0.1% in 2019, with a relatively stable share of 7-8% in 27 countries of the Union.

The Polish inland waterways fleet clearly differs, both quantitatively and qualitatively, from the Western European fleet. It consists of approx. 180 self-propelled vessels (pushers, tugs and motor barges, and approx. 480 barges), mostly from the 1970s and 1980s, of which nearly 80% have a lifting capacity not exceeding 1000 tonnes [19]. For comparison, the EU has a total fleet of: 12 thousand self-propelled river vessels, as a rule with a lifting capacity exceeding 1000 tons.

The condition of the sea fleet is also unfavourable, although it increased by 1.7% in terms of the number of vessels and 25% in terms of carrying capacity between 2005 and 2019, it still accounts for only 1% of the number of ships above 1000 DWT operated throughout the EU (138 and 12,571 units). The average age of ships (95% operated under foreign flags and 71% by other EU countries) is over 15 years, mainly (over 80%) traditional bulk carriers [17].

In terms of aviation rolling stock, Poland has only 146 aircraft, including 18 with large capacity over 251 seats, with 3843 units operated in 27 EU countries, of which 387 were large transport aircraft taking over 250 passengers [3].

Summing up, the level of development of transport systems in the freight segment of Poland compared to the entire EU, it follows that in the last 30 years, Poland has taken measures to modernize quantitatively and qualitatively, first of all, the rolling stock and, to a lesser extent, the infrastructure. On the other hand, development delays of Polish transport sectors remain large compared to the EU average. This applies in particular to rail, inland waterways and sea transport.

However, the undertaken developments activities in the field of infrastructure and rolling stock, resulting from the implementation of subsequent sectoral strategies, made it possible to overcome key barriers to the development of Polish transport. Polish freight transport was fastest in approaching the average achieved in the EU countries in terms of the recorded transport performance.

When analysing the change in the transport structure by the type of freight transport, it should be stated that the Polish transport system quite quickly adapted to the intersectoral division of freight transport, traditional for the EU.

The dominance of road transport in freight transport, on the other hand, progressed much faster than in the entire EU, clearly weakening the share of the rail sector, including the intermodal sector.

The high share of road transport in freight transport remains typical of the economies of developed countries, despite their high capital intensity.

It should be noted, however, that investment outlays on transport, especially on transport infrastructure, have for decades been in Poland disproportionately low in relation to the outlays incurred for this purpose in most EU countries. Although they were characterized by a similar level of share in GDP, which in the case of infrastructure investments oscillated at the level of 0.5-1.5% (while in the EU it remained at the level of 1.2% of GDP on average), but nominally they were much lower outlays than in other EU countries (see: Table 1).

The situation improved after Poland joined the EU and billions of euros of funds were obtained from aid funds for the development of the economy and transport. In 2010, more than EUR 7 billion was spent on infrastructure investments with a significant EU contribution, and EUR 3 billion in 2019.

Under the Infrastructure and Environment Operational Program 2007-2013, EUR 23.9 billion were allocated to transport [4].

From it, nearly EUR 19 billion was spent on investments of national scope, and about EUR 4.5 billion of regional importance.

Most funds under national operational programs were allocated to the construction of motorways (TEN-T) – over EUR 7.7 billion, railway routes (TEN-T) – over EUR 3.9 billion and national roads – nearly EUR 2.3 billion, and under regional programs for the construction of regional/local roads – over EUR 3 billion.

These funds allowed for a rapid increase in investment outlays on transport infrastructure. They allowed, among the others construction in the years 2007-2013 of 430 km of motorways in the TEN-T network, 579 km of expressways in the TEN-T network, as well as modernization of 512 km of railway lines, 8 airports, 12 facilities on waterways [4].

The high pace of development of infrastructure investments in transport was also maintained in the years 2014-2020. As part of the next Infrastructure and Environmental Protection Operational Program, EUR 19.9 billion was allocated to transport investments [6]. In the years 2015 and 2019, approx. EUR 6 and 7.5 billion were spent on transport infrastructure, respectively, which accounted for 1.3-1.4% of Polish GDP.

Although it was an amount lower by EUR 4 billion than the amount allocated to Poland in POIOS for the years 2007-2013, but taking into account the necessary national contribution and more difficult to meet income criteria, it contributed to a further reduction of the technological gap in the development of Polish transport in relation to the most developed EU countries.

This contributed to the strengthening of the position of Polish transport against the EU, as it, by employing a similar number of people in the transport and storage sector, was able to generate revenues with a greater share in GDP than the EU average. Poland, employing about 5.8% of the total number of employees in transport (compared to 5.3% of those employed in transport and warehousing in the 27 EU countries), creates approximately 6.2% of GDP (with the EU average in 2010-2018 amounting to 4.9% and 5.0% respectively (Table 1).

The civilization leap that Poland is experiencing accelerated by its accession to the European Union in 2004 was noticeable in transport, although issues related to the quality and efficiency of freight transport require many changes.

The undertaken and implemented activities for the development of freight transport in Poland, despite many delays and legislative problems, adapt the Polish transport system to modern EU transport systems.

Maciej Menes

maciej.menes@its.waw.pl

Motor Transport Institute

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