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10. THE POTENTIAL OF TRANSPORT AND COMMUNICATION

The society's function of modern times is considerably determined by transport and communication, that is to say passengers transport, goods transport and sending of information. Its role is becoming every time more significant because life and economy in every corner of the world is becoming dependent on areas surrounding which are regarded as the source of commodities, services and information. The transport of particular commodities let some territories have a high specialization in production, services, which is possible thanks to the import of indispensable commodities.

Present-day transformations in Polish economy accompanies two basic processes among which there should be included the process of globalization and European integration. The not trifling role in these changes is played undoubtedly by the sections of Polish transport and communication. These sections of economy have to face great challenges.

10.1. Transport

Since time immemorial transport had to accomplish many functions. Its infra-structure provided the connections and spatial integrality. Owing to the process many internal bonds and some ties between particular regions appeared. The historic inheritance was strengthening. Today transport has to face equally important challenges, such as: - equalize the disparities in economic development, - development of cooperation, - calling into being the conditions appropriate for investors, - improvement of competitiveness, - ensuring an easy access to various institutions in other parts of the country for the inhabitants.

In each period of our country's development some particular sections of transport were of different consequence. Today the road transport is developing – in particular at the cost of railway, which has fallen into decline. When the international lines are taken into consideration the air transport has deprived the sea transport of their passengers. The last mentioned instead has specialized in transport of bulk goods (dry materials, liquids).

First railways on the present-day Polish lands were planned and built by the contemporary invaders. They started to appear in mid 19th century, for instance: Wrocław – Olawa (1842), Warsaw – Szczakowa (1845–1847). As the particular economies were developing the railway system grew, but unequally in several parts of today Poland. Some economic factors and political strategies conducted by the invaders were

decisive in this matter. That is why for example in Russian annexation some areas situated on the border were totally deprived of railways. In 1918 the thickness of railway system on Polish lands was in great measure very differentiated. From only 2,7 km/100 km² in former Russian annexation, through 5.1 km/100 km² in Galicja to 12,2 km/100 km² in former Prussian annexation.

In period between the Wars the main task for the contemporary government of newly-appeared country was to merge all the railways. It triggered off not only the necessity to build many sections connecting existing railway systems but also to unify the system and organize the railway's work (for example the unification of gauge or implementation of common standards of side-tracks and loading platforms). Some strategic lines were also built, such as trunk-line (Gorny Slask – Gdynia), Warsaw – Cracow, Warsaw – Poznan. None the less, considerable disproportions in density of railway system were not liquidated. In the period the process of railways' electrification began as well (Warsaw junction). After the last war country and its railway systems' unification within its new borders was of great significance once more. The great destructions of railways caused by invaders were supposed to disappear.

The imperfections of today road system should be also regarded as the inheritance after the period of annexations. In 1918 on Polish lands there were only about 44 thousands of roads of hard surface (among it only 500 km of surface improved), that is only 11.2 km/100 km². The density of roads was very unequal, from 29.9 km in former Prussian annexation to only 1.5 km/100 km² in Russian annexation. Additionally due to the considerable destruction almost 14 thousands km of roads should have been rebuilt immediately. In interwar period an ambitious plan of roads' extension was elaborated. As a result in 1939 on Polish lands there were already 64.5 thousands of roads (among it 3.5 thousands km of roads of improved surface) which gave the average of road system's density – 16.5 km/100 km².

In inland navigation the state of Polish rivers' use is believed to be the most serious problem. It is the consequence of great negligences which have their source in period of annexations, but also in the interwar period. Unfortunately this section of transport was not developed. The system of inland transport which is situated on the western areas and which Poland inherited from the Germans is the only unified (mainly on Odra and its affluents). Unfortunately an ineffective policy, incompetent usage of existing installations, waterway rivers and canals, deficiency in investments led to the regress of this branch of transport.

One of the most important tasks of interwar Poland was to become open to the maritime commercial exchange. However after regaining the independence there was no seaport of greater importance at country's

disposal. That is why during first years of independence the seaport in Gdynia was built "on the rough root" and the city to accompany it. The next task was to join the new seaport with the land road system. After Second World War within Polish borders there were some other big seaports: Szczecin – Swinoujście, Gdansk (additionally the new seaport was built here- Northern), Elbląg (according to the policy led by Union of Soviet Socialist Republics in militarized district of Kaliningrad the seaport lost its link with open sea and fell into decline, there are some plans of its restoration).

The rest sections of transport (especially the transmitting section) in the interwar period were in their infancy. Their progress and usage took place only just within last 60 years. Similarly just within last decades the majority of communication sections was developing. Only the postal system (since the beginning of 19th century) and telephony (since the second half of 19th century) were already developed in the interwar period. The initiations of Polish radiophone have their source in the same period. On the other hand however the mobile telephony or data transmission have been rapidly developing only just since the last decade.

Poland's area is covered by the system of transport infra-structure, which includes: carriageable roads, rail-tracks, water- and air- lines, airports, railway stations, seaports, logistic centers . Transport plays immeasurably significant role in national economy which consists in translocation of various goods and passengers. Beside final products, which are transported to their consumers, there are also some semi-manufactured articles transferred from the place of their gaining or production to consignees who convert them. Among all kinds of transport in Poland the predominant role is played by motor transport (84,4% of carriages of all goods, 70,4% of total transport-work carried out by all kinds of transport) and railway transport (properly 11,8% and 15,45%) and in a less degree pipeline transport and maritime transport. In the event of passengers' transport in practice only car-transport (570 millions of passengers transported from all 838 million people) and railway transport (261 millions of passengers) enter into account. In Poland the number of passengers of air, sea and inland transport is increasing (as opposed to road transport), however it still remains on the level very low – altogether, these kinds of transport were chosen by about 7 millions of passengers in Poland.

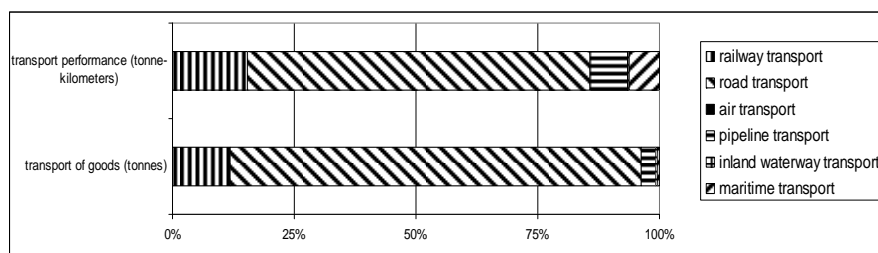


Figure 56. Structure of transport of goods and transport performance in 2010

Source: *Transport – wyniki działalności w 2006 r.*, 2007, GUS, Warszawa.

In some elaborations relating to transport the problems of so-called transmitting transport is described as well (which here will not be discussed thoroughly). It contains transfer of products usually by means of various kinds of pipelines (especially used in petroleum, natural gas and water forwarding) and belt conveyors (granular materials) or the transfer of electric energy. In 2010 in Poland there were about 2362 km of main pipelines used to pump the petroleum and other petroleum products. The greatest role is played by the pipeline called "Friendship" (running from Russia to Germany through Plock where there are its numerous branches) and pipeline linking Northern Port in Gdansk with Plock. Whereas the net of gas mains is more extended, it distributes raw material extracted in Podkarpackie district (the main junction is in Jaroslaw) and in southern Wielkopolska, coal gas in Gorny Slask and gas imported from Russia and Ukraine. The Polish electric-energetic system consists of transmitting lines of high tension (mainly 400, 220 and 110 kilovolts) and the distributive systems (less than 60 kilovolts). They connect power plants with the transformer - stations which distribute the current to some local transformer - stations and particular consumers.

Polish transport is functioning today within conditions co-originated on the arena of European Union. The aim of European transport policy is to provide the balanced development of transport with assurance of high standards of environment's protection and general security. The development is supposed to be carried out by means of restricting the carriages of car transport in favor of the increase in number of carriages of railway, inland waterways transport and coastal shipping and combined transport. The preference given to some sections of transport stems from high external costs of road transport, restraints in roads' extension which are emerging more vividly now and the possibility to decrease the costs of commodities' carriage in multimodal transport.

10.1.1. The road transport

Road transport is considered to be the most developed branch of transport nowadays not only in Poland but also in all Europe. It was determined by many factors among which crucial are those determining high competitiveness of this means of transport: for example growing demand for the carriage of some commodities' parts characterized by rather small size, decrease in distance between the source of commodity's registration and its destination, general increase in spatial mobility and necessities connected with it, motor transport's development. Additionally the road transport has such qualities as: accessibility, flexibility, rapidity, disposition and competitive level of prices of services.

The system of Polish carriageable roads is relatively dense (almost 88 km/km²), and its intensity indicates far-reaching connection with people's arrangement in country. Total length of public roads in 2010 amounted to 406,1 thousands km (from which 67,4% that is more than 273 thousands km are the roads of hard surface and rest of them – unsurfaced roads). Most roads of hard surface are found in Voivodeship s: Śląskie (172 km/km²), Małopolskie (156), Świętokrzyskie (112) and Łódzkie (102), whereas the least amount of such roads are in Warmińsko-Mazurskie (52), Podlaskie (59), Zachodniopomorskie (59) and Lubelskie (58) (fig. 2). In structure of Polish roads characterized by hard surface national roads (18.6 thousands km), Voivodeship roads (28.5 thousands km), district (126.2 thousands km) and communal roads (232.9 thousands km) are distinguishable. Unfortunately motor-ways (we have only 857.4 km of them) and expressways (674,7 km) both contribute to rather weak and miserable image of Poland. That is why not the length of road system but its quality is regarded as the main problem in Poland. The building intensity of the best roads has become even deeper after 2000, nevertheless it is still too low in comparison with the demand and plans. Today only three longer lines of motor-ways are functioning: A1 on the route Gdansk - Torun, A2 on the route Swiecko - Strykow and A4 on the section Zgorzelec – Wieliczka and three short sections close to Piotrkow Trybunalski, Szczecin, Wrocław and Gliwice.

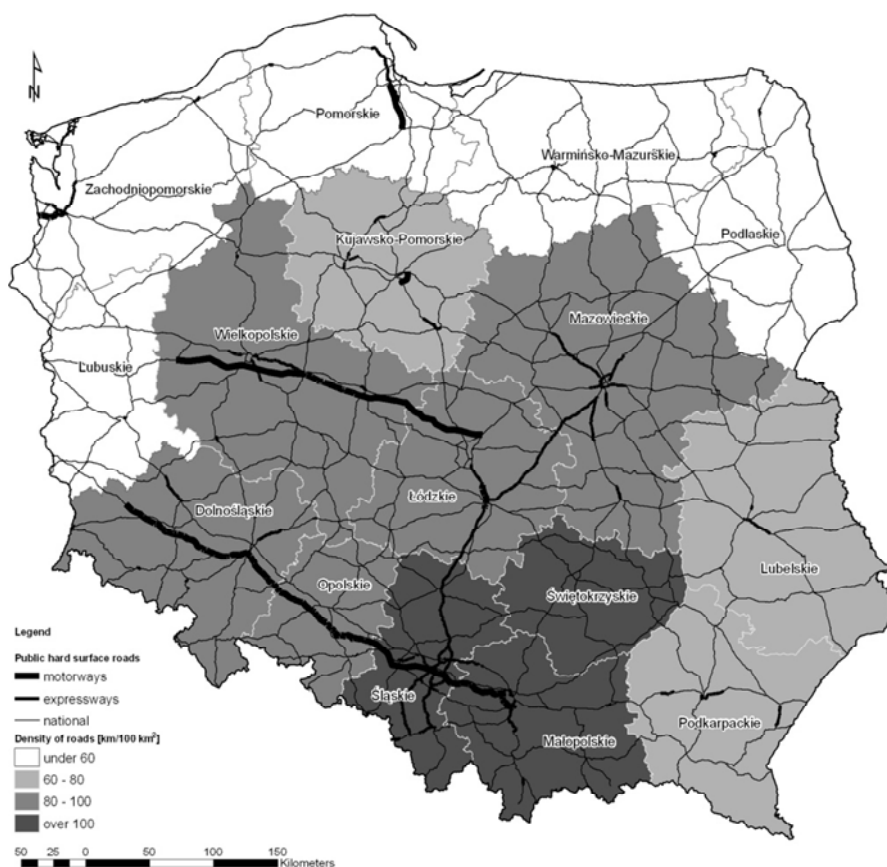


Figure 57. The system of national roads (as of early 2012) with the density of hard surface roads in Poland (2010)

Source: *Transport – wyniki działalności w 2006 r., 2007*, GUS, Warszawa.; <http://www.gddkia.gov.pl/>; elaborated by K. Dmochowska-Dudek)

Therefore the creation of integrated and compact with European system motor-way and expressway system as soon as possible is certainly a big challenge for Poland. Interregional connections, especially those between big agglomerations in country need also some improvements. Except for those mentioned above among main disadvantages of Polish road infra-structure there should be also: adaptation of few routes to the highest capacities, many routes traversing areas of buildings and weak security of mobility (high rate of accidents and high mortality of accidents' victims). The priorities of approved Program of building of national roads (for the period 2007–2020) relate to: leveling the disadvantages mentioned earlier and solving all the problems. The plan's aim is to create before 2015 the system of roads of fast traffic including motor-ways (A1 –

Gdansk – Lodz - Gorzyczki, A2 – Swiecko – Lodz – Minsk Maz., A4 – Zgorzelec – Katowice – Krakow - Korczowa) and expressways (S3, S5, S7, S8, S17, S19, S69).

On the grounds of researches of road traffic it was ascertained that the average twenty-four hours' car traffic in 2010 amounted to 9888 vehicles per day and night and was higher by about 19% in comparison with 2005. There was also noticed higher traffic on the international roads where the average twenty-four hours' traffic amounted to more than 16,7 thousands vehicles per day and night. Regional diversity in roads' load was also stated. The greatest roads' load was observed in Śląskie Voivodeship (18,262 vehicles per day and night). Małopolskie and Łódzkie are the Voivodeships also characterized by big load of traffic. In Voivodeship s: Warmińsko-Mazurskie, Podlaskie and Lubelskie there was the least traffic load of road systems. The greatest concentration of road traffic was characteristic of gornoslaska agglomeration and neighbourhoods of Warsaw, Cracow, Poznan, Wroclaw and Lodz. In 2010 among the most loaded roads there were roads E-40 (25,1 thousands vehicles per day and night) E-75 (21,5 thousands), E-77, E-67 and E-30. In 2005-2010 an increase in vehicle traffic's load on every kind of roads and in all regions of the country was noticeable. The greatest traffic's increase, even up to 49% applied to lorries with truck trailers, motor cycles (121%) and passenger cars (22%).

In the end of 2010 in Poland there were more than 23 millions of road motor vehicles and mopeds registered. Most of them were passenger cars (17.2 million), but Polish indicator of number of cars per 1000 inhabitants is considered to be one of the lowest in European Union (for Poland 432 and for 25 countries of European Union – 473 cars per 1000 inhabitants). Moreover there were registered 2,8 millions of lorries, 215 thousands of road tractors and 97 thousands of buses. The number of all kinds of vehicles mentioned above is growing but unfortunately in the same time their average age is increasing as well.

In 2010 1552 million tones of goods were carried by car transport. It was more than the year before by 8.9%. The transport performance (in tone-kilometers) increased even more, because by 16,5%. In structure of general carriages (in tones) there was noticed higher, because by 51% participation of transport for hire or reward than transport on own account.

Polish car transport occupies 3rd position in European Union, just after Germany and Spain but before France. Whereas in international carriages Poland has about 19% share and occupies 1st place before Germany, Spain and Holland.

In structure of goods' carriages according to the groups of goods (in tones) the greatest role is played by metal ores and other mining products and quarrying products (34,8%), other non metallic mineral products (12,6%), secondary raw materials, municipal wastes (9,6%) and food products, beverages and tobacco.

In 2010 569,7 millions of passengers were carried by bus transport which meant the decrease compared with the year before by almost 7.1%. In 2005 bus transport was realized on almost 25 thousands of national lines which gave total length- 1.25 millions km, and on about 3000 international lines of total length reaching 583 thousands km. A tendency to decrease the quality and shorten the length of national lines is now distinguishable (suburban carriages are becoming more and more predominant), in contrary to the international lines.

Urban transport in 2006 was present in 259 Polish cities. More than 3905 millions of passengers took advantage of its services. The only one in the country line of metro (of 23 km of length) is located in Warsaw. The number of carried passengers (140,2 million) increased by 3.9% in comparison with 2009.

10.1.2. Railway transport

The potential of Polish railway includes infra-structure (areas, railway lines, buildings, etc.), rolling-stock and property which is expressed in particular elements of material potential. Differentiated railway infra-structure, the inheritance of various policies conducted by invaders became thoroughly rebuilt and improved in the third decade of 20th century. Its next extension and modernization took place in the second half of last century (60s and 70s.). Its changes noticeable today, after 1989 relate mainly to some chosen lines' liquidation, electrification and modernization of strategic sections which shorten the time and improve the travels' comfort.

The apogee of railway system's development in Poland took place at the beginning of 80. when about 27 thousands railways were functioning. The time of constitutional transformation in Poland was the period of Polish railway's regress. In the period 1985-99 6.2 thousands km of railways were closed and in the period 2000-2004 the next 2,2 thousands km of railways were closed as well. The greatest diminution in railway system was observed in western Poland, where it was the most dense. Today 20228 km of railways are being utilized which gives the density of 6.5 km/100 km² (which means one of the lowest densities in our part of Europe). The lines include: 20089 km of standard-gauged lines, 543 km

of large-gauged lines³⁴ and 139 km of narrow-gauged lines (the level of electrification is regarded as the highest in Europe and amounts to about 60%). The principal problem of the system is its total adjustment to velocity of 120 km/h, which was a standard but 40 years ago. Nowadays it is perceived as an obstacle in railway transport's development, because reaching velocity up to 160 km/h is now required. Therefore modernization of even fundamental arrangement is desirable. Following the example of other countries, railway system's restructurisation in domain of building new lines of high velocities between big agglomerations, modernization of the rest important connections and creation of railway system designed to railway transport (entirely or in some part) are necessary. Especially the creation of new lines of high velocities will let Polish railway regain the considerable commercial position, which will be to society's and national economy's advantage.

The greatest density of railways (fig. 3) is observed in southern Voivodeships (Śląskie 17,5; Opolskie 9,2; Dolnośląskie 8,9 km/100 km²) and it becomes less in northern and eastern directions (in Podlasie the system's density amounts only to 3,8 km/100 km²). The main owner of railways is Polish State Railways (PKP). The rest subjects have only 387 km of normal-gauged lines and all the narrow-gauged lines at their disposal. It is said that the bad situation of Polish railways mainly stems from the PKP enterprise's bad functioning which does not create real conditions of competitiveness on the market of railway's carriages. The overgrowth of employment and allocation of state donations for the payment fund are the main problems of this enterprise.

³⁴ The longest large gauge railway line in Poland is Broad Gauge Metallurgy Line (Linia Hutnicza Szerokotorowa often known by its acronym LHS). The line runs as a single track line for 394,6 km from Hrubieszów (on the Polish-Ukrainian border) to Sławków Południowy in Zagłębie (25 km from Katowice). It is used only for freight traffic, mainly iron ore and coal. It is the westernmost large (broad) gauge railway line in Europe (distance between the rails is 1520 mm). The previous name of the line was Metallurgy - Sulphur Line (Linia Hutniczo Siarkowa), but after sulphur ceased to be transported on the line its name had been changed, keeping the initials the same.

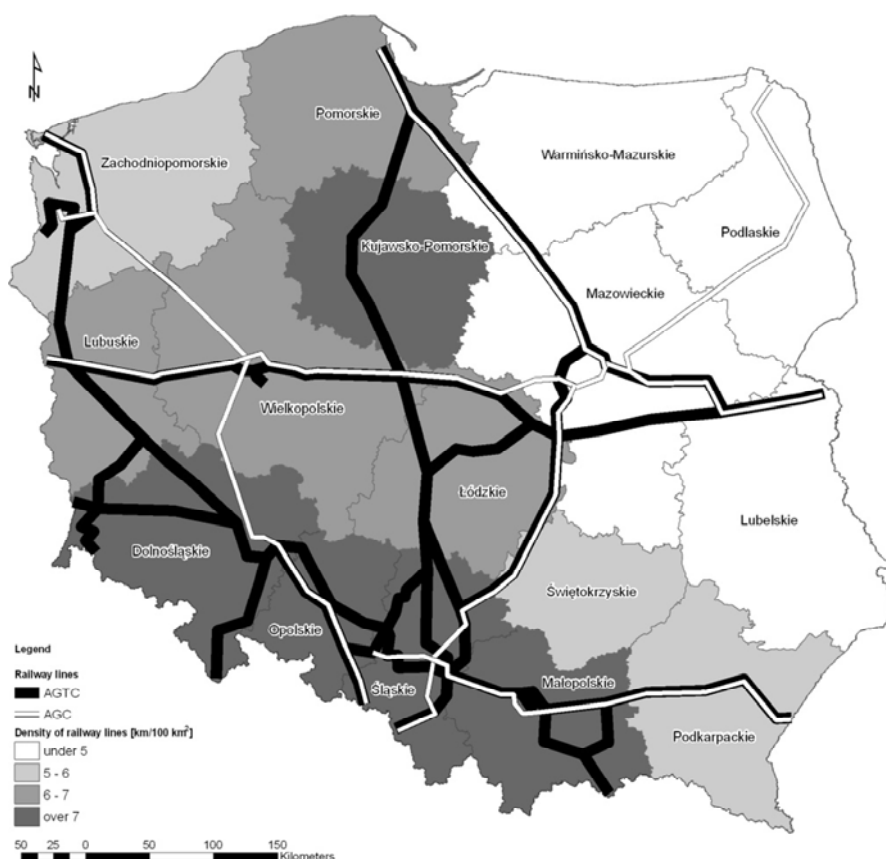


Figure 58. The main international railway lines with the density of railway system in Poland

Source: *Transport – wyniki działalności...* 2011;

http://www.pkp.pl/files/mapa_KDP_AGTC.pdf; elaborated by K. Dmochowska-Dudek)

All Polish railway system was divided into lines of state and local significance which is regulated by appropriate Disposition of Cabinet³⁵. Moreover some lines have importance for international railway transits. These lines come within some international agreements about lines AGC and AGTC³⁶ (fig. 3). The lines which are not mentioned in the settlements are modernized in stages with a view to attain the compatibility of Polish

³⁵ *Dziennik Ustaw*, nr 273/poz. 2704 in 2004.

³⁶ AGC – European Agreement on Main International Railway Lines; AGTC–European Agreement on Important International Combined Transport Lines and Related Installations.

railway system with European one. The lines' modernization is realized with use of budget resources (about 25%) and European Union's funds.

Polish rolling-stock (except for narrow-gauged) in 2010 included: 1905 electric and 2358 diesel locomotives (in 2005 still 20 steam-engine locomotives were functioning), more than 89 thousands of freight wagons and almost 7,9 thousands of passenger rail coaches and others.

Polish railways performed the greatest work at the beginning and in the middle of 80. of 20th century when almost 140 milliards tkm (goods) and 50 milliards pkm (passengers) were carried. In 2010 this work amounted to 48,7 milliards tkm and 17,9 pkm, with appearing tendencies of growth in the last years. Among the most important commodities carried by railway in 2010 there were: hard coal and briquettes (43,7% tones of all goods), stone, sand, gravel, clay (20,5%) and liquid refined petroleum products (9,7%). In international exchange in export the most important role is played by such goods as: hard coal, coke, briquettes and refined petroleum products, chemicals, chemical products, man-made fibers, rubber and plastic products, and basic metals, fabricated metal products; whereas in import: hard coal, iron ore, Coke, briquettes and refined petroleum products. The majority of commodities transported by railway is received from Poland by Germany, Czech Republic, Austria and Slovakia; while to Poland by this means of transport the majority of goods comes from Russia, Ukraine, Germany, Czech Republic and Belarus.

Furthermore the railway is an important passenger means of transport. In 2010 more than 261 millions of passengers were carried (on average distance of 69 km) from which about 1,8 millions of passengers in international communication (304 km). The destination of travels by Polish railway was most of all Germany, Belarus and Ukraine, and to Poland the majority of people came from Germany, Belarus and Czech Republic.

The railway transport is a strategic sector, which will be decisive for success of all national economy. According to the today's strategy of European Union in railway transport the markets' opening not only for international commodities' carriages but also for international passenger carriages is the priority.

10.1.3. Inland waterways transport

The amount of goods' carriages by means of inland waterways transport in Poland is considerably different from the tendencies present in other countries of European Union. The average participation of inland waterways transport in European Union's transport of all commodities amounts to 7.1%, here are some countries mentioned as an example to

make a comparison with Poland: Holland (about 50%), Belgium (more than 40%), Germany (more than 20%), France (about 12%). In Poland the participation in 2010 amounted to only 0,4%, that is less by a dozen or so than European average described above. Fundamental problem of this branch of transport in Poland is scarcity of the navigation's infrastructure, especially there is a deficiency in canals' systems, which are indispensable when the navigation of modern units floating is taken into consideration. The length of Polish inland waterways (rivers, canals which have their sewer systems, lakes) includes officially more than 3,6 thousands km. With reference to their poor usage only a few separated sections of total length – 214 km are of the transport significance (i.e. waterways that are of international significance). Among them the most important are: Odra with canal Gliwicki, road Wisla – Odra (through Brda, Bydgoski canal, Notec and Warta) and Warta close to Poznan. Practically however greater role is played only by lower Odra (from Schwedt to Szczecin), which is used in traffic between Berlin and Szczecin/Swinoujscie. The process of decreasing amount of carriages on this section in the last few years may be stopped or even the amount may increase by means of existing plans of modernization and keeping the transport function. The most important river ports on Odra are located in Kedzierzyn-Kozle, Opole, Wroclaw, Poznan (on Warta) and Kostrzyn. Among five boundary entrances the most significant is in Widuchowa which is responsible for the traffic from Germany to Szczecin. Whereas the significance of route Wisla – Odra, which additionally does not have any chances for investments in the proximate future is disappearing.

The second serious problem of described waterways transport is shrinking supply column and its decapitalization. In 2010 it included 222 tugs and pushers (compared to 425 in 1980), 597 barges (1,570 in 1980) and 93 passenger ships (from 1980 there are seven less). The next impediments in the development of Polish inland waterways transport are: high annual fluctuations of water's level, scarcity of the biggest rivers' regulations, long period of icing, undergrowth of ports' hinterland, diversified navigational parameters of routes (depth, breadth, sizes of sluices).

In the largest in Europe **inland port** in Duisburg there are about 50 millions tones of goods trans-shipped per year, that is 10 times more than in Poland.

In 2010 there were carried 5.1 millions tones of goods by the inland waterways transport, i.e. 9.1% less than in 2009. Till 2005 year the carriages were growing incessantly since 2002, moreover the process was more rapid than the carriages taken as a whole by all means of

transport. It was mainly possible due to the growing participation of carriages within international communication (it already constitutes about 70% of general carriages by inland road) and even more due to the increasing number of carriages of goods on Polish waters between external ports. But the general decrease in national freight (after 2005) had the biggest influence on the fall of the total carriage of goods. The greatest enterprise organizing waterways transport carriages is Odratrans S.A. from Wrocław, which within market's consolidation took over in 2004 the greatest competitor: Bydgoska Zegluga S.A. After the unification the ship-owner accomplishes about 75% of all goods' carriages.

In internal transport the most often goods are metal ores and other mining products (i.e. sand and gravel) (38.3%) as well as mineral fuel (21.3%) the rough minerals and those converted.

In 2010 the most important directions of carriages of goods by means of inland waterways transport in the international exchange were Germany, Holland and Belgium. This route is used to export mainly: hard coal and briquettes, chemicals and secondary raw materials. Basic metals and fabricated metal products are those mainly imported.

It is also worth mentioning that inland waterways transport is of great importance when the tourism (for instance Elblaski canal) and passenger's carriage (in 2010 about 879 thousands of passengers were carried, on the average distance of 15 km) are taken into consideration.

The identification of **European transport policy** within so-called balanced development by European Union is considered to be the chance for Polish inland waterways transport. The support is given mainly to those branches of transport which are environmentally-friendly and the negative influence of inland waterways transport on environment is imperceptible.

10.1.4. Maritime transport

Poland's location at the Baltic Sea may be regarded as rather disadvantageous but on the other hand it entails some chances of development for all economy. The Baltic is a sea of internal character, through which some main navigation routes do not pass. That is why Baltic seaports are inferior to seaports of Northern Sea. While the advantages of our region are a developing economy of Baltic countries and considerable commercial exchange between them. The Baltic Sea is also one of the most important areas of ferry navigation in Europe. Unfortunately so far Polish ship-owners have not taken advantage of this potential.

The maritime transport operates particularly the carriages of bulk goods in an international exchange. It is often also used in operating regional carriages, especially in countries, which economic activity is accumulated along extensive coastal zone. Maritime transport's activity in this domain is defined as coasting shipping.

After 1989 Polish maritime transport, envisaging general economic transformations, to which the competitiveness of road transport and western European ports should be added as well, undoubtedly lost its significance. To the factors of negative influence there ought to be also mentioned: deficiency in compact maritime policy realized by the country and lack in making the strategic decisions favoring the development of this branch. The considerable decline in number of carriages of goods was observed. The situation became normalized just after 2000, when the decrease in reloading was stopped, and since 2004 even relatively high increase in some greatest ports is noticeable. The regress in maritime economy was suppressed thanks to modernization of Polish seaports. They succeeded both in adjusting their own infra-structure to the new structure and commercial directions and modernizing the connections with road infra-structure in country as well (including the building of container terminals).

In 2010 Polish maritime transport fleet contained 121 ships, which in total had the deadweight exceeding 2,9 millions tones DTW, and average age of ships amounted to 19 years. It is certainly worse situation than that from the beginning of constitutional transformations. In 1990 the fleet had 247 ships of deadweight surpassing 4 millions tones DTW and average age of 12 years at its disposal. Nevertheless the situation has been gradually improving since 2002. Among 121 Polish ships 107 are the merchant ships (69 dry bulk carriers, 5 ro-ro, 12 tankers and 21 other general cargo ships), 11 are ferries and 3 – passenger ships. The interesting phenomenon of our times is the fact that only 15 ships sail under the Polish flag and almost 106 chose so-called cheap flags as: Bahamian (35), Cyprian (22), Maltese (22), Liberian (13), Vanuatuan (9), Panamanian (2) and others.

In 2010 the maritime transport carried more than 8 million tones of goods, while just in the early 21st century the quantity was twice higher. The transport performance decreased more rapidly. Still in 2003 there were more than 100 millions tkm, and seven years later only 19.7 millions tkm. When the division into groups of loads is taken into consideration, general cargo (72% of all goods; esp. roll-on) and dry bulk (25%; for example hard coal and coke, cereals); whereas among reloadings there were such important commodities as: coal and coke, petroleum and petroleum products. By stages however the amount of reloadings realized in Polish trade seaports is getting smaller and in 2010 59.5

millions tones were surpassed. Among the most important Polish trade seaports there are seaports in Gdansk, Gdynia, Szczecin (it is even of the greater significance as the seaport closest to Berlin) and Swinoujscie. Moreover in the local aspect the seaports in Police, Nowe Warpno, Miedzyzdroje, Darlowo, Elblag, Kolobrzeg, Stepnica, Trzebiez, Ustka and Wladyslawowo are also important. Through the trade seaports 760 thousands passengers coming to Poland and 782 thousands departing passed as well (mainly from and to Sweden).

The maritime transport in Poland is underestimated. Anyway much the same was in European Union. Just in 2002 the program which aim is to promote and develop the maritime transport appeared, other priorities of the plan relate to create "sea ways" and improve the exchange of goods in seaports. The more so as the maritime transport was regarded as the safe one (not many accidents), economical one (it consumes small amounts of petroleum) and environmentally-friendly.

10.2. Air transport

The basic advantage of air transport is its highest velocity in comparison with other kinds of carriages. However there are also some drawbacks which include: high costs of air conveyance, rather weak ports' accessibility and weak infallibility (for example in consideration of weather conditions). The Polish potential of air transport is based on its infra-structure and aerial fleet. The infra-structure of air transport contains some elements of linear character (marked airlines equipped with terrestrial appliances guaranteeing safe flights) and punctual character, that is to say airfields, ports, airstrips and other buildings performing airfield functions.

In 2010 in Poland there were 11 working airports: 1 national (Warszawa – Okęcie) and 10 regional (Cracow – Balice, Katowice – Pyrzowice, Gdansk – Rebiechowo, Wroclaw – Strachowice, Poznan – Lawica, Szczecin – Goleniow, Rzeszow – Jasionka, Bydgoszcz – Szwederowo, Lodz – Lublinek, Zielona Gora – Babimost). The system of these airports is far from being sufficient, it is by six times less rare than the average of other developed European countries.

According to a register of the Department of Civilian Aviation the national civilian aviation was using 1,118 aircrafts (83 jet planes, 37 turbo propeller-engine planes and 998 helicopters), among which the timetabled transport had 56 aero planes at its disposal (5,611 passenger seats).

Everywhere in the world, in air transport the predominant object of activity is the passenger transport. A goods-transport which has not developed yet for good constitutes to some extent the additional and

complementary activity. The carriers of passengers noticed that they had free space in holds of airplanes and decided to take advantage of the fact. Since the half of 90. the dynamics of air conveyances in Poland has been considerably rising. It is the result of liberalization of the access to market for new carriers (especially so-called 'cheap lines' from European Union), and also general improvement of economic situation, appearance of greater competitiveness, prices' drop. Despite the fact that in consideration of the size of operated passenger and goods traffic Poland is far behind other countries in the world, it is nowadays the market of air conveyance of passengers which is developing in the quickest way in the world.

The operated traffic by Polish airports is performed mainly on short-distance connections with other ports in Europe and less so on the national connections. The long-distance connections are discharged only by airports in Warsaw and Cracow, which are of minor importance when the conveyance of passengers is taken into consideration.

The regular air transport was being performed on 173 routes – 8 national and 165 foreign. The system of national routes included only 2292 km and was used only between Warsaw and Bydgoszcz, Gdansk, Katowice, Krakow, Poznan, Rzeszow, Szczecin and Wroclaw. Therefore no direct scheduled flights between regional airports were functioning. Whereas international routes were preserved with 88 cities in 46 countries on the distance of 340,7 thousands km.

In 2010 in Poland airlines carried about 5 millions of passengers. The number for several years remains at a similar level. However the passenger traffic in airports was considerably greater, considering their service performed by foreign carriers. In total to Poland came nearly 9.2 millions of passenger and 100 thousands more people flew from the country. The majority of passengers in international air transport Poland exchanged with Great Britain (21,3% of all people), Germany (15.3%), Italy (5.9%), Egypt (4.6%), Ireland and France (4.2% each)

In 2010 the predominant role in passenger traffic's service was played by airports in Warsaw (42% of all traffic), Cracow (14%), Katowice (12%) and Gdansk (11%). Just now greater increase in regional airports' contribution is observed and it is predicted that before 2020 the participation of passenger conveyances in Okecie will fall to 40% (at the same time the number of passengers will increase twice). Therefore gradually the decentralization of passenger traffic will become commonplace.

In spite of rapid development of cheap airlines, Polish Airlines 'LOT' still remains the carrier of greatest importance (with total number of about 30 traditional carriers and 9 so-called low-cost). In 2010 'LOT' serviced more than 29% of all passengers in Polish airports, however low-cost carriers attend for about 52% of passengers at Polish airports.

In 2010 81 thousands tones of goods were carried. The majority, because almost 66.4 thousands tones was carried on international routes.

10.3. The logistics centers

The logistics centers are nowadays regarded as an important element of transport system. In today's economy there exists a considerable demand for services operated by the centers. Various subjects (of industrial, transport, trading and service character) prefer entrusting centers with some logistic activities to employing themselves because it is more worth-while. Backwardness in building of such centers and rising necessity for them entail the great development of every time bigger and more modern centers of logistic service. Poland, in consideration of its geographic location has some chances for rebuilding of systems of logistic centers operating not only the regional Polish market but also performing the significant role in Europe.

Buildings erected before 1990 which perform functions attributed to nowadays' logistic centers are out of date in domains of technology and informatics. Modern subjects of that kind appeared in Poland just after 1991. Their localization is rather characteristic because they emerge most often within the bounds of big cities, in their neighborhoods (up to 50 km), on the area of seaports, frontier entrances. In Poland in spite of matters of financial (deficiency in important investors), administrative character and those connected with detail localization (lands' gain) the greatest problems in development of logistic centers were the scarcity in PKP's involvement and delays in building of systems of motorways and expressways. Only after 2002 together with PKP Cargo's commitment in building of its own system of centers the situation changed in the positive way. Today's logistic centers have to perform many functions: warehouse, reloading, sorting, complementing, distributive, terminal of combined transport, service of means of transport and others (of social and packing aspect and the like).

In Poland we have now only four focused logistics centers corresponding to European standards: Śląskie Centrum Logistyki S.A. (in Gliwice), Euroterminal Sławków (in Sławków), Centrum Logistyczne Inwestycyjne Poznań CLIP (in Swarzędz-Jasina) and Wielkopolskie Centrum Logistyczne Konin-Stare Miasto S.A. (in Modła Królewska near. Konin). The existing logistics centers do not work together and do not take initiatives to create a national intermodal logistics network. In the near future the Polish sea ports (of Szczecin, Gdańsk and Gdynia) hopes a new logistics centers will bolster their strong position as regional transport hubs.

In addition to logistics centers an important part of the logistics system are warehouse centers. They usually operate only with access to car transport. The largest warehouse centers are located in the large agglomeration as Warszawa (Warszawa, Mszczonów, Teresin, Błonie, Ożarów Mazowiecki, Nadarzyn), Górny Śląsk (Będzin, Chorzów, Dąbrowa Górnicza, Sosnowiec, Czeladź, Gliwice, Tychy), Poznań (Poznań, Komorniki, Gądko), Łódź (Łódź, Stryków, Pabianice, Piotrków Trybunalski, Wola Bukowska) and Wrocław (Wrocław, Kobierzyce, Bielany Wrocławskie, Wojkowice, Pietrzykowice). Centers in this five agglomerations cover 93% of the entire Polish warehouse – 6.9 million m².

10.4. Communication

Communication belongs to the zone of material services, due to it constitutes the prolongation of production processes. In economy and private life of citizens it performs more and more important role. It accompanies all economic processes, contributing to their acceleration and coordination, saving of time, it also influences in the positive way on the increase in work's efficiency. Nowadays the communication has become a condition making the development of cooperation between people and institutions possible. Many governments in the world care for the communication's development which is regarded as the fundamental incentive for all economy's progress.

The effect of communication services' activities are not the new products but the change of postal matter's and information's place. These services' peculiarity relates generally to:

- personal and confidential character (secret of correspondence),
- immediate consumption of service,
- service quality (regularity, rapidity, preciseness of information's circulation,
- seasonal character of demand (postal services tend to increase rapidly in periods preceding the holidays and phone calls are made generally during a day).

In consideration of the way of information's sending the communication may be divided into postal services, telecommunication and satellite communication. The post is responsible for consignment of material things (for example letters, parcels) and remittance. Consignments and information send by wire-way or non-wire lines are the telecommunication's domain. Among the group there are such sections as: telephony (fixed-line and mobile), tele-informatics (data transmission) and radio communication (radiophone, television, radio) and of minor importance nowadays: telegraphy, telex, telematics (fax).

10.4.1. The post

The post is a fundamental and the most traditional section of communication which is its oldest form. In Poland it has been functioning since 1764, that is to say since Stanislaw August Poniatowski published the proclamation.

The most important element of postal infra-structure includes the post offices which in 2010 amounted to 8365 (they were only owned by public postal operator: Poczta Polska) and 2541 offices owned by private operators (in the end of 2010 there were 152 operators of this kind functioning in the country). Furthermore Poczta Polska has more than 46 thousands postal boxes at its disposal.

The Polish Post recorded in 2010 the decrease in the size of operated services. Less postal transfers paid (51.2 millions – 27.9%) were realized, payments to the bank accounts (201.8 million), less parcels were sent (19.8 millions – 14.1%) and less standard letters posted as well (958.6 millions – 21.7%). Only the number of posted registered letters increased (407.7 millions – 5.3%). While private operators provided mainly services in domain of: letters' delivery (153 millions of the national services and 153 thousands of the cross-border services), parcels' delivery (378 thousands and 69 thousands) and express mail (51.8 million and 2.5 millions).

10.4.2. Telecommunication

At present stage of civilization's progress the telecommunication constitutes one of the basic sections of national economy. National system of telecommunication is numbered among the general indispensable necessities of inhabitants, institutions, and especially banking system and stock market, trade, education, tourism systems and other sections of services. The development of cooperation and international exchange considerably depend on modernity and the range of telecommunication infra-structure. The economic and social significance of telecommunication also relates to the ability of fast absorption, promotion and implementation of innovations.

The infra-structure of telecommunication is the system with aim to satisfy and create necessities connected with messages transfer, data transformation and information retrieval. The infra-structure includes: telegraph infra-structure, telephone, telex, tele-informatics infra-structure. The punctual infra-structure includes: telephone and telegraph exchanges; and telecommunication networks (cable, overhead line, radio, fiber optic and digital networks) as a linear infra-structure.

The access to cheap communication in Poland is still confined in greater measure than in European Union. Moreover some considerable disproportions in this domain in particular regions of the country still exist. Although it is commonly said that the telecommunication services are the fundament indispensable for the creation of information society, which is able to use all the chances stemming from the processes of integration and globalization.

Network of fixed telephone lines. In the world where the information is a commercial commodity the telephony became the economy's sector which develops in the fastest way. Nowadays telephony systems, except for voice transmission, enable also an interactive cooperation with many bases of computer systems and ensure some additional services, which aim is to support the business sector. The improvement of access of telephone communication was observed in Poland just in 90s of the last century. At that time the number of subscribers increased almost by three times. Today the increase in number of fixed-line telephony was impeded. Today the development of traditional telephony is rather of quality character (the improvement of quality and broadening of services' choice) than quantity. In 2010 in Poland there were 126 operators offering the services (local, national and international connections) in domain of fixed networks. In the country there were 8.2 millions of main telephone lines (including 7 millions standard main telephone lines and 1.2 million lines in ISDN access), and the greatest density (per 100 people) was observed in Voivodeships: Mazowieckie (31.5 per 100 people), Dolnośląskie (23.5) and Pomorskie (22.6). The least advantageous situation was found in Podkarpackie (17.1) and in Warmińsko-Mazurskie (17.5). Decrease in the number of subscribers was observed from a few years. The main reason for this was the rapidly growing segment of mobile telephony, which is a substitute for services at a fixed location. It is important also had a wide range of Internet services, including VoIP (Voice over IP).

Among the countries of European Union (where the average is more than 43 connections per 100 inhabitants) one of the lowest indicators of **subscription density** of constant connections is characteristic for Poland (with almost 22 connections per 100 people). Lower value of indicator is found only in Czech Republic and Lithuania. In domain of mobile telephony Poland with its indicator of 118 subscribers (per 100 inhabitants) takes 18th place among the European Union countries (in 2006 it was the last place in U-27).

The mobile telephony. At the beginning of 90s of 20th century Poland started to build its own system of mobile telephony, alternative to the

conventional one (wire). To begin with PTK Centertel, quite quickly put the out of date analogue system NMT into service. In 1996 Ministerstwo Łączności decided about two tenders for the building of modern digital systems of second generation: GSM, which were won by the firms such as: Polkomtel and PTC. Since 2004 the services of telephony of third generation – UMTS have been being offered.

Currently there are in Poland seven mobile operators: PTK Centertel (brand *Orange*; 30,5% of subscribers), Polkomtel (*Plus*; 29.9%), PTC (*T-Mobile*; 27.6%), P4 (*Play*; 11%), CenterNet, Mobyland and Aero2 (and 15th virtual operators). At the end of 2009 the number of subscribers of mobile telephony amounted to 47,5 millions, during the year the number increased by about 5.5%. Polish market of this telephony is numbered among those which develop in the fastest way in Europe. The surface of Poland is covered by the system of 122 centrals and more than 26 thousands base stations cooperating with one another.

Internet. In Poland the number of people using the Internet, which is already operated by 1 886 Internet service providers, is growing in the very dynamic way. In 2010 there were over 7.5 millions of subscribers (consumers and business) using the Internet, that is by about 15,6% more than the year before.

The most common forms of access to Internet chosen by subscribers were: modems in mobile network (moreover – 3.5 million of users), xDSL lines (more than 2.5 million users), cable modems (1.8 million), local area network LAN – Ethernet and wireless local area network WLAN. Other technologies, including the once very popular dial-up access, played a lesser role.

Approximately 99.8% of the total lines were broadband lines (of which half was characterized transmission equal to or greater than 2 Mbps – their number increased by more than 0.9 million). Therefore recipients of services had greater opportunity to take advantage of offers faster access to the Internet. According to consumer research conducted in 2010 on behalf of Urząd Komunikacji Elektronicznej, more than 52.8% of users surveyed had access with data rates of 2 Mbps or more.

The largest Internet operator in Poland is TP S.A. (22.4% of users), but its advantage in the market from year to year declines. The subsequent major operators are: PTK (13.1%), Polkomtel (10.6%), PTC (7.4%), P4 (6.8%) and UPC (6%).

10.4.3. The satellite communication

The satellite communication is numbered among the youngest and at the same time most advanced in technological aspect sections of

communication. For the first time it was used in 1962 when satellite Telstar transmitted the television signal. However the quick development of satellite communication services took place in 90. of last century. Today owing to thousands of satellites going round the Earth, satellite services are almost commonplace and are becoming accessible for everyone, and the only one confinement may be unfortunately still high costs of exploitation. Nevertheless it is believed that satellite communication is in many cases the best, and sometimes also the cheapest solution. It is observed on the areas, where the development of ground-systems is insufficient or impeded by the shape of surface. Other advantages of this kind of communication are short period of equipments' installation, initiating transmission, security or certainty of the transmission's continuity. Satellite communication proves correct in firms having numerous agencies and branches, for instance in offices, banks, insurance companies, nets of shops, or TV and radio stations. The deliverers of services connected with the Internet should also be interested in satellite platform.

The satellite communication in Poland has been functioning for more than 30 years. The first satellite systems were installed in Świętokrzyskie mountains in the Centre of Satellite Service TP SA. In 1974 the first satellite station appeared in Poland, it was working within the system Intersputnik. In a few years later other stations emerged, among others in 1993 in Poreby Lesne close to Warsaw the central station of system VSAT (*Very Small Aperture Terminal*) was opened.

Today in Poland a few types of ground-satellite stations function. The SCPC (*Single Channel Per Carrier*) stations are possessed by all the radio, TV and telecommunication broadcasters (PAGI, TP S.A., AB Space); VSAT central stations serviced by the operators of this system (Grytek, Tel-Energo, TTcom, PAGI, TP S.A.); VSAT final stations; sending stations of satellite radio difusion serviced by the operators of satellite digital platforms (Canal+, Polsat Cyfrowy, TVN, Lux Veritas, TVP); reportorial stations SNG (*Satellite News Gathering*) are owned by such senders as: TVP, TVN, Polsat, Lux Veritas, Radio Maryja, France Telecom, British Telecom.

The satellite communication has various kinds of services in offer. The stationary services FSS (Fixed Satellite Systems) relate to radiodifusion (transmission of TV programs), telephone connections, transmission of data VSAT, occasional transmissions, quick access to the Internet. While the mobile services MSS (Mobile Satellite Systems) include: connection with the mobile objects Inmarsat (ships, planes), satellite systems of mobile telephony (Iridium, Globalstar, Thuraya, ACeS), the systems of short messages' transmission (quick Internet, interactive, broadband and multimedia systems).

Poland has 2 orbital positions 15,2°E and 50°E. In case of the position 15,2°E the coverage is confined only to national surface, which makes the usage of satellite in the international communication impossible. The position could be possibly used if some attempts to place the national satellite, designed to the necessities of Polish subjects and institutions, were undertaken. The system could serve also the necessities of country's security or accomplishment of national strategy of broad-lined communication development. While the position 50°E is commercially more attractive. The possibility of its sale or leasing in favor of big satellite operator exists.

10.5. Recapitulation

Today transport in Poland is not the ideal origination. We have still many problems to solve. They relate both to transport which is already functioning and which still needs to be modernized and improved, and to the tasks which have not been started yet as well (or barely begun such as the plan of building of motorways). Among the most important problems of transport, which should be solved, there is an unequal arrangement in transport structure, with clear predominance of road transport. The next problems are: the existence of congestion and so-called "narrow throats" of goods and passengers conveyance, endangered security, noise or surface absorption. Moreover all tasks must be realized with maintenance of high proecological standards and with use of environmentally-friendly technologies. The globalization of world economy gives Polish transport another duties, which are the integration of all transport system and elimination of missing links in transport system.

The accomplishment of even such generally indicated tasks would be for Polish economy a burden too great. Fortunately, the plans of Polish transport's development and modernization are coherent with the aims of the economic development of European Union. That is why Poland may count on co-financing the majority of investments. In "National Program of Development for 2007-2013" financing Operational Program "Transport competitiveness" was accepted on the level exceeding 5,8 milliards euro. In this sum of money 3,6 milliards are supposed to come from the European Fund of Coherence (ISPA), and the next 300 million euro from European Fund of Regional Development (SPOT) and from the fund PHARE and less known TEN. TEN or Trans-European Network is a special budget of European Union which aim is to support the development of pan-European transport systems (TEN-T), energetic (TEN-E) and telecommunication (e-TEN). Within the program the chosen plans important from the European point of view are financed. The point is to equalize the level of transport infra-structure development, accom-

plish its coherence and protect environment and improve the security. Within this program 30 plans of priority importance were outlined. In Poland there are four such plans: 1) railway line: Gdansk – Warsaw – Bratyslaw – Wieden; 2) motorway: Gdansk – Bratyslaw – Wieden; 3) railway line: „Rail Baltica” Warsaw – Kowno – Ryga – Tallin – Helsinki; 4) the maritime motorway on the Baltic Sea. Moreover the national plans are co-financed, their list is available on the website of GDDKiA.

In modern Poland communication experiences deep structural changes of consumption and services delivery. The most important is expansion of data transition. The main trends, which one can observe on Polish market are: decrease of prices and widening of services access. Additionally free market, i.e. competitively, gives potential users whole range of products prepared ‘only’ for them. It is good stimulus for increasing of telecommunication services, particularly in mobile telecommunication and the Internet. It seems to be unchanged in next years. Another important phenomenon is continuing conversation of services delivered with various electronic technologies. We will witness diminishing importance of traditional diversification of voice connections, video transition and data transition.