PART 1

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CHAPTER 1 RAILWAY POLICIES AND RAILWAY MANAGEMENT STRATEGIES

1.1 CONCEPTS OF RAILWAY RESTRUCTURING AND PRIVATIZATION AND BASIC PRINCIPLES OF JICA'S STUDY

1.1.1 Need for Restructuring and Privatizing the Polish Railways

The railway was the major transport mode for everything in the planned economy era. However, after the transition to a market-oriented economy, the rapidly developed motor transport took away share of the transport market, leading to a drastic decrease in demand for rail transport. As a result, the profitability of railway operations deteriorated. The railways had to depend heavily on state subsidies to stay afloat, which strained the national finance.

To tackle this issue, the Polish Government has been making attempt to reduce the financial burden on the state through restructuring and privatization of the Polish railways. However, the various restructuring and privatization measures implemented so far have not fully succeeded in downsizing the operations to a scale compatible with the sharp decline in transport demand and in upgrading operational efficiency to enable the railways to survive in the competitive marketplace. For this reason, the Polish railways have not yet reached the stage of sound operation, making it difficult to pursue privatization. For the PKP Group to achieve privatization, further reforms are needed.

1.1.2 Restructuring and Privatization of the Japanese National Railways

In the past, the Japanese National Railways also experienced the same situation now faced by the Polish railways and it underwent restructuring and privatization.

There was also an period in Japan when road construction and car ownership were pursued at a dizzying speed and railways had a hard time adjusting properly to the increasingly competitive transport market. At that time, although the Japanese railway industry had lost its monopoly in the marketplace because of competition from motor transport, the government, management of the Japanese National Railways, labor unions, media, and the public all failed to recognize this fact; resulting in a marked delay in structural and organizational reforms.

Furthermore, because important decisions regarding the operations of the Japanese National Railways required the approval of the government and the Diet, business management was always tied to politics. The political sector also interfered sometimes in the operations of the Japanese National Railways, pressuring the management to construct and operate loss-making railway lines. Another weakness of the Japanese National Railways was the volatile labor-management relations. The Japanese National Railways was an enormous business entity; it was extremely difficult to communicate the intentions of the management to every corner of the worksites. The management, which relied heavily on politics, lacked the ability to negotiate with labor unions on an equal basis, leading to frequent strikes. Consequently, the Japanese National Railways became an entity not meeting the social needs.

In April 1987, the Japanese railways were reformed pursuant to the "Passenger Railway Companies and Japan Freight Railway Company Law" to resolve these problems. The Japanese National Railways was divided into six regional passenger railway companies and one national freight company; which started operations as special companies. It was deemed necessary that the government should act as guardian of the new companies for certain time to ensure the smooth operations of business. The reform intended to have the government own all the stocks first and then offer them up for sale in the stock market later. The restructuring of the Japanese National Railways is a major factor attributing to the revitalization of railways. The following three reasons can be cited:

- The railway industry was rid of the many constraints imposed on it during the monopoly era.
- An environment was created in which railway operations can be separated from politics and managers can concentrate on business management.
- The consciousness of railway employees was reformed, making it possible to render customer-oriented services.

The "restructuring of the Japanese National Railways" is characterized by the adoption of basically the same form of organization as a private corporation and the commitment to use the same decision-making principle as a conventional private company. Herewith, the kinds of "political dependency" and "political interference" at the times of the Japanese National Railways were eradicated. Managers in the era of the Japanese National Railways were too busy dealing with the Diet, making it impossible for them to concentrate on railway management. Because the newly inaugurated JR companies are separated from politics, managers can concentrate on their primary job, which is business management.

Another characteristic of the "restructuring of the Japanese National Railways" is the success in reforming the consciousness of railway employees. During the days of the Japanese National Railways, many employees lacked the "customer-oriented" concept. The notion that the "Japanese National Railways would never go bankrupt" took shape in low morale among the workers and actions lacking in moderation by the labor unions. Privatization brought fundamental changes to these aspects. The "customer-oriented" consciousness permeated to every corner of the organization. The newly inaugurated JR companies also put efforts in employee education and training to point out that "they are different from the former state enterprise." These efforts bore fruit in better services and more customers today.

1.1.3 Basic Principles of JICA's Study

In general, privatization refers to the transfer of the ownership of an entity to the private sector. The JICA Study, however, aims not merely at transferring ownership to the private sector but also realizing a sound form of corporation that will enable the entity to operate independently from the government in terms of finance, etc. The restoration of corporate health and the approach to privatization are referred to in this Study as "restructuring and privatization," and these are what the Study is aiming at accomplishing.

Why does the JICA Study aim at restructuring the PKP Group first before proceeding to privatization? If the business operations of the PKP railway operators are not restored to a sound state that sustains viable corporate activity, the value of those companies will be appraised lower by prospective investors, thus the government can not attain the expected capital gain from the sale of the company.

Once the PKP railway operators are purchased by prospective investors, due to the railways' lack of management capacity, the investors will most probably shut down unprofitable parts of the railways, and dispose the assets by selling it into pieces. Since the sell off of railways is an irreversible action, proper measures taken now will ensure the survival of railway service in the future, inaction will likely lead to their demesne.

To effectively restructure and privatize the Polish railways, it is necessary to take into account Poland's current financial situation and adopt methods that will have the least of financial burden. To this end, the most effective method is cutting down on the scale of operations (hereinafter referred to as "downsizing"). Downsizing here does not stop at achieving a smaller railway network but includes also the reduction of surplus workforce and excess facilities.

On the other hand, downsizing alone may not develop businesses that meet market needs. In order to provide services that adapt to market needs, it is necessary to focus business resources on the downsized railway services, modernize railway infrastructure facilities and rolling stock selectively, and upgrade the level of various services.

Therefore, the basic principles of this Study is to first aim at building "a railway system adaptable to the market" through downsizing and then to "selectively modernize railway transport services and upgrade the services of businesses that have been downsized to the appropriate size.

1.2 CIRCUMSTANCES FACED BY THE POLISH RAILWAYS

Restructuring and privatization of the Polish railways must be implemented taking into full consideration various other factors such as the "trend in railway demand," "changes resulting from accession to the EU," etc.

1.2.1 Trends in Railway Demand

According to the results of demand forecast conducted in this Study, the trend of railway demand is forecasted as follows:

(1) Volume of Passenger Transport

The diffusion of automobile advances the shift from public transport to motor vehicles, resulting in a decrease in public transport users. If demand for the railways is not maintained and no expansion measures are taken, the share of railway passenger transport, excluding urban public transport, is projected to be 7.9–8.5% per capita in 2006 and 6.9–7.7% (214.5–240.4 million passengers) in 2010. If the current trend continues, railway users are estimated to decrease 30% by 2010, using 2001 as the base year.

The share of international travelers in railway passenger transport is projected to be less than 1% in the future. If the current mobility pattern continues, the shares of international travelers using railways to Germany and Belarus are estimated to be about 30% each.

(2) Volume of Freight Transport

In terms of freight transport, the Polish Government has been able to project transport demand based on the respective demand forecast of major high-volume transport items. The result shows that the share of the railway among all transport modes is projected to be 11.1–12.1% per ton in 2006 and 9.5–11.2% in 2010. The volume of domestic freight transport by rail is projected to decrease 3–25% by 2010, using 2001 as the base year.

On the other hand, the share of future international freight transport demand by rail is projected to be 4.9–5.3% in 2006 and 4.2–4.4% in 2010. From the current mobility pattern, it is conceivable that the railways will be used for exports in a wide range of areas. In the case of imports, rail transport is seen as a major player in transactions with countries in Eastern and Central Europe in the future.

(3) Overview of Demand Forecast

The transport demand for railways is in decline. If no measures are taken to effectively maintain demand, the transport demand for railways is expected to continue to decline in the future.

With regard to passenger transport, due to advance in road development, diffusion of private vehicles, and progress in air transport, the railway will likely be confined to markets of mainly mid-to-long distance passenger transport and passenger transport in large cities and conurbations where the railway has a relative edge in terms of time and cost. In freight transport as well, the same trend of restricted market is evident. With the different transport modes becoming more specialized in transport according to product item, transportation time, and distance, the railway will likely become specialize in the mid-to-long distance transport of bulk freight and combined freight transport such as containerization, etc.

Furthermore, liberalization and deregulation of the transport market is expected to expand the transport share of road and air run by the private sector, which has few business constraints, while shrinking the transport share of the railway.

1.2.2 Changes Accompanying the Accession to EU

(1) EU Directives

Following Europe's market integration in 1993, it becomes necessary for EU and its Member States to cooperate in reforming their current railway operations in order to build truly competitive railway systems that can be integrated into Europe's future transport framework. To this end, the Council of the European Union formulated a Council Directive (91/440/EEC) in July 1991 for the development of railways in the European Community. It laid down the ground rules for the reformation of railway systems.

The contents of the Directive include ensuring the management independence of railway undertakings, separating the account of business managing railway infrastructure from the account of business providing railway transport services, improving the financial structure of railway undertakings by reducing indebtedness from the past, and ensuring the access and transit rights, the so-called open access, to the networks of Member States for international groupings of railway undertakings and for railway undertakings engaged in the international combined transport of goods. Furthermore, the Council Directive (95/18/EC) on the licensing of railway undertakings and Council Directive (95/19/EC) on track access charge (hereinafter referred to as "TAC") were formulated to supplement the Directive (91/440/EEC).

As part of market integration, EU has proceeded with the liberalization of railways to introduce the concept of competition into the Community's rail transport market. In reality, however, liberalization has not proceeded as originally planned due to the fact that companies that can be awarded open access are international groups made up of multiple railway undertakings, that open access is limited to undertakings engaging in the international combined transport of goods, and that the setting of TAC is different in different Member States, etc.

In January 2001, a new transport policy promoting open access in the field of freight transport was put into effect. That is, as the first package of railway reform, the Directive (91/440/EEC) and Directive (95/18/EC) were amended to become Directive (2001/12/EC) and Directive (2001/13/EC). The Directive (95/19/EC) was repealed and the new Directive (2001/14/EC) was enacted.

(2) Amendments to the EU Directives

The major amendments to the three new directives are as follows:

- As compared to before the amendment, "freight forwarders engaging in international transport within the Trans-European Rail Freight Network" were added as a business eligible for entry from 2003.

- The options "to have organizational separation within a single undertaking for the management of infrastructure and provision of railway services or to delegate infrastructure management to a separate entity" were added.

- The allocation of railway infrastructure capacity and the levying of TAC were clarified providing that the infrastructure manager shall ensure that "infrastructure capacity is allocated on a fair and non-discriminatory basis" and that "although the infrastructure access charge is set according to the operations of train services, it may take into consideration the costs of congestion and environmental effects."

In addition, as the second package, the European Commission is reviewing and preparing various directives related to (i) responsibility for the Community's railway safety and unification of safety certificates; (ii) expansion of interoperability; (iii) establishment of a European railway agency; (iv) further development of the Community's railways, and (v) accession to the Convention concerning International Carriage by Rail (COTIF).

In light of the above-mentioned directives and Poland's accession to the EU in May 2004, the Polish railways will face a business environment with the following changes:

- With open access granting entry to international transport companies and powerful foreign transport companies, competition in the railway business will intensify.
- The inland transport network linking the whole EU region and neighboring regions will expand.
- Modal shift with emphasis on EU's basic policies of environment and safety will be promoted.

(3) Effects on Strategically Important Lines

Although PKP PLK is not an entity slated for privatization, it has the responsibility of contributing to sound development of the railway industry by providing good infrastructure facilities, achieving appropriate TAC through cost reduction, and realizing an appropriate network scale, etc. It also has tremendous influence on the operations of various transport companies that are targeted for privatization.

PKP PLK maintains and manages 20,150 km of railway tracks. This railway network includes important lines such as the lines of national importance designated by the Railway Transport Law, lines operating under international treaties such as AGC and AGTC, and TINA (Transport Infrastructure Needs Assessment) corridors the infrastructure of which must be maintained in compliance with EU standards, etc. Table 1.2.1 shows these strategically important lines.

Table 1.2.1 Strategically Important Lines

Line	Relevant Laws and Agreements, etc.	Route Length	
Lines of National Importance	Railway Transport Law（Article 6）	Approximately 12,000 km	
AGC Lines	European Agreement on Main International Railway Lines dated May 31, 1985	Total: Approximately 5,000 km	
AGTC Lines	European Agreement on Important International Combined Transport Lines and Related Installations dated February 1, 1991		
TINA	Transport Infrastructure Needs Assessment by TINA Secretariat, Vienna, in 1999	Truck line network: 3,741 km	Total: 5,632 km
		Additional network: 1,891 km	

Of these, Poland is placing priority on the modernization of internationally important railway lines that pass through Poland, which are shown in Table 1.2.2. These are corridors designated by TINA as lines for modernization.

Table 1.2.2 Priority Corridors for Modernization

Corridor	Line	Alignment
I	E-75	Baltic countries–Białystok–Warszawa
II	E-20 と CE-20	Berlin–Poznań–Warszawa–Minsk–Moscow
III	E-30	Dresden–Wrocław–Katowice–Lvov
VI	E-65 と CE-65	Gdynia–Gdańsk–Warszawa–Katowice–Czech

1.3 ANALYSIS OF PENDING ISSUES

The objective of this Study is to present measures for eliminating the "pending issues" in the restructuring and privatization of Polish railways by pursuing the Study's basic principles of building "a railway system adaptable to the market" and "selectively modernizing railway transport services and upgrading services." Table 1.3.1 shows the result after sorting out the specific details of the "pending issues."

Table 1.3.1 Specific Contents of the "Pending Issues"

Pending Issue	Specific Contents
Overly extended network	Surplus workforce
	Excess facilities
Lack of railway services that meet market needs	Slow in modernizing infrastructure facilities and rolling stock
	Slow in transferring ownership of assets
	Lack of marketing expertise
Lack of financial resources for settling accumulated debts	Slow in taking action to liquidate assets owned by PKP S.A.
Legislative, organizational, and structural aspects hindering railway operations	Railway operations hindered by administrative organization
	Railway operations hindered by legislation
	Need for revamping the regional passenger transport system
	Need for revising TAC regulations

1.3.1 Overly Extended Railway Network

(1) Surplus Workforce and Excess Facilities

With today's rapid growth in automobile, airplanes, and other transport modes and the decline in both the transport volume and share of the railways, the current size of Poland's railway network is overly stretched. An oversized railway network leads to a surplus workforce and excess facilities, which become a major burden to sound operation. This distortion is especially acute in regional passenger transport services.

According to PKP PLK's profit-and-loss statement for FY 2002, the operating revenue failed to cover the operating expenditure, resulting in an operating deficit. Furthermore, because PKP PLK wrote off the debts for PKP Regional in FY 2002, PKP PLK suffered tremendous loss. These problems are believed to have been caused by an oversized railway network. Figure 1.3.1 shows the revenue and expenditure structure of PKP Regional in FY 2002.

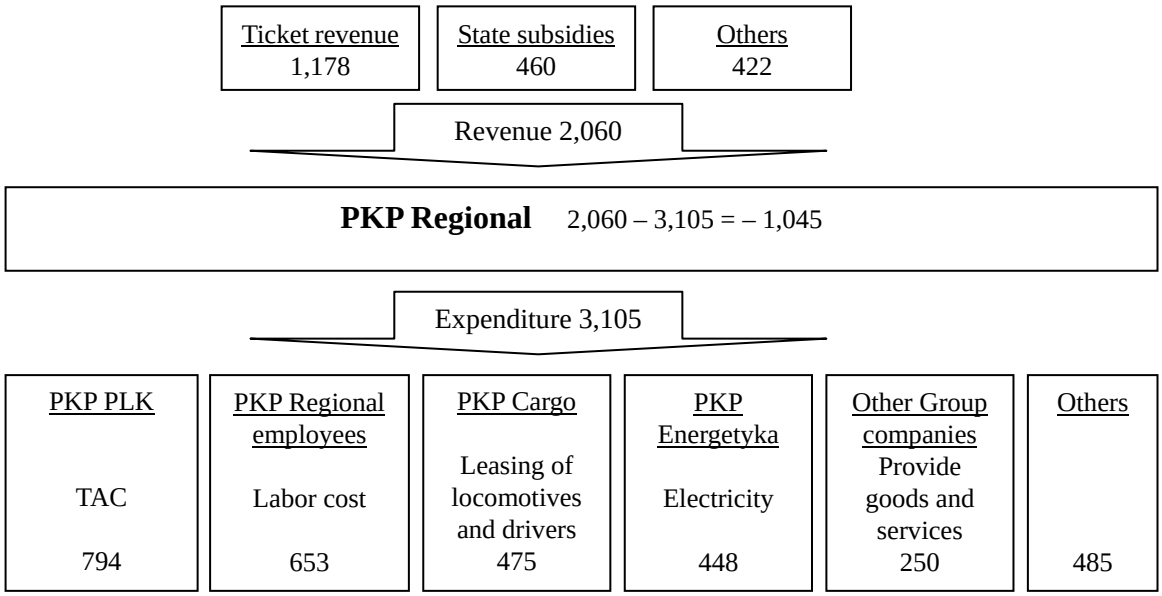

Figure 1.3.1 Revenue and Expenditure of PKP Regional (Unit : million PLN)

According to Figure 1.3.1, PKP Regional was not able to balance its revenue and expenditure, incurring a loss of over 1 billion PLN in FY 2002. This was because the regional passenger transport industry in Poland had more personnel and facilities (hereinafter referred to as "surplus workforce" and "excess facilities") than were required by the market. The surplus workforce and excess facilities burdened the operations.

An overly extended railway network affects not only regional passenger transport services but also other aspects. For example, some marshalling yards that were designed in the past to handle large volume of freight transport have scales no longer matching today's transport needs. Stations too, because they were built according to the railway network in the past, some are not functioning effectively.

Railway undertakings require a huge amount of fixed cost to maintain the lines. Therefore, lines that are not compatible to market needs or have low traffic demand will have a relatively high cost compared to its traffic volume, posing a threat to their operations.

(2) Effects of an Oversized Railway Network on Various Companies

Specifically, the overly extended railway network gives rise to the following problems:

1) Lack of Funds for Maintaining Infrastructure Facilities

At present, the Polish railways has a network of 20,150 km. The Polish Government and PKP PLK are responsible for maintaining and managing this network. PKP PLK cannot cover the cost of maintaining and managing the infrastructure with TAC revenues from transport companies and the Polish Government does not have sufficient funds to make up the shortfall. It is estimated that only about 30% of the funds needed to maintain and manage the infrastructure facilities can be secured. For this reason,

infrastructure facilities deteriorate rapidly. If this situation continues, the survival of the Poland's railway industry will be at stake.

2) Loss-making Trains of Regional Passenger Transport Undertakings

Regional passenger transport undertakings incur a loss of over 1 billion PLN every year because of their loss-making train operations. Some of the transport services within the voivodship are operated based on contracts made between PKP Regional and the voivodship. However, PKP Regional does not receive enough compensation from these contracts. In addition, among the remaining non-contracted train operations, only some of them are profitable. Due to the operation of these loss-making train services, the regional passenger transport system is plagued by financial problems.

3) Potential Risk in the Freight Transport Industry

Freight transport is the most important business area in Poland's railway business. PKP Cargo, especially, is the largest of the PKP Group companies. It is considered the most important target for privatization. On the other hand, PKP Cargo has too many employees and idle assets. Its large business scale obscures the burden of a surplus workforce and idle assets and it has the tendency of not being able to fully rationalize operations. In the future, if demand for freight transport continues to be sluggish, the burden resulting from a surplus workforce and idle assets will stand out, posing the danger of deficits.

1.3.2 Lack of Railway Transport Services Meeting Market Needs

At present, Polish railway undertakings have not been able to provide railway transport services that meet market needs.

(1) Delay in the Modernization of Infrastructure and Rolling Stock

1) Delay in the Modernization of Infrastructure

With Poland's accession to the EU in May 2004, EU's technological standard will become applicable to PKP PLK's main lines, making modernization necessary in order to be in compliance. EU's technological standard provides that the maximum speed for passenger trains shall exceed 160 km/h, maximum speed for freight trains shall exceed 120 km/h, and the largest axle load shall be 22.5 tons. However, only E-20 and part of E-65 (CMK = Centralna Magistrala Kolejowa, the central trunk line) can be operated at a maximum speed of over 160 km/h for passenger trains.

2) Insufficient Maintenance and Management of Infrastructure Facilities

Due to the shortage of funds for maintenance and government funds for modernization, PKP PLK is not providing good track facilities to the various transport companies at this time.

According to the result of PKP PLK audit conducted by the Supreme Chamber of Control (NIK) directly under the Polish parliament, the upgrading of tracks by PKP

PLK has dropped to one-third and upgrading of turnouts has dropped to one-tenth in the last two years. Because track facilities, signaling/communication facilities, and grade crossing safety facilities have become superannuated, it has been found that 14%, 19%, and 7% of the respective facilities require urgent upgrading. Furthermore, according to the 2003/2004 Network Statement, because of poor track condition, many of the lines have to be operated at a speed limit of 30 km/h. To make matters worse, operations at about 1,980 km of the main lines have been closed.

In this way, the lack of maintenance and management of infrastructure facilities (hereinafter referred to as "maintenance backlog") accumulates and speed limits on trains are imposed at many places, drastically depriving the competitiveness of railways against other transport modes.

3) Superannuated Rolling Stock

About half of the electric trains owned by PKP Regional are more than 25 years old and almost no new rolling stock has been added in the last ten years. PKP Intercity only has old passenger cars. Although the interior of some cars has been refurbished and the overall level has been improved, compared to the cars in Western European countries, their functions are inferior, showing that they lack international competitiveness.

(2) Delay in Procedures for Transferring the Ownership of Assets

Currently, the assets owned by PKP S.A. are being divided between PKP PLK and various transport companies in the form of investment in kind (hereinafter referred to as "division of assets"). In the process of dividing the assets, it is necessary to apportion them properly within the PKP Group. In planning the division of assets, the following points must be taken into consideration:

· Secure the necessary assets for railway operations

· Divide assets according to EU directives

· Secure financial resources for debt settlement

In particular, stations and marshalling yards are important assets from the viewpoint of railway management; decision on them must be made as soon as possible. However, no method has been determined yet. The delay in the decision-making of asset division may hinder effective operation and weaken the competitiveness of the PKP Group as a result.

(3) Lack of Marketing Expertise

At present, the various transport companies in Poland do not have sufficient know-how in marketing. For example, PKP Regional and PKP Intercity do not have enough expertise in ticket sale systems and price setting mechanisms to respond to customer needs. PKP Cargo too, because it has been operated as a transport undertaking dependent on the coal and iron and steel industries, it lags behind in the development of adequate marketing skills. In the future, when foreign companies enter Poland's railway market through open access, the highly sophisticated marketing methods of these foreign companies may rapidly take away the share of railway business from

Poland's transport companies.

1.3.3 Lack of Financial Resources for Settling Accumulated Debts

(1) Financial Status of PKP S.A.

When PKP was incorporated in 2001, PKP S.A. took over the accumulated debts of Poland's railway industry.

The book values of PKP S.A.'s assets and liabilities as of the end of FY 2002 were 22.2 billion PLN and 11.4 billion PLN, respectively. Pursuant to the new Law on restructuring, commercialization and privatization of the Polish State Railways, PKP S.A. procures funds, repays short-term liabilities, and provides financial support to PKP Regional. The Ministry of Finance (hereinafter referred to as "MOF") guarantees loans borrowed by PKP S.A. PKP S.A.'s major assets, such as the stocks of transport companies, are offered to MOF as collaterals.

On the other hand, due to various problems, most of the assets owned by PKP S.A. cannot be made into capital easily, making it impossible to use them to pay off debts. For this reason, PKP S.A. may not be able to repay all the debts by itself. Restructuring the assets and liabilities of PKP S.A. has become an urgent issue from the perspective of finding a solution to this problem.

(2) Problems Relating to the Settlement of Accumulated Debts

There are two problems related to the settlement of PKP S.A. debts. One problem is that it is not easy to plan the cash flow of PKP S.A. due to difficulty in predicting the amount of funds needed to support PKP Regional financially. Another problem is that the time will come when a huge amount of capital will be needed to repay PKP S.A.'s loans and bonds; there is the possibility that the necessary capital will not be available.

The following summarizes the precautions to be taken in the settlement of accumulated debts.

1) PKP S.A. may not be able to repay all the debts by itself. Government bailout is necessary to repay the remaining debts.

2) Privatization of the related companies through the sales of stock is expected to be the largest source of funds for debt repayment. Failure in these privatization attempts may doom the cash planning.

3) Additional financial assistance to PKP Regional may force PKP S.A. to change cash planning.

In the case that PKP S.A. fails to acquire enough funds from privatization to repay the debts, MOF may sell off the assets used as collaterals to compensate for losses incurred in providing the guarantee. In such case, PKP Group may no longer be able to maintain its industry position in Poland's domestic market because whoever buys the liquidated assets will employ the assets in such a way as to optimize profits, without paying heed to the policies of the Polish Government. In addition, the Polish Government may not be able to effectively implement policies such as the policy to boost employment.

Poland's railway undertakings may fail even before wear and tear take a toll on the rolling stock and infrastructure facilities

To solve problem 1), efforts must be made to increase the sources of funds to pay off the debts of PKP S.A. With regard to problems 2) and 3), the financial situation of various related companies must be improved wherever necessary.

In the new Restructuring Program, the importance of a swift privatization process for various PKP companies, PKP Cargo in particular, is emphasized. For implementing this privatization process effectively as well, the financial situation of the related companies must be improved as quickly as possible.

(3) Risk of Reduction in Financial Resources for Settling Accumulated Debts

In addition to the above problems, there is the danger that the amount of debts that PKP S.A. fails to repay on its own may increase. At present, revenue from the sales of the stocks of related companies accounts for the largest source of funds for debt settlement. The book value of the stocks and equity of the related companies is about 4.5 billion PLN. However, there are contributing factors that can lower the sales value of stock than expected. The biggest factor is the surplus workforce at various related companies. The existence of redundant personnel and powerful unions may deprive investors of their incentive to invest. Under such circumstances, investors may make the purchase with a lower evaluation of the companies' values, thus reducing the financial sources for repaying the debts.

1.3.4 Legislative, Organizational, and Structural Aspects Hindering Railway Operations

(1) Operations Hindered by the Organizational Aspect of Government

The Railway Bureau under the Ministry of Infrastructure is in charge of railway administration. However, due to the shortage of manpower, it is not an agency equipped for carrying out the restructuring and privatization of the railway industry. In addition, as it is necessary to coordinate not only with the Railway Bureau but also with the policies and organizational strategies of other ministries and agencies in the drafting of railway policies, such coordination is not yet in place, creating an obstacle to railway operations.

(2) Operations Hindered by the Legislative Aspect

In terms of the legislative aspect, various regulations that are not applicable to the current state of railway operations exist, hindering the operations of various PKP companies. The fare discounting system is an obvious example. The system is prescribed by the Railway Transport Law; losses from fare discounting are to be compensated by the government. However, due to the current budgetary constraint, the government can only subsidize part of the losses. Therefore, companies engaging in passenger transport must shoulder part of the losses of this system, which is implemented under a government policy. The existence of such system constitutes a major obstacle to railway operations.

(3) Revamping the Regional Passenger Transport System

As described in Section 1.3.1 of Chapter 1, problems resulting from the "overly extended railway network" become obvious in the regional passenger transport system. Downsizing is indispensable in order to improve the regional passenger transport system. On the other hand, because the various burdens related to the operations of the regional passenger transport system are now concentrated at PKP Regional, if this structure is not revised, reformation of the regional passenger transport system is not likely to succeed.

At present, about 67% of the operating expenses are incurred from transactions within the PKP Group. These are expenses that PKP Regional cannot reduce on its own. In other words, this huge amount of losses is not caused by problems peculiar to PKP Regional. The transaction structure of the whole regional passenger transport system is the culprit.

Another problem is that PKP Regional does not have sufficient capacity to negotiate transaction conditions with outside suppliers such as PKP Cargo and PKP Energetyka. This is caused by the fact that PKP Regional does not have a department to calculate the appropriate costs of services required of a regional passenger transport undertaking. Furthermore, because of the practice of trying to procure goods and services from within the PKP Group as much as possible, PKP Regional may be purchasing goods and services at prices higher than the market prices.

In addition, as all engine and train drivers are now employed under PKP Cargo, PKP Regional must hire them through a lease contract. Train operation is an important factor in railway operations and safety management, the fact that this is consigned to another company constitutes a major obstacle to independent operations.

(4) Revising TAC-related Provisions

Presently, TAC rates are determined by dividing the operating expenses of PKP PLK in the last fiscal year by the projected train kilometers while taking into account other factors. As a consequence, the cost performance of PKP PLK is reflected in TAC. Thus, when the cost performance of PKP PLK is low, it will affect transport companies through TAC. Methods for setting TAC must be reviewed to avoid such interference. Furthermore, because the method of setting TAC affects the burden sharing of railway's operation costs between the passenger and freight transport, it must be reviewed carefully.

1.3.5 An Overview of Issues

Table 1.3.2 gives a summary of the various issues and their relationship with responsible entities. "O" indicates the entity that shall handle the issue and "M" indicates the main entity that is dealing with the issue.

Table 1.3.2 Issues and the Role of Various Entities

Summary of Issues	Polish Government PKP S.A.	Various PKP PLK Companies
Dealing with the surplus workforce	M	O
Effective utilization of excess assets	M	O
Liquidation of accumulated debts	M	O
Upgrading and modernization of superannuated facilities and rolling stock	M	O
Development of marketing system	-	O
Other management improvements	-	O
Improvement of administrative organizations	O	-
Legislative improvement	O	-
Reform of regional passenger transport system	O	-
Revision of TAC-related provisions	O	-

1.3.6 Relationship between the Issues and the Study's Basic Principles

Figure 1.3.2 shows the relationship between the various problems/issues and the basic principles of the Study.

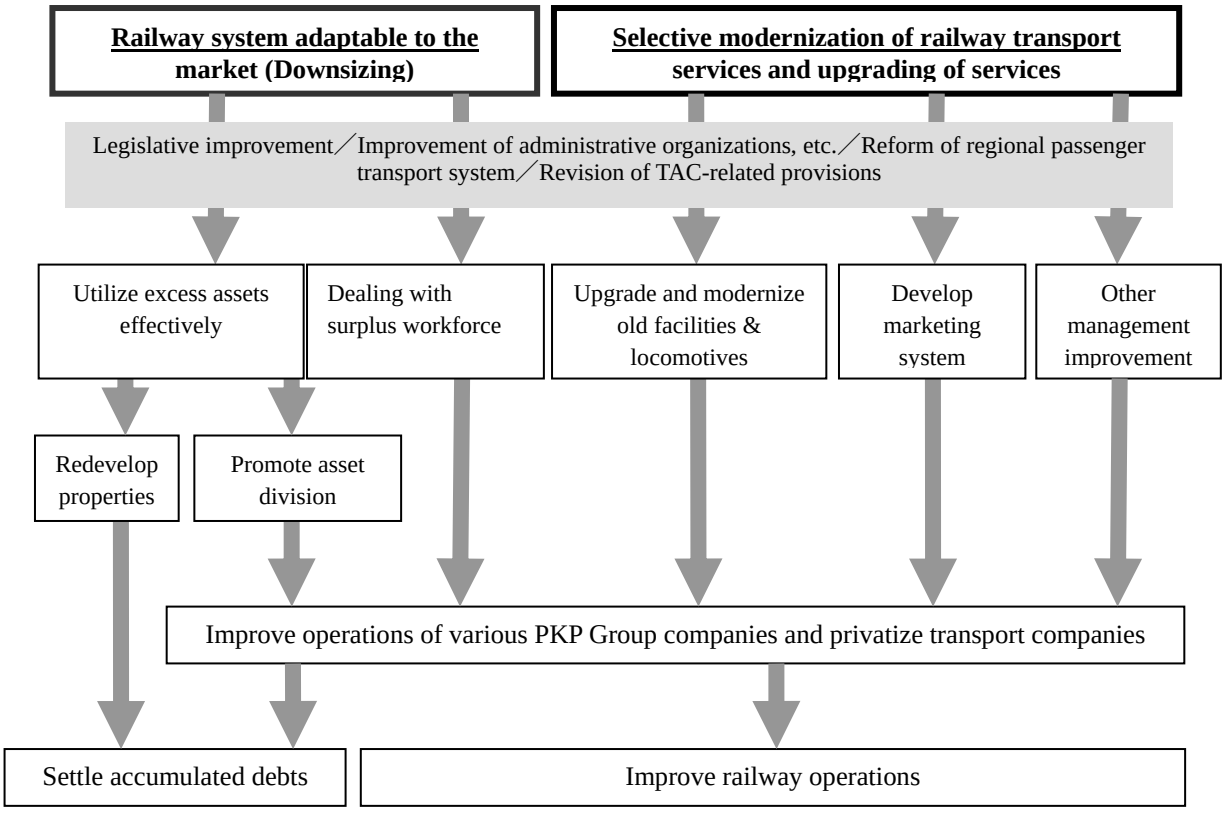

Figure 1.3.2 Relationship between the Issues and the Basic Principles of the Study

1.4 RAILWAY SYSTEM ADAPTABLE TO THE MARKET

Downsizing needs to be carried out to build a railway system that is adaptable to the

market. The concept of downsizing is as follows:

1.4.1 Precautions at the Time of Downsizing

(1) Effects of Downsizing on Various PKP Group Companies

Because the downsizing of each company will also affect the operation scale of other companies, the degree of downsizing must be determined taking into consideration its effects. It is also necessary to take into account the railway policy of the country and local needs. Figure 1.4.1 shows the current operation scales and operation kilometers of various companies.

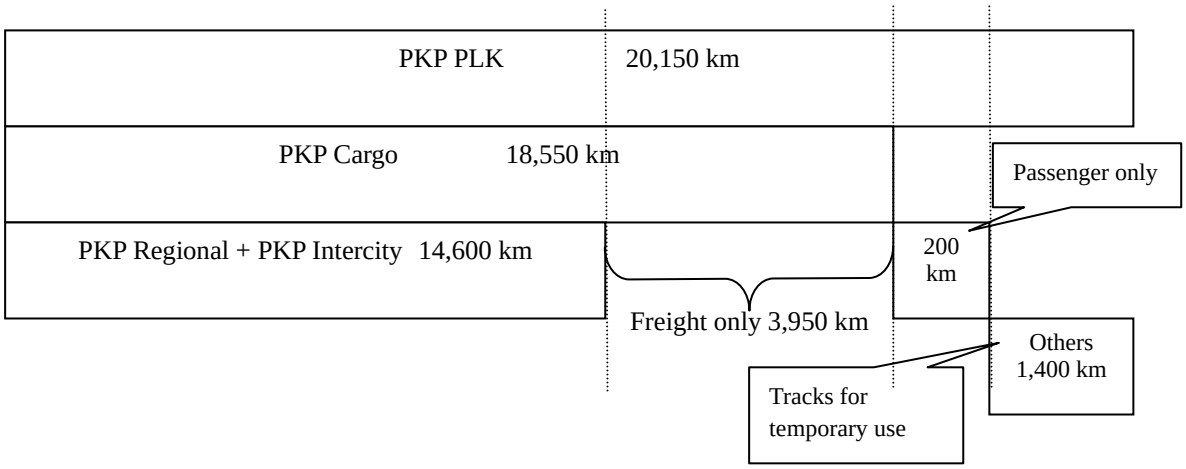

Figure 1.4.1 Operation Scales of Various Companies

Because PKP PLK is an infrastructure management company, it cannot determine its own operation scale. For the most part, its operation scale is determined according to the needs of various transport companies. Thus, as shown in Figure 1.4.1, the operation scale of PKP PLK is dependent heavily, among other transport companies, on the operation scale of PKP Cargo.

Through TAC, downsizing at the various transport companies will affect the profit and loss of these companies mutually. For example, if PKP Regional carries out downsizing unilaterally to reduce its operation scale, the share of TAC shouldered by PKP Cargo, which transports freight, may increase, posing a threat to the soundness of its business. Therefore, the degree of downsizing pursued by the various transport companies must take into consideration the kind of effects it may have on other companies and the downsizing level of the PKP Group must be determined.

(2) Effects of Downsizing on Voivodships

It is necessary to examine how voivodships will handle the loss-making regional passenger transport lines that PKP Regional closes down due to downsizing.

If the Law of Income of Government Units takes effect, local tax revenues (PIT for personal income tax and CIT for corporate income tax) will increase substantially while most of the special subsidies that voivodships have been receiving from the national government until then will be abolished. The original subsidies for regional

passenger transport undertakings are included in these special subsidies. Figure 1.4.2 shows the basic concept of the Law of Income of Government Units.

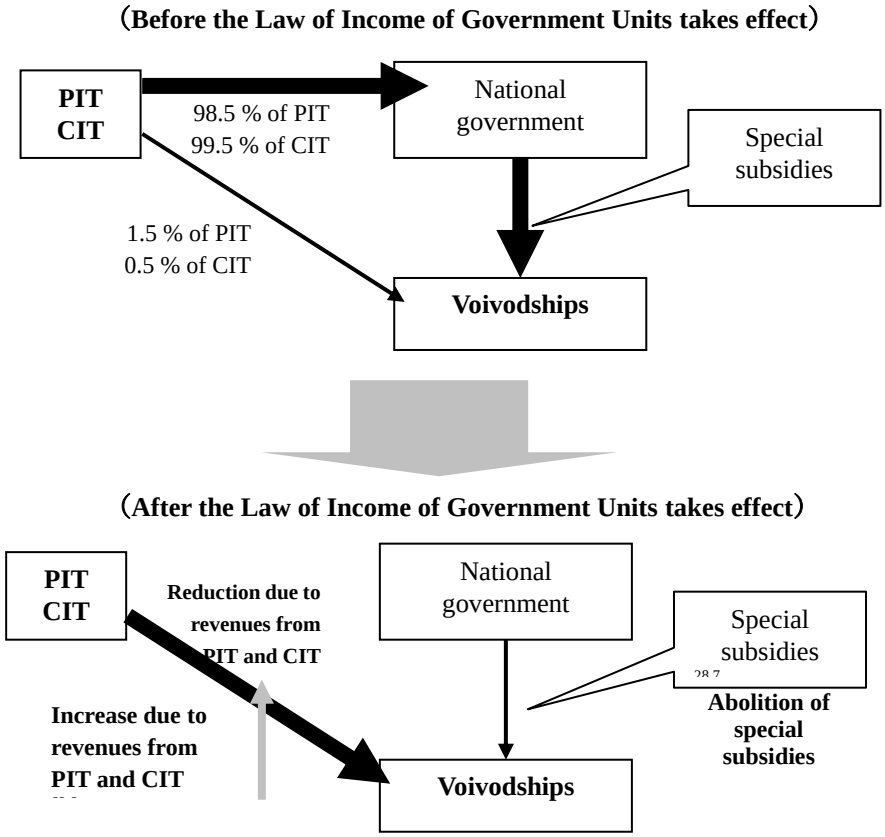

Figure 1.4.2 Basic Concept of the Law of Income of Government Units

With the effectuation of the Law of Income of Government Units, voivodships may utilize the increased tax revenues to make innovative improvements to regional passenger transport services to fulfill the mobility needs of local residents. Regional passenger transport services also include the operation of loss-making trains that PKP Regional has closed down.

On the other hand, because voivodships can also use the increased revenue from the Law of Income of Government Units for other transport modes besides railways, they might choose other alternative modes such as bus operation, etc. rather than running loss-making trains. In the case that voivodships do not have enough revenue income, loss-making trains that can be operated may be limited.

That is, when implementing downsizing, the scale of downsizing must be determined taking into account the readiness of voivodships in continuing the operation of loss-making trains and their revenue income. In addition, as voivodships are expected to have different principles for regional passenger transport services, regional passenger transport systems that can respond to multiple forms of operation should be established.

1.4.2 Basic Principles of Downsizing

How downsizing should be implemented is determined by the basic strategies of various companies and the railway policy of the Polish Government. The following are two basic principles for determining the degree of downsizing.

(1) Downsizing should emphasize that the various companies are independent corporate entities and aim at optimizing profits. In this case, loss-making trains and lines will be completely abolished. Hereinafter this concept is referred to as "profit-optimization strategy."

(2) Downsizing should aim at a break-even operation scale. This method aims at moderating the degree of downsizing by using profits from profitable businesses to subsidize losses from loss-making businesses. Hereinafter this concept is referred to as "balance-of- payment strategy."

Table 1.4.1 summarizes the characteristics of the two strategies.

Table 1.4.1 Comparison of the Concepts of Downsizing

Strategy	Strengths	Weaknesses
(1) Profit-optimization strategy	Basic strategy for private companies. Can expect investment from outside investors if high profitability is maintained.	Compared to the balance-of-payment strategy, this strategy requires drastic layoff because of downsizing and may trigger disputes between the labor and management. Also, it may not be in accord with national policies.
(2) Balance-of-payment strategy	Compared to the profit-optimization strategy, its moderate degree of downsizing can ease labor-management disputes and the employment issue.	Because this strategy cannot bring in profits, the chance of obtaining investment from outside investors is slim.

PKP PLK is not scheduled for privatization; it is expected to remain as a state enterprise. Although it is not obliged to pay dividends to stockholders, it needs to balance its income and expenditure to attain the minimum condition for a company to survive. Consequently, PKP PLK shall adopt the balance-of-payment strategy. On the other hand, transport companies that plan to privatize can adopt either one of the above-mentioned strategies.

1.4.3 Provisional Analysis of Downsizing Strategies

When applying the above-mentioned two strategies to PKP Regional and PKP Cargo, the combinations in Table 1.4.3 can be conceived.

Table 1.4.2 Various Strategy Combinations

PKP Cargo \ PKP Regional	Balance-of-payment strategy	Profit-optimization strategy
Balance-of-payment strategy	Scenario A	Scenario C
Profit-optimization strategy	Scenario B	Scenario D

Combinations of strategies in Table 1.4.2 produce four scenarios. The strengths and weaknesses of various scenarios must be assessed taking into account the social needs for regional passenger transport and freight transport. In particular, as it is desirable to develop regional passenger transport in areas that already have existing customers, it is necessary to maintain a relatively large network. On the other hand, because of the social need to transport a large volume of freight at specific sections, it is not necessary to choose the shortest transport sections. In comparison, freight transport can have more flexibility in increasing or reducing the network size.

Specifically, when determining the degree of downsizing, the following procedures can be used to facilitate the analysis of effects on various organizations.

1) Calculate the feasible level of overall TAC reduction by assuming an achievable level of productivity improvement at PKP PLK.

2) Assume an achievable level of productivity improvement at PKP Regional.

3) Calculate a workable network size for regional passenger transport based on the assumed level of productivity improvement. At that time, the state of regional passenger transport must be taken into consideration to determine whether PKP Regional shall adopt the balance-of-payment strategy or the profit-optimization strategy.

4) Calculate the network size of PKP Cargo based on the assumed level of TAC reduction and the network size of regional passenger transport. At that time, the network size of PKP Cargo when adopting the balance-of-payment strategy and the network size when adopting the profit-optimization strategy shall both be calculated.

5) From the viewpoint of balanced development for the country, the network size shall be determined taking into account the lines (lines of national importance) that the country must maintained.

According to the above analysis, the network size that is adaptable to the market is estimated at about 11,000 km to 15,000 km. Detailed analyses will be given in chapters 5 and 6 to recommend an optimal network size.

1.5 SELECTIVE MODERNIZATION OF RAILWAY TRANSPORT SERVICES AND UPGRADING OF SERVICES

After a network size adaptable to the market is achieved through downsizing, railway businesses that have reached an appropriate scale must be modernized to improve services to satisfy customer needs. The following are items that shall be implemented with emphasis.

· Eliminate maintenance backlog and modernize inefficient infrastructure facilities

· Modernize rolling stock

· Provide services that satisfy customer needs

· Develop marketing systems

1.5.1 Elimination of Maintenance Backlog and Modernization of Inefficient Infrastructure Facilities

(1) Elimination of Maintenance Backlog

With Poland's accession to the EU, it is necessary to make urgent investment to eliminate slow sections caused by maintenance backlog on lines operating under international treaties. Under the severe financial situation, it is important to always quantify maintenance backlog and be aware of the cost required for its elimination in order to draw up effective maintenance plans.

(2) Re-examining Priority in the Modernization of Infrastructure Facilities

Investment in the modernization of lines needs to be carried out by first taking into account the restructuring and privatization of the PKP Group. Priority must be given to those railway lines that can not only improve the profitability of PKP PLK but also those of the various transport companies including PKP Regional, PKP Intercity, and PKP Cargo, etc. In other words, priority must be given to lines that can effectively utilize the limited investment capital, have high investment return, and can increase the competitiveness of the railway undertakings.

1.5.2 Modernization of Rolling Stock

When western European companies with high-quality rolling stock enter the market through open access after Poland's accession to the EU, the current PKP Group transport companies may find themselves in disadvantage. The gap in the competition with other transport modes such as motor vehicles and airplanes, etc. may widen. Highly efficient and comfortable new cars must be introduced to bridge the gap.

Since financial constraints make it difficult to make replacement with all new rolling stock, ways to utilize the existing passenger cars shall be considered such as by selecting relatively new rolling stock and refurbishing them completely to increase competitiveness.

1.5.3 Offering of Services that Satisfy Customer Needs

(1) Shorter Trainset and Higher Frequency Services

In addition to the high speed of urban transit and short-distance intercity transport, high-frequency operations and a standardized timetable without the need of checking the time are important elements for raising the competitiveness of railway transport undertakings. Efforts shall be made to attain shorter trainset and higher frequency in order to realize these elements. By further raising the operation frequency, it is possible

to upgrade services by offering transport services that combine high-speed and slower services.

(2) Expanding Intercity Transport

Because there is a potential need for intercity transport that links major cities, efforts shall be made to actively offer qualified train services to connect these regional transport centers. Issues for intercity transport include strengthening of international competitiveness following accession to the EU and actively upgrading the speed of modernized sections to increase competitiveness with other transport modes.

(3) Construction of Logistics Centers

Combined transport, together with bulk transport, is expected to become the main force of rail freight transport in the future. However, if a combined transport company becomes a contractor for only mid-distance rail transport, it does not have the base to adequately accommodate customer needs, making it difficult to develop businesses that can respond to customer needs. To avoid this, it must aim at becoming an intermodal transport company. Logistic centers, which are the bases for responding to customer needs, must be developed as soon as possible.

1.5.4 Development of Marketing Systems

Expertise in developing marketing skills, including the review of price-setting methods, improvement of ticket sales system, etc, must be acquired in order to develop marketing systems for the transport companies. Besides acquiring the know-how for developing marketing systems, it is also necessary to secure facilities for conducting marketing activities.

For example, stations are important assets for PKP Regional and PKP Intercity, which operate passenger transport. The marketing methods and ticket sale systems will change dramatically depending on how the stations are utilized. Similarly, marshalling yards are important assets for PKP Cargo, which transports freight. They have great influence on the structure of the distribution system. Therefore, it is important to divide these assets as soon as possible.

1.6 ROLES OF THE NATIONAL AND LOCAL GOVERNMENTS

With today's rapid increase in road transport, keeping a huge conventional railway network in Poland is a drawback to the country. A transport policy that can draw financial resources to transport services and effectively utilize the strength of railways is needed.

To realize this transport policy, the PKP Group, the entity responsible for the implementation, must have a stable operation base. The government must lend support to the PKP Group companies to help resolve the various problems they face in order to put Poland's transport policy into practice.

1.6.1 Need for a Comprehensive Transport Policy

When developing the infrastructure of transport-related social capital, it is necessary to formulate a comprehensive plan with a view to the national life, clarify priorities, and give priority to investment in the public sector. To that end, a comprehensive transport plan must be formulated. It is also necessary to establish and implement a comprehensive transport policy from the perspective of implementing various policy issues and transport measures.

In Poland, because the railway played a central role as the main transport mode for passenger and freight transport in the planned economy era, it did not require any comprehensive transport policy. In the 1990s, due to the immense changes that took place in the political and economic systems and the rapid shift to road transport, a need to determine the allocation of public investment between the road and rail transports emerged. However, because Poland had not given much thought to allocating public investment to the transport industry until then, PKP ended up running a huge inefficient system and seeing its operation condition deteriorates year after year.

In Europe, car ownership and road freight increased considerably in the 1950s and 1960s. From the perspective of a comprehensive transport policy and in a form matching the actual needs of the transport market, many loss-making railways were abolished. Services become concentrated to areas that can utilize the characteristics of rail transport. Besides the fact that many lines were abolished, considerable amounts of income from Germany's petroleum tax and France's office tax are used to subsidize regional transport including railways. Without such financial backup, public transport would have been threatened by the growth of motorization.

1.6.2 Areas in Which Rail Transport Excels

The following are areas that can utilize the characteristics of rail transport in light of Poland's geographical condition, city distribution, and industrial structure:

(1) Intercity Passenger Transport

Besides the railway, air and road transport are other means of intercity passenger transport. Air transport has the merit of being able to cover a relatively long distance in a short time while road transport is extremely flexible in meeting transport needs as compared to other transport modes. On the other hand, air transport is not suitable for bulk transport and it is not economical for mid-distance transport.

Compared to other transport modes, road transport has a disadvantage in travel time in transport longer than mid-distance. In terms of intercity passenger transport, the railway has a niche in high-speed passenger transport within the range of a maximum travel time of four hours.

(2) Passenger Transport in Urban Areas

Besides the railway, road transport is a viable means of transport in urban areas. Compared to the railway, road transport has the merits of being more flexible and can

adjust easily to the needs of the traveling party. On the other hand, because urban development needs to be pursued while utilizing the city's limited space effectively, excessive development of road transport can create problems such as traffic congestion. One way to tackle this problem is to utilize the railway, which is suitable for high-volume transport in suburban areas, to provide commuting and regular transport services to the cities.

For areas other than large cities, although they do not need to be concerned about "pursuing urban development and utilizing limited space effectively," some have no choice but to continue train operations because (i) there is no alternative transport means (e.g. bus) to replace the railway, or (ii) the railway is more economical compared to other transport modes. In this case, the national and local governments shall work out policies to maintain the railway such as by contracting out train operations or injecting capital to secure the transport means for citizens living along the railway lines.

(3) Combined Freight Transport

Conventionally, bulk transport accounts for most of the freight transport business. In line with changes in future transport demand, it will be necessary to meet various freight transport needs. The flexibility of road transport is expected to be an important element in freight transport as well. On the other hand, the railway will always have economical advantage in the transport of high volume goods. The railway industry must cooperate with other freight transport modes to establish a system that can facilitate the so-called combined freight transport, develop container transport, provide direct transport between centers, expand the scope of coverage, clarify the arrival time and so on. It must transform itself into an enterprise that can play a central role in combined freight transport.

(4) Transport of Bulk Freight

Rail transport is most suitable for the mid-to-long distance transport of bulk freight; this trend will not change in the future. On the other hand, the demand for bulk freight transport is greatly influenced by the demand for the transported items. In Poland, because coal transport accounts for the greater part of the bulk freight transport market, the trend of coal demand must be taken into full consideration when reviewing how the railway shall handle the bulk freight transport business in the future.

(5) Environmental and Safety Concerns

When reviewing role sharing between the rail transport and other transport modes, it is necessary to take into consideration the possible increase of external diseconomy brought upon by other transport modes, such as road transport, on the entire nation with regard to safety, environment, and other aspects. In land transport, the railway has remarkably low accident and fatality rates. Its low carbon dioxide emissions exert little burden on the environment. A modal shift policy shall be considered because it is possible to restrain these external diseconomies by utilizing rail transport.

1.6.3 Tackling Various Problems

In order to put the basic concepts of the above-mentioned comprehensive transport policy into practice, the Polish Government must help resolve the problems faced by the various PKP Group companies. If privatization is carried out prior to solving these problems, the Polish Government may not be able to effectively implement its policies such as the policy to boost employment. Of the issues pointed out in "Analysis of Pending Issues" in Section 1.3 of Chapter 1, Table 1.6.1 shows the issues that the government shall tackle and their relevant measures.

Table 1.6.1 Various Issues and Governmental Measures

Summary of Issue	Governmental Measure
Deal with surplus workforce	Utilize PKP S.A., etc. to deal with the surplus workforce
Utilize excess properties effectively	Utilize PKP S.A., etc. to employ excess properties
Settle accumulated debts	Increase financial resources for debt settlement through reduction of redundant workers and utilization of excess properties
Upgrade and modernize superannuated facilities and rolling stock	Provide financial allowances for upgrading facilities and rolling stock, etc.
Improve administrative organizations, etc.	Set up a committee to coordinate opinions of the organizations
Legislative development	Make amendment in the new Railway Transport Law and enact the new Law on restructuring, commercialization and privatization of the Polish State Railways
Revamp the regional passenger transport system	Implement structural reform for PKP Regional
Revise TAC-related regulations	Revise ministerial ordinance on TAC-setting method

1.7 CORPORATE MANAGEMENT APPROACH ADAPTABLE TO MARKET ECONOMY

1.7.1 Elimination of External Interference

The Polish Government, especially the Ministry of Infrastructure, must make efforts to create an environment that prevents external organizations from interfering inappropriately into railway operations. In particular, because the PKP Group was originally a state entity, it would be easy for politics to interfere in management decisions such as withdrawal from loss-making businesses and selection of procurement partners, etc. However, such kind of political interference must be eliminated after privatization.

1.7.2 Awareness Reform

Both the management and employees of a company in a market economy must be "customer-oriented." Only when there are customers then can a company have income, its employees have wages, and stockholders have dividends. All managers and employees shall work to satisfy customers, each in his/her own capacity. In other words, they must carry out work always keeping in mind the trust, safety, convenience, and amenity of the customers.

1.7.3 Human Resources Development

(1) Human Resources Development Workshop

Resources must be invested into human resources development in order to reform the awareness of employees and enable them to acquire job skills. Many tools have been developed for human resources development. As part of this Study, a "Human Resources Development Workshop" was implemented using these human resources development tools to enable middle-management executives from various PKP Group companies to participate in a pilot training program aimed at cultivating customer-oriented awareness. Table 1.7.1 gives an overview of the workshop.

Table 1.7.1 Overview of the Human Resources Development Workshop

Purpose	The Workshop aimed at reviewing actions that should be taken to train desirable workers and develop customer-oriented culture for various transport companies and enticing awareness reform in light of accession to the EU.
Method	The "ID/OS (Institutional Development/Organizational Strengthening) Method" and "SWOT (Strength, Weakness, Opportunities, Threat) Analysis," participatory methods widely used in Europe, were employed to enable participants to analyze the status of the PKP Group themselves and to make them realize the problems in today's operation conditions.
Result	The Workshop was effective in enabling its participants to identify problem areas in PKP companies. It helped sort out problems that should be resolved and identified feasible measures that should be implemented by the various companies. The group presentation helped clarify the relationship between the participants' companies and other Group companies.

Participants expressed strong interest in similar workshops in the future.

(2) Other Methods

In addition, small group activities and recommendation activities at railway jobsites are effective in motivating participation, upgrading services, and improving work attitude. Utilizing in-house training facilities is effective in reforming awareness. For a corporate entity that has as many employees as the PKP Group, the existing training facilities can be put to better use.

1.7.4 Dealing with Labor Unions

Although inappropriate interference in operation by outsiders shall be discouraged, active support from the government is needed in dealing with the labor unions.

Historically, the labor unions had contributed immensely to the sound operation of businesses by preventing unnecessary disputes between the management and workers and directing management resources to where they were needed. However, with changes of the times, companies must be managed in a flexible way to adjust to the economic environment. In such times, the rigid stance of labor unions may obstruct the mobility of human resources and lower the productivity of businesses.

At the time of restructuring with a view to raising productivity, negotiation with the labor unions is necessary in order to deal with the surplus workforce. Negotiating this issue with the labor unions is one of the important tasks of the management. The PKP Group was originally the largest state entity, its labor unions were huge and their ties to politics were strong. For this reason, it is difficult to negotiate with the labor unions on a non-governmental level. Negotiations must be carried out with adequate support from the government.

Furthermore, as negotiations with the labor unions may result in different levels of financial burden for the public, it is necessary to keep the public well informed during the process of negotiation. The government, companies, labor unions, and politicians should be aware of public opinions. To avoid making wrong judgment in the negotiations, it is important to inform the public of the negotiation process and establish venues to facilitate communications between the railway undertakings and the people.

CHAPTER 2 RAILWAY DEMAND FORECAST

2.1 METHODOLOGY

2.1.1 Passenger Transport

(1) Total Passenger Transport Demand Forecast

Although Poland has experienced drastic socioeconomic changes, there has been little change in statistics related to trip purposes and average number of trips made by the Polish people.

By experience, it is proven that the average number of trips made by car owners and those made by non car owners are not the same, and that the average person-trip increase correlates to the increase of car ownership. Statistical data shows that the number of passengers by all transport modes except passenger car decreased almost by half from 1990 to 2001 in Poland while the number of registered passenger cars increased by 5.242 million. It is can be predicted that the number of total passengers by all transport modes including passenger cars will slightly increase, since the overall passenger-km is assumed to increase in proportion to the increase with gross domestic product (GDP).

In this study, the elasticity method was applied to forecast the passenger-km. It was assumed that the forecasted passengers (trips) will increase in proportion to the increase of the population and also is affected by the rise of car ownership.

Forecasts for future passenger transport demand were made for 2006 and 2010, considering the upper and lower case socioeconomic structure. The transit passenger demand was also forecast using the elasticity method with respect to the average GDP growth rate in the Central and Eastern European countries.

(2) Modal Split

The modal split model was applied to forecast the total passenger transport demand for passenger car, and the demand for public transport, taking into consideration the projected future car ownership rate. The inland waterway and maritime passenger transport demand was also forecast using historical trends.

(3) Assigned Traffic

Two types of forecast methods were applied. The first method is to estimate the traffic volume by railway section based on future railway passenger OD (Origin-Destination) data and the railway network. The second method is to estimate traffic volume by railway section by applying the growth rate. The second method was applied in the demand forecast since plausible results can be obtained for forecasts for the near future. It can also reflect intra-zonal traffic and be used to forecast transport volume on dead end railway lines.

Since sufficient data was not available, the future international passenger transport

volume by railway section was estimated by projecting the growth rate to the present international passenger transport volume based on present railway passenger origin-destination (OD) data and railway network.

2.1.2 Freight Transport

(1) Total Freight Transport Demand

Freight transport demands for major commodity groups were forecast based on the official reports by referring to their projected volumes of commodity production and consumption. Freight transport demand forecasts for commodities were made by applying elasticity with respect to GDP growth.

The reasons are as follows.

- Total freight transport demand of the country depends on its level of economic activity. Accordingly, the empirical elasticity of freight transport demand in relation to GDP, expressed in terms of ton-km, was used extensively in the forecast.

- The value of the future demand of freight transport demand elasticity shows a positive value, similar to that of Western European countries.

- The accumulation of projected volume of commodity groups was used to forecast the freight transport demand since it attains more plausible results than using a common elasticity model using the GDP growth data.

- Official reports with projections for future demand and production volume by major commodity groups were readily available.

As for the socioeconomic frame as a base for future freight transport demand forecast, “Good” Case and “Bad” Case scenarios were applied.

Regarding transit freight transport, future demand was forecast by elasticity method using the average GDP growth rates projected for Central and Eastern European countries.

(2) Modal split

The freight transport demand for air, inland waterway, and maritime, and pipeline transport was forecasted on historical trend basis.

(3) Assigned Traffic

In this Study, assigned traffic was forecast only for railway based on the information presented above.

Two types of forecast methods are applicable. The first method is to estimate the transport volume by railway section based on future railway freight OD (Origin-Destination) data and railway network. The second method is to estimate traffic volume by railway section by applying the growth rate. The second method was applied for the demand forecast since plausible results can be obtained for forecasts of

the near future, it can reflect intra-zonal traffic, and transport volume on dead end railway line can be forecasted.

2.1.3 Zoning System

As indicated in Figure 2.1.1 and Attachment 2.1.1, Poland was divided into 164 traffic zones for the purpose of transport forecast and neighboring traffic areas outside Poland were divided into 37 zones. Traffic zones within Poland were determined based on the catchment area of major stations. Traffic zones outside of Poland were determined based on the cross border points by rail.

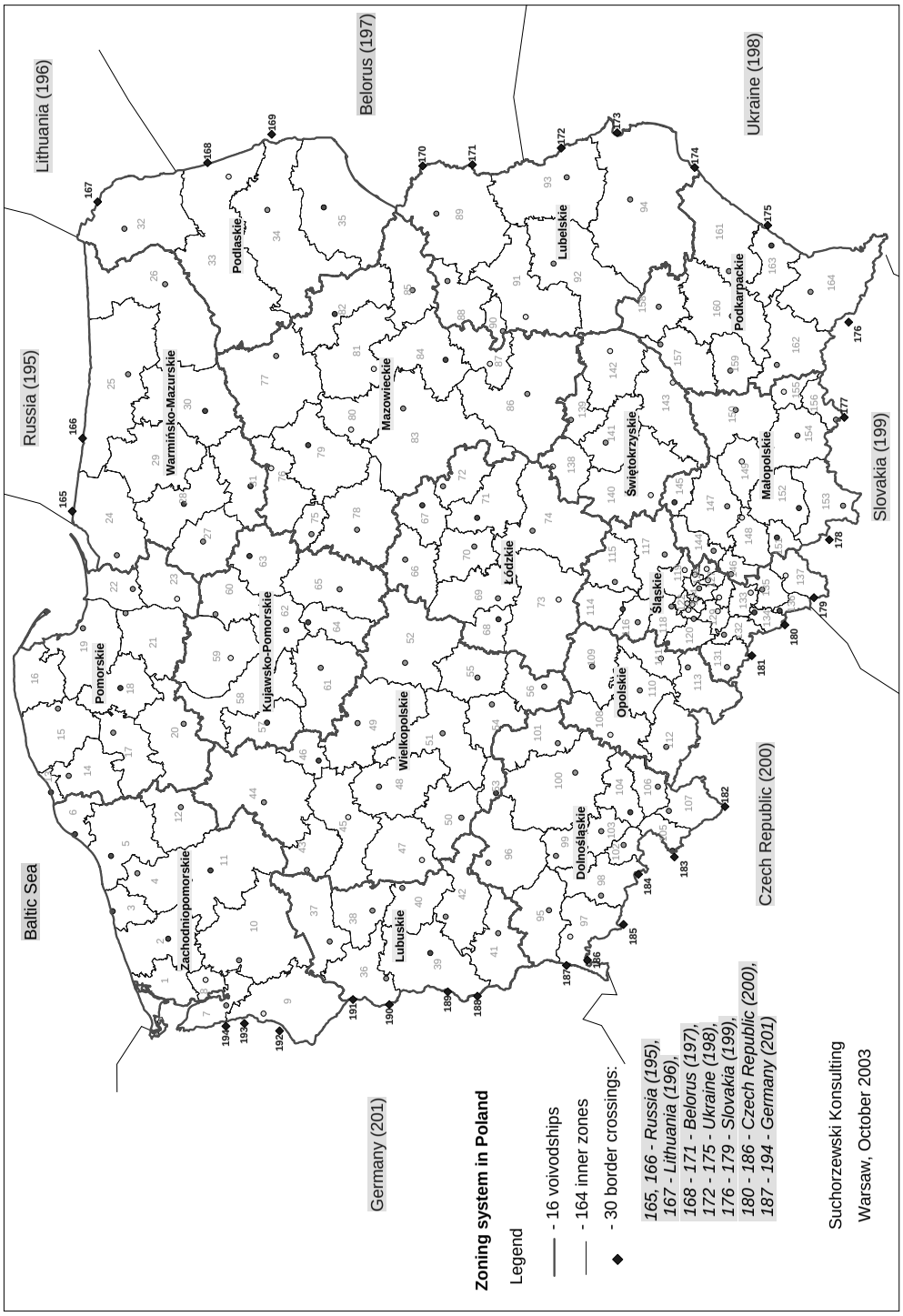

Figure 2.1.1 Traffic Zones

2.2 SOCIOECONOMIC STRUCTURE

2.2.1 Economic Growth

As similarly observed in Eastern European countries, the Polish economy showed negative growth rates since the socioeconomic reform started in 1989. The economy experienced minus growth from 1989 to 1991 and recovered in 1992.

In the period between 1994 and 1997, the economy grew more than 5% in terms of GDP, however between 2001 and 2002, the economy stalled and resulted in a GDP 1.3% growth in 2002.

In 2001, the GDP in Poland was 176,300 million US dollars and GDP per capita was 4,600 US dollars as expressed in 2001 prices. However, according to the "National Account of OECD Countries, Main Aggregates, Volume 1", compiled by OECD, the GDP per capita was estimated at 9,900 US dollars in terms of purchasing power parity.

The Ministry of Finance of Poland has judged that the economy has already recovered from the worst economic situation and forecasts a GDP growth rate of 3.5% in 2003.

A comparison of the economic structure of Poland to that of EU shows that the agricultural sector is large and the service sector is relatively small. In Poland, the agricultural sector represents 7% of the economy, the manufacturing and construction sectors are at 40%, and the service sector is at 53%. Whereas, in the average of EU countries these statistics stand at 2.3%, 31% and 66%, respectively.

As presented in Table 2.2.1, the "National Development Plan 2004-2006", sets aims and achievement level targets. Among the various aims, the expansion of modernized railway section was targeted for expansion from 300km at the end of 2001 to 2,434km at the end of 2006. Expansion of highway/expressway network from 398km/206km to 940km/399km was also targeted.

The GDP growth rate forecast in the "National Development Plan 2004-2006" was approximately 5% a year considering the buoyancy effect provided by the planned accession to EU.

Table 2.2.1 Goals Set in the "National Development Plan 2004-2006"

No	Aim	Index	Index value at the end of 2001	Assumed index value at the end 2006
1.	General Aim	GDP *per capita* (EU 15 = 100)	40,0	42,0 – 43,0
2.	Aim 1: support for achieving & sustaining long-term high GDP growth	Year average GDP growth (previous year = 100)	1,0	6,0
3.	Aim 2: Increase of level of employment and education	Employment index (age 15-64)	52.7%	54-55%
4.		Unemployment rate (BAEL[1)])	19.9	15.0
5.		Education level (basic/medium/higher)	17.6 / 70.8 / 11.6	15.0 / 72.0 / 13.0
6.	Aim 3: Joining Poland into European networks of transport and information infrastructure	Highways/ expressways (km)	398 / 206	940 / 399
7.		Modernized railway lines (km)	300	2,434
8.		Access to Internet (hosts no / 100 habitants)	1.2	3.4
9.	Aim 4: Increase of share of high value added sectors in economy	Employment in sectors (agriculture/industry/ services)	19.1 / 30.5 / 50.4	17.5 / 30.5 / 52.0
10.		Expenses of R&D (% of GDP)	0.65	~1.5
11.	Aim 5: Support for all regions & social groups to participate in the development & modernization	Internal difference of GDP *per capita* between regions	1:2.2	Below 1:2.2
12.		Difference in the unemployment rate	1:7.1	Below 1:6

Source: "National Development Plan 2004 – 2006"

[1] BAEL – the research of the economic activity of the population (*Badanie Aktywnosci Ekonomicznej Ludnosci*) conducted by the Main Statistical Office (GUS), using the definitions of professionally active population, working population and unemployed comparable with those used by the UE.

Note that since the Polish economy could not achieved targeted economic growth rate in 2001 and 2002, prospect of a strong future Polish economy is not entirely promising.

The negative factors for the Polish economy growth are;

- The economy in neighboring Germany, which has a large influence on the Polish economy, seems to have entered into a stagnation period.

- Recent political instability is impeding foreign investment,

- There has been little progress made in restructuring the heavy industry sector, including hard coal production and steel production industries, which are suffering from redundancy in the workforce and overproduction.

- Domestic consumption is still at a low level, and

- the taxation system does not offer a favorable incentive to medium and small enterprise activities.

In the report, "Development Strategy for Poland until 2020" by Polish Academy of Science (PAN), an Optimistic Case and Pessimistic Case were provided in the forecast of the growth of the Polish economy.

In the Pessimistic Case, although world market supports the Polish economy, it assumed that economic policy for economic reform would not have the expected effect due to the expanding or existing deficit in trade balance.

In addition, though the Polish government can expect funds from EU for structuring reform after EU accession, it was pointed out that Poland lacks the human resources and organizations at local government level to make most of these funds.

Table 2.2.2 Economic Forecast Summary

Key Indicators	2002		2003		2004		2005		2006	
Sources	1	2	1	2	1	2	1	2	1	2
Real GDP growth (%)	1.2	1.3	3.5	2.7	4.9	3.8	5.2	4.0	5.5	4.3
Consumer price inflation (av, %)	2.5	1.9	2.3	1.3	2.8	2.0	2.5	2.6	2.5	2.5
Unemployment rate	18.4		18.3		17.4		15.8		15.0	
Current-acc. balance (% of GDP)	-4.0	-3.6	-5.0	-3.7	-5.2	-4.0	-5.7	-4.3	-	-4.4
Budget deficit (% of GDP)	5.4	-	4.9	-	4.5	-	3.9	-	3.8	-
Public debt (% of GDP)	49.8	-	52.5	-	54.2	-	54.0	-	-	-

Sources: 1) "National Development Plan 2004 – 2006", approved by Parliament on 14-January 2003.
2) "Poland: Country Forecast", Economist Intelligence Unit, 9 April, 2003.

Table 2.2.3 GDP Evolution to 2020

GDP	2000	2001	2002	2003	2004	2005	2010	2015	2020
Poland: optimistic scenario (billion PLN) (% yearly)	686	699 1.9%	713 2.0%	735 3.1%	768 4.5%	807 5.1%	1,073 ~5.5%	1,506 ~5.5	2.045 ~5.5
Poland: pessimistic scenario (billion PLN) (% yearly)	686	699 1.9	706 1.0	720 2.0	746 3.6	774 3.8	950 ~4.5	1,199 ~4.5	1,487 ~4.5
Poland: optimistic scenario (billion €)	171	174	178	183	191	201	268	376	510
Poland: pessimistic scenario (billion €)	171	174	176	180	186	193	237	299	371
EU 15 (billion €)	8,510	8,680	8,811	8,987	9,211	9,442	10,683	12,086	13,675

Source: "Development Strategy for Poland until 2020", Forecast Committee "Poland 2000+"

In consideration of the two set of economic growth rates shown above, the projected growth rates for demand forecast is summarized in Table 2.2.4.

Table 2.2.4 Projected Growth Rates

	Actual	Forecast				
	2002	2003	2004	2005	2006	-2010
"Good" case	1.35	3.5	4.9	5.2	5.3	5.5
"Bad" case	1.35	2.7	3.8	4.0	4.3	4.5

The car ownership rate, which has a strong relationship with the distribution of the modal shares of passenger transport, is usually determined by GDP per capita. In the good case scenario, GDP per capita was estimated at 6,950 US dollars 2010, and in bad case scenario, it was 6,430 US dollars.

Based on this per capita GDP data for 2010 and using data car ownership data from neighboring Eastern European countries, the car ownership rate in Poland was projected to be in a range between 320-360 vehicles per 1,000 persons.

The Czech Republic:5,487 US dollars per capita, 325 vehicles per 1,000 persons;

Hungary: 4,652 US dollars per capita, 360 vehicles per 1,000 persons

When a logistic curve was applied to the data, 321 vehicles per 1,000 persons in 2006, and 348 vehicles per 1,000 persons in 2010 were projected for Poland.

$M = S/(1+Ke^{-at})$
where;
M: Passenger car ownership per 1,000 persons
t: Year (Base year is 1960 set as 0)
S,K,a: Parameters
S = 400
K = 88.467
a = 0.12783
$R^2 = 0.995$

In this study, 348 vehicles per one thousand persons, as projected by the logistic curve method, was adopted as the car ownership rate in 2010.

2.2.2 Population

Population in Poland was 38.6 million in 2002, making it the ninth most populous country in Europe accounting for 5% of the population of Europe. Half of the population is less than 33 years old. This large portion of young people is a noticeable feature of Poland.

More than 45% of country's population is concentrated in 42 large cities of more than 100,000 inhabitants. Population densely is concentrated in south and central Poland the historical center of industry in the country.

For the past 10 years Poland's population has been stable and the change in population is almost ignorable.

As for future population in Poland, detailed population forecast data up to 2020 by Prowiat is released by the Central Statistical Office. This forecast population is commonly used as basic data for various types of planning.

According to this forecast, future population in Poland is characterized as follows.

- Up to 2005, the population less than 15 years old will decrease.

- Up to 2005, the working population will increase and oppress the labor market.

- For the next 30 years from now population aging will proceed and the aged population will increase.

This study uses the population forecast by the Central Statistical Office. This forecast

shows a 1% increase of population from 2000 to 2010.

2.2.3 Regional Economic Growth

At present Poland is divided into16 voivodships and socioeconomic conditions of voivodship are considerably differ each other as indicated in Table 2.2.5.

In the transitional period of economy from 1986 to 1990, impact caused by the transitional economy on the rural areas in Eastern Poland was relatively small and economy in those areas showed improvement.

During the negative economic growth from 1991 to 1992, former voivodships dominated by the individual agriculture showed higher gross regional domestic product (GRDP) growth. However in voivodsihps formerly dominated by state owned agricultural farming system showed negative GRDP growth. In the same period regions with large cities also showed negative GRDP growth because of the regress in the industry.

In the period of overcoming recession, Warszawa agglomeration and other large cities showed economic growth by adapting the new economic system. However, Eastern Poland was less capable for development dynamics.

Table 2.2.5 Characteristics of Voivodships in 1999

Voivodship	Area [km]	GRDP [10^6PLN]	Gross value added in %			Unempl-oyment Rate (%)	Av. monthly salary (PLN)
			Agri.	Indust.	Serv.		
Poland	312,685	523,560	4.9	35.8	59.3	13.1	1,697.1
Dolnoslaskie	19,948	42,646.4	4.2	38.0	57.8	16.0	1,626.0
Kujawsko-Pomorskie	17,970	27,693	6.0	35.1	58.2	16.9	1,512.9
Lubelskie	25,114	23,270.3	10.7	28.5	60.8	12.9	1,494.7
Lubuskie	13,984	13,340.7	5.8	31.6	62.6	17.5	1,490.2
Łódźkie	18,219	33,840.5	4.6	36.3	59.1	14.3	1,498.4
Malopolskie	15,144	41,840.3	3.1	36.7	60.2	10.2	1,561.3
Mazowieckie	35,598	105,972.9	4.1	29.6	66.3	9.5	2,201.8
Opolskie	9,412	13,779.4	7.1	39.4	53.5	13.2	1,550.4
Podkarpackie	17,926	23,037.1	5.0	38.2	56.8	14.5	1,456.6
Podlaskie	20,180	13,371.7	11.2	28.6	60.2	12.5	1,494.1
Pomorskie	18,293	30,829.7	3.2	34.8	62.0	13.8	1,604.4
Slaskie	12,294	78,305.1	1.3	44.2	54.5	10.4	1,799.5
Swietokrzyskie	11,672	14,673.9	7.1	36.4	56.5	15.1	1,415.1
Warminsko-Mazurskie	24,203	16,061.8	8.1	32.8	59.1	22.4	1,474.7
Wielkopolskie	29,286	20,694.9	7.2	39.9	52.9	10.5	1,581.2
Zachodniopomorskie	22,902	24,202.3	6.1	32.6	61.3	18.1	1,582.6

Source: Main Statistcal Office (GUS)

Regional economic growth forecast from a viewpoint of regional development potential was published by IBnGR (The Gdańsk Institute for Market Economics) in "Average Growth 2003-2013 in Impact of the EU Accession (July 2003)". In this Study, GRDPs were estimated referring to this forecast.

The projected growth scenario of the regions are as following.

1) During the period from 2001 to 2020, the Warszawa agglomeration will be the

fastest developing region of the country. The GRDP growth will be 7-10% initially and will slightly slow down later. In the same time the difference between Warszawa metropolis and its surroundings will deepen. The area of the positive effect of the metropolis will be more extensive with the strengthening of cohesion within the Mazowieckie Voivodship, thanks to the infrastructure development.

2) Agglomerations of Poznań, Kraków and Wrocław have the chance to gain status as European cities (with Gdańsk and Szczecin later on because of the sea ports, provided proper financial services and other factors are available). The development dynamics of those areas will be equal or above the country average.

3) If the restructuring of Łódż economy continues toward high technology and specialized services, the development dynamics of Łódż and its surrounding area initially will be only slightly lower from the country average.

4) Upper Silesia is still facing serious restructuring. In this region, two economic development scenarios can be assumed. One is to drastically reduce coal output and restructure the industrial sector. The other is to perform mild restructuring in the industrial sector.

5) The Central-western regions will show growth dynamics similar to the country average, as the fast growth of non-agriculture sectors will be slowed down by the considerable share of the agriculture sector in the regional economies.

6) The eastern and central (non-metropolis) part of Poland will face slower development than the country average. The situation in the east of Poland will very much depend on the developments in Russia, Ukraine, Belarus and Lithuania, with no substantially positive prospects so far.

7) The south-eastern parts of Poland will face considerable difficulties; following the stagnation of the backward, small-scale and over-populated agriculture. There will not be substantial EU assistance to the region.

8) The northern parts of Poland, facing difficult situation caused by the bankruptcies of the non-efficient state farms in the beginning of the transformation process, are gradually improving. Some areas have chance to develop tourism while other areas will be facing depopulation. The developments of sea-port related industries will be of a special importance.

9) For the eastern parts, the closeness to Germany (commercial exchange) was an important factor for economic growth. The efforts should concentrate now on the creation of technical and institutional infrastructure, to enable economic cooperation and partnerships. There will be considerable impulse for the development after accession to EU.

Based on the above consideration, the growth rates of GRDP by voivodship were determined. The results are presented in Attachment 2.2.1 and 2.2.2.

2.3 PRESENT TRANSPORT DEMAND

2.3.1 Passenger Transport

2.3.1.1 Passenger Transport by Transport Mode

Statistical yearly data on the total number of passengers by all transport modes (excluding passengers by private car) revealed a drastic decrease by half in the decade from 1990 to 2000. It can be conjectured that rapid popularisation of private cars caused rapid modal shift in passenger transport from public transport to private transport.

As per Table 2.3.1 to 2.3.4, though the share of air transport in absolute value is small, it shows a rapid increase in passenger transport and is 1.7 times larger in 2000 than those in 1990. On the contrary, the number of passengers by rail, bus and inland waterways decreased almost by half respectively.

Above situation can be regarded as an evidence of the promotion of time value significance in passenger transport.

Table 2.3.1 Transport of Passengers in Poland

(Unit: 1,000 passengers)

	1990	1995	2000	2001
Total	2,880,730	1,601,089	1,319,972	1,236,583
Railway transport	789,922	465,901	360,687	332,218
Standard gauge	787,518	465,059	360,154	331,766
Narrow gauge	2,404	842	533	452
Road transport [b]	2,084,708	1,131,593	954,515	898,710
Maritime transport [c]	569	540	625	582
of which are ferries	562	537	624	581
Inland waterway transport	3,816	1,208	1,265	1,637
Air transport [d]	1,715	1,847	2,880	3,436

Note:
a Excluding passengers transported free of charge.
b Excluding transports by urban road transport fleet and those by foreign carriers.
c Excluding transports by foreign carriers.
d Scheduled and non-scheduled; in 1990 exclusively scheduled.
Excluding transports by foreign carriers.

Table 2.3.2 Transport of Passengers in Poland

(Unit: Million passenger-km)

	1990	1995	2000	2001
Total	101,623	65,483	62,055	60,073
Railway transport	50,373	26,635	24,092	22,469
Standard gauge	50,339	26,622	24,084	22,461
Narrow gauge	34	13	8	8
Road transport [b]	46,599	34,024	31,735	30,996
Maritime transport [c]	193	166	168	154
of which are ferries	148	151	165	151
Inland waterway transport	28	25	26	42
Air transport [d]	4,430	4,633	6,034	6,412

Source: Statistical Yearbook
Note:
a Excluding passengers transported free of charge.
b Excluding transports by urban road transport fleet and those by foreign carriers.
c Excluding transports by foreign carriers.
d Scheduled and non-scheduled; in 1990 exclusively scheduled.
Excluding transports by foreign carriers.

Table 2.3.3 Passenger Transport Indices in Poland

	1990	1995	2000	2001
Population	100.0	101.2	101.4	101.4
GDP (constant prices)	100.0	111.4	143.1	144.5
Total	100.0	55.6	45.8	42.9
Railway transport	100.0	59.0	45.7	42.1
Standard gauge	100.0	59.1	45.7	42.1
Narrow gauge	100.0	35.0	22.2	18.8
Road transport [b]	100.0	54.3	45.8	43.1
Maritime transport [c]	100.0	94.9	109.8	102.3
of which areferries	100.0	95.6	111.0	103.4
Inland waterway transport	100.0	31.7	33.1	42.9
Air transport [d]	100.0	107.7	167.9	200.3

Source: Statistical Yearbook
Note:
a Excluding passengers transported free of charge.
b Excluding transports by urban road transport fleet and those by foreign carriers.
c Excluding transports by foreign carriers.
d Scheduled and non-scheduled; in 1990 exclusively scheduled.
Excluding transports by foreign carriers.

Table 2.3.4 Passenger-km Transport indices in Poland

	1990	1995	2000	2001
Population	100.0	101.2	101.4	101.4
GDP (constant prices)	100.0	111.4	143.1	144.5
Total	100.0	64.4	61.1	59.1
Railway transport	100.0	52.9	47.8	44.6
Standard gauge	100.0	52.9	47.8	44.6
Narrow gauge	100.0	38.2	23.5	23.5
Road transport [b]	100.0	73.0	68.1	66.5
Maritime transport [c]	100.0	86.0	87.0	79.8
of which are ferries	100.0	102.0	111.5	102.0
Inland waterway transport	100.0	89.3	92.9	150.0
Air transport [d]	100.0	104.6	136.2	144.7

Source: Statistical Yearbook
Note:
a Excluding passengers transported free of charge.
b Excluding transports by urban road transport fleet and those by foreign carriers.
c Excluding transports by foreign carriers.
d Scheduled and non-scheduled; in 1990 exclusively scheduled.
Excluding transports by foreign carriers.

As indicated in Table 2.3.5, the estimate of modal share of rail in passenger transport in 2000, excluding passengers by urban public transport, based on the available statistical data sources was 12.1% in terms of passengers and 19.7% in terms of passenger-km. By this time, the modal share of passenger cars already reached 55.9% in terms of passengers and 49.2% in terms of passenger-km.

Table 2.3.5 Passengers by Transport Mode in Poland, 2000

	Passengers (million)		Passenger-km (million)		Average Distance (km)
Total	2,989.16	100.0%	122,040	100.0%	40.8
Railway	360.20	12.1%	24,100	19.7%	66.9
Bus	954.52	31.9%	31,740	26.0%	33.2
Car	1,669.67	55.9%	60,010	49.2%	35.9
Air	2.88	0.1%	6,030	4.9%	2,094.9
Inland waterway	1.27	0.0%	30	0.0%	20.5
Maritime transport	0.63	0.0%	130	0.1%	206.7

Source: Poland Statistical Yearbook

According to the IDIM report, as presented in Table 2.3.6, the total number of passengers using private cars was estimated at 1,670 million in 2000, about 4.6 times larger than those using railways.

Table 2.3.6 Private Car Passengers in Poland, 2000

	Passengers (million)	Passenger-km (million)	Average Distance (km)
Total	1,670	60,000	35.9
Short distance	1,254	15,000	12.0
Interurban long distance	416	45,000	108.2

Source: IDIM report

2.3.1.2 Passenger Transport by Rail

As stated earlier, the number of passengers using rail is showing a generally decreasing trend each year. In 2001 railway transported 331.7 million passengers for 24,100 million passenger-km.

The trend by the number of passengers differs by train type. The number of passengers by qualified train is showing increasing trend. The number of passengers by interregional train showed a steep decline in 1992 and 1993, after that it was mostly stable up to now. As indicated in Attachment 2.3.1, in 2001, qualified trains carried 9.24 million passengers for 3,071 million passenger-km. Average trip distances were 333 km for qualified trains, 220 km for interregional train and 29k m for regional train. Although PKP was divided into PKP companies in 2001, this estimate was made by converting statistical data on the number of passenger by PKP companies into yearly data for 2001. Consequently, in 2001, PKP Regional transported 277.8 million passengers for 18,384 million passenger-km, and PKP IC 8.9 million passengers for 3,071 million passenger-km.

In 2002, PKP Regional transported 250.5 million passengers for 16,477 million passenger-km (domestic transport only) and 119.2 million train-km, and PKP IC 9.2 million passengers with 3,138 million passenger-km and 21.1 million train-km respectively. From statistics as presented in Table 2.3.7 to 2.3.12, the decrease in passenger volume is phenomenal.

WKD and SKD undertook public urban transport in Warsaw metropolitan area and tri-cities (Gdansk, Gdynia and Rumia) from 1st of July 2001. After the data conversion, it was estimated that WKD transported 7.1 million passengers for 156.25 million passenger-km and SKD 37.6 million passengers for 849.57 million passenger-km.

Urban international passengers by rail showed a decreasing trend. In 2001, the number of international passengers by rail between the following destinations was: Poland and Belarus, 983 thousand passengers; between Poland and Germany, 920 thousand passengers; between Poland and Ukraine, 355 thousand passengers; between Poland and Russia, 288 thousand passengers; and Between Poland and Austria 82 thousand passengers respectively.

By examining yearly changes of international passengers by rail, a decrease of international passengers by rail between Poland and Ukraine could be identified.

Table 2.3.7 Passenger Transport by Rail in Poland

(unit: million passengers)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Qualified	5.6	4.9	5.5	7.4	6.8	7.3	9.1	9.5	9.9	10.0	9.2
Interregional	90.1	73.7	54.8	63.4	62.5	64.3	61.0	60.6	64.6	57.2	52.3
Regional	554.3	469.4	479.8	422.9	395.7	361.9	346.6	330.7	320.6	293.0	270.3
Total	650.0	548.0	540.1	493.7	465.1	433.5	416.6	400.8	395.2	360.2	331.8

Source: Yearbooks, PKP Intercity and PKP Regional

Table 2.3.8 Passenger-km Transport by Rail in Poland

(unit: billion passengers-km)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Qualified	1.7	1.5	1.7	2.3	2.2	2.4	2.9	3.1	3.3	3.3	3.1
Interregional	21.7	17.9	12.2	14.5	14.3	14.7	13.8	13.6	14.1	12.5	11.5
Regional	16.7	13.2	17.0	10.8	10.1	9.4	9.1	9.0	8.8	8.3	7.9
Total	40.1	32.6	30.8	27.6	26.6	26.6	25.8	25.7	26.2	24.1	22.5

Source: Yearbooks, PKP Intercity and PKP Regional

Table 2.3.9 Average Passenger Trip Distance by Rail in Poland

(unit: km)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Qualified	303.6	306.1	309.1	310.8	323.5	328.8	318.7	326.3	333.3	330.0	332.5
Interregional	240.8	242.9	222.6	228.7	228.8	228.6	226.2	224.4	218.3	218.5	219.6
Regional	30.1	28.1	35.4	25.5	25.5	26.0	26.3	27.2	27.4	28.3	29.3
Total	61.7	59.5	57.0	55.9	57.2	61.4	61.9	64.1	66.3	66.9	67.7

Source: Yearbooks, PKP Intercity and PKP Regional

Table 2.3.10 International Passengers by Rail, 2001

(unit: 1,000 passengers)

	Total	Austria	Belarus	Czech	Germany	Russia	Ukraine	Others
Total	3,006.0	81.5	982.8	168.9	919.8	288.0	355.3	209.7
	100.0%	2.7%	32.7%	5.6%	30.6%	9.6%	11.8%	7.0%

Source: Yearbooks, PKP Intercity and PKP Regional

Qualified Trains

In 2000, the PKP group operated 107 qualified trains per day on average. Those were classified into EC, IC, express train, and night sleeper train. EC, IC and express trains connect the major cities in Poland.

Interregional Train

In the same year PKP group operated 375 interregional trains per day on average. Those trains were generally operated at higher speeds between cities in different regions.

In 2000 PKP group operated 4,295 regional and agglomeration trains per day on average.

Regional, Agglomeration Trains

Though number of passengers by rail is decreasing, passengers and passenger-km by qualified train expanded. reflecting a change in an increasing passenger demand for saving time.

Table 2.3.11 Passenger Transport by Rail in Poland, 2001

	Passengers (x 1000)	Passengers-km (million)	Average Distance (km)
PKP IC (qualified)	9,236	3,071	333
International	654	157	240
Interregional	8,582	2,914	340
PKP Regional	277,830	18,384	66
International	2,641	610	231
Interregional	49,634	10,868	219
Fast	35,194	8,546	243
Passenger train (over 100km)	14,440	2,322	161
Regional	225,555	6,906	31
SKM	37,600	850	23
WKD	7,100	156	22
Total	331,766	22,461	68

Source: Statistical Yearbook
Note: Narrow gauge passenger trains are not included.

Table 2.3.12 Passenger Train-km in Poland, 2001

(Unit: 1,000 train-km)

	Total	Steam	Electric			Diesel		
			Sub-total	Locomotive	EMU	Sub-total	Locomotive	Rail-bus
Total	161,325	142	140,095	79,080	60,034	21,087	20,524	563
Interregional & Regional	141,157	142	120,005	59,006	60,018	21,010	20,447	563
Interregional	45,328	0	43,182	40,722	2,460	2,146	2,101	45
Regional	95,829	142	76,823	18,284	57,558	18,864	18,346	518
Qualified	20,167	-	20,090	20.074	16	76	76	-
Passenger-freight	1	-	-	-		1	1	-

Source: Statistical Yearbook
Note: Includes WKD

As indicated in Table 2.3.13, the portion of free tickets in 2001 in relation to the total number of passengers by all ticket types, was more than 20% of total in terms of both passenger volume and passenger-km.

Table 2.3.13 Rail Passenger by Ticket Type in Poland, 2001

	Passengers (million)	Passenger-km (million)	Average Distance (km)
Total	331.8	22,461	67.7
of which are international trains	3.3	767	233.0
One trip tickets	132.7	14,474	109.1
Normal fare	44.8	5,782	129.1
Discount fare	87.9	8,692	98.9
Monthly ticket	125.9	3,261	25.9
Normal fare	64.1	1,736	27.0
Discount fare	61.7	1,525	24.7
Free tickets	73.2	4,726	64.5

Source: Statistical Yearbook

2.3.2 Freight Transport

2.3.2.1 Freight Transport by Transport Modes

According to the statistical yearly data, total transport volume by all transport mode has decreased from 1990 to 1995, however after that it was almost stable. As presented in from Table 2.3.14 to 2.3.17, transport volume in terms of ton-km by pipeline, inland waterways, and air and road transport showed an increasing trend after 1995. On the contrary, transport volume by rail showed an incessant decreasing trend.

It can be conjectured that the rapid popularization of private car caused the rapid modal shift in passenger transport from public transport to private transport.

Mostly small- and medium-scale trucking companies undertook road transport in Poland. Some 300 trucking companies have transport network nationwide and provide transport services and other diverse services within 24 hours inside of Poland .

A major commodity group transported by inland waterway is sand and gravel. Transport volume by inland waterway is stable in recent years. One of the specific characteristics of the inland waterway in Poland is its international goods transport services to Germany, Belgium and Denmark.

Pipelines are used almost exclusively transport crude oil and petroleum products. A pipeline for crude oil traverses Poland from east to west and a branch pipeline is laid from Gdansk.

In the same manner as with passenger transport, it can be concluded that there is a progressive modal shift from other transport modes to road transport.

Table 2.3.14 Freight Transport by All Transport Means in Poland

(unit: million tons)

	1990	1995	2000	2001
Total [a]	1,645.5	1,380.8	1,347.9	1,317.2
Railway transport	281.7	225.3	187.2	166.9
standard gauge [b]	278.1	224.3	186.9	166.6
narrow gauge	3.5	1.0	0.3	0.2
Road transport [c]	1,292.4	1,086.8	1,083.1	1,072.3
of which hire or reward transport	347.0	319.4	376.0	370.6
Pipeline transport	33.0	33.4	44.3	45.3
Maritime transport	28.5	26.0	22.8	22.4
Inland waterway transport	9.8	9.3	10.4	10.3
Air transport [d]	0.0	0.0	0.0	0.0

Source: Statistical Yearbook
Note:
a Including horsedrawn transport not included in further breakdown.
b Including broad gauge.
c Data partially estimated.
d Scheduled and non-scheduled; in 1990 exclusively scheduled.

Table 2.3.15 Freight Transport by All Transport Means in Poland

(unit: million ton-km)

	1990	1995	2000	2001
Total [a]	346,232	300,807	282,559	253,269
Railway transport	83,530	69,116	54,448	47,913
standard gauge [b]	83,462	69,093	54,439	47,906
narrow gauge	68	23	9	7
Road transport [c]	40,293	51,200	72,842	74,403
of which hire or reward transport	19,131	28,178	46,892	48,439
Pipeline transport	13,887	13,493	20,354	21,093
Maritime transport	207,430	166,048	133,654	108,517
Inland waterway transport	1,034	876	1,173	1,264
Air transport [d]	57	74	88	79

Source: Statistical Yearbook
Note: a Including horse-drawn transport not included in further breakdown.
b Including broad gauge.
c Data partially estimated.
d Scheduled and non-scheduled; in 1990 exclusively scheduled.

Table 2.3.16 Freight Transport Indices (tonnage) in Poland

(unit: million tons)

	1990	1995	2000	2001
Population	100.0	101.2	101.4	101.4
GDP (constant prices)	100.0	111.4	143.1	144.5
Total [a]	100.0	83.9	81.9	80.0
Railway transport	100.0	80.0	66.5	59.2
standard gauge [b]	100.0	80.7	67.2	59.9
narrow gauge	100.0	28.5	9.7	6.8
Road transport [c]	100.0	84.1	83.8	83.0
of which hire or reward transport	100.0	92.0	108.3	106.8
Pipeline transport	100.0	101.1	134.4	137.3
Maritime transport	100.0	91.4	80.0	78.8
Inland waterway transport	100.0	95.0	106.5	104.7
Air transport [d]	100.0	157.1	200.0	192.9

Source: Statistical Yearbook
Note:
a Including horse-drawn transport not included in further breakdown
b Including broad gauge.
c Data partially estimated.
d Scheduled and non-scheduled; in 1990 exclusively scheduled.

Table 2.3.17 Freight Transport Indices (ton-km) in Poland

(unit: million ton-km)

	1990	1995	2000	2001
Population	100.0	101.2	101.4	101.4
GDP (constant prices)	100.0	111.4	143.1	144.5
Total [a]	100.0	86.9	81.6	73.2
Railway transport	100.0	82.7	65.2	57.4
standard gauge [b]	100.0	82.8	65.2	57.4
narrow gauge	100.0	33.8	13.2	10.3
Road transport [c]	100.0	127.1	180.8	184.7
of which hire or reward transport	100.0	147.3	245.1	253.2
Pipeline transport	100.0	97.2	146.6	151.9
Maritime transport	100.0	80.1	64.4	52.3
Inland waterway transport	100.0	84.7	113.4	122.2
Air transport [d]	100.0	129.8	154.4	138.6

Source: Statistical Yearbook
Note:
a Including horse-drawn transport not included in further breakdown.
b Including broad gauge.
c Data partially estimated.
d Scheduled and non-scheduled; in 1990 exclusively scheduled.

2.3.2.2 Rail Freight Transport

In 2001, 166.6 million tons of goods were transported by railway for 47,913 million ton-km.

A breakdown of the freight transport by rail shows that in 2001, domestic transport accounted for 60%, international transport some 38% and transit 3%. In the case of international freight transport by rail, most of the freight was exported through ports while most of the freight was imported through border crossings.

The share of combined freight transport by PKP and road is around 1% in total transport volume by rail.

Absolute international transport volume by rail is showing a decreasing trend. In 2001, exported volumes by rail were 9,712 thousand ton to Germany, 5,486 thousand ton to Czech Republic and Slovakia, 3,148 ton to Austria and 1,802 thousand ton to Belarus and Ukraine.

Imported volumes by rail in 2001 were 6,793 thousand ton from Belarus and Ukraine, 3,675 thousand ton from Russia, 3,609 thousand ton from Czech Republic and Slovakia, 2,178 thousand ton from Germany, 1,009 thousand ton from Lithuania, Latvia and Estonia, three countries that formerly belonged to Soviet Union.

As for the transit freight transport by rail, transport volumes between Czech Republic/Slovakia and Poland port Szczecin (metal products), Germany and Panstwa pozostale (metal products), Russia and Czech Republic (ore), and Ukraine and Czech Republic (ore) were outstanding.

The average commercial speed of PKP Cargo trains in 2001 was 28.1 kilometer per hour, which was slightly faster than that of the previous year.

Table 2.3.18 Freight Transport by Rail

(unit:1,000 tons)

	1990	1995	2000	2001
Total	287,139	224,346	186,905	166,616
Domestic	198,469	141,436	114,069	98,469
To foreign countries	49,146	55,256	41,135	40,889
by land	23,691	29,716	20,143	22,014
through ports	25,455	25,540	20,992	18,875
From foreign countries	22,709	22,015	26,888	22,267
by land	17,519	17,990	22,679	18,773
through ports	5,190	4,025	4,209	3,494
Transit	7,815	5,639	4,813	4,991

Source: Statistical Yearbook
Note: Including those transported by LHS

Table 2.3.19 International Freight Transport by Rail (Export) in 2001

(units: 1,000 tons)

	Total	Austria	Belarus/ Ukraine	Czech/Slovakia	Finland/ Sweden/ Norway	Germany	Hungary	Others
	40,889	3,148	1,801	5,485	827	9,712	830	19,086
Total	100.0%	7.7%	4.4%	13.4%	2.0%	23.8%	2.0%	46.7%

Source: Statistical Yearbooks

Table 2.3.20 International Freight Transport by Rail (Import) in 2001

(units: 1,000 tons)

	Total	Belarus/ Ukraine	Czech/Slovakia	Lithuania /Latvia/Estonia	Germany	Russia	Italy	Others
	22,267	6,793	3,609	1,009	2,178	3,675	343	4,660
Total	100.0%	30.5%	16.2%	4.5%	9.8%	16.5%	1.5%	20.9%

Source: Statistical Yearbooks

The dominant commodity group in freight transport by rail was hard coal, accounting for half of the total volume transported by rail. Following hard coal, dominant commodity groups were stones and gravel, ores crude oil and petroleum products, metal and metal products. As presented in Attachment 2.3.2 to 2.3.10, from 1990, commodity groups other than stones and gravel, and crude oil and petroleum products showed decreasing tendencies in the yearly change of shares in total transport volume . Transport volume of consumer goods was small and is transported as a non-scheduled container freight.

2.4 FUTURE TRANSPORT DEMAND

2.4.1 Passenger Transport

2.4.1.1 Future Passenger Transport Demand by All Transport Modes

Empirically it is commonly recognized that not a small difference between average person trip generation rate by those who own cars and the one by those without car ownership exists, and usually the former is higher than the latter.

Also it is known that those belonging to the high-income group are more socially active and are above average in the generation of trips.

Accordingly, it seemed probable that the rise in the average person trip rate was in response to the increase in income and car ownership and fueled by the prospect of future GDP growth. However, since relatively high car ownership has already been achieved, no large expansion of car ownership is expected in Poland.

In reality, statistical data revealed that total passenger transport demand including those by private car were almost stable in the past. This means that the average person trip

rate was stable in terms of person-trip and not strongly influenced by the expansion of income.

It was almost proved that passenger transport demand elasticity in terms of person-trip with respect to GDP growth is lower than the one in terms of passenger-km.

The passenger transport demand elasticity in terms of passenger-km with respect to GDP from 1995 to 2000 in Poland was estimated at 0.4. This figure was considerably low when compared with the one put in use for the passenger demand forecast in middle and Eastern Europe.

In this study, as summarized in Table 2.4.1, the demand elasticity of the passenger transport in terms of passenger-km with respect to GDP growth was set as 0.5. For the setting of the demand elasticity, the increase of economic activity and improvement of infrastructure after the EU accession was taken into account. The value of 0.1 was adopted as a passenger transport demand in terms of person-trip with respect to GDP growth.

Table 2.4.1 Elasticity of Passenger Transport Demand (Passenger-km) with Respect to Income

Domestic	Foreign		
	Outgoing	Incoming	External-external
0.5	0.5	0.5	0.85

The result of the passenger demand forecast is shown in Table 2.4.2.

Table 2.4.2 Total Future Passenger Transport Demand

		Passengers (1,000 passengers)					Passenger-km (1,000pass.-km)[a)]
Year		Total	Domestic	Foreign			
				Outgoing	Incoming	External - external	
2001		7,638,712	7,509,728	64,382	64,411	192	128,273,000
2006	Good case	7,799,128	7,667,432	65,734	65,764	198	141,741,665
	Bad case	7,760,935	7,629,883	65,412	65,442	198	138,919,659
2010	Good case	7,967,180	7,832,646	67,150	67,181	203	158,032,336
	Bad case	7,906,072	7,772,568	66,635	66,665	203	151,875,232

Note: a) excluding urban transport

The factors affecting future modal share of passenger transport are as follows.

a) Factors diminishing public transport use

- Increase in passenger car ownership
- Road improvement especially motorway improvement
- Rise of public transport fare including railways
- Intensification of speed-oriented transport demand due to the increase in time value

b) Factors promoting public transport use

- Social awareness of environmental protection
- Improvement of servicing level of public transport including railway
- Rise of retail prices of fuel (caused by taxation system)

It can be said that the lack of appropriate means until now invited modal shift from public transport to private transport in accordance with the increase of car ownership. If motorways are developed in the future, it is assumed that this tendency will continue unless appropriate measures such as the reduction of traveling time by railway are taken.

A regression analysis between the public transport trips per person-day and car ownership rate was made based on the assumption that the that modal shift from public transport to private car and the resultant decrease in number of public transport passengers was caused by the dissemination of private cars. The following results were obtained. (Note that urban public transport was excluded.)

Under the condition of 348 vehicles per 1,000 persons, which is the estimated rate of car ownership in Poland in 2010, public transport rate per person-day was 0.0563 in terms of un-linked person trip.

Consequently, 797.2 million passengers were estimated as the total number of public transport passengers excluding urban public transport in 2010. This would mean a thirty five (35) percent decrease of public transport passengers when compared with those in 2001, as indicated in Table 2.4.3 and Figure 2.4.1.

Among public transport modes, maritime transport and inland transport are considered to retain their present level of passenger transport demand because of the specific characteristics of these modes, such as specific routes for specific passenger transport demand in spite of the long traveling time they require.

Numbers of passengers by maritime transport and inland waterway were estimated at the same transport demand level as 2001.

As for air transport, although the current modal share is 0.36% as of 2001, it is well likely to be a competitor to railway in the future because of the intensification of speed-oriented transport demand. In this study, the elasticity method was adopted to forecast air passenger transport demand. As indicated in Table 2.4.4 and 2.4.5, estimated past passenger transport demand elasticity in terms of person trip with respect to GDP from 1995 to 2000 was at approximately double that of the GDP growth rate.

Table 2.4.3 Relation Between Car Ownership and Passenger Transport Demand by Public Transport

		1990	1995	2000	2001
Passenger transport	(1,000passengers)	2,880,730	1,601,089	1,319,972	1,236,583
Population Population	(1,000population)	38,183	38,609	38,644	38,633
Trip rate	(trips/person-day)	0.207	0.114	0.094	0.088
Passenger car ownership	(veh./1,000pop.)	137.8	194.7	258.5	271.8

Source: Statistical yearbook

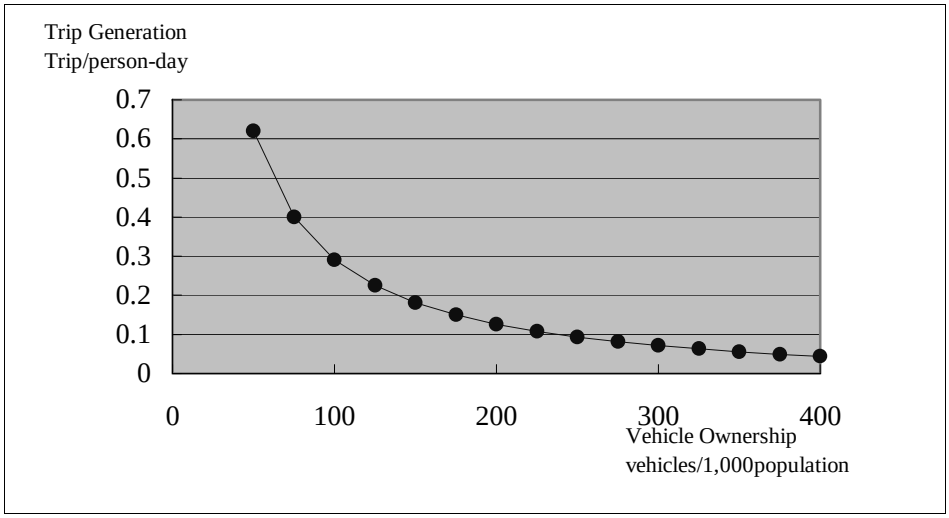

Figure 2.4.1 Public Transport Generation Trend in Relation to Passenger Car Ownership in Poland

$PTP=32.895/VO-0.038189$ ($R^2=0.959$)

PTP：Rate of public transport modes per person-day (trip/person-day) (excluding urban public transport (bus, tram and subway))
VO：Passenger car ownership (vehicles/1,000persons)

Table 2.4.4 Passenger Demand by All Transport Modes in 2001

(Unit: 1,000 passengers)

	2001				
	Total	Domestic	Foreign		
			Outgoing	Incoming	External-external
Rail[1)]	332,218	328,923	1,570	1,570	155
Car[2)]	1,753,289	1,646,559	47,575	47,575	11,580
Bus[3)]	909,055	896,405	6,325	6,325	-
Maritime[4)]	4,417	-	2,197	2,220	-
Inland waterway	1,637	1,030	304	304	-
Air[5)]	5,674	667	2,482	2,488	37
Urban Transport[6)] (buses and tram)	4,569,000	4,569,000	-	-	-
Urban Transport (Subway)	70,000	70,000	-	-	-
Total	7,645,290	7,512,584	60,453	60,482	11,772

Source: Transport Statistical Yearbook, and consultant's estimate

Note:
1) Including railway passengers by narrow gauge. Data discrepancy is attributale to the periods applied.
2) 2 passengers including driver was assumed for border crossing passenger cars. Distinction between passenger car and motorcycle was not made in the statistics
3) 12 passengers/bus was assumed for border crossing buses. External-external transport was estimated by consultant.tistical data.
4) Data on passengers by port was used. External-external transport was estimated by consultant.
5) Data on passengers by airport was used.
6) The number of passengers carried by the company with more than 9 employee are counted.

Table 2.4.5 Passenger Demand Forecast by All Transport Modes in 2010

(Unit: 1,000passengers)

	2010 (Good case)				
	Total	Domestic	Foreign		
			Outgoing	Incoming	External-external
Rail[1)]	240,416	238,030	1,136	1,136	114
Car[2)]	2,318,578	2,177,437	62,914	62,914	15,314
Bus[3)]	560,971	553,164	3,903	3,903	-
Maritime[4)]	4,607	-	2,303	2,303	-
Inland waterway	1,708	1,074	317	317	-
Air[5)]	9,284	1,094	4,075	4,075	39
Urban Transport[6)] (buses and tram)	4,765,467	4,765,467	-	-	-
Urban Transport (Subway)	73,010	73,010	-	-	-
Total	7,974,041	7,832,646	70,581	70,611	203

2.4.1.2 Future Railway Passenger Transport Demand

Future railway passenger transport demands by company were forecast by trend method to the yearly transport volume shares of each company in the past. Transport volumes before the separation in 2001 were estimated based on the passenger transport volumes by train type in railway transport statistics.

Passenger transport volumes by railway section were estimated by growth method. Growth factors were determined for each voivodship. The result of the passenger demand forecast are presented from Table 2.4.6 to 2.4.8.

Table 2.4.6 Forecast of Railway Passenger Share by Train Type

(Unit: %)

	Actual									Forecast (adjusted)	
	1991	1993	1995	1996	1997	1998	1999	2000	2001	2006	2010
Qualified	0.86	1.02	1.46	1.68	2.18	2.37	2.51	2.78	2.78	3.93	4.51
Interregional	13.86	10.15	13.44	14.83	14.64	15.12	16.35	15.88	15.76	16.90	17.47
Regional	85.28	88.84	85.08	83.48	83.20	82.51	81.12	81.34	81.46	79.17	78.02
Total	100	100	100	100	100	100	100	100	100	100	100

Source: Yearbooks, PKP Intercity and PKP Regional

Table 2.4.7 Railway Passenger Transport Demand Forecast by Company in 2006

		Passengers (x 1,000)	Passenger-km (million)	Average Distance (km)
PKP IC (qualified)	Good case	10,243	3,421	334
	Bad case	9,586	3,202	334
PKP Regional	Good case	207,803	14,763	71
	Bad case	189,518	13,662	72
Interregional[1)]	Good case	44,026	9,686	220
	Bad case	41,203	9,065	220
Regional	Good case	163,776	5,077	31
	Bad case	148,315	4,598	31
SKM &WKD	Good case	42,465	956	23
	Bad case	44,700	1,006	23
Total	Good case	260,511	19,140	73
	Bad case	243,804	17,870	73

Source: Statistical Yearbook
Note: Narrow gauge passengers are not included.
[1)] International passengers by PKP Regional was included.

Table 2.4.8 Railway Passenger Transport Demand Forecast by Company in 2010

		Passengers (x1,000)	Passenger-km (million)	Average Distance (km)
PKP IC (qualified)	Good case	10,838	3,631	335
	Bad case	9,670	3,239	335
PKP Regional	Good case	189,343	13,808	73
	Bad case	160,131	12,047	75
Interregional[1)]	Good case	42,001	9,240	220
	Bad case	37,474	8,244	220
Regional	Good case	147,343	4,568	31
	Bad case	122,657	3,802	31
SKM &WKD	Good case	40,230	905	23
	Bad case	44,700	1,006	23
Total	Good case	240,416	18,344	76
	Bad case	214,505	16,292	76

Note: Narrow gauge passengers are not included.

[1)] International passengers by PKP Regional is included.

2.4.2 Freight Transport

2.4.2.1 Future Freight Transport Demand by All Transport Modes

A commonly used method for forecasting future freight transport demand is the one of applying freight transport elasticity in terms of ton-km with respect to GDP growth. However, due to the socioeconomic system reform, including those for production and

logistic systems from late the 1980's to the early 1990's, the total freight transport elasticity with respect to GDP growth in Eastern European countries showed negative value. Poland was no exception.

In particular, transport demand in the industrial sector, such as coal and steel production for which restructuring is still under way, showed a continual decrease.

As not a small influence by political factors on the industrial production is envisaged in near future and horizon of forecast range is relatively short, transport demand of major commodity groups comprising large rail transport volume were forecast based on the official production/consumption prospects. As for the other commodity groups, transport demand, the elasticity method expressed in terms of tonnage with respect to GDP growth was adopted.

The freight transport demand elasticity in terms of ton-km with respect to GDP from 1995 to 2000 in Poland was estimated at 0.22. This figure was considerably low compared with the commonly used value of 0.7 to 0.8 for freight transport demand forecast in middle and Eastern Europe.

In this study, 0.35 was adopted as a freight transport demand elasticity in terms of ton-km with respect to GDP growth considering expansion of freight transport movement after EU accession and expected improvement of infrastructure for increased transport speed. In the same manner, transport demand elasticity in terms of tonnage with respect to GDP growth was estimated. The estimated value showed a slightly minus value. The value of 0.0 was adopted as a freight transport demand in terms of tonnage with respect to GDP growth in this study. Elasticity value of 0.1 was applied to the expected GDP growth rate for the middle and eastern European regions for the external-external transport demand forecast.

Applied elasticity and freight transport demand by commodity group based on the official prospects of production/consumption are shown below.

<Hard coal>

Hard coal production in Poland decreased by half from 193 million tons in 1980 to 102 million tons in 2000. Such a drastic decrease is mainly caused by the consumption decrease in household and public sector, which is similar to the world hard coal consumption trend.

Future hard coal demand in Poland highly depends on the extent of the consumption shift from hard coal to petroleum, natural gas and regenerative energy.

In the past, any surplus of hard coal production in Poland was exported, however, the exported volume is showing a decreasing tendency from 30 million tons in 1990 to 24 million tons in 2000. Hard coal production industry in Poland is losing competitiveness in the international market and such decreasing tendency of hard coal is expected to continue.

Several forecast reports on the prospect of future of hard coal demand/consumption were released. Each of these forecasts implied a decrease of hard coal consumption in

Poland.

In the report ”The Assumptions of the Policy of the Power Industry in Poland up to the Year 2020” by the Ministry of Economy, hard coal consumption in 2010 was estimated at 84.3 million tons which is almost equal to the present level of consumption. The volumes of export and import were estimated at 7.7 million tons and 2 million tons respectively. Consumption level of hard coal in 2020 was estimated at 81.9 million tons. Those estimates are higher than IEA (International Energy Agency) forecast results.

As per Table 2.4.9, 2.4.10, and 2.4.11 the report, “Coal Information 2001” compiled by International Energy Agency (IEA), hard coal demand in Poland is forecast to decrease continuously to 70 million tons of coal equivalent (Mtce) in 2010 and 61 Mtce in 2020. Hard coal production in Poland was also forecast in the same report to be 68 million tons in 2010 and 53 million tons in 2020.

Table 2.4.9 World Hard Coal Production Projections

(Unit: Mtce)

	2000	2005	2010	2020
Poland	83.8	85.8	67.9	53.0
Germany	34.5	26.0	34.4	0.0

Source: IEA Country Submissions and Secretariat estimates

Table 2.4.10 World Hard Coal Production Projections – Regional Aggregate

(Unit: million tons)

	1980	1985	1990	1995	2000
Total	2,810	3,243	3,566	3,715	3,639
Europe	500	456	378	295	208
West Europe	270	228	203	139	88
East Europe	230	228	175	156	119
Poland	193	192	148	137	102
Former USSR	553	569	543	326	322
North America	733	777	894	899	936
Latin America	11	18	31	36	52
Asia	818	1,124	1,377	1,751	1,649
Aus/N.Z.	74	120	161	194	241
Africa	120	179	182	213	231

Source: "Coal Information 2001", International Energy Agency, 2001

Table 2.4.11 World Hard Coal Consumption Projections – Regional Aggregate

(Unit: million tons)

	1980	1985	1990	1995	2000
Total	2,781	3,231	3,535	3,721	3,738
Europe	572	564	510	431	379
West Europe	353	346	344	292	266
East Europe	218	217	166	139	113
Poland	164	160	120	108	86
Former USSR	529	543	517	324	295
North America	633	708	754	792	916
Latin America	17	25	26	28	33
Asia	901	1,215	1,540	1,934	1,884
Aus/N.Z.	36	42	51	54	65
Africa	93	134	136	159	167

Source: "Coal Information 2001", International Energy Agency, 2001

Though export volume of hard coal is showing a decreasing tendency, the increase in export to Germany is noticeable. Hard coal demand in Germany is also showing decreasing tendency and IEA forecast 83 million tons in 2020 from 114 million tons in 2000 as a demand level of hard coal.

On the contrary, almost no hard coal production in 2020 was forecast in Germany in the same report, and hard coal demand is expected to be fulfilled by imported hard coal. Hard coal production surplus in Poland in 2010 was estimated at 2~3 Mtce. If the same constitution rates of hard coal export as it is now is assumed, hard coal export from Poland to Germany is estimated to drastically decrease to around 1 Mtce.

<Metal and metal products>

Like the to hard coal industry, the iron and steel industry in Poland is also suffering from over production. Though the restructuring process is under way, this mismatch between production and demand in both domestic and international markets is likely to continue. Iron and steel industry in Poland is characterized by the deterred accommodation to demand shift, over production, redundancy in workforce, low quality of products, huge energy consumption, and lack of environmental protection considerations.

In the report, “The Restructuring and Development of Polish Iron and Steel Industry Till 2006” which was adopted by Council of Ministers on 10th of January 2003 and amended on 25th of may 2003, production volume of hot rolled products in 2006 was estimated at 8.535 million tons.

Providing that the present share in 2001 of iron and steel products in total metal and metal products in terms of tonnage remain at present level, production volume of metal and metal products in 2006 was estimated at 32.1 million tons (25.1 million ton multiplied by 1.28).

In the above report, 3% per annum was assumed as the growth rate of metal/steel products in Poland after 2004. By applying this growth rate metal and metal production in 2010 was estimated at 36.1 million tons.

In this study, 36.1 million tons was adopted as a domestic and international transport demand of metal and metal products in the upper case.

<Ore>

No existing forecast result was available. The transport demand of ore can be assumed in principle proportional to metal and metal products production level. 3% per annum in the above report was assumed as a growth rate of transport demand of ore in Poland after 2004.

<Crude oil and petroleum products>

Crude oil is produced in Poland, however, output volume was small, 0.77 million tons in 2001. Almost all of Poland's crude oil demands are dependent on the import from Russia. Crude oil demand in Poland in 2001 was 17.5 million tons. Imported volumes of petroleum products were 2.11 million tons in 2000 and 2.32 million tons in 2001. Exported volumes of petroleum products were 2.51 million tons in 2000 and 2.52 million tons in 2001.

In the report, "Forecast for the National Demand for Fuels and Energy" (Ministry of Economy), several forecast cases for future crude oil demand were studied. In base case 19.36 million tons in 2005 and 20.4 million tons in 2010 were forecast, and in pessimistic case, 20.4 million tons in 2005 and 20.2 million tons in 2010.

Compared with present demand, the increase in demand is discreet in either case. This discreet demand forecast seems to be attributable to the forecast backgrounds, that is, intensification of international competition entailing restructuring of the sector, progress in less energy consumption system formation, expansion of natural gas consumption. In the base case, progress in restructuring petroleum industry was assumed. In case of little progress in restructuring, import of crude oil was forecast to increase. In the above report, petroleum products demand in Poland in 2005 was forecast to be 19.36 million tons.

In this study, base case forecast in the above report was adopted as the good case of domestic and international transport demand of crude oil. For the bad case, the present level of transport demand was adopted.

2.4.2.2 Future Freight Transport Demand by Rail

Since the transport mode of a commodity is basically determined by its characteristics, the prospects of transport mode for each major commodity group were respectively examined.

<Hard coal>

Among OECD European countries, the largest hard coal production, consumption and export are performed in Poland. Coal mining is primarily under way in Upper Silesia in

the southwest, and the Lublin coalfield in the east. Most of hard coal produced in Poland is consumed in the power and heat generation sector and steel industry. Coal for export is railed from Upper Silesia about 550 km to five ports of exit for seaborne markets. Coal consumed in eastern Germany and central Europe is exported directly by rail; though a small portion of coal exported to Germany moves by barge.

Some unit train movements are used to handle coal between larger mines and major ports which are Gdańsk and Gdynia. Swinoujscie and Szczecin port handle relatively smaller vessels. Rail freight rates to the ports have been increasing as full cost allocation has occurred.

Rail transport share in total domestic and international transport volume of hard coal from 1995 to 2001 was stable, though slight decrease is observed as shown in Table 2.4.12.

In this Study, no drastic change in modal shares of hard coal transport is assumed for a period of time.

Table 2.4.12 Modal Share of Hard Coal Transport by PKP Group

(Unit: million tons)

	1995	2000	2001
Coal balance in Poland	173.1	131.3	132.1
Export	31.9	23.2	23.0
Import	1.5	1.5	1.9
Domestic	139.7	106.6	107.2
Total transported volume by PKP group	107.5	82.2	79.2
(%)	62.1	62.6	59.9

Source: Statistical Yearbooks

<Metal and metal products>

Usually materials input for the production of iron and steel and such products in Poland are transported by rail. PKP LHS transports iron and steel products between Poland and CIS countries.

About 30% of transport of iron and steel products between factory and wholesale storage depends on road transport according to hearing survey. Between wholesale storage and individual consumers those products are mainly carried by road. Accordingly transport of steel and steel products depends on road or combination of road and rail.

Except bulky metal products, such as steel sheet, metal, the products are mainly carried by trucks.

Rail transport share in total domestic and international transport volume of metal and metal products decreased from 1995 to 2001, and this tendency of modal shift from rail to road is assumed to continue as presented in Table 2.4.13.

Table 2.4.13 Selected Metal Products Balance and Metal and Metal Products Transport by PKP Group

(Unit: million tons)

	1995	2000	2001
Metal and metal products balance in Poland	14.2	13.8	12.9
Index	100.0	97.3	90.7
Export	3.0	2.6	2.7
Import	0.4	1.5	2.1
Domestic	10.8	9.7	8.1
Total transported volume by PKP group	16.2	13.9	11.7
Index	100.0	85.7	72.1

Source: Statistical Yearbooks

Note: Hot rolled products, cold rolled steel sheets, tin-plating sheets and strips, zinc coated sheets and strips, aluminum, zinc, and copper

<Ore>

Ores are imported by PKP LHS by broad gauge rail, and maritime transport. PKP LHS plays a significant role by carrying some 50% of the iron ore from foreign countries. Some iron ore is imported by rail through the Medyka-Mostiska border.

In case of maritime transport, iron ore is mainly imported through Szczecin port and from there transported by rail to Silesia region where major ironworks exist.

However, railway share in domestic transport volume of ores in Poland is not large, accounting for 9%. Rail transport share in total domestic and international transport volume of ores decreased from 1995 to 2001, and this shift from rail transport to road transport is assumed to continue.

Since transport capacity by trucks is not large, railway transport is considered to play significant role in the long distance transport of ore as presented in Table 2.4.14.

Table 2.4.14 Selected metal products balance and Ore Transport by PKP Group

(Unit: million tons)

	1995	2000	2001
Metal and metal products balance in Poland	14.2	13.8	12.9
Index	100.0	97.3	90.7
Export	3.0	2.6	2.7
Import	0.4	1.5	2.1
Domestic	10.8	9.7	8.1
Total transported volume by PKP group	14.0	13.4	10.2
Index	100.0	96.0	73.2

Source: Statistical Yearbooks

Note: Hot rolled products, cold rolled steel sheets, tin-plating sheets and strips, zinc coated sheets and strips, aluminum, zinc, and copper

<Crude oil and petroleum products>

Imported crude oil is refined at seven refinery plants in Poland.

Pipeline is functioning major transport means of crude oil. Przyjazni pipeline in east-west direction conveyed 15.85 million tons in 2001. Small portion of crude oil is imported by maritime transport through Gdańsk north port and conveyed to refinery plants in Płock and Silesia region.

Railway share in crude oil transport in 2001 was 5% in terms of tonnage.

Petroleum products are transported by pipeline or railway tank wagon to distribution terminals all over the country. Railway is used for the transport petroleum products to the areas where a pipeline is not available. Railway is used for the transport of petroleum products from refinery plants to industrial areas and export terminals. As presented in Table 2.4.15, the share of railway in domestic transport of petroleum products is 46% in terms of tonnage. Since high dependence on only pipeline transport is risky to secure stable supply of crude oil, from this viewpoint the need for a means of transporting crude oil other than pipelines is justifiable.

In this study, railway transport volume of crude oil and petroleum products by rail is assumed to keep the present transport volume level.

Table 2.4.15 Modal Share of Petroleum and Petroleum Products by PKP Group

(Unit: million tons)

	1995	2000	2001
Crude oil balance in Poland	13.4	18.8	19.0
Index	100.0	139.7	141.3
Export	0.0	0.1	0.4
Import	13.0	18.0	17.6
Domestic	0.5	0.7	1.0
Petroleum balance in Poland	11.2	11.7	11.6
Index	100.0	104.2	103.2
Export	0.0	0.1	0.5
Import	1.9	1.6	1.8
Domestic	9.3	10.0	9.2
Crude oil and petroleum products transported volume by PKP group	11.6	13.2	11.6
Index	100.0	113.2	99.5

Source: Statistical Yearbooks
Note: Fuel oils are excluded.

<Stones and gravel>

Stones and gravel are mainly extracted in Podolaskie in northeastern Poland and Dolnoslaskie in Southwestern Poland and carried to the construction sites of roads, bridges and highways. As presented in Table 2.4.16, some stones and gravel are

imported from Sweden through Gdańsk or Gdynia ports. Competition between rail and road is expected to continue. In this study, railway is assumed to retain its present share of the transport of stones and gravel.

Table 2.4.16 Change in Transport Volume of Sand and Gravel by Rail

(Unit: million tons)

	1995	2000	2001
Total transported volume by PKP group	16.1	17.7	13.2
Index	100.0	110.5	82.1

Source: Statistical Yearbooks

<Others>

A gradual modal shift from rail to road transport is in progress, as indicated by Attachment 2.4.1 to 2.4.4.

Based on the future prospect of production/consumption by commodity group and estimated modal share for each commodity group on the trend base, future freight transport volume by transport means and commodity group were estimated. The results are shown in Attachments 2.4.5 to 2.4.12.

2.5 RAILWAY TRANSPORT DEMAND IN AGGLOMERATION

Railway service for commuting are not well developed in most agglomeration areas in Poland. Therefore, the possibility exists that railway will absorb latent transport demand if appropriate railway service is provided.

Since the voivodships will be responsible to plan and provide regional transport services, the findings in this section needs to be elaborated in the future. In this study, several agglomerations are selected and studied to have prospects for the expansion of railway passengers in agglomeration by providing commuter train services in agglomeration as a pilot model case.

＜Definitions＞

Agglomeration: Agglomeration includes city (in its administrative border) plus suburban towns and villages. Boundary of the agglomeration is not formally defined. Usually they are defined taking into account of commuting and other trips to the central districts of urban area.

Agglomeration traffic/transport: Trips within agglomeration.

Regional traffic/transport: Trips within the region (approx. within a voivodship)

Network: for rail transport: railways, metro, tramways – system of lines; for bus transport – congregation of streets (roads) used by buses

Route: for tram and bus systems – specific connection on the network served by trams

or buses of given number (e.g. bus route no.175).

Peak period: In most cases periods 6:00 – 9:00 and 15:00 – 18:00.

Periodical route: Routes operated in some duration of the day – usually in peak hours of working days.

2.5.1 Study Method

1) Study Steps

Following steps were followed for the study.

a) Selection of model agglomerations

b) Analysis of present urban transport system of agglomeration

c) Possibility to expand railway transport demand in future.

2) Selection of Model Agglomerations

Agglomeration areas in Poland are boldly classified into following three groups.

a) Multi-core agglomerations served by the developed railway network: ex. Upper Silesia (Katowice) (around 3 million inhabitants) and Tri-City (Gdańsk – Sopot - Gdynia) (around 1 million inhabitants).

In both agglomerations, distribution pattern of OD trips are favorable for railways service, because considerable houses, working places and services are located in the vicinity of railway stations.

b) Mono-centric agglomerations with suburban towns and villages located along railway lines:

ex. Warszawa (approximately 2.5 million inhabitants) and Kraków (some one million inhabitants)

In both agglomerations, well developed railway system has a large potential in serving agglomeration traffic.

c) Mono-centric agglomerations where the size and/or land use pattern as well as the railway system configuration are unfavorable for the railway to serve agglomeration traffic.

Table 2.5.1 Population in Major Agglomerations in Poland

(Unit: 1,000 pers.)

Cities with prowiat status	1995	2001	Increase rate (%)
Warszawa	1,632	1,610	-1.3
Gdańsk	468	455	-1.6
Gdańsk-Gdynia-Sopot	758	752	-0.8
Katowice	351	338	-3.8
Białystok	279	286	2.8
Wrocław	642	634	-1.2
Poznań	581	572	-1.6
Bydgoszcz	386	383	-0.7
Kraków	745	741	-0.6
Łódż	820	787	-4.5
Szczecin	419	416	-0.6

Source: Statistical Yearbook of the Regions-Poland, Central Statistical Office (GUS)

In this study Warszawa agglomeration, Kraków agglomeration, and Łódż agglomeration are selected. The present urban public transport system of agglomeration is presented in Attachment 2.5.1

2.5.2 Possibility to Expand Railway Passengers in Agglomeration

2.5.2.1 Transformation of Role of the Railways

Change in modal shares in agglomeration is closely related to the land use pattern in suburbs. Generally speaking, population sprawling to the suburbs is supposed to intensify the role of railway However, recent changes in housing and industrial land use pattern has a negative impact on the role of railway. Once, residential areas and commercial facilities had located in the nearby areas of railway station. However, in the last decade, those areas and facilities showed the tendency to locate along major roads. It means that dissemination of passenger cars and land development for urban functions greatly affects the railway transport demand in agglomerations in Poland.

2.5.2.2 Fundamental Conditions for Agglomeration Railway Service

There exists great potential for railway to play an important role of transport system in agglomerations where railway network is densely formed. To this end, not only managerial effort but also organizational and institutional environmental arrangement is required. Moreover, cooperation/collaboration work among central government, local governments and railway operators is indispensable.

There are considerable main factors affecting railway transport demand after the introduction of agglomeration railway service. These include: population and the spatial scale of agglomeration, urban structure (distribution pattern of urban functions

and their mutual connection pattern), population density, service level of competitive urban public transport means, dissemination of passenger cars and parking conditions, and further institutional environment.

As for the population size of agglomeration, one million is commonly recognized as a basic condition viable for the railway management. Ten (10) km radius is also considered as a basic condition for the effective use of mass transit system with tracks in terms of rapidity compared with other urban public transport means.

As for the urban structure, ribbon type urban structure (ex. Tri-city in north Poland as a sub-type of multi core pattern) is suitable for mass transit system with tracks, because various facilities locate in a ribbon pattern where large transport demand is generated and attracted. In case of mono-centric urban pattern, existence of apparent corridors of housing and/or industries becomes a condition. In case of multi core urban pattern, railway transport demand depends on the spatial distribution of urban functions and density of such areas.

Compared with bus and tram, the catchment area of railway is large, however one km radius (walking distance) is usually adopted as a criterion. Because of the characteristics of railway as a mass transport means, high densities of population and working population are favorable for railway management. As for the population density, the level of 7,500 persons/km^2 is desirable. Off course, it is not the case if feeder transport service is provided.

In case where tram system covers large area or metro system exist already at considerable frequency level, lots of diversion traffic from those transport means to railway is hardly expected when new agglomeration railway service is provided.

As already mentioned, dissemination of passenger cars and development of bus/mini bus service are the major reasons for the decrease in number of railway passengers. A bus/mini bus, provides convenient transport service in a large area. The required condition for the expansion of railway transport demand is that combined total cost of railway and feeder service transport by other public transport means in monetary term or time-value term is smaller than those by bus/mini bus only.

It can be pointed out that no serious constraint for passenger car usage exists in Poland. Though the dissemination rate of passenger car in Poland has already reached to the level of 300 vehicles per 1,000 persons, owing to the broad road network in the central district in many cities, traffic congestion and parking problems rare. However in cities with historical blocks and general traffic restrictions, the possibility to rebuild comprehensive urban transport system including railway exists.

2.5.2.3 Railway Transport Demand Prospect in Agglomeration

(Warszawa Agglomeration)

All seven radial railway lines serve corridors to suburbs. However, the sources of transport demand are versatile. Some railway lines serve medium population density areas and pass through the central areas of cities/towns in the suburbs. Other railway lines are passing through low population density areas.

In most sections, tracks are in poor technical conditions resulting in a reduction of maximum operating and commercial speed. Aged and devastated station houses with poor maintenance work and poor safety management are influencing on the number of railway passengers transported. Also aged and outdated traffic controlling system is reducing the railway line capacity. Except for the new access line to the Okecie Airport, construction of new railway lines can not be justified. Measures to maintain existing infrastructure and modernization of railway houses are essentially required. Installation of modernized rail traffic control system is required for the Central line where six (6) railway lines are co-operated.

The transport policy determined at the Warszawa Congress in 1995 explicitly states the priority on public transport means with tracks (railway, tram and metro). With respect to railway, the following principles were adopted.

- Work places and commercial functions shall be concentrated in the central area of the city and areas where mass transport means such as railway, tram and metro serve. Also this principle shall be adopted in case of aggregated housing development of high population density.

- Investment, organizational restructuring, economic activities to expand the role of railway serving agglomeration shall be supported.

- Collaboration and coordination among/between governmental organizations and PKP for the realization of effective public transport system shall be supported.

- Appropriate resolution making it possible to implement public works shall be made.

However, this transport policy has not been performed effectively. As a phenomenon, the progress of motorization and the lowering of railway service level had much influence on the land use pattern in the suburbs. On one side, sprawling emerged in the direction to expand railway passenger transport demand, on the other side, new housing areas, working areas and commercial areas were developed along major roads, making them dependent upon road transport.

In Warszawa agglomeration, in terms of population size, it meets the required condition for the sustainable management of the agglomeration railway service. Already WKD exclusively for the agglomeration transport service was separated from PKP in 2001. This railway line serves only in the direction from the center of Warszawa to the southwest.

As for spatial scale, that Warszawa agglomeration extends beyond a10 km radius, which is also a favorable condition as well.

Urban corridors (axis with densely concentrated housing and industrial areas) in Warszawa agglomeration extend to southeast, southwest, east, northeast, and northwest. Some of those corridors are covered by metro and WKD services already. However, all corridors are not covered as yet, therefore, a new mass public transport means is likely to be viable for corridors without mass public transport means.

Out of seven (7) railway lines, following four (4) radial railway lines are expected to

absorb more railway passenger transport demand taking into account development density around railway stations.

Warszawa – Grodzisk
Warszawa – Otwock,
Warszawa – Wolomin – Tluszcz,
Warszawa – Legionowo

In particular, the line between Warszawa-Otowock is supposed to carry almost the same volume of passengers as WKD (19,500 passengers per day in 2001). The railway line to Okecie international airport is worth while to construct to absorb latent railway passenger demand.

However, the financial matters prevent the railway operators from the agglomeration of the railway transport service. Reportedly almost all local governments of gminas are not ready to subsidize agglomeration railway transport service. It should be noted that gminas governments in Legionowo have a plan to improve the railway service level of Legionowo-Warszawa Gdańska link in collaboration with PKP Regional.

Following three projects proposed by local governments (ex. Legionowo city, gminas) and specialists are worth while to consider:

- Warszawa - Legionowo (to Choszczówka) section improvement project （partial railway track improvement for operation speed up and frequency improvement）
- Warszawa - Otwock section (to Falenica) improvement project
- Warszawa - Grodzisk section (to Włochy) improvement project

In Warszawa agglomeration, railway service (frequency, comfort, safety and information system) improvement is necessary to absorb latent railway passenger transport demand. As such a measure, common ticketing system between railway and other urban public transport means has proven to be effective in increasing the attractiveness of railway service through the trial introduction. Introduction of common ticketing system should be promoted.

(Łódż Agglomeration)

Population size of Łódż agglomeration is one million. This is almost minimal size of population for the introduction of agglomeration railway service. As for the spatial scale and urban structure, densely populated areas where large transport demand is expected are located along the railway lines in radial direction. However the scales of those populous areas are rather small and do not provide the favorable conditions for expanding the role of railway in agglomeration transport. In addition, the current well-developed tram network and bus services are also strong competitors because those public transport means are serving major cities in suburbs (ex. Zgierz, Ozorkow).

Taking above conditions into consideration, the expansion of railway role in Łódż agglomeration transport could be challenging. However, following two lines are likely to expand railway passenger transport volume.

- Łódż - Koluszki: Railway serves well this corridor and no strong competitive urban public transport means exist. However, the total transport demand around the railway station is not large.

- Łódż – Pabianice – Zdunska Wola – Sieradz: The idea of utilizing an existing railway line that is not in use for passenger transport at present has been proposed. As one such project, the circular railway service (Zgierz - Łódż Kaliska – Łódż Chojny – Zgierz) project has been proposed for many years.

In Łódż agglomeration, railway service (frequency, comfort, safety and information system) improvement is also necessary to absorb latent railway passenger transport demand.

It is also necessary to establish a close relationship between local governments and PKP Regional to expand the role of the railway in agglomeration transport.

Kraków agglomeration has one million population and mono-centric urban pattern.

Restriction for general traffic is applied to the historic blocks in central area of Kraków where old palaces and cathedrals are located. Therefore, urban public transport has a significant role in those areas. The relatively large transport demand for tourism by car, bus and railway is a specific feature of transport demand in this agglomeration.

In this agglomeration, bus transport deprived railway of large passenger transport demand in spite of the inconsistency of local government policy to give many concessions to bus and minibus operators. Also tram network is well developed in Kraków agglomeration and new modern tram cars are operated. Tram lines along the railway are used as a main urban public transport means.

Railway serves almost all urban corridors. However, densities of population and work places along railway are low to medium and do not provide the favorable conditions that would justify agglomeration railway service. Dual tram or rail bus to serve Kraków city and suburban areas are proposed to cope with growing traffic problems. Those projects attract more attention than positive utilization measures of existing railway.

There exists the possibility for expanding railway passenger transport demand in east-west corridor (Trzebinia – Kraków – Bochnia). To this end, collaboration among local governments and PKP companies toward railway service improvement and establishment of integrated urban transport system are prerequisite.

In Skawina-Kraków corridor, many railway passengers feel inconvenience due to lack of investment for direct train operation between Kraków Glowny and Kraków Plaszow. Dual tram is also regarded as an option to solve this problem.

In Karkow agglomeration, improvement of railway service (station house, comfort, safety) and dilapidated station houses is also necessary to absorb latent passenger transport demand.

Attachment 2.1.1 Traffic Zones

[Within Poland]

Zone No	Railway station name	Station type	Voivodship
1	ŚWINOUJŚCIE PORT	Freight + passenger station	Zachodniopomorskie
2	PŁOTY	Passenger station	Zachodniopomorskie
3	KOŁOBRZEG	Passenger station	Zachodniopomorskie
4	BIAŁOGARD	Freight + passenger station	Zachodniopomorskie
5	KOSZALIN	Passenger station	Zachodniopomorskie
6	DARŁOWO	Passenger station	Zachodniopomorskie
7	SZCZECIN GŁÓWNY	Freight + passenger station	Zachodniopomorskie
8	GOLENIÓW	Freight station	Zachodniopomorskie
9	DOLNA ODRA	Freight station	Zachodniopomorskie
10	STARGARD SZCZECIŃSKI	Freight + passenger station	Zachodniopomorskie
11	ZŁOCIENIEC	Passenger station	Zachodniopomorskie
12	SZCZECINEK	Freight + passenger station	Zachodniopomorskie
13	USTKA	Passenger station	Pomorskie
14	SŁUPSK	Freight + passenger station	Pomorskie
15	LĘBORK	Freight + passenger station	Pomorskie
16	HEL	Passenger station	Pomorskie
17	BYTÓW	Freight + passenger station	Pomorskie
18	KOŚCIERZYNA	Passenger station	Pomorskie
19	GDAŃSK GŁÓWNY	Freight + passenger station	Pomorskie
20	CHOJNICE	Freight + passenger station	Pomorskie
21	TCZEW	Freight + passenger station	Pomorskie
22	MALBORK	Freight + passenger station	Pomorskie
23	KWIDZYN	Freight station	Pomorskie
24	ELBLĄG	Freight + passenger station	Warmińsko-Mazurskie
25	KĘTRZYN	Freight + passenger station	Warmińsko-Mazurskie
26	EŁK	Freight + passenger station	Warmińsko-Mazurskie
27	IŁAWA GŁÓWNA	Freight + passenger station	Warmińsko-Mazurskie
28	OSTRÓDA	Passenger station	Warmińsko-Mazurskie
29	OLSZTYN GŁÓWNY	Freight + passenger station	Warmińsko-Mazurskie
30	SZCZYTNO	Passenger station	Warmińsko-Mazurskie
31	DZIAŁDOWO	Passenger station	Warmińsko-Mazurskie
32	SUWAŁKI	Freight + passenger station	Podlaskie
33	SOKÓŁKA	Freight station	Podlaskie
34	BIAŁYSTOK	Freight + passenger station	Podlaskie
35	BIELSK PODLASKI	Passenger station	Podlaskie
36	RZEPIN	Freight + passenger station	Lubuskie
37	GORZÓW WIELKOPOLSKI	Freight + passenger station	Lubuskie
38	MIĘDZYRZECZ	Freight + passenger station	Lubuskie
39	KROSNO ODRZAŃSKIE	Passenger station	Lubuskie
40	ZBĄSZYNEK	Freight + passenger station	Lubuskie
41	ŻAGAŃ	Freight + passenger station	Lubuskie
42	ZIELONA GÓRA	Freight + passenger station	Lubuskie
43	KRZYŻ	Freight + passenger station	Wielkopolskie
44	PIŁA GŁÓWNA	Freight + passenger station	Wielkopolskie

Zone No	Railway station name	Station type	Voivodship
45	SZAMOTUŁY	Freight station	Wielkopolskie
46	WĄGROWIEC	Passenger station	Wielkopolskie
47	WOLSZTYN	Freight station	Wielkopolskie
48	POZNAŃ GŁÓWNY	Freight + passenger station	Wielkopolskie
49	GNIEZNO	Freight + passenger station	Wielkopolskie
50	LESZNO	Freight + passenger station	Wielkopolskie
51	JAROCIN	Freight + passenger station	Wielkopolskie
52	KONIN	Freight + passenger station	Wielkopolskie
53	RAWICZ	Passenger station	Wielkopolskie
54	OSTRÓW WIELKOPOLSKI	Freight + passenger station	Wielkopolskie
55	KALISZ	Freight + passenger station	Wielkopolskie
56	KĘPNO	Freight + passenger station	Wielkopolskie
57	NAKŁO N/NOTECIĄ	Passenger station	Kujawsko-Pomorskie
58	BYDGOSZCZ GŁÓWNA	Freight + passenger station	Kujawsko-Pomorskie
59	TERESPOL POMORSKI	Freight station	Kujawsko-Pomorskie
60	GRUDZIĄDZ	Freight + passenger station	Kujawsko-Pomorskie
61	INOWROCŁAW	Freight + passenger station	Kujawsko-Pomorskie
62	TORUŃ GŁÓWNY	Freight + passenger station	Kujawsko-Pomorskie
63	BRODNICA	Passenger station	Kujawsko-Pomorskie
64	ALEKSANDRÓW KUJAWSKI	Passenger station	Kujawsko-Pomorskie
65	WŁOCŁAWEK	Freight + passenger station	Kujawsko-Pomorskie
66	KUTNO	Freight + passenger station	Łódzkie
67	ŁOWICZ GŁÓWNY	Passenger station	Łódzkie
68	SIERADZ	Passenger station	Łódzkie
69	ZDUŃSKA WOLA	Freight + passenger station	Łódzkie
70	ŁÓDŹ FABRYCZNA	Freight + passenger station	Łódzkie
71	KOLUSZKI	Passenger station	Łódzkie
72	SKIERNIEWICE	Freight + passenger station	Łódzkie
73	CHORZEW SIEMKOWICE	Freight station	Łódzkie
74	PIOTRKÓW TRYBUNALSKI	Freight + passenger station	Łódzkie
75	SIERPC	Freight + passenger station	Mazowieckie
76	MŁAWA	Freight station	Mazowieckie
77	OSTROŁĘKA	Freight + passenger station	Mazowieckie
78	PŁOCK	Freight + passenger station	Mazowieckie
79	CIECHANÓW	Passenger station	Mazowieckie
80	NASIELSK	Freight station	Mazowieckie
81	TŁUSZCZ	Freight station	Mazowieckie
82	MAŁKINIA	Passenger station	Mazowieckie
83	WARSZAWA CENTRALNA	Freight + passenger station	Mazowieckie
84	PIŁAWA	Passenger station	Mazowieckie
85	SIEDLCE	Freight + passenger station	Mazowieckie
86	RADOM	Freight + passenger station	Mazowieckie
87	ŚWIERZE GÓRNE	Freight station	Mazowieckie
88	ŁUKÓW	Freight + passenger station	Lubelskie

Zone No	Railway station name	Station type	Voivodship
89	BIAŁA PODLASKA	Freight + passenger station	Lubelskie
90	DĘBLIN	Freight + passenger station	Lubelskie
91	PUŁAWY AZOTY	Freight station	Lubelskie
92	LUBLIN	Freight + passenger station	Lubelskie
93	CHEŁM	Freight + passenger station	Lubelskie
94	ZAMOŚĆ	Freight + passenger station	Lubelskie
95	BOLESŁAWIEC	Freight + passenger station	Dolnośląskie
96	GŁOGÓW	Freight + passenger station	Dolnośląskie
97	LUBAŃ ŚLĄSKI	Freight station	Dolnośląskie
98	JELENIA GÓRA	Freight + passenger station	Dolnośląskie
99	LEGNICA	Freight + passenger station	Dolnośląskie
100	WROCŁAW GŁÓWNY	Freight + passenger station	Dolnośląskie
101	OLEŚNICA	Freight + passenger station	Dolnośląskie
102	WAŁBRZYCH GŁÓWNY	Freight + passenger station	Dolnośląskie
103	JAWORZYNA ŚLĄSKA	Freight + passenger station	Dolnośląskie
104	DZIERŻONIÓW ŚLĄSKI	Passenger station	Dolnośląskie
105	KUDOWA ZDRÓJ	Passenger station	Dolnośląskie
106	KAMIENIEC ZĄBKOWICKI	Freight + passenger station	Dolnośląskie
107	KŁODZKO GŁÓWNE	Freight + passenger station	Dolnośląskie
108	BRZEG	Freight station	Opolskie
109	KLUCZBORK	Freight + passenger station	Opolskie
110	OPOLE GŁÓWNE	Freight + passenger station	Opolskie
111	STRZELCE OPOLSKIE	Freight station	Opolskie
112	NYSA	Freight + passenger station	Opolskie
113	KĘDZIERZYN KOŹLE	Freight + passenger station	Opolskie
114	HERBY NOWE	Passenger station	Śląskie
115	CZĘSTOCHOWA	Freight + passenger station	Śląskie
116	LUBLINIEC	Freight + passenger station	Śląskie
117	ZAWIERCIE	Freight + passenger station	Śląskie
118	TARNÓWSKIE GÓRY	Freight + passenger station	Śląskie
119	DĄBROWA GÓRN.ZĄBKOW	Freight station	Śląskie
120	GLIWICE	Freight + passenger station	Śląskie
121	ZABRZE BISKUPICE	Freight station	Śląskie
122	BYTOM	Freight station	Śląskie
123	RUDA CHEBZIE	Freight station	Śląskie
124	CHORZÓW BATORY	Freight station	Śląskie
125	KATOWICE	Freight + passenger station	Śląskie
126	SOSNOWIEC DAŃDÓWKA	Freight station	Śląskie
127	MYSŁOWICE	Freight station	Śląskie
128	JAWORZNO SZCZAKOWA	Freight station	Śląskie
129	ŁAZISKA ŚREDNIE	Freight station	Śląskie
130	TYCHY	Freight station	Śląskie
131	RACIBÓRZ	Freight + passenger station	Śląskie
132	RYBNIK	Freight + passenger station	Śląskie

Zone No	Railway station name	Station type	Voivodship
133	CZECHOWICE DZIEDZICE	Freight station	Śląskie
134	CHYBIE	Passenger station	Śląskie
135	BIELSKO BIAŁA GŁÓWNA	Freight + passenger station	Śląskie
136	WISŁA UZDROWISKO	Passenger station	Śląskie
137	ŻYWIEC	Freight station	Śląskie
138	GR. IZ 25/13-15	Freight station	Świętokrzyskie
139	SKARŻYSKO KAMIENNA	Freight + passenger station	Świętokrzyskie
140	SĘDZISZÓW	Freight station	Świętokrzyskie
141	KIELCE	Freight + passenger station	Świętokrzyskie
142	OŻARÓW CEMENTOWNIA	Freight station	Świętokrzyskie
143	POŁANIEC	Freight station	Świętokrzyskie
144	TRZEBINIA	Freight + passenger station	Małopolskie
145	TUNEL	Passenger station	Małopolskie
146	OŚWIĘCIM	Freight + passenger station	Małopolskie
147	KRAKÓW GŁÓWNY OSOB.	Freight + passenger station	Małopolskie
148	SKAWINA	Freight station	Małopolskie
149	BOCHNIA	Freight station	Małopolskie
150	TARNÓW	Freight + passenger station	Małopolskie
151	SUCHA BESKIDZKA	Passenger station	Małopolskie
152	CHABÓWKA	Passenger station	Małopolskie
153	ZAKOPANE	Freight + passenger station	Małopolskie
154	NOWY SĄCZ	Freight + passenger station	Małopolskie
155	GORLICE ZAGÓRZANY	Freight station	Małopolskie
156	MUSZYNA	Freight + passenger station	Małopolskie
157	OCICE	Freight + passenger station	Podkarpackie
158	STALOWA WOLA PŁD.	Freight + passenger station	Podkarpackie
159	DĘBICA	Freight + passenger station	Podkarpackie
160	RZESZÓW	Freight + passenger station	Podkarpackie
161	PRZEWORSK	Freight + passenger station	Podkarpackie
162	JASŁO	Freight + passenger station	Podkarpackie
163	PRZEMYŚL GŁÓWNY	Passenger station	Podkarpackie
164	ZAGÓRZ	Freight + passenger station	Podkarpackie

[Border crossings in Poland]

Zone No	Name of railway border crossing	Name of road border crossing	Country
165	Braniewo (GR)	Gronowo	Russia
166	Głomno (GR)	Bezledy	Russia
167	Trakiszki (GR)	Budzisko + Ogrodniki	Lithuania
168	Kużnica Biał. (GR)	Kuźnica Białostocka	Belarus
169	Zubki Biał. (GR)	Bobrowniki	Belarus
170	Terespol (GR)	Terespol + Kukuryki	Belarus
171	-	Sławatycze	Belarus
172	Dorohusk (GR)	Dorohusk	Ukraine
173	Hrubieszów (GR)	Zosin	Ukraine
174	Hrebenne (GR)	Hrebenne	Ukraine
175	Medyka (GR)	Medyka + Korczowa	Ukraine
176	Łupków (GR)	Barwinek	Slovakia
177	Muszyna (GR)	Niedzica	Slovakia
178	-	Chyżne	Slovakia
179	Zwardoń (GR)	Zwardoń	Slovakia
180	Cieszyn (GR)	Cieszyn	Czech Republic
181	Chałupki (GR)	Chałupki + Marklowice + Gołkowice	Czech Republic
182	Międzylesie (GR)	Boboszów	Czech Republic
183	-	Kudowa	Czech Republic
184	Lubawka (GR)	Lubawka	Czech Republic
185	-	Jakuszyce	Czech Republic
186	Zawidów (GR)	Porajów	Czech Republic
187	Zgorzelec (GR)	Zgorzelec + Jędrzychowice	Germany
188	Zasieki (GR)	Olszyna	Germany
189	Gubin (GR)	Gubin + Gubinek	Germany
190	Kunowice (GR)	Świecko + Słubice	Germany
191	Kostrzyń (GR)	Kostrzyń	Germany
192	-	Krajnik + Osinów	Germany
193	Tantów (GR)	Kołbaskowo	Germany
194	Grambów (GR)	Lubieszyn	Germany

[Foreign countries]

Zone No	Counry
195	Russia
196	Lithuania
197	Belarus
198	Ukraine
199	Slovakia
200	the Czech Republic
201	Germany

Attachment 2.2.1 Characteristics of Voivodship

Voivodship	Actual GDP[1] (mil. PLN)	Population[2] (x1,000)				GDP[4] (mil. PLN)	
	2000	2001	2002[3]	2010		2006	2010
Total	684,982	38,641	38,643	38,788	Upper case	844,906	1,046,690
					Lower case	810,792	966,885
Dolnoslaskie	54,516	2,971	2,971	2,957	Upper case	72,674	97,396
					Lower case	68,619	87,533
Kujawsko-Pomorskie	33,392	2,100	2,101	2,112	Upper case	35,327	36,319
					Lower case	35,088	35,976
Lubelskie	27,125	2,230	2,230	2,207	Upper case	33,418	40,921
					Lower case	32,094	37,996
Lubuskie	16,279	1,024	1,026	1,042	Upper case	18,568	20,813
					Lower case	18,136	19,962
Łódżkie	41,631	2,638	2,633	2,567	Upper case	50,611	61,038
					Lower case	48,747	56,990
Malopolskie	51,064	3,238	3,237	3,309	Upper case	72,146	103,322
					Lower case	67,283	90,690
Mazowieckie	136,202	5,076	5,064	5,097	Upper case	186,941	259,021
					Lower case	175,414	230,036
Opolskie	16,458	1,083	1,084	1,077	Upper case	17,775	18,714
					Lower case	17,573	18,373
Podkarpackie	26,827	2,130	2,133	2,168	Upper case	32,614	39,334
					Lower case	31,413	36,725
Podlaskie	16,098	1,221	1,222	1,222	Upper case	18,991	22,127
					Lower case	18,412	20,922
Pomorskie	39,117	2,202	2,201	2,258	Upper case	45,070	51,112
					Lower case	43,924	48,813
Slaskie	94,773	4,840	4,855	4,827	Upper case	104,840	113,459
					Lower case	103,098	110,251
Swietokrzyskie	18,358	1,321	1,318	1,291	Upper case	19,895	21,028
					Lower case	19,654	20,614
Warminsko-Mazurskie	19,370	1,469	1,469	1,483	Upper case	22,167	24,944
					Lower case	21,636	23,891
Wielkopolskie	63,457	3,363	3,363	3,419	Upper case	76,889	92,376
					Lower case	74,111	86,371
Zachodniopomorskie	30,316	1,735	1,736	1,753	Upper case	36,978	44,767
					Lower case	35,590	41,740

Source: Statistical Yearbook, Population Census

Note:[1] At current prices

[2] Population for 2001 is as of 31st of December.

[3] GUS estimate

[4] At 2000 prices

Attachment 2.2.2 Population Forecast until 2020

Voivodship	1996*	2000*	2001*	2002	2006	2010	2020
Total	38,639,341	38,644,211	38,632,453	38,639,761	38,647,941	38,787,993	39,003,026
Dolnoslaskie	2,986,884	2,972,667	2,970,094	2,967,380	2,956,628	2,956,977	2,943,106
Kujawsko-Pomorskie	2,095,819	2,099,724	2,101,654	2,101,517	2,103,642	2,111,921	2,124,648
Lubelskie	2,244,212	2,232,054	2,227,574	2,227,056	2,214,472	2,206,981	2,186,534
Lubuskie	1,017,596	1,023,988	1,024,499	1,027,393	1,033,244	1,042,394	1,060,199
Łódżkie	2,680,350	2,643,385	2,632,879	2,623,415	2,589,461	2,566,861	2,514,259
Malopolskie	3,197,064	3,233,799	3,240,928	3,244,174	3,272,652	3,308,803	3,391,317
Mazowieckie	5,061,049	5,072,335	5,079,006	5,064,533	5,070,281	5,096,666	5,152,823
Opolskie	1,092,524	1,084,665	1,080,505	1,082,939	1,077,998	1,076,937	1,071,145
Podkarpackie	2,112,560	2,128,605	2,131,368	2,136,696	2,150,362	2,167,717	2,205,479
Podlaskie	1,223,133	1,221,128	1,219,879	1,221,716	1,219,756	1,221,547	1,222,797
Pomorskie	2,172,540	2,198,322	2,204,375	2,205,867	2,227,924	2,258,131	2,319,061
Slaskie	4,902,913	4,847,600	4,830,472	4,848,172	4,824,666	4,826,986	4,803,830
Swietokrzyskie	1,330,460	1,322,879	1,319,611	1,314,740	1,301,977	1,290,826	1,258,433
Warminsko-Mazurskie	1,456,724	1,468,313	1,469,274	1,470,094	1,475,256	1,483,240	1,491,057
Wielkopolskie	3,339,757	3,360,899	3,366,020	3,367,092	3,386,986	3,418,836	3,492,256
Zachodniopomorskie	1,725,756	1,733,848	1,734,315	1,736,977	1,742,636	1,753,170	1,766,082

Source: Main Statistical Office (GUS)

Note: *Actual

Attachment 2.3.1 Passenger Transport by Transport Mode in Poland, 2000

	Passenger (million)		Passenger.-km (million)		Average Distance (km)
Total	2,989.16	100.0%	122,040	100.0%	40.8
Railway	360.20	12.1%	24,100	19.7%	66.9
Bus	954.52	31.9%	31,740	26.0%	33.2
Car	1,669.67	55.9%	60,010	49.2%	35.9
Air	2.88	0.1%	6,030	4.9%	2094.9
Inland waterway	1.27	0.0%	30	0.0%	20.5
Maritime transport	0.63	0.0%	130	0.1%	206.7

Source: Poland Statistical Yearbook

Attachment 2.3.2 Rail Freight Transport by Commodity Group

(unit: 1,000 tons)

	1990	1995	2000	2001	Average Transport Distance per one ton in km
Total	278,139	224,346	186,905	166,616	288
Hard coal [b]	120,146	107,457	82,070	78,936	275
Lignite and coke [b]	11,185	9,175	7,101	6,893	231
Ores	18,014	13,984	13,428	10,241	318
Rocks and gravel [c]	12,919	14,744	16,235	12,259	250
Sand [d]	2,837	1,321	1,419	925	270
Crude petroleum and petroleum products	11,870	11,635	13,170	11,581	307
Metals and metal products	24,431	16,202	13,886	11,684	262
Bricks	54	7	284	17	101
Cement	4,857	5,649	3,815	2,808	298
Fertilizers	6,413	5,145	4,069	3,355	359
Other chemical articles	11,840	9,926	9,214	8,702	301
Cereals	2,445	2,257	1,798	981	292
Potatoes	937	156	34	26	192
Sugar beets	2,241	934	530	386	236
Other crops [a] and agricultural products	4,763	2,520	1,921	1,806	302
Wood and wood products	6,247	3,323	3,540	3,296	335
Other goods	36,940	19,911	14,391	12,720	368

Source: Statistical Yearbook
Note:
a Including those transported by LHS
b Including station shipments.
c Excluding gravel.
d Including gravel.

Attachment 2.3.3 Rail Freight Transport by Commodity Group by PKP Cargo (tonnage) in 2001

(unit: 1,000 tons)

	Total	Domestic	To foreign countries			From foreign countries			Transit
			Total	by land	through port	Total	by land	through port	
Total	162,827	98,469	40,843	21,968	18,875	18,524	15,030	3,494	4,991
Hard coal	79,169	55,042	23,003	8,697	14,306	1,077	1,006	71	47
Lignite and coke	6,971	3,028	3,855	3,633	222	24	18	6	64
Ores	8,648	2,793	84	67	17	4,059	2,241	1,818	1,712
Rocks and gravel	12,848	10,711	1,399	1,398	1	734	731	3	4
Sand	932	895	36	30	6	1	1	-	-
Crude petroleum and petroleum products	11,592	8,436	689	368	321	2,462	2,310	152	5
Metals and metal products	13,297	5,584	4,178	3,019	1,159	1,927	1,838	89	1,608
Bricks	17	-	-	-	-	17	17	-	0
Cement	2,794	1,971	532	518	14	290	290	-	1
Fertilizers	3,504	1,139	1,127	263	864	1,029	832	197	209
Other chemical articles	8,943	3,121	2,745	1,533	1,212	2,794	2,370	424	283
Cereals	1,050	357	5	5	-	618	294	324	70
Potatoes	25	0	25	25	-	0	0	-	-
Sugar beets	386	385	0	0	-	-	-	-	-
Other crops [a] and agricultural products	1,854	477	709	293	416	608	433	175	60
Wood and wood products	3,454	2,072	547	503	44	676	676	0	159
Other goods	5,382	2,314	1,335	1,204	131	1,432	1,316	116	301
Intermodal	1,961	144	574	412	162	776	657	119	467

Source: Statistical Yearbook

Attachment 2.3.4 Rail Freight Transport by Commodity Group by PKP LHS (tonnage) in 2001

(unit:1,000 tons)

	Total	Domestic	To foreign countries			From foreign countries			Transit
			Total	by land	through port	Total	by land	through port	
Total	3,789	-	46	46	-	3,743	3,743	-	-
Hard coal	12	-	-	-	-	12	12	-	-
Lignite and coke	0	-	-	-	-	0	0	-	-
Ores	3,307	-	-	-	-	3,307	3,307	-	-
Rocks and gravel	53	-	5	5	-	48	48	-	-
Sand	2	-	-	-	-	2	2	-	-
Crude petroleum and petroleum products	-	-	-	-	-	-	-	-	-
Metals and metal products	132	-	1	1	-	131	131	-	-
Bricks	-	-	-	-	-	-	-	-	-
Cement	16	-	0	0	-	16	16	-	-
Fertilizers	61	-	0	0		61	61	-	-
Other chemical articles	41	-	0	0		41	41	-	-
Cereals	1	-	-	-	-	1	1	-	-
Potatoes	1	-	1	1		-	-	-	-
Sugar beets	-	-	-	-		-	-	-	-
Other cropsa and agricultural products	12	-	2	2		10	10	-	-
Wood and wood products	15	-	2	2		13	13	-	-
Other goods	103	-	11	11		92	92	-	-
Intermodal	33	-	24	24		9	9	-	-

Source: Statistical Yearbook

Attachment 2.3.5 Rail Freight Transport by Commodity Group by PKP Cargo and PKP LHS (tonnage) in 2001

(unit:1,000 tons)

		Domestic	To foreign countries			From foreign countries			Transit
			Total	by land	through port	Total	by land	through port	
Total	166,616	98,469	40,889	22,014	18,875	22,267	18,773	3,494	4,991
Hard coal	79,181	55,042	23,003	8,697	14,306	1,089	1,018	71	47
Lignite and coke	6,971	3,028	3,855	3,633	222	24	18	6	64
Ores	11,955	2,793	84	67	17	7,366	5,548	1,818	1,712
Rocks and gravel	12,901	10,711	1,404	1,403	1	782	779	3	4
Sand	934	895	36	30	6	3	3	-	-
Crude petroleum and petroleum products	11,592	8,436	689	368	321	2,462	2,310	152	5
Metals and metal products	13,429	5,584	4,179	3,020	1,159	2,058	1,969	89	1,608
Bricks	17	-	-	-	-	17	17	-	0
Cement	2,810	1,971	532	518	14	306	306	-	1
Fertilizers	3,565	1,139	1,127	263	864	1,090	893	197	209
Other chemical articles	8,984	3,121	2,745	1,533	1,212	2,835	2,411	424	283
Cereals	1,051	357	5	5	-	619	295	324	70
Potatoes	26	0	26	26	-	0	0	-	-
Sugar beets	386	385	0	0	-	-	-	-	-
Other crops [a] and agricultural products	1,866	477	711	295	416	618	443	175	60
Wood and wood products	3,469	2,072	549	505	44	689	689	0	159
Other goods	5,485	2,314	1,346	1,215	131	1,524	1,408	116	301
Intermodal	1,994	144	598	436	162	785	666	119	467

Source: Statistical yearbook

Attachment 2.3.6 Rail Freight Transport by Commodity Group by PKP Cargo (ton-km) in 2001

(unit: million km)

	Total	Domestic	To foreign countries			From foreign countries			Transit
			Total	by land	through port	Total	by land	through port	
Total	46,477	23,342	15,185	5,587	9,598	5,273	3,577	1,696	2,776
Hard coal	21,477	12,540	9,118	1,660	7,458	119	111	8	8
Lignite and coke	1,628	535	1,049	932	117	11	7	4	33
Ores	2,645	252	23	14	9	1,664	531	1,133	706
Rocks and gravel	3,245	2,555	610	609	1	78	76	2	2
Sand	250	236	14	11	3	0	0	-	-
Crude petroleum and petroleum products	3,555	2,750	226	115	111	577	530	47	2
Metals and metal products	4,117	977	1,424	834	590	664	623	41	1,052
Bricks	2	-	-	-	-	2	2	-	0
Cement	835	603	204	197	7	27	27	-	1
Fertilizers	1,325	457	553	91	462	183	106	77	132
Other chemical articles	2,790	935	973	399	574	699	541	158	183
Cereals	323	106	2	2	-	178	81	97	37
Potatoes	5	0	5	5	-	0	0	-	-
Sugar beets	91	91	0	0	-	-	-	-	-
Other crops a and agricultural products	577	110	240	98	142	190	138	52	37
Wood and wood products	1,200	723	177	165	12	203	203	0	97
Other goods	1,322	317	384	338	46	427	395	32	194
Intermodal	782	56	183	117	66	251	206	45	292

Source: Statistical Yearbook

Attachment 2.3.7 Rail Freight Transport by Commodity Group by PKP LHS (ton-km) in 2001

(unit: million km)

	Total	Domestic	To foreign countries			From foreign countries			Transit
			Total	by land	through port	Total	by land	through port	
Total	1,429	-	13	13	-	1,416	1,416	-	-
Hard coal	1	-	-	-	-	1	1	-	-
Lignite and coke	0	-	-	-	-	0	0	-	-
Ores	1,319	-	-	-	-	1,319	1,319	-	-
Rocks and gravel	3	-	1	1	-	2	2	-	-
Sand	0	-	-	-	-	0	0	-	-
Crude petroleum and petroleum products	-	-	-	-	-	-	-	-	-
Metals and metal products	21	-	0	0	-	21	21	-	-
Bricks	-	-	-	-	-	-	-	-	-
Cement	2	-	0	0	-	2	2	-	-
Fertilizers	13	-	0	0	-	13	13	-	-
Other chemical articles	16	-	0	0	-	16	16	-	-
Cereals	0	-	-	-	-	0	0	-	-
Potatoes	0	-	0	0	-	-	-	-	-
Sugar beets	-	-	-	-	-	-	-	-	-
Other crops [a] and agricultural products	4	-	0	0	-	4	4	-	-
Wood and wood products	2	-	0	0	-	2	2	-	-
Other goods	34	-	2	2	-	32	32	-	-
Intermodal	14	-	10	10	-	4	4	-	-

Source: Statistical Yearbook

Attachment 2.3.8 Rail Freight Transport by Commodity Group by PKP Cargo and PKP LHS (ton-km) in 2001

(unit: million km)

	Total	Domestic	To foreign countries			From foreign countries			Transit
			Total	by land	through port	Total	by land	through port	
Total	47,906	23,243	15,198	5,600	9,598	6,689	4,993	1,696	2,776
Hard coal [b]	21,786	12,540	9,118	1,660	7,458	120	112	8	8
Lignite and coke [b]	1,628	535	1,049	932	117	11	7	4	33
Ores	3,964	252	23	14	9	2,983	1,850	1,133	706
Rocks and gravel	3,248	2,555	611	610	1	80	78	2	2
Sand	250	236	14	11	3	0	0	-	-
Crude petroleum and petroleum products	3,555	2,750	226	115	111	577	530	47	2
Metals and metal products	4,138	977	1,424	834	590	685	644	41	1,052
Bricks	2	-	-	-	-	2	2	-	0
Cement	837	603	204	197	7	29	29	-	1
Fertilizers	1,338	457	553	91	462	196	119	77	132
Other chemical articles	2,806	935	973	399	574	715	557	158	183
Cereals	323	106	2	2	-	178	81	97	37
Potatoes	5	0	5	5	-	0	0	-	-
Sugar beets	91	91	0	0	-	-	-	-	-
Other crops [a] and agricultural products	581	110	240	98	142	194	142	52	37
Wood and wood products	1,202	723	177	165	12	205	205	0	97
Other goods	1,356	317	386	340	46	459	427	32	194
Intermodal	796	56	193	127	66	255	210	45	292

Source: Statistical Yearbook

Attachment 2.3.9 Intermodal Transport by PKP in 2000

		Total	Domestic	Export	Import	Transit
Total	tons	2,078,965	133,357	598,180	853,909	493,519
		100.0%	6.4%	28.8%	41.1%	23.7%
	1,000 ton-km	844,821	54,150	192,302	298,171	300,198
		100.0%	6.4%	22.8%	35.3%	35.5%
Loaded units						
Semi-trailer	tons	19,078		7,969	11,109	
	1,000 ton-km	2,404		1,232	1,172	
Mobile box	tons	216,352		80,055	134,288	2,009
	1,000 ton-km	38,367		10,748	26,741	878
Container	TEU	128,577	4,408	27,674	63,121	33,374
	tons	1,622,648	74,491	371,752	694,019	482,386
	1,000 ton-km	744,236	30,729	153,509	266,605	293,393
sub-total	tons	1,858,078	74,491	459,776	839,416	484,395
	1,000 ton-km	785,007	30,729	165,489	294,518	294,271
Empty units						
Semi-trailer	tons	228	3	219		6
	1,000 ton-km	51	1	47		3
Mobile box	tons	73,138		73,105	33	
	1,000 ton-km	10,107		10,104	3	
Container	TEU	67,741	29,681	29,444	5,523	3,093
	tons	147,521	58,863	65,080	14,460	9,118
	1,000 ton-km	49,656	23,420	16,662	3,650	5,924
sub-total	tons	220,887	58,866	138,404	14,493	9,124
	1,000 ton-km	59,814	23,421	26,813	3,653	5,927

Attachment 2.3.10 Freight Transport by Rail in Poland in 2001

(unit:1,000 train-km)

	Total	Steam	Electric			Diesel		
			Sub-total	Locomotive	EMU	Sub-total	Locomotive	Rail-bus
Total	80,108	50	70,005	70,005	-	10,053	10,053	-
International	7,949	25	7,154	7,154	-	770	770	-
System	2,315	-	2,247	2,247	-	68	68	-
Fast	12,306	-	12,303	12,303	-	3	3	-
Exclusive	37,608	-	35,349	35,349	-	2,259	2,259	-
Interregional	5,587	-	5,168	5,168	-	419	419	-
Regional	14,331	25	7,781	7,781	-	6,525	6,525	-
Freight-passenger	12	-	3	3	-	9	9	-

Source: Statistical Yearbook

Attachment 2.4.1 Rail Cargo Transport by Commodity Group

	1999	2001
Total	186,366	166,616
Index	100.0	89.4
Hard coal, ores, crude petroleum and petroleum products, and metals and metal products	127,441	116,157
Index	100.0	91.1
Others	58,925	50,459
Index	100.0	85.6

Source: Statistical Yearbook

Attachment 2.4.2 Change in Modal Share between Rail and Road

	Unit	1990	1995	2000	2001
Total transported volume by rail and road	million ton	1,574.1	1,312.1	1,270.3	1,239.2
	%	100.0	100.0	100.0	100.0
Railway transport	million ton	281.7	225.3	187.2	166.9
	(%)	17.9	17.2	14.7	13.5
of which others	million ton	103.7	75.1	64.4	54.2
	(%)	6.6	5.7	5.1	4.4
Road transport	million ton	1,292.4	1,086.8	1,083.1	1,072.3
	(%)	82.1	82.8	85.3	86.5
Total transported volume by rail and road	million ton-km	123,823	120,316	127,290	122,316
	(%)	100.0	100.0	100.0	100.0
Railway transport	(million ton-km)	83,530	69,116	54,448	47,913
	(%)	67.5	57.4	42.8	39.2
Road transport	(million ton-km)	40,293	51,200	72,842	74,403
	(%)	32.5	42.6	57.2	60.8

Source: Statistical Yearbooks

Attachment 2.4.3 Change in Average Freight Transport Distance by Rail

	Unit	1990	1995	2000	2001
Tonnage	million ton	281.7	225.3	187.2	166.9
Ton-km	million	83,530	69,116	54,448	47,913
Average distance	Km	297	307	291	287
Index		100.0	103.4	98.1	96.8

Source: Statistical Yearbooks

Attachment 2.4.4 Elasticity of Freight Transport Demand (ton-km) with Respect to GDP

Commodity	Domestic	Foreign		
		Export	Import	External-external
Others	0.35	0.35	0.35	0.77

Attachment 2.4.5 Freight Transport Demand in 2001

	2001																					
	Domestic			Foreign																		
				Export						Import						External-external						
	Total	Rail	Others	Total	Rail	Road	Inland waterway	Pipeline	Others	Total	Rail	Road	Inland waterway	Pipeline	Others	Total	Rail	Road	Inland waterway	Pipeline	Maritime	Others
Hard coal	86.0	55.0	31.0	23.7	23.0	0.0	1.5	-	13.1	1.5	1.1	0.0	-	-	0.6		0.0	unknown	unknown		-	unknown * unknown
Ore	32.1	2.8	29.3	0.1	0.1	-	-	-	-	7.7	7.4	0.0	0.0	-	2.1		1.7	unknown	unknown		-	unknown unknown
Metal and metal products	17.1	5.6	11.5	4.6	4.2	2.5	0.1	-	1.7	3.4	2.1	2.1	0.0	0.0	0.5		1.6	unknown	unknown		-	unknown unknown
Crude oil	0.8	0.0	0.8	0.4	0.0	0.4	-	-	-	17.6	0.9	-	-	16.5	-	25.1	0.0	-	-	25.1	-	-
Petroleum, petroleum products	18.4	8.4	10.0	2.5	0.7	0.0	-	-	2.1	2.3	1.6	0.2	-	-	0.8		0.0	unknown	unknown		-	unknown unknown
Others	1,015.0	26.6	988.4	35.0	13.0	13.6	1.2	-	6.8	26.6	9.3	13.8	0.5	-	9.2		1.6	unknown	unknown		-	unknown unknown
Total	1,169.4	98.5	1077.0	66.3	40.9	16.5	2.7	0.0	23.7	59.1	22.3	16.0	0.5	16.7	13.2	49.9	5.0	6.8	0.4	25.1	12.7	-

Source Statistical Yearbook

Note: Railway transport volumes are based on "the Railway Statistics 2001".
As for the international transport, summed up transport volume does not accord to the total transport volume, due to the different sources of data.

Attachment 2.4.6 Freight Transport Demand in 2010

		2010																					
		Domestic			Foreign																		
					Export						Import						External-external						
		Total	Rail	Others	Total	Rail	Road	Inland waterway	Pipeline	Others	Total	Rail	Road	Inland waterway	Pipeline	Others	Total	Rail	Road	Inland waterway	Pipeline	Maritime	Others
Hard coal	Upper case	84.3	53.9	30.4	7.7	7.5	0.0	0.5	-	4.3	2.0	1.5	0.0	-	-	0.8		0.0					
	Lower case	49.0	31.4	17.7	18.9	18.3	0.0	1.2	-	10.4	2.7	2.0	0.0	-	-	1.1		0.0	unknown	unknown		-	unknown unknown
Ore	Upper case	53.4	4.5	48.9	0.2	0.2	-	-	-	-	12.8	11.8	0.0	0.0	-	3.5		1.8					
	Lower case	32.1	2.6	29.5	0.1	0.1	-	-	-	-	7.7	6.8	0.0	0.0	-	2.1		1.8	unknown	unknown		-	unknown unknown
Metal and metal products	Upper case	28.4	8.3	20.1	7.7	6.2	4.8	0.2	-	2.8	5.7	3.1	3.8	0.0	0.0	0.8		1.7					
	Lower case	17.1	4.8	12.3	4.6	3.6	3.1	0.1	-	1.7	3.4	1.8	2.4	0.0	0.0	0.5		1.7	unknown	unknown		-	unknown unknown
Crude oil	Upper case	0.9	0.0	0.9	0.5	0.0	0.5	-	-	-	19.9	0.9	-	-	19.0	-	25.9	0.0			25.9		
	Lower case	0.8	0.0	0.8	0.4	0.0	0.4	-	-	-	17.6	0.9	-	-	16.5	-	25.9	0.0	-	-	25.9	-	-
Petroleum, petroleum prod	Upper case	20.6	8.4	12.2	2.8	0.7	0.0	-	-	2.4	2.6	1.6	0.2	-	-	0.9		0.0					
	Lower case	18.4	8.4	10.0	2.5	0.7	0.0	-	-	2.1	2.3	1.6	0.2	-	-	0.9		0.0	unknown	unknown		-	unknown unknown
Others	Upper case	1,015.0	20.9	994.1	35.0	10.2	16.4	1.2	-	6.8	26.6	10.0	16.5	0.5	-	9.2		1.7					
	Lower case	1,015.0	18.4	996.6	35.0	9.0	17.6	1.2	-	6.8	26.6	8.8	17.7	0.5	-	9.2		1.7	unknown	unknown		-	unknown unknown
Total	Upper case	1,202.6	96.0	1106.6	53.9	24.7	21.7	1.8	0.0	16.2	69.6	28.7	20.5	0.5	19.0	15.3	51.6	5.1	7.6	0.4	25.9	12.7	-
	Lower case	1,132.4	65.6	1066.8	61.5	31.7	21.1	2.5	0.0	21.0	60.3	21.8	20.2	0.5	16.5	13.8	51.6	5.1	7.6	0.4	25.9	12.7	-

Attachment 2.4.7 Rail Freight Transport Demand by Company in 2001 (Tonnage)

(Unit: 1,000 tons)

Company	Total	Domestic	To foreign countries			From foreign countries			Transit
			Total	by land	through port	Total	by land	through port	
Total	166,616	98,469	40,889	22,014	18,875	22,267	18,773	3,494	4,991
PKP Cargo	162,827	98,469	40,843	21,968	18,875	18,524	15,030	3,494	4,991
LHS	3,789	-	46	46	-	3,743	3,743	-	-

Source: Statistical Yearbook

Attachment 2.4.8 Rail Freight Transport Demand Forecast by Company in 2006

(Unit: 1,000 tons)

Company	Case	Total	Domestic	To foreign countries			From foreign countries			Transit
				Total	by land	through port	Total	by land	through port	
PKP Cargo	Upper case	160,840	98,978	33,111	19,177	13,934	23,709	18,923	4,786	5,042
	Lower case	142,149	76,255	39,973	20,843	19,130	20,878	17,115	3,763	5,042
LHS	Upper case	5,602	-	42	42	-	5,560	5,560	-	-
	Lower case	3,808	-	40	40		3,769	3,769	-	-

Attachment 2.4.9 Rail Freight Transport Demand Forecast by Company in 2010

(Unit: 1,000 tons)

	Case	Total	Domestic	To foreign countries			From foreign countries			Transit
				Total	by land	through port	Total	by land	through port	
PKP Cargo	Upper case	148,752	96,031	24,688	15,544	9,144	22,918	18,179	4,739	5,116
	Lower case	120,675	65,609	31,641	16,773	14,868	18,310	15,001	3,309	5,116
LHS	Upper case	5,839	-	37	37	-	5,802	5,802	-	-
	Lower case	3,478	-	32	32	-	3,446	3,446	-	-

Attachment 2.4.10 Rail Freight Transport Demand for PKP Cargo by Commodity Group in 2001 (Ton-km)

(Unit: million ton-km)

Item	Total	Domestic	To foreign countries			From foreign countries			Transit
			Total	by land	through port	Total	by land	through port	
Total	47,906	23,243	15,198	5,600	9,598	6,689	4,993	1,696	2,776
PKP Cargo	46,477	23,243	15,185	5,587	9,598	5,273	3,577	1,696	2,776
LHS	1,429	-	13	13	-	1,416	1,416	-	-
Hard coal	21,786	12,540	9,118	1,660	7,458	120	112	8	8
PKP Cargo	21,785	12,540	9,118	1,660	7,458	119	111	8	8
LHS	1	-	-	-	-	1	1	-	-
Ores	3,964	252	23	14	9	2,983	1,850	1,133	706
PKP Cargo	2,645	252	23	14	9	1,664	531	1,133	706
LHS	1,319	-	-	-	-	1,319	1,319	-	-
Crude petroleum and petroleum products	3,555	2,750	226	115	111	577	530	47	2
PKP Cargo	3,555	2,750	226	115	111	577	530	47	2
LHS	-	-	-	-	-	-	-	-	-
Metals and metal products	4,138	977	1,424	834	590	685	644	41	1,052
PKP Cargo	4,117	977	1,424	834	590	664	623	41	1,052
LHS	21	-	0	0	-	21	21	-	-
Others	14,463	6,724	4,407	2,977	1,430	2,324	1,857	467	1,008
PKP Cargo	14,375	6,724	4,394	2,964	1,430	2,249	1,782	467	1,008
LHS	88	-	13	13	-	75	75	-	-

Source: Statistical Yearbook

Attachment 2.4.11 Rail Freight Transport Demand Forecast for PKP Cargo by Commodity Group in 2006 (Ton-km)

(Unit: million ton-km)

Item	Case	Total	Domestic	To foreign countries			From foreign countries			Transit
				Total	by land	through port	Total	by land	through port	
Total	Upper case	44,812	22,973	12,088	5,055	7,033	6,946	4,544	2,402	2,805
	Lower case	41,579	18,109	14,957	5,200	9,757	5,709	3,939	1,770	2,805
Hard coal	Upper case	18,399	12,399	5,847	1,065	4,783	144	135	9	8
	Lower case	18,275	8,433	9,607	1,749	7,858	227	212	14	8
Ores	Upper case	3,645	381	34	21	13	2,516	803	1,713	714
	Lower case	2,637	250	23	14	9	1,650	527	1,124	714
Crude oil and petroleum products	Upper case	3,555	2,750	226	115	111	577	530	47	2
	Lower case	3,555	2,750	226	115	111	577	530	47	2
Metals and metal products	Upper case	5,417	1,387	2,021	1,184	838	943	884	58	1,066
	Lower case	3,941	916	1,336	782	553	623	585	38	1,066
Others	Upper case	13,796	6,055	3,959	2,671	1,289	2,767	2,192	575	1,015
	Lower case	13,172	5,759	3,766	2,540	1,226	2,632	2,085	546	1,015

Attachment 2.4.12 Rail Freight Transport Demand Forecast for PKP Cargo by Commodity Group in 2010 (Ton-km)

(Unit: million ton-km)

Item	Case	Total	Domestic	To foreign countries			From foreign countries			Transit
				Total	by land	through port	Total	by land	through port	
Total	Upper case	40,624	22,173	8,810	4,255	4,555	6,795	4,368	2,427	2,846
	Lower case	35,280	15,625	11,789	4,226	7,564	5,020	3,443	1,577	2,846
Hard coal	Upper case	15,413	12,283	2,962	539	2,423	160	150	10	8
	Lower case	14,632	7,142	7,267	1,323	5,944	215	201	14	8
Ores	Upper case	3,827	402	47	28	18	2,655	847	1,808	724
	Lower case	2,503	231	21	13	8	1,527	487	1,039	724
Crude oil and petroleum products	Upper case	3,555	2,750	226	115	111	577	530	47	2
	Lower case	3,555	2,750	226	115	111	577	530	47	2
Metals and metal products	Upper case	5,648	1,456	2,122	1,243	879	990	929	61	1,081
	Lower case	3,730	844	1,231	721	510	574	539	35	1,081
Others	Upper case	12,179	5,282	3,454	2,330	1,124	2,414	1,912	501	1,030
	Lower case	10,860	4,657	3,045	2,054	991	2,128	1,686	442	1,030

ATTACHMENT 2.5.1
Analysis of Present Urban Public Transport System of Agglomeration

A2.5.1.1 Kraków Agglomeration

1) Public Transport System

Kraków is divided into 18 districts. In the year 2002, population (permanent and temporary registered inhabitants) was 746,745. The average density of population was 2,283 persons per square-km, and by district, it varied from 678 to 13,023 per square-km. The distribution of population within Kraków agglomeration is presented in table A2.5.1.

Table A2.5.1 Distribution of population along Kraków agglomeration railway lines (1999)

Station	Population		
	400m radius	800m radius	City/town
Kraków Glowny	1,730	6,150	-
TRZEBINIA direction			
Kraków Lobzow	6,600	14,430	-
Kraków Mydlniki Kraków	150	330	-
Wapiennik	100	170	
Zabierzow	-	-	20,000
Krzeszowice	-	-	31,000
Trzebinia	-	-	34,000
BOCHNIA direction			
Kraków Zablocie	3,340	7,765	
Kraków Plaszow	925	1845	
Kraków Prokocim	1,335	3,690	
Kraków Biezanow	1,540	2,905	
Kraków Drozdzonow	525	1,165	
Wieliczka	-	-	45,000
Niepolomice			26,000
Klaj			11,000
Bochnia	-	-	46,000
SKAWINA direction			
Kraków Krzemionki	2,395	4,030	
Kraków Bonarka	1,895	3,340	
Kraków Borek	675	3,645	
Kraków Swoszowice	815	1,325	
Kraków Sidzina	150	300	
Skawina	-	-	40,000
Spytkowice	-	-	9,000
Alwernia	-	-	12,500
Kalwaria-Lanckorona	-	-	24,000
MIECHOW direction			
Kraków Batowice	445	1375	
Michałowice			7,000
Miechow	-	-	20,000

Source: "Kraków Land Development Study", 1999

According to the Kraków Statistical Office, the urban public transportation system in Kraków in 2002 consisted the following tram and bus systems.

(Tram system)

Network length - 80 km, of which 62 km is exclusive lane.
- 23 tram routes
- 286 km of tram route length
- 332 trains operating in rush hour

(Bus system)

- 1,050 km of routes

MPK bus routes are basically operated within city limits, however, 37 MPK bus lines extended to the suburbs.

MPK bus routes within city boundary are subsidized from the Kraków municipal budget. MPK bus routes servicing surrounding towns are subsidized on the basis of the agreements between Kraków and municipalities served.

In 2002, Kraków Statistical Office estimated the number of public transport passengers in Kraków agglomeration was at the level of 331.2 million. 58% of the total cost of urban public transport was from the fare revenue. The remaining 42% was subsidized by the local government.

Within the Old Town area of Kraków, three zones are designated and different traffic restrictions are applied.

Zone A; for pedestrians only
Zone B; accessible in general only for the residents and for delivery cars (8 p.m. - 8 a.m.)
Zone C; accessible with parking fees in limited time band, not accessible for heavy vehicles.

2) Railway Service within Kraków Agglomeration

Four railway lines, indicated in figure A2.5.1 and A2.5.2 converge in Kraków and serve the transport of the agglomeration.

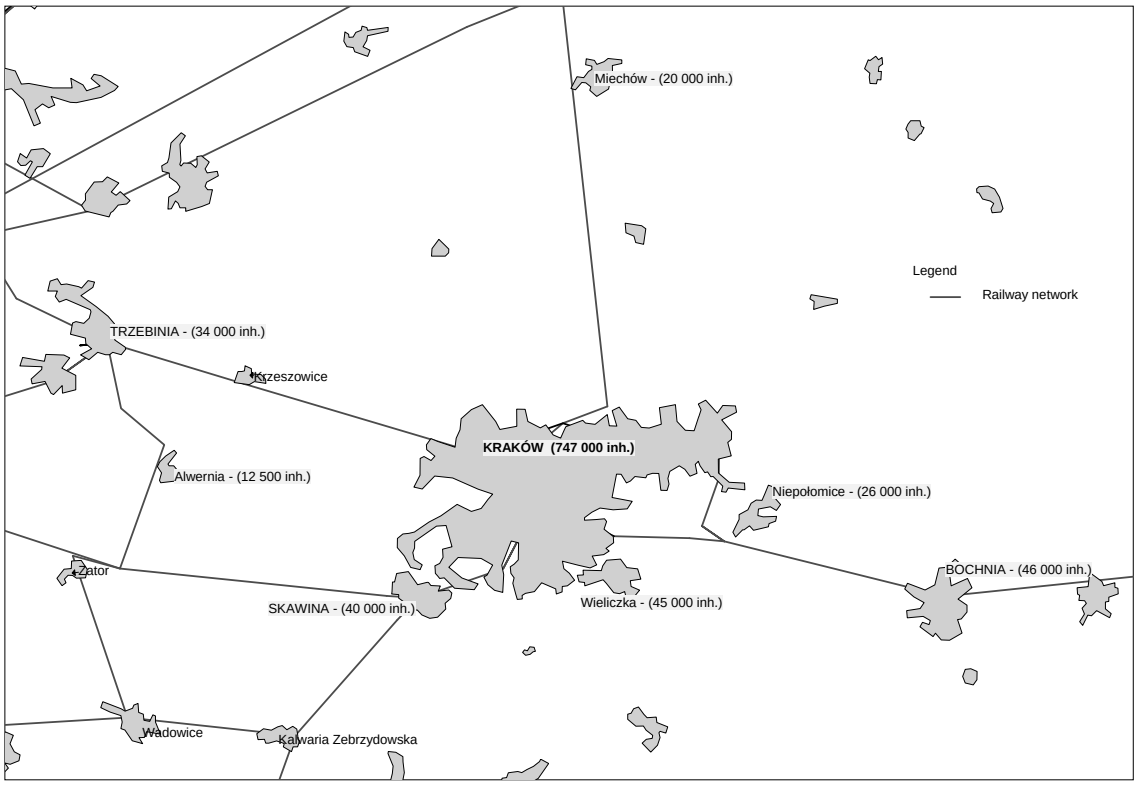

Figure A2.5.1 Railway Network Connecting Kraków Agglomeration

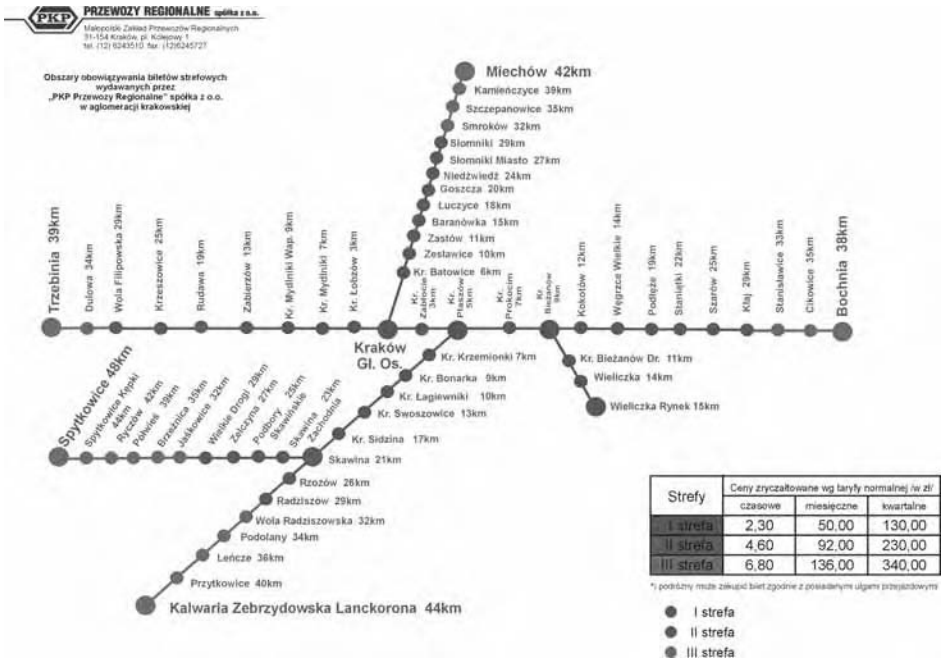

Figure A2.5.2 Schematic Railway Lines in Kraków Agglomeration

North direction: Kraków - Batowice - Slomniki - Miechow (length 42 km) This line serves also long distance traffic to Kielce, Czestochowa, Warszawa, Gdańsk, etc.

East direction: Kraków - Plaszow - Klaj - Bochnia (length 38 km) This line serves also long distance traffic to Tarnów, Rzeszow and Ukraina.

South direction: Kraków - Sidzina - Skawina - Radziszow - Kalwaria/Lanckorona (length 44 km), with branch line Skawina - Spytkowice (length 27 km) This line serves also Tatra mountain region (Zakopane city).

West direction: Kraków - Mydlniki - Trzebinia, (length 39km) This line serves also long distance traffic to Upper Silesia region (Katowice) and further west.

East-West lines are pertaining to E-30 Trans-European railway line and E-65 Line to north

The total length of railway lines serving the agglomeration is approximately 150 km.

However, typical agglomeration rail system hasn't been formed as yet. Commuting transport demand depends on following regional trains.

West direction:	to	Trzebinia,	Oswiecim,	Katowice
North direction:	to	Miechow,	Tunel,	Sedziszow
East direction:	to	Brzesko,	Tarnów	South direction:
	to	Oswiecim,	Sucha	Beskidzka

Only the trains eastbound have characteristics of agglomeration train. However, the line serving exclusively agglomeration - Kraków-Wieliczka - has just been closed in 2003.

As per figure A2.5.3, most of the trains depart from Kraków Glowny station. Some trains depart southward from Kraków Plaszow Station. As mentioned, most of the agglomeration trips by rail are served by regional trains, accordingly the timetables are not properly adjusted to the needs of passengers commuting to Kraków for work and study.

In addition, inconveniences for passengers due to the irregular intervals between train departures and lack of integrated fare system including other transport modes were pointed out as well.

Railway use rate for the traffic zone covering Kraków agglomeration in this Study was estimated at 0.62% in 2001. Following formula was employed for the estimate of railway use rate.

Railway-use rate = (intra-zonal railway passengers per day)/(zonal population)

Estimated figure was considerably lower than the one for Warszawa agglomeration.

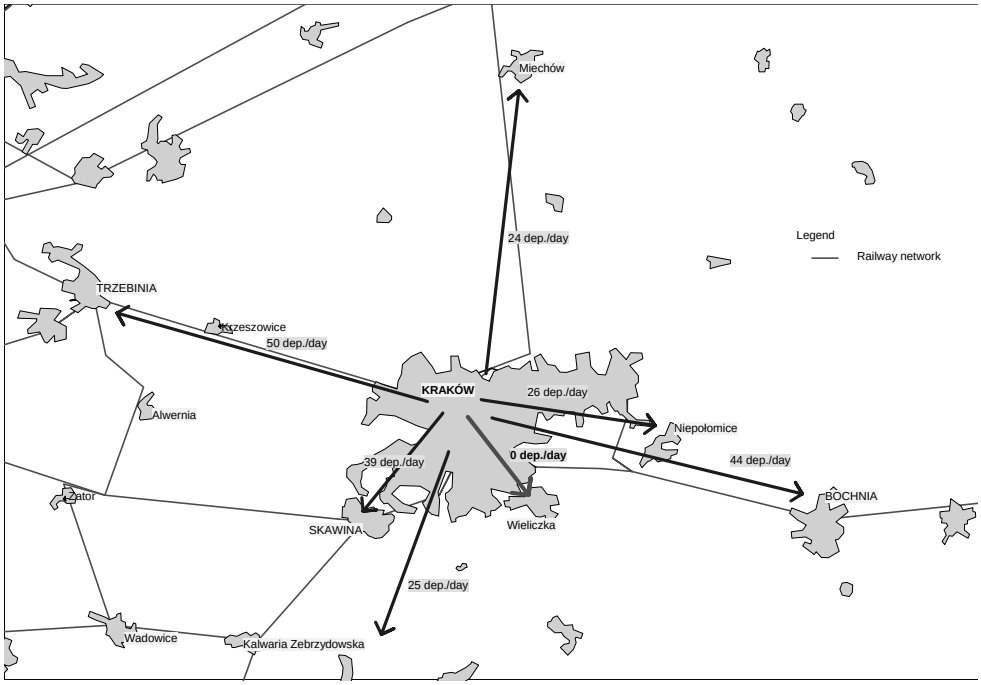

Figure A2.5.3 Number of Trains by Direction in Kraków Agglomeration (both direction)

The railway passenger volume in the Kraków agglomeration is decreasing. Assumable reasons are following:

- Increase in number of passenger cars vehicles
- Change in spatial development (ex. new investments far from railway lines)
- Industrial restructuring leading to the reduction of workplaces in main factories along railway lines
- Competition with private buses that offers flexible, more frequent, and cheaper transport services with better access to stops and tickets sold by drivers.
- Railway operation policy (PKP Regional) – reduction of operation frequency or abolishment of line due to the decrease in number of railway passengers.

Cost recovery rates from fare box by railway line are following:

- Kraków-Plaszow-Skawina 38.5%
- Kraków-Bochnia 61.3%
- Kraków-Trzebinia 66.2%

3）Population along Railway Corridor

Population along railway corridor is summarized in attachment 2.3.15. Data source is from “Studium uwarunkowan i Kierunkow zagospodarowania przestrzennegio miasta Krakówa” (Kraków Land Development Study) and Voivodship Address File.

4）Railway Passenger Volumes

Information concerning passenger volumes on Kraków agglomeration railway lines

was based on data (passenger counts) delivered by Urzad Marszalkowski Wojewodztwa Malopolskego (Malopolska Region Council), and is summarized in table A2.5.2.

Table A2.5.2 Railway Passenger Volume in Kraków Agglomeration (1999)

Trzebinia-Kraków (one direction)	Unit	Quantity
Number of trains	trains/day	48
Number of regional trains	trains/day	25
Number of Interregional trains	trains/day	23
Number of passengers by regional trains 1)	passengers/day	1,025
Number of passengers by interregional trains 2)	passengers/day	6,550
Bochnia-Kraków (both direction)		
Number of trains	trains/day	44
Number of regional trains	trains/day	27
Number of Interregional trains	trains/day	17
Number of passengers by regional trains	passengers/day	0
Number of passengers by interregional trains	passengers/day	8,770
Skawina-Kraków (both direction)		
Number of trains	trains/day	38
Number of regional trains	trains/day	33
Number of Interregional trains	trains/day	5
Number of passengers by regional trains	passengers/day	360
Number of passengers by interregional trains	passengers/day	3,000
Miechow-Kraków (Both direction)		
Number of trains	trains/day	27
Number of regional train	trains/day	16
Number of Interregional trains	trains/day	11
Number of passengers by regional trains	passengers/day	1,520
Number of passengers by interregional trains	passengers/day	1,750

Source: "Kraków Land Development Study", 1999

Note: 1) passengers measured within Kraków city boundary
2) estimated on the basis of 28 trains count
3) estimated on the basis of 22 trains

5) Bus Service along Railway Line

The majority of passenger trips by bus between Kraków and surrounding cities/towns are served by mini-buses.

According to timetables registered in Urzad Marszalkowski Wojewodztwa Malopolskego (Malopolska Region Council, Aug. 2003), there are 3,405 bus departures per day (in one direction) between Kraków and other towns and villages in

Malopolska. Aggregated data for main transport corridors are shown in table A2.5.3.

Table A2.5.3 Number of Buses by Direction (as of Aug. 2003)

Bus corridor	Number of buses/day/direction
East direction	2,243
West direction	228
South direction	635
North direction	299

Source: Malopolska Region Council

Most of those trips, especially on shorter routs were made by mini buses (capacity up to 15 persons).

Normal size buses in operation by PPKS in 2003 are as follows.

to Kalwaria-Lanckorona	3 departures per day
to Bochnia	2 departures per day
to Miechow	13 departures per day
to Wieliczka	0 departures per day

At the same time small private carriers utilizing mini-buses provides:

to Kalwaria-Lanckorona	85 departures per day
to Bochnia	172 departures per day
to Miechow	41 departures per day
to Wieliczka	1,747 departures per day

Notable result was observed in the competition between rail and mini bus transport in Kraków-Wieliczka corridor. Railway line with 39 trains per day and approximately 1,130 passengers per day (28 passengers/train) has just been closed in 2003. After that, almost 1,750 mini-buses departures (with the capacity of appoximately 25,000 passengers per day per direction) served between Kraków (mainly from: Pawia street, Railway Main Station, Kurniki street, Pradnicka street, Barska street, Augusta street, Kamienna street, Rydygiera Hospital) and Wieliczka.

Bus service between Kraków and surrounding cities/towns based on the available data are presented in figure A2.5.4.

Figure A2.5.4 Bus Operation in Kraków Agglomeration in 2003

6) Comparison of Rail and Bus Passenger Volume along Corridor

Comparison between number of passengers by rail and those by bus along corridor were summarized in the following table A2.5.4.

Table A2.5.4 Comparison between Rail and bus Passengers along Corridors

Bus route	Number of buses (buses/day/direction[1])	Number of bus passengers (pax./day[2]) (est.)	Number of trains (trains/day/direction)[3]	Number railway passengers (pax./day/direction) (est.)
East direction				
Kraków –Wieliczka	1,747	17,500	0	8,950 including interregional trips[4]
Kraków - Niepolomice	437	4,400	27	
Kraków - Klaj	114	1,150	27	
Kraków - Bochnia	172	1,700	43	
West direction				
Zabierzow	331	3,300	25	6,500 including interregional trips[5]
Krzeszowice	281	2,800	40	
Trzebinia	29	290	48	
South direction				
Skawina	667	6,700	38	2,600 including interregional trips[6]
Lanckorona	12	120	25	1,700[6]
Kalwaria Zebrzydowska	73	730	8	550[6]
North direction				
Słomniki	154	1,550	16	3,000 including interregional trips[7]
Miechow	41	400	27	

Note:
1) Malopolska Region Council, Aug. 2003
2) Calculation was made on the assumption of 10 persons as average mini bus occupancy
3) PKP timetable, Sept. 2003.
4) Based on traffic counts on 25 trains (2003)
5) Based on traffic counts on 13 trains (2003)
6) Based on traffic counts on 14 trains (2003)
7) Based on traffic counts on 14 trains (2003)

A2.5.1.2 Łódż Agglomeration

1) Public Transport System

Łódż (249.4 square-km) is divided into 5 districts (Baluty, Gorna, Polesie, Srodmiescie, Widzew). In 2002, population (permanent and temporary registered inhabitants) was 780 thousand. The average density of population was 2,653 persons per square-km.

The population of Łódż agglomeration reaches one million, when inhabitants in surrounding cities and towns were counted.

According to the Kraków Statistical Office, in 2002, Łódż urban public transportation system consists of following tram and bus systems operated by MPK Łódż (municipal UPT Company).

(Tram system)

- 106.2 km of network length, of which 62 km is exclusive lane.
- 21 tram routes (15 routes within city and 5 routes connecting the city with agglomeration towns)

- 468 tram units

(Bus system)

- 358.9 km of network length
- 58 routes (of which 8 are night routes)
- 383 buses.

2) Railway Service within Łódż Agglomeration

Following four (4) railway lines meeting in Łódż serve commuting traffic in the agglomeration.

- East Direction for Koluszki, Debica (four tracks)
- Direction for Zdunska（double tracks）
- Direction for Kunto（single track）
- Direction for Lowicz（single track）

There is no trunk railway line passing through Łódż central district and no typical agglomeration (commuter) railway system is serving the area. Transport demand for railway in Łódż agglomeration is depending on regional trains as indicated in figure A2.5.5, A2.5.6, and A2.5.7, and table A2.5.5 and A2.5.6.

Railway use rate for the traffic zone covering Łódż agglomeration adopted in this Study was estimated at 0.22% in 2001.Following formula was employed for the estimate of railway-use rate. Estimated figure was still lower than the one for Kraków agglomeration.

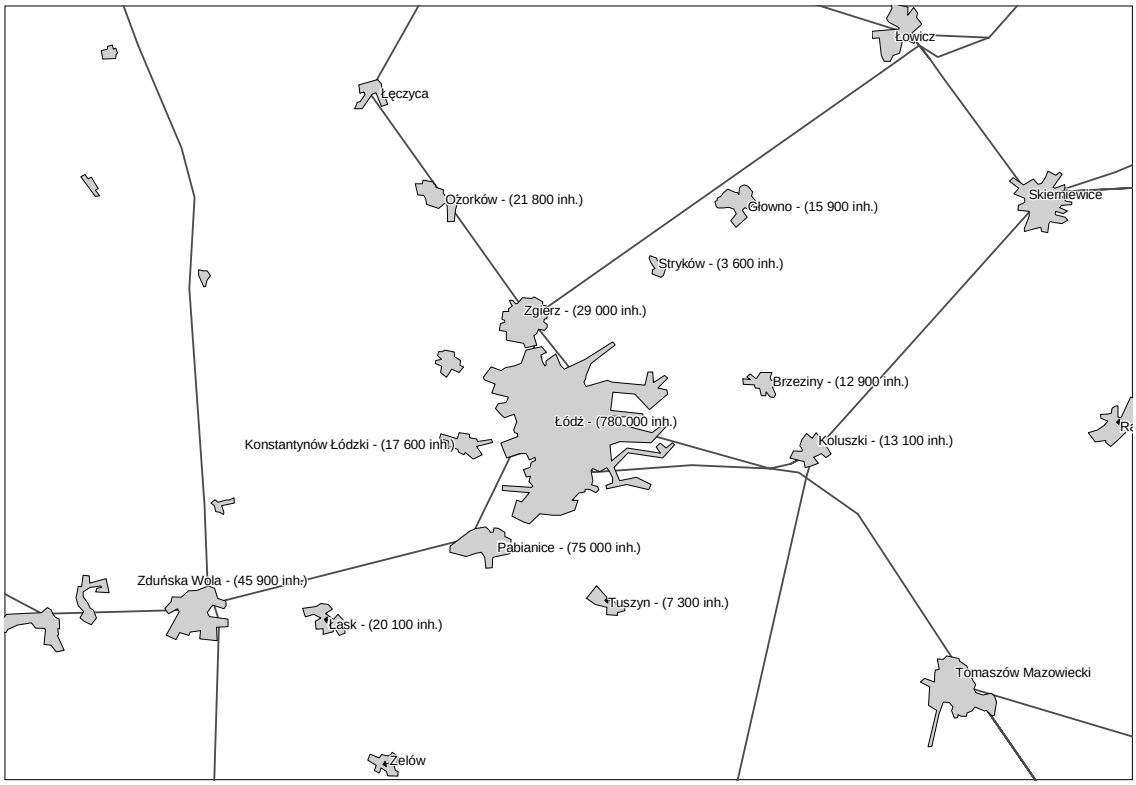

Figure A2.5.5 Railway Network in Łódź Agglomeration

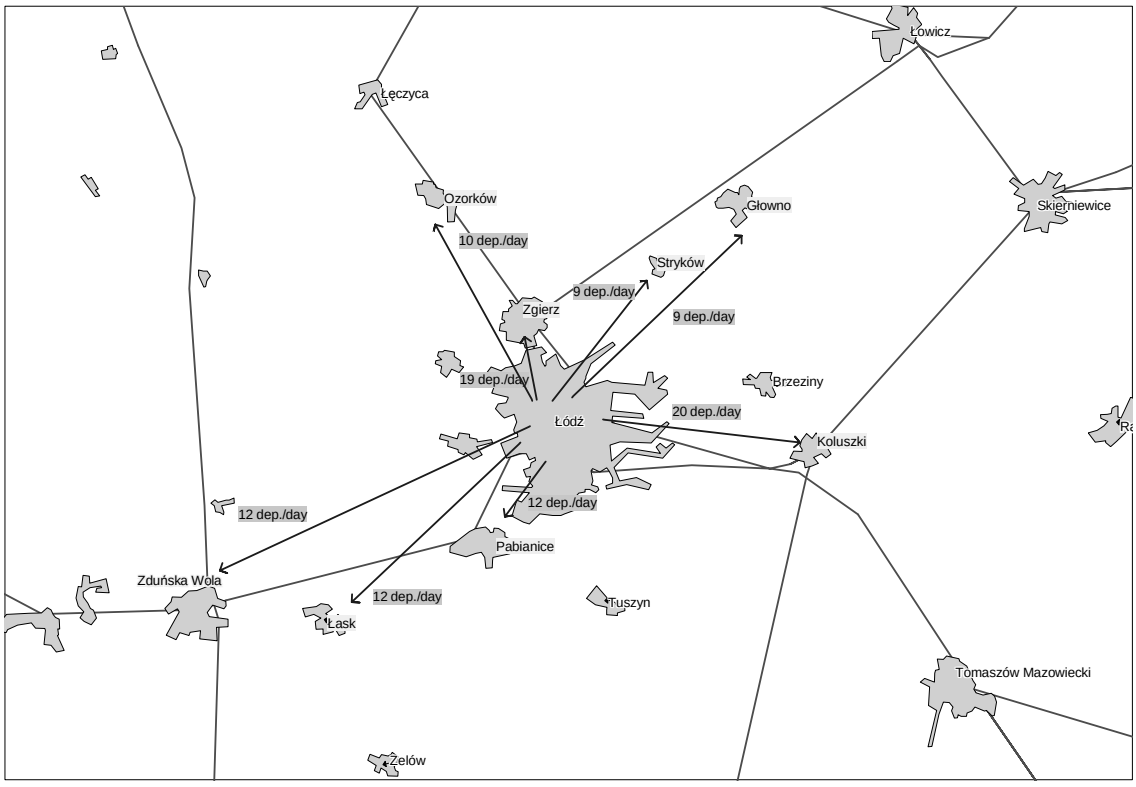

Figure A2.5.6 Number of Trains by Direction in Łódź Agglomeration (both direction)

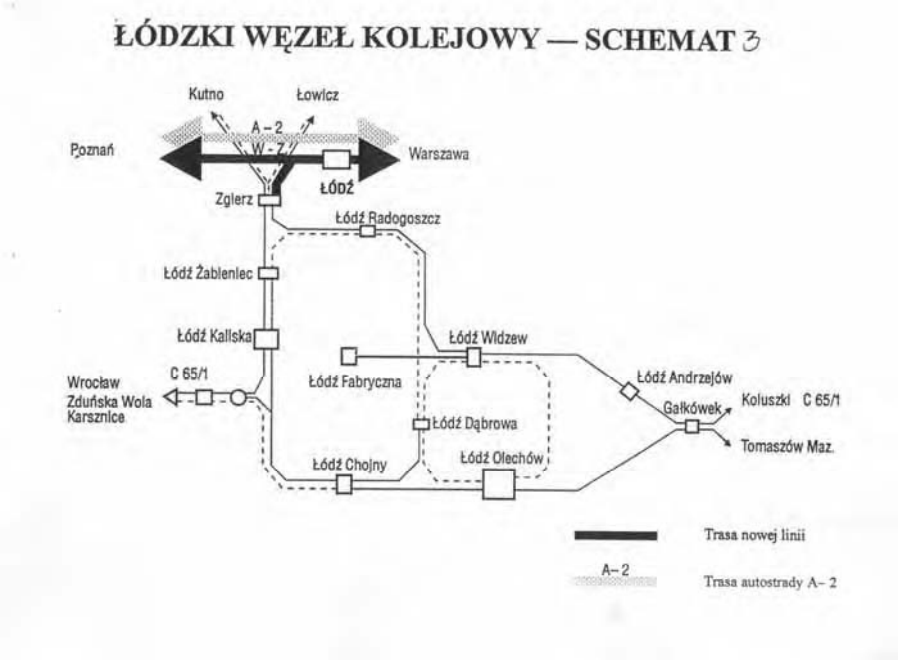

Figure A2.5.7 Schematic Railway Network within Łódź Agglomeration

Table A2.5.5 Railway Lines and Connecting links in Łódź Agglomeration

No	Line No.	Relation	No. of tracks
1	14	Łódź Kaliska – Zdunska Wola (Wrocław)	2
2	15	Łódź Kaliska – Lowicz	1
3	16	Łódź Widzew – Kutno	1
4	17	Łódź Fabryczna – Koluszki - (Warszawa)	2
5	25	Łódź Kaliska – (Koluszki) – Tomaszow Maz. (Debica)	2
6	458	Łódź Fabryczna – Łódź Widzew	1
7	539	Łódź Kaliska Tow. – Retkinia	2
8	540	Łódź Chojny – Łódź Widzew	2
9	541	Łódź Widzew – Łódź Olechow	2

Table A2.5.6 Railway Connection with Surrounding Areas

No.	Relation	Travel time required (min.)	Distance (km)	Commercial speed (km/h)
From Łódź Fabryczna station to:				
1	Koluszki	33 - 36	27	45.0
2	Radom	204	143	42.0
3	Skarżysko Kamienna	204	141	41.5
4	Skierniewice	76 - 89	67	50.9 (52.9)
From Łódź Kaliska station to:				
1	Kutno	71 - 78	68	57.5 (52.3)
2	Lowicz Glowny	78 - 81	63	54.0 (43.9)
3	Ostrow Wlkp.	138 - 146	137	59.6 (56.3)
4	Sieradz	63 - 66	60	56.0 (56.2)
5	Zdunska Wola	62	49	47.4

3）Railway Passenger Volumes

- Passengers by interregional trains

There are 55 interregional trains per day going from/through Łódż in 2002. Of which, 30 trains were going from/through Łódż Kaliska station, 23 trains from Łódż Fabryczna station and 2 from Łódż Widzew station. There were neither "Eurocity" nor "Intercity" trains going through Łódż.

Data available for the year 2001 showed that 24,000 passengers per day were carried by interregional trains (that is 218 passengers/train) on the average. The heaviest traffic of 12,000 passengers/day was observed between Łódż Fabryczna and Koluszki belonging to Warszawa-Łódż section.

- Passengers by regional train: 49 pairs of trains serve regional and agglomeration railway passenger traffic.

Łódż Fabryczna is an origin station for 20 trains going to Koluszki (of which 12 trains go further to Skierniewice). Łódż Kaliska station serves 29 regional trains on the lines to Zdunska Wola, Kutno and Lowicz.

The total regional passenger traffic on all railway lines in Łódż agglomeration was about 16,000 passengers per day in June 2001, which gives 163 passengers per train. The heaviest traffic was observed on the section between Koluszki and Łódż Fabryczna, i.e. 7,700 passengers/day (197 passenger per train).

4) Bus Service along Railway Line

Regional and agglomeration buses are operated at following two terminals.

Centralny terminal: Located near the Fabryczna railway station serving mostly regional and some long-distance connections

Polnocny terminal: Located in the northern part of the city, serving mostly agglomeration and some regional connections

Agglomeration buses are also operated at other 11 terminals (ul. Bazarowa, ul. Broniewskiego, DH Central, CZMP, ul. 11 Listopada, pl. Niepodleglosci, ul. Wersalska, ul. Weglowa, ul. Wojska Polskiego/ Sporna, Żabieniec and ul. Żeromskiego).

As presented in figure A2.5.8, bus transport network in Łódż agglomeration, mostly regional, is dispersed. Most routes are operated at very low frequencies (in many cases these are one digit trips per day). Several routes are served to each town surrounding Łódż. The main bus operator is PKS employing mainly normal (large) buses (about 40 seats). However no detailed data on traffic volumes by those operators is available.

Apart from PKS, there are several small operators of minibuses as follows:

Direction for Glowno and Lowicz: 8 operators (15 minibuses per day)
Direction for Zgierz and Ozorkow: 9 operators (17 minibuses per day)
Direction for Pabianice: 4 operators (8 minibuses per day)

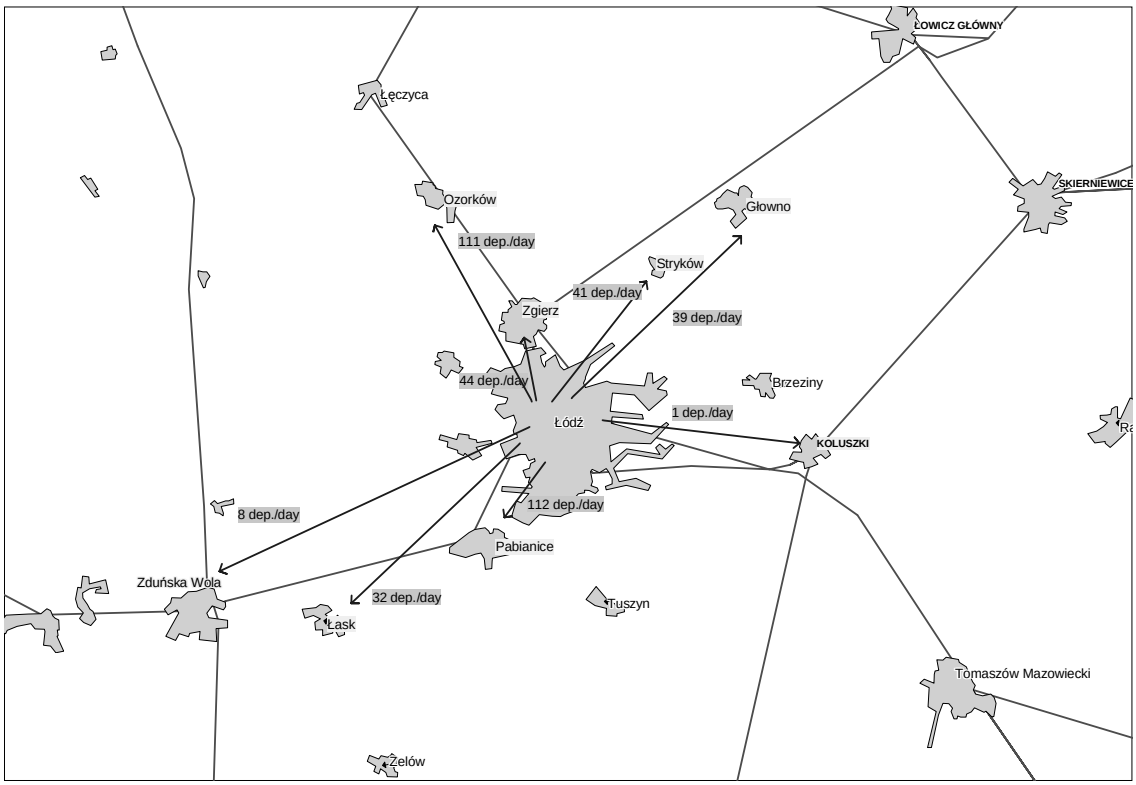

Figure A2.5.8 Bus Operation in Łódź Agglomeration, 2003

5) Comparison of Rail and Bus Passenger Volume along Corridor

The transported volumes of passengers by rail and bus competing along corridor are shown in table 2.5.7. Because of good railway connections, there is no serious competition for rail on the most important corridor to Koluszki. One should bear in mind the large share of tram in total agglomeration traffic. In addition to serving the city of Łódź, trams also operate on the routes to Zgierz, Ozorkow and Pabianice.

Table A2.5.7 Comparison of Rail and Bus Passengers (data for one way traffic)

Line	No. of buses (buses/day)	Transported Volume by Bus (pass./day) 1)	No. of regional trains (trains/day)	Transported volume by rail (pass./day) 2)
Glowno	39	1 170	9	1,025
Koluszki	1	30	20	2,850
Lask	32	960	12	1,280
Ozorkow 3)	111	3,330	10	1,290
Pabianice 3)	112	3,360	12	1,280
Strykow	41	1,230	9	1,025
Zdunska Wola	8	240	12	1,280
Zgierz 3)	44	1,320	19	1,650

Note: 1) estimated based on the assumed occupancy of 30 passengers/bus
2) data from PKP Regional, May 2003
3) towns connected with Łódż by tram

A2.5.1.3 Warszawa Agglomeration

1) Public Transport System

Warszawa (518 square-km) is divided into 18 districts (Bialoleka, Targowek, Rembertow, Wawer, Wilanow, Ursynow, Wlochy, Ursus, Bemowo, Bielany, Praga Poludnie, Praga Polnoc, Mokotow, Srodmiescie, Ochota, Wesola, Wola, Zoliborz). Population of Warszawa city and Warszawa agglomeration in 2003 were 1.63 million and 2.5 million respectively. Density of population was 3,300 inhabitants per square-km. Table 2.5.8 presents the number of inhabitants and work places within 800 meters radius around railway stations in Warszawa agglomeration in 2003.

Urban public transport system serving the city of Warszawa comprises tram, bus and metro and is organized by the Urban Transport Authority (Zarzad Transportu Miejskiego – ZTM) which is a part of the City Authority. ZTM is responsible for routing and scheduling and contracting with operators of urban public transport. It also collaborates with other local governments (towns/gminas surrounding Warszawa) and PKP.

Table A2.5.8 Number of Inhabitants and Work Places within 800m radius Zones Around Railway Stations in Warszawa Agglomeration in 2003

Station name	Population	Workplace
Anin	9,725	4,700
Kasprzaka	40,150	30,900
Dawidy	568	200
Dw. Gdański	17,111	8,800
Dw. Wilenski	62,767	32,200
Dw. Wschodni	30,237	27,100
Dw. Zachodni	3,453	25,100
Falenica	8,192	5,600
Gocławek	5,540	7,300
Jeziorki	1,072	300
Koło	74,305	23,200
Miedzeszyn	12,812	7,200
Międzylesie	5,894	7,600
Ochota	39,154	51,900
Okęcie	642	11,800
Olszynka Grochowska	25,470	13,700
Płudy	3,003	1,700
Powisle	32,171	44,100
Praga	25,634	19,700
Radość	9,225	3,100
Rakowiec	38,710	22,000
Rembertów	13,320	4,400
Służewiec	10,580	21,500
Stadion	14,341	12,800
Śródmieście	30,788	93,000
Toruńska	25,214	21,700
Ursus	38,377	17,300
Ursus Płn	14	9,800
Wawer	9,725	4,700
Włochy	11,705	5,400
Wola	3,453	25,100
ZOO	16,372	11,500
Żerań	2,552	16,500

Following data on tram/bus/metro system concern services organized by ZTM. Metro and tram systems are serving city area only.

(Tram system)

Warszawa is served by extensive tram network with total length of 121.8 km (double track), of which exclusive tracks account for over 95 percent of the total.

In 2003, twenty seven (27) tram routes were served. All those routes are served by the Tramwaje Warszawskie company (TW). The total length of routes amounts to 479.5 km. The average length of tram route is 14.7 km and average distance between stations is 457m.

The total number of tram units in an inventory is equal to 860 (June 2003). During peek hours approximately 668 units serves permanent routes. Tram system capacity in the peak period is some 47 thousand passengers per hour and 32 thousand passengers per hour in remaining periods.

(Bus system)

As presented in figure 2.5.9, the total length of bus transport network administered by ZTM is 849.1 km and the total length of bus routes is close to 3,000 km.

Warszawa bus system is composed of 150 routes (September 2002) operated by following companies.

Figure A2.5.9 Bus Network in Warszawa

Miejskie Zakłady Autobusowe (MZA) (municipal bus company)	131 routes
Connex	5 routes
PKS Grodzisk Mazowiecki	5 routes
MZA+PKS Grodzisk i Connex	7 routes

The types of bus route operation are following.

normal routes	94 routes, including 8 periodical,
express routes	27 routes, including 6 periodical,
agglomeration routes	29 routes, including 5 periodical

Note: Agglomeration bus routes are operated on the basis of agreement with gminas served, which cover part of the costs.

The average bus line length is 16.2 km and the average distance between stops is 517m. The average commercial speed is 16.5 km per hour. During peek period approximately 1,075 buses serves permanent routes.

(Metro system)

As presented in figure A2.5.10, there is a single metro line whose operation commenced in April 1995 between its southern terminus Kabaty and Politechnika (11.5 km all underground). In May 1998, operation of Centrum station started as the largest station on the line situated just north of the east-west main railway line tunnel, close to city's main railway station. Construction was continued towards the north, and the next two stations Swietokrzyska (future transferring station to Line 2) and Ratusz (1.7 km) were opened in May 2001. Initially Russian-built rolling stocks (81-series identical to those operating in Prague St. and Petersburg, Moscow etc.) were introduced. In spring 1998, 108 new cars were ordered GEC Alsthom. The first new cars were delivered in Oct. 2000.

The length of the line is 14.2 km with 14 stations.

Figure A2.5.10 Metro Network in Warszawa

In addition to services organized by the ZTM, other bus companies are serving outer areas of the agglomeration. On the all radial corridors leading to the central area of Warszawa, mid-size buses are operated by small companies. Those operators are providing services in both PKP railway catchment areas and other areas.

Some suburban towns (such as Legionowo) have their own local public transport, which usually uses minibuses.

2) Railway Service within Warszawa Agglomeration

As presented in figure A2.5.11 and A2.5.12, the railway system in Warszawa agglomeration is composed of 7 electrified and double track radial lines. Six (6) of them meet on the central 4-track line (linia srednicowa – diameter line) with stations, Warszawa West, Warszawa Central and Warszawa East. Two of four tracks are used by long distance trains. Trains from Legionowo use another line by-passing the central area from north to west.

In addition, the line from the north-east (from Tluszcz) splits into two lines. Part of trains run to Warszawa East and further through the central line. Remaining trains operate to Warszawa Wilenska station in the center of Prague (right bank of the Vistula River)

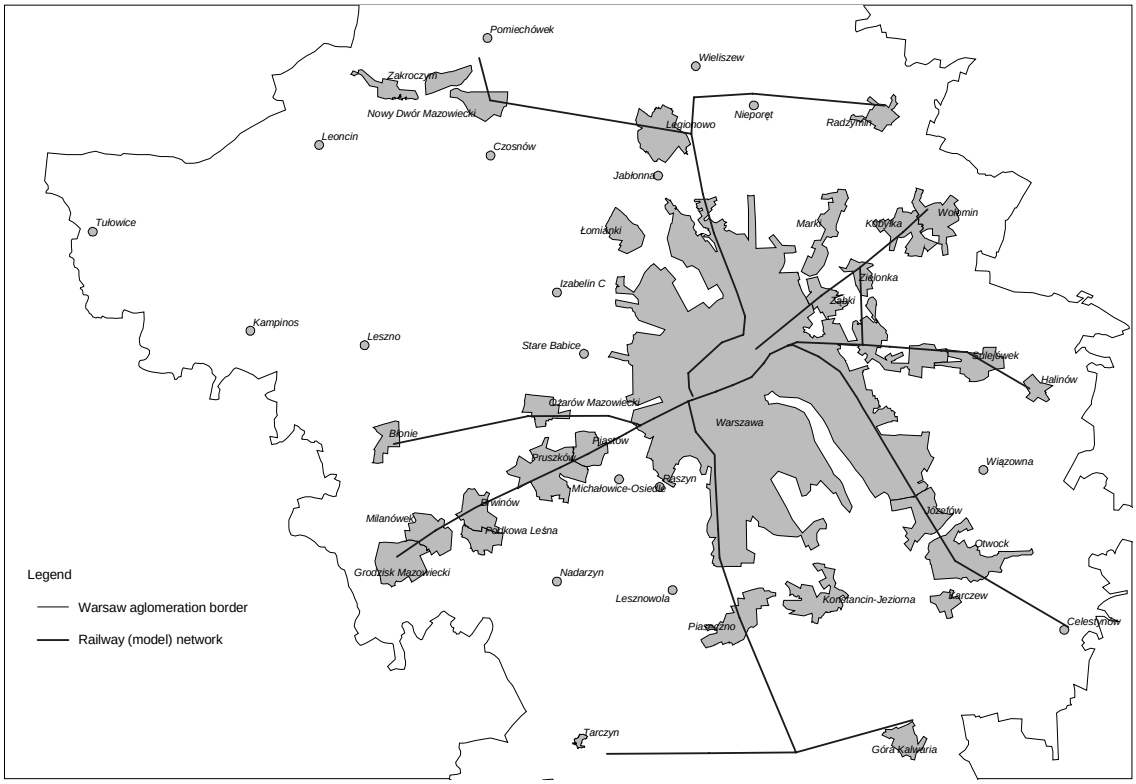

Figure A2.5.11 Railway Network in Warszawa Agglomeration

There also is a separate WKD line serving one suburban corridor (to Grodzisk).

Railway lines serve Warszawa agglomeration and surrounding towns including Nowy Dwor Maz., Legionowo, Wolomin, Tluszcz, Minsk Maz., Sulejowek, Otwock, Warka, Piaseczno,m Godzisk Maz., Milanowek, Sochaczew, Piastow, Pruszkow, Blonie, Ozarow.

All lines are supplied with the direct three thousand volts, except for WKD (Warszawska Kolej Dojazdowa) line which is supplied with direct 600 volts.

Railway use rate for the traffic zone covering Warszawa agglomeration in this Study was estimated at 4.44% (including WKD) in 2001. Following formula was employed for the estimate of railway use rate.

Railway use rate = intra-zonal railway passengers per day/zonal population

Estimated figure was higher than those for other agglomerations that revealed the relative important role of railway in Warszawa agglomeration.

Through competition between railways and other means of transport (car, bus, tram), a substantial drop in the number of railway passengers in Warszawa agglomeration, from 250 000 passenger per day in the eighties to approximately 100,000 passenger per day currently.

With the increase of the number of passenger cars and the development of bus service in railway corridors, the frequency of trains was reduced, from 6-12 trains/hour to 1

train per hour at some sections. At the same time, the length of trains (number of coaches) was reduced (from 3 to 2 units). As a consequence of the worsening the level of service offered by the railway, the number of passengers has decreased.

Figure A2.5.12 Schematic Railway Network in Warszawa Agglomeration

The railway lines are summarized below.

Warszawa Zachodnia – Grodzisk Mazowiecki - (Skierniewice direction)（26km）

A part of trunk line with four tracks between Warszawa Central and Katowice. At km 30.5 (in Grodzisk Mazowiecki), main double track line to Zawiercie starts, which together with section Warszawa – Grodzisk is a part of the AGC and AGTC corridor, E-65/C-E 65. Agglomeration line (No 447) Warszawa-Grodzisk is parallel to E-65, and operation of intercity trains is separated from the agglomeration ones. Maximum (technical) speed is 100 km per hour.

Warszawa Włochy - Sochaczew - (Lowicz direction)（45km）

A part of trunk line with double tracks between Warszawa West and Kunowice (State border). This line is a part of AGC corridor, E-20. This section is used by all types of trains, namely, qualified, interregional, agglomeration and freight ones. Maximum (technical) speed is 140 to 160 km per hour, however in the section between Warszawa Wlochy and Golabki, maximum (technical) speed is 60 km per hour.

Warszawa West - Czachowek - (Warka and Radom direction）（33km）

A part of double track line between Warszawa West and Kraków. This section is used

by all types of trains, namely, qualified, interregional, agglomeration and freight ones. Maximum (technical) speed is 100 km per hour. However in the section between Warszawa West and Piaseczno, maximum (technical) speed is 50 km per hour.

Warszawa Wola – Warszawa Gdańska-Legionowo-（Nasielsk and Dzialdowo direction）（25km）

The first section of this line, from Warszawa Wola to Warszawa Gdańska serves only agglomeration trains. The next section to Warszawa Praga is used by freight trains as well.

At Warszawa Praga the line merges with the double track trunk line between Warszawa East and Gdańsk, a part of E-65/C-E65, the AGC and AGTC corridors. In this section different types of trains operate, namely, qualified, interregional and agglomeration ones. Freight traffic is served on line No.456.

Technical conditions of the first section (from Warszawa Wola to Warszawa Praga) are very poor with speed limits up to 20 km/h. Maximum (technical) speed from Warszawa Praga station is 120 km per hour, with local limitations up to 90 km per hour.

Warszawa East-Otwock-（Piława and Deblindirection）（23km）

Double track line between Warszawa Central and Dorohusk/State border. This line serves an important international corridor, Warszawa – Kijow/Lwow. This line serves mainly passenger traffic. Only in the section between Warszawa East and Goclawek, agglomeration traffic is separated from long distance traffic. Maximum (technical) speed is 60 km per hour in the section between Warszawa East and Wawer, and 100 km per hour in the section between Wawer and Otwock.

Warszawa Wschodnia-Minsk Mazowiecki-（Siedlce direction）（36km）

Double track line between Warszawa Central and Terespol/State border. This line is a part of the AGC corridor E-20, Paris-Berlin-Warszawa-Moscow. In this section, different types of trains (qualified, interregional, agglomeration and freight) are operated.

Warszawa Wilenska-Tluszcz-（Malkina direction）（34km）

This section between Warszawa Wilenska and Zielonka serves only regional and agglomeration traffic. At Zielonka station it merges with the main line between Warszawa and Kuznica Bialostocka/State border. Starting from Zielonka station, the line serves also long distance passenger traffic and freight traffic. Maximum (technical) speed is 100 km per hour with several limitations to 60 km per hour.

Central Line（Linia sredniowa）（9km）

Central line with double tracks serves following traffic.

Long distance passenger traffic to/from Warszawa West – Warszawa Central – Warszawa East; maximum technical speed is 60 km per hour.

Agglomeration traffic to and from Warszawa West–Warszawa City Centre (Srodmiescie) -Warszawa East; maximum (technical) speed is 60 km per hour.

Train operation in Warszawa agglomeration is summarized in table A2.5.9.

Table A2.5.9 Number of Trains by Direction in Warszawa Agglomeration

(as of August 2003)

	Section	Number of trains (trains/day/direction)	Frequency in peak period [1)] (trains/h.)	Time required (min.)
1	Warszawa East-Otowock	47	1 - 4	27 - 37
2	Warszawa West-Grodzisk Maz.	61	2 - 6	31
3	Warszawa East-Rembertow	45	1 - 6	8
4	Warszawa East -Minsk Mazowiecki	39	1 - 4	44
5	Warszawa West-Piaseczno	24	1 - 3	28 - 42
6	Warszawa West-Czachowek	20	1	44 - 64
7	Warszawa West-Sochaczew	30	1 - 3	34
8	Warszawa Wilenska-Tluszcz	49	3 - 6	50
9	Warszawa Gdańska-Legionowo	23	1 - 2	31

Note: [1)] 6-9 A.M. in the morning and 15-18 P.M. in the evening

The main shortcomings of the railway system serving Warszawa agglomeration are following.

- low level of train frequency
  low quality of service (unsightly trains, lack of cleanliness of trains and stations)
  lack of security feeling in train and at station
  long pedestrian access to stations
  visible deterioration of rolling stocks and infrastructure (tracks, power supply system, stations, etc.).

Deterioration causes substantial limitation of train speed - on some sections and connecting links up to 30-40 km/h, and at some even up to 15 km/h. The average age of rolling stock is approx. 17 years, with its very poor technical characteristics, especially as it concerns: high energy consumption, low acceleration and poor standard of equipment.

3）Population along Railway Corridor

In the suburbs of Warszawa agglomeration, areas of densely inhabited or where work places concentrated are located around railway agglomeration stations. Close relationship between railway and population distribution in Warszawa agglomeration can be identified as presented in figure A2.5.13 and A2.5.14.

Distribution of population and work places along railway corridors were estimated on the basis of the “Warszawa Traffic Model” elaborated in 1998 and updated in 2003.

Figure A2.5.13 Distribution of Work Places in Warszawa 2003

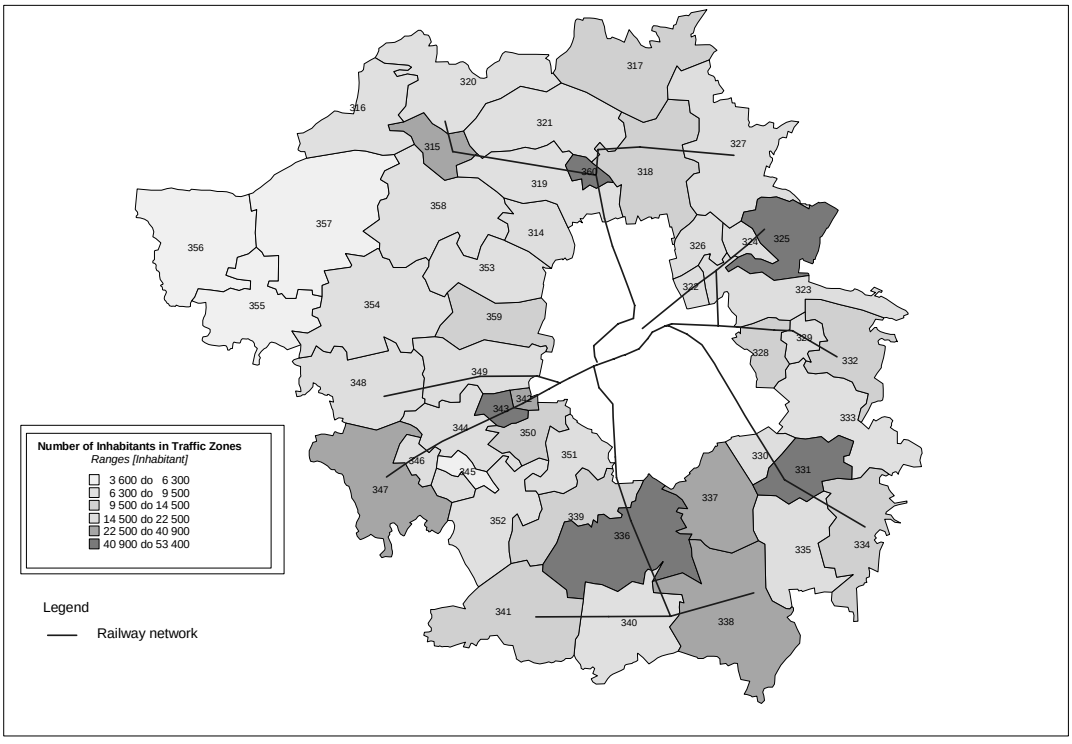

Figure A2.5.14 Distribution of Population in the suburbs of Warszawa Agglomeration 2003

4) Comparison of Rail and Bus Passenger Volume along Corridor

Comparison between rail passengers and bus passengers by direction are summarized

in table A2.5.10 and figure A2.5.15 and A2.5.16.

Table A2.5.10 Comparison between Rail and bus Passengers（one direction）

	Direction	Bus passengers （passengers/h.）	Rail passengers （passengers/h.）
1	Warszawa East-Otwock	1,900	4,000 - 4,900
2	Warszawa West-Grodzisk Maz.	no data	5,600 - 6,900
3	Warszawa East-Rembertow	400	3,600
4	Warszawa East-Wolomin	1,000	5,000
5	Warszawa West- Piaseczno	2,000	2,400
6	Warszawa West-Czachowek	1,500	5,800
7	Warszawa West-Sochaczew	600	400 - 2,500
8	Warszawa Wilenska-Tluszcz	1,700	1,000 - 5,300
9	Warszawa Gdańska-Legionowo	1,500	4,800 - 5,900

Figure A2.5.15 Railway Passengers in Morning Period in Warszawa Agglomeration in 2003

Figure A2.5.16 Bus Passengers in Morning Period in Warszawa Agglomeration in 2003