PART 2

CHAPTER 6 PKP S.A.

6.1 ISSUES

There are two main issues in relation to PKP S.A. One is that PKP S.A. does not have enough financial resources to repay all its debts. The other is that PKP S.A. does not have sufficient plans to redevelop and utilize its existing assets.

6.1.1 Lack of Funds for Repayments

Based on the financial planning of "Program of Further Restructuring and Privatization of PKP Group to 2006", it is concluded that PKP S.A. may not be able to repay all the debts by itself. In particular, the redemption of bonds issued in 2002 and planned to be issued from 2003 to 2005 will become financial burdens of PKP S.A. after 2008.

In addition, there is another risk that the amount of debt, which cannot be repaid by PKP S.A. itself, may increase. At present, revenues from selling stocks of subsidiaries are regarded as the biggest financial resources for the repayments. However, there are several factors that cause the stocks to be sold at lower prices than expected. One of the biggest factors is that each subsidiary may have excess personnel, which may discourage investors who are considering purchasing the stocks. In this case, the investors may place the value of those stocks at low prices and this in turn would erode the financial resources for repayments.

If PKP S.A. cannot repay all the debts, the Ministry of Finance (MOF) will dispose of the pledged and mortgaged assets to compensate for the losses caused by the guarantee without consideration about the future of the railway business in Poland, because it is the priority of the MOF to avoid financial losses of the Treasury of Poland rather than improve the railway business in Poland. In this case, it will be difficult for PKP group to keep its current status because buyers of the disposed assets will use or sell assets individually to exploit their profits regardless of the governmental policy of Poland. Moreover, the governmental policy includes than just a railway policy; it also includes an employment policy and others.

In order to resolve this problem, PKP S.A. has to increase the financial resources for repaying the debts through thoughtful asset and labor restructuring.

6.1.2 Division of Assets

PKP S.A. has to consider the optimal redistribution of the existing business resources in the course of the division of assets. In planning the division of assets, PKP S.A. has to consider following purposes.

- To utilize assets more efficiently for railway business
- To meet the requirements of EU accession
- To utilize assets to get additional financial resources to repay its debts

The assets fall into the categories of railway tracks, stations, marshaling/shunting yard complexes, depot facilities and so on. It is clear how to treat the railway, since EU order has regulated the treatment. In terms of depot facilities, distribution of assets has been already completed without any outstanding problems.

However, the treatment of stations and marshaling/shunting yard complexes has not been determined, though those treatments need to be determined from the management point of view. Delay in the decision-making may impede efficient business operations and lessen the competitiveness of the PKP group.

If further time is necessary to fix the possessive right of lands, at least clear and concrete plans of asset division is essential in order to carry out privatization of the concerning company.

6.2 RESOLUTIONS

In order to resolve the two problems mentioned above, it is expected that PKP S.A. will complete the following items.

- To promote asset restructurings, considering "Redevelopment of low utilized assets" and "Further utilization of existing facilities" (In concrete terms, this means the careful consideration of the utilization of stations and redevelopment of yards.)

- To promote labor restructuring of entire PKP group with a comprehensive view of the financial resources.

6.2.1 Division of Assets

Figure 6.2.1 shows a basic concepts.

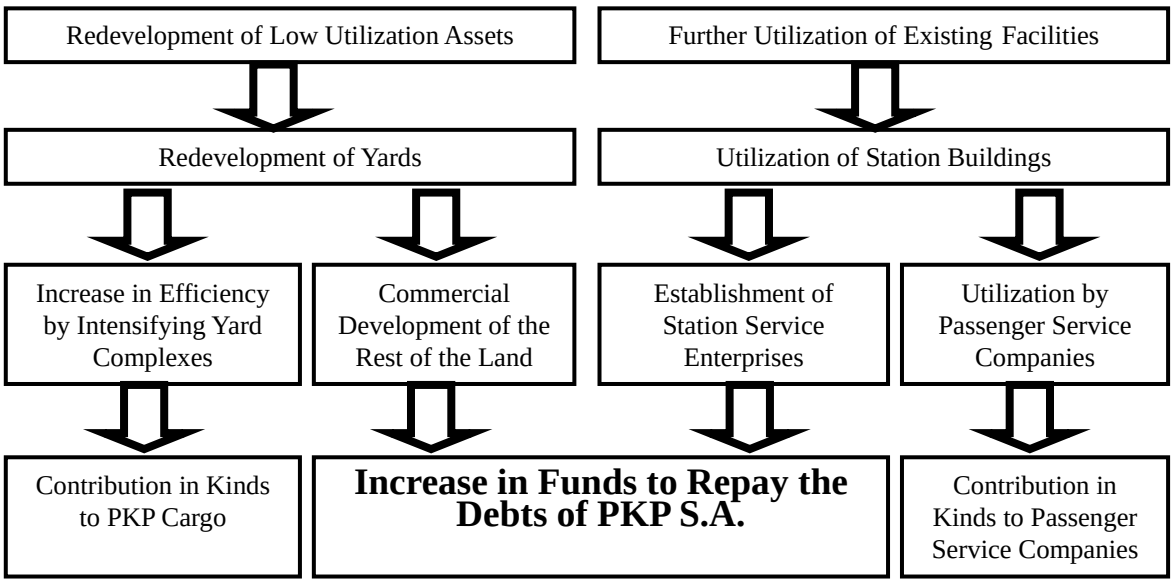


Figure 6.2.1 Basic Concepts of Resolutions

6.2.1.1 Stations

(1) Current situation

The platforms, passageways and main station buildings – containing ticket windows, concourses, waiting rooms, kiosks, buffets, offices, etc. – are controlled by PKP S.A., with the exception of some platforms and passageways that are part of PKP PLK. The aforementioned items could be transferred to PKP PLK as a natural extension of its control of the general rail infrastructure. However, under such an arrangement it is difficult to envisage the incentive for PKP PLK to make appropriate future improvements.

(2) Management by train operating companies

Alternatively the main station buildings, platforms and passageways could be given over to the operating companies themselves. This would promote development of both passenger transportation business and various businesses in station spheres comprehensively. However, it may be against the EU directive to be under the condition of open access.

(3) Management by independent companies – the Station Service Enterprise

A further alternative is the creation of a separate entity, the Station Service Enterprise, which operates and manages main railway stations as its core business and charges a fee to the train operators for use of its station facilities. This option could provide a number of benefits, including independence and fairness to the various station users . In addition, a company such as this could promote development of the railway passenger transport industry in cooperation with passenger operating companies. PKP S.A. would not obtain profit directly, but rather through the sale of stock.

Therefore, the optimum solution, given the particular circumstances in the Polish railway industry, would appear to be to transfer the major stations in big cities to an independent management entity, with small stations in outlying districts and towns being transferred to the appropriate operating companies.

6.2.1.2 Marshaling/Shunting Yards

(1) Current situation

PKP Cargo currently controls the major parts of these facilities. PKP PLK controls some parts, such as main tracks and auxiliary main tracks, but they represent significant land areas that are not necessary for the operations of PKP Cargo. This is due to the yards having been developed for much larger traffic volume and offer a wider range and types of installations. Marshalling humps, sorting tracks, arrival/departure tracks, storage tracks, wagon repair sidings, loading/offloading facilities, etc., are distributed throughout the total land area.

While the current volume of traffic could be dealt with using a smaller land area, this cannot be done without a complete re-organization of the facilities to fit within a smaller area.

(2) Redevelopment of yard complexes

The essential land area required for PKP Cargo operations in each location should be established and the required investments to allow these smaller portions of yards to be effectively utilized should be quantified. The non-essential land areas could then be commercially developed as real estate by PKP S.A,, who would be required to fund the technical developments and improvements necessary to release the real estate. PKP S.A. would generate a return on its investment due to the increase in the value of PKP Cargo, whose stock could also be sold.

(3) Collaboration for redevelopment

The redevelopment of yards aims at an increase in efficiency by intensifying operations in complexes that have been reduced in size an and then commercially developing of the remainder of the land. Collaboration between PKP S.A., PKP Cargo and PKP PLK is imperative for effectively redeveloping the yards. Therefore, both of the companies are expected to collaborate with each other by establishing a committee to study the methods for the redevelopment. The collaboration will enable PKP S.A. and PKP Cargo to share the burden accompanying the development. In addition, an even more effective redevelopment can be achieved by including developers and voivodships in the development projects.

(4) Summary of redevelopment of yard complexes

The cooperation of several concerned parties is desperately needed for effectively redeveloping these yard complexes.

Negotiations with voivodships or local governments with regard to the development are desperately needed. It is desirable for PKP S.A. to trust the developers to negotiate various conditions in developing the targeted areas.

It is also desirable to speed up the process to resolve the property rights problems. In order to resolve this problem, support of the Polish central government and voivodships are desperately needed.

Figure 6.2.2 shows the concept of the cooperation.

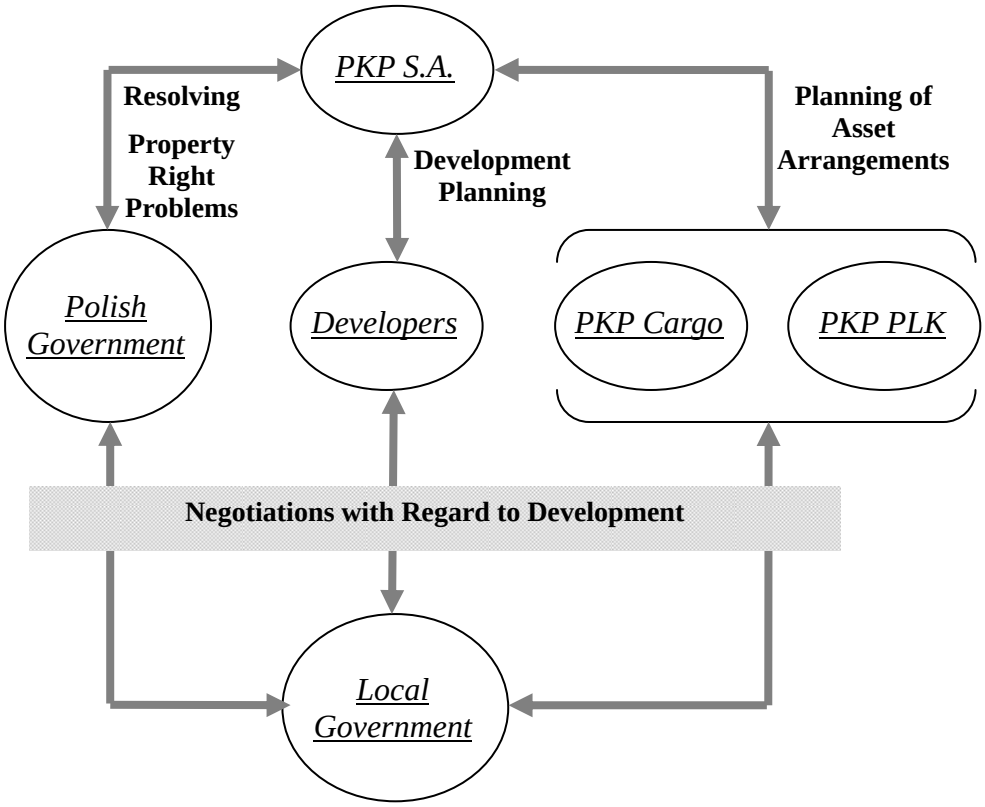


Figure 6.2.2 Relationship of Concerned Parties

6.2.1.3 Summary of Assets Division

There are two points to be noted. One is that, other financial resources are necessary in order to develop and utilize the assets. Other financial resources can be obtained by mortgaging the assets to banks and investors. However, without persuasive development plans, it will be difficult for the banks or the investors to provide enough funds. Therefore, persuasive development plans are desperately needed to achieve enough funds for the redevelopment.

Another is that settlement of property rights problems is mandatory. Therefore, when proceeding with the procedures to settle the problems, it is necessary to give priority to the problems related to the redevelopment of yards and utilization of stations.

6.2.2 Labor restructuring

Two options can be recommended to implement labor restructuring.

(1) By-Companies Methods

While PKP S.A. provides funds and plans for labor restructuring, each company is engaged in implementing labor restructuring, considering each company's individual circumstances. This method has following merits and demerits.

(Merits)

Since entire PKP group can engage in the labor restructuring, it is possible to strongly promote labor restructuring.

(Demerits)

Each company has to engage in its fundamental business during labor restructuring. Therefore, the assets being used for labor restructuring may erode precious resources for the fundamental business.

(2) PKP S.A.Implementation Method

PKP S.A. assumes employment of the excess personnel of PKP group and implements labor restructuring. This method has following merits and demerits.

(Merits)

Since a special department in PKP S.A. is expected to engage in labor restructuring, PKP group companies can concentrate business resources on their fundamental business.

(Demerits)

Labor union may resist against the measure to transfer the excess personnel to PKP S.A. In addition, there is a risk that the labor restructuring procedures may run into difficulties if the special department of PKP S.A. does not have enough capability in the area labor restructuring.

(3) Compromised option

Considering the current situations of PKP group, the Option (2), "PKP S.A.-Implementation Method" is difficult to complete. Therefore, Option (1), "By-Companies Methods" is more feasible. On the contrary, treatment of drivers of PKP Cargo should be decided by the concerned parties and cannot be resolved only by PKP Cargo or PKP Regional. Therefore, in resolving this problem, Option (2) should be considered.

CHAPTER 7 PKP PLK

7.1 INVESTMENT IN RAILWAY INFRASTRUCTURE

7.1.1 PKP PLK Network

7.1.1.1 Classification of Railway Lines

Currently, PKP PLK maintains and operates approximately 23,500 km of railway lines. Table 7.1.1 classifies these lines by function. Of all the lines that make up the Polish railway network, PKP PLK designates 17,000 km as lines that should be maintained for their important role in future transportation. These lines account for more than 90% of the passenger and freight transportation volume and are deemed indispensable in railway transportation. More detailed discussion of the PKP PLK lines is given in Chapter 8 to Chapter 10 to illustrate its utilization by operators.

Table 7.1.1 Classification of PKP PLK Network

Function	Length	
Passenger lines[1]	7,000 km (30 %)	Subtotal
Freight lines[2]	5,060 km (22 %)	17,000 km (71 %)
Combined passenger and freight lines	4,050 km (17 %)	(16,717 km)
Connecting and bypass lines	1,000 km (4 %)	
Other lines (to be abolished or transferred to other operators)	7,000 km (30 %)	
Total	23,500 km (100 %)	

Source: PKP PLK

Notes 1: Mainly used for passenger transport.

2: Mainly used for freight transport

7.1.1.2 Important Lines

The important lines in the PKP PLK railway network are designated. They include lines of national importance, which are stipulated by the Railway Transport Law; lines to be developed under international treaties; and corridors to be modernized in conjunction with the integration into the EU.

(1) Lines of National Importance

In Article 6 of the Railway Transport Law, which was enacted on May 28, 2003, the lines of national importance are prescribed as follows:

Railway Transport Law, Article 6

1. Railway lines are divided into:

    1) lines of national importance;

    2) remaining lines

2. The Council of Ministers shall lay down, by way of an ordinance, a list of railway lines which are of national importance for economic, social, defense or ecological reasons, with a provision for Paragraph 3.

3. The Minister competent for transportation affairs, acting in consultation with the National Defense Minister, shall lay down, by way of an ordinance, a list of railway lines important exclusively to defense.

4. The ordinance referred to in Paragraph 3 shall not be subject to publication.

Of the length of the PKP PLK-administered network, which totals 23,500 km, approximately 12,000 km are designated as lines of national importance under the above-mentioned legislation.

These lines are determined based on the following factors:

1) Transport density of the line from an economic standpoint

2) Social importance of the line

3) Environmental friendliness of the line

4) National defense value of the line

Lines of national importance are determined through comprehensive assessment. They are designated not by the Minister of Infrastructure but by an ordinance issued by the Cabinet Council. The existing lines of national importance were designated based on an ordinance of 2000. Review is under way to formulate a new ordinance for the designation of new lines of national importance based on the Railway Transport Law. It is to be issued before Poland's accession to the EU in May 2004. The scale of modification, however, is expected to be small. In this connection, the national defense lines will be designated by the Minister of Defense.

Article 38 of the Railway Transport Law stipulates that the government should bear the cost of modernizing the lines of national importance. It also stipulates that PKP PLK should disburse the maintenance cost of these lines excluding the national defense lines.

(2) Lines to be Developed under International Treaties

Until the early 1990s, the unification of infrastructure standards in Europe was pursued mainly through international treaties. Although these treaties did not include any specific development plans for transport infrastructure, they still have a great influence today in that they indicate the standard technical level of international infrastructure. Table 7.1.2 shows the railway-related international treaties that are ratified in Europe.

Table 7.1.2 International Treaties on International Transport Infrastructure in Europe

Transport Mode	Conclusion Date	Name of Treaty
Railway	May 31, 1985	European Agreement on Main International Railway Lines (AGC)
Combined Transport	Feb.1, 1991	European Agreement on Important International Combined Transport Lines and Related Installations (AGTC)

(3) TEN-T Plan

Due to the drastic increase in international traffic volume in the European Community (EC), constraint in the development of transport infrastructure on the national level became evident, making infrastructure development a prerequisite for the single market economic activities. Therefore, EC announced the TEN (Trans-European Network) Action Program, which introduced a specific action plan for road and railway sectors. This plan gained legal ground with the effectuation of the Maastricht Treaty in 1993. Hereupon, the Trans-European Network Plan was officially adopted as one of EU policy. The main purpose of this TEN-T (Trans-European Transport Network) Plan is to integrate several small-scale transport infrastructure networks in EU countries into a single transport infrastructure network that will ensure physical linkage and interoperability. The railway-related guideline adopted in 1996 for the construction of TEN-T is shown in table 7.1.3.

Table 7.1.3 Elements and Purposes Included in the TEN-T Plan

Transport Mode	Element	Purpose
Railway	High-speed railways and conventional railways	To achieve interoperability
Combined Transport	Railways, inland waterways, and freight terminals	To expedite transfer between transport modes

(4) TINA Network Plan

The TINA (Transport Infrastructure Needs Assessment) Network Plan was proposed following the eastward expansion of the TEN-T Plan. This plan was prepared through the TINA process carried out under the Multi-Country Transportation Program of the PHARE (Poland and Hungary: Action for the Restructuring of the Economy) Program. The TINA Network covers 11 countries, namely, Bulgaria, Czech, Cyprus, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. When the accession of these countries to the EU becomes a reality, the TINA Network will be integrated into TEN-T in succession. Table 7.1.4 gives an outline of the TINA Network Plan.

Table 7.1.4 TINA (Transport Infrastructure Needs Assessment) Network Plan

Proposed year	1999
Base of proposal	TINA process of PHARE
Scope	Central and East Europe, Cyprus
Background	Recognition of the need for transport infrastructure projects following the eastward expansion of the TEN-T Plan
Objectives	Identify networks as candidates for TEN-T in Central and East Europe Establish linkage between main cities in Central/East Europe and EU countries Determine the specific routes of ten corridors
Contents	The specific routes of ten corridors Additional networks Roads, railways, inland waterways, airports, and combined transport
Characteristics	One of the pre-accession strategies Integration into TEN-T in the future Adoption of multi-modal network strategy Strategic Acquis Communautaire
Target year	2015
International organization	EU

(5) Important PKP PLK Lines

Table 7.1.5 is the a summary of the nationally and internationally important PKP PLK lines.

Table 7.1.5 Important PKP PLK Lines

Line	Relevant legislation and agreements, etc.	Length	
Lines of national importance	Railway Transport Law enacted on May 28, 2003 (Article 6)	12,000 km	
AGC lines	European Agreement on Main International Railway Lines dated May 31, 1985	About 5,000 km in total	
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	Backbone Network: 3,741 km	5,632 km in total
		Additional Network Components: 1,891 km	

7.1.1.3 Priority Corridors for Modernization

Table 7.1.6 shows the internationally important railway corridors that pass through Poland. They are lines designated for TINA modernization, which are prioritized for implementation in Poland.

Table 7.1.6 Priority Corridors for Modernization

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

The following is an overview of these important corridors.

E-20 is a part of the Trans-European Transport Corridor II linking Berlin, Warszawa, Minsk, Moscow, and further with deep Russia and Asia. After modernization works have been carried out for several years, the speed required by the EU standards has been achieved in the sections between Warszawa, Poznań, and Berlin. The Polish section of this corridor that leads up to the border in Terespol will be modernized by 2006.

E-30 links the most important conurbation in Southern Poland, which includes Legnica, Wrocław, Opole, Katowice, Kraków, Tarnów and Rzeszów. It gives the regions the prospect of quick access to South Germany and Ukraine.

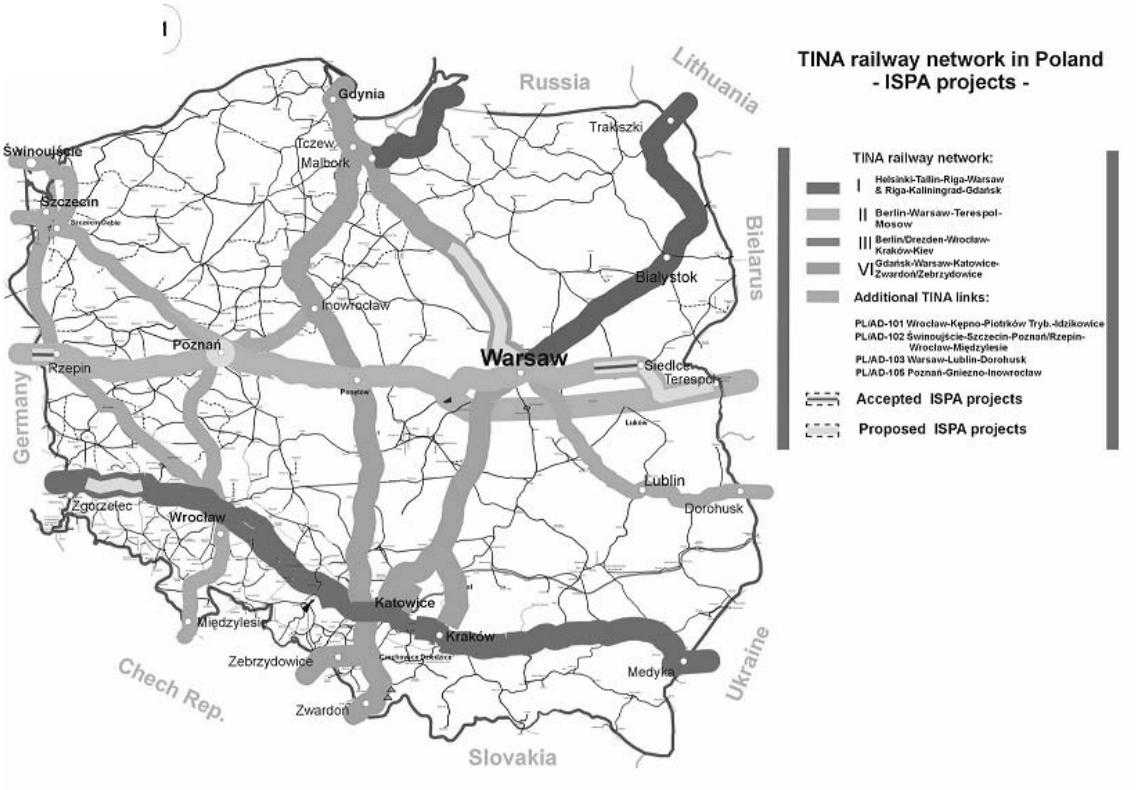
Within the framework of the European agreements, modernization works will also be carried out on other lines listed as follows:

E-65 and CE-65: Warszawa–Tricity (Gdynia, Sopot, and Gdańsk)

E-75: Warszawa–Białystok and further to the border with Lithuania

E-59 and CE-59: Świnoujście and Szczecin through Poznań and Wrocław to the border with Czech Republic in Międzylesie

Figure 7.1.1 shows the TINA railway lines that should be developed with priority.



Source: Ministry of Transport and Maritime Economy, "National ISPA Strategy: Transport Sector," January 2000.

Figure 7.1.1 TINA Railway Network in Poland – ISPA projects –

7.1.1.4 Downsizing of PKP PLK Network

As explained in Chapter 8, section 8.3.1, if the operations of money-losing trains of PKP Regional are terminated, the network would be downsized to about 6,000 km. Similarly, as explained in Chapter 10, section 10.2.5, the network of PKP Cargo would have to be scaled back to about 11,000 km to enable the company to maximize profits and secure operational routes for rail freight transport. Since most of these lines overlap, PKP PLK would only need to maintain a network of about 11,000 km in the future.

These size of the network is approximately equals to the network size of nationally important lines. Among the PKP PLK lines, those currently required by TINA to undergo modernization are already included in the 12,000-km network that PKP PLK should maintain in the future. Therefore, the discussion on the modernization of railway infrastructure in this Chapter is focused on the important lines that will constitute the future PKP PLK network.

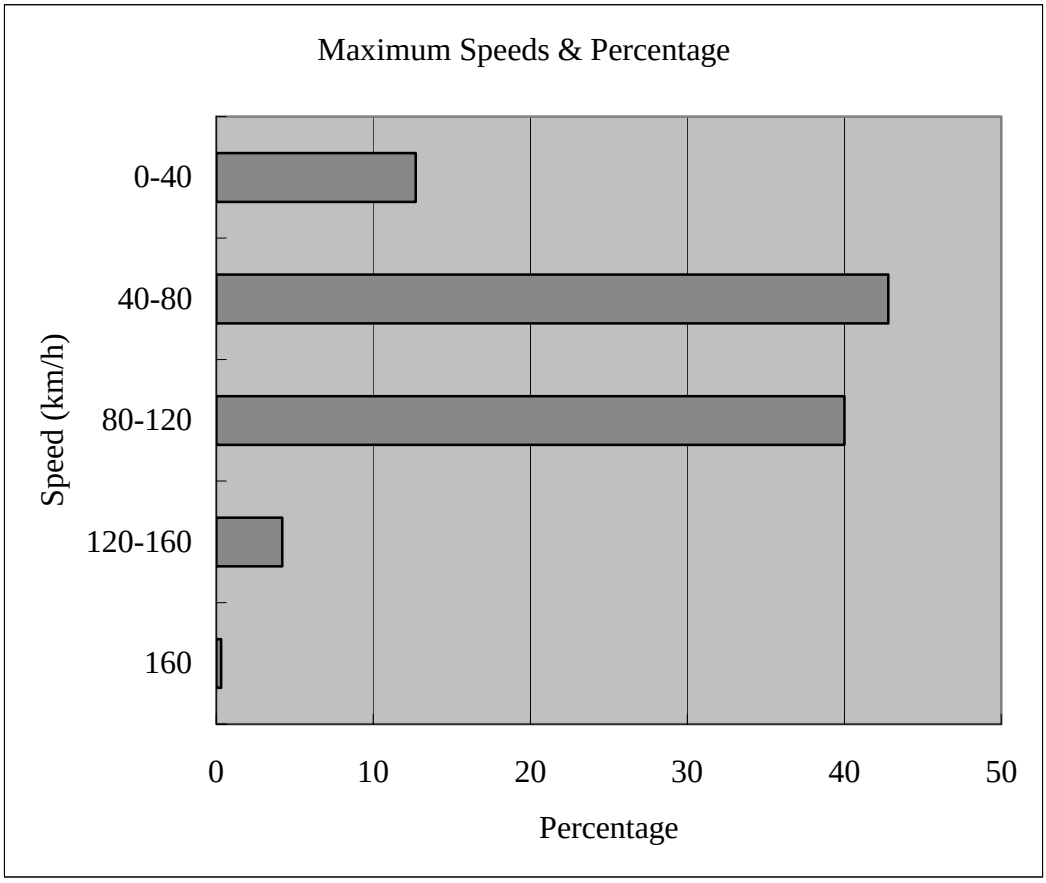
7.1.2 Problems of Railway Infrastructure and Investment

7.1.2.1 Railway Infrastructure

(1) Condition of Railway Lines

At present, only 29.5% of the PKP PLK railway lines are in good technical condition and require only light maintenance. The technical condition of 42% of the lines is considered as in operable condition but the lines require extensive maintenance work and speed limitation. Condition of the remaining 28.5% is not tolerable, with speed limitation at as slow as 20 km/h.

Figure 7.1.2 shows the maximum speeds of lines in operation.



Source: PKP PLK Annual Report 2002

Figure 7.1.2 Maximum Speeds and Percentage of Lines in Operation

The EU technical standards stipulate that the maximum speeds for passenger trains and freight trains should be 160 km/h and 120 km/h, respectively, and the maximum axle load should be 22.5 tons. Only E-20 and E-65 (CMK = Centralna Magistrala Kolejowa) have been able to deliver the maximum speed of 160 km/h stipulated for passenger trains by the EU standards.

It should be noted that the technical conditions of tracks have become noticeably deteriorated due to insufficient maintenance funds. The severe wear of tracks

necessitates the following operational restrictions to ensure safety in train operations.

- Limitation on maximum speeds
- Introduction of speed restrictions
- Limitation on the permissible axle load

Because of such track conditions, the total length of tracks with speed limitation has been increasing year by year, from 2,515 track-km in January 2000 to 3,246 track-km in January 2003, an increase of 1.3 times. The service quality of passenger and freight transportation has substantially declined, making it urgent to eliminate the maintenance backlog.

If the funds for track maintenance are not increased in the coming years, the technical and operational parameters will decrease on the already modernized sections while degradation of the remaining lines will continue.

(2) Railway Modernization for EU Accession

The purpose of PKP PLK's investment is to integrate the Polish railways with the EU system, in terms of both technical standards and compatibility of railway networks in preparation for its accession to the EU on May 1, 2004. After Poland's accession to the EU, there will be a transitional period until the end of 2006 before PKP PLK must open 20% of its railway traffic capacity to foreign railway operators on TERFN (Trans-European Railway Freight Network). However, due to the shortage of funds for railway modernization, lines satisfying the EU technical standards are few. Measures must be taken to upgrade the main lines to EU standards.

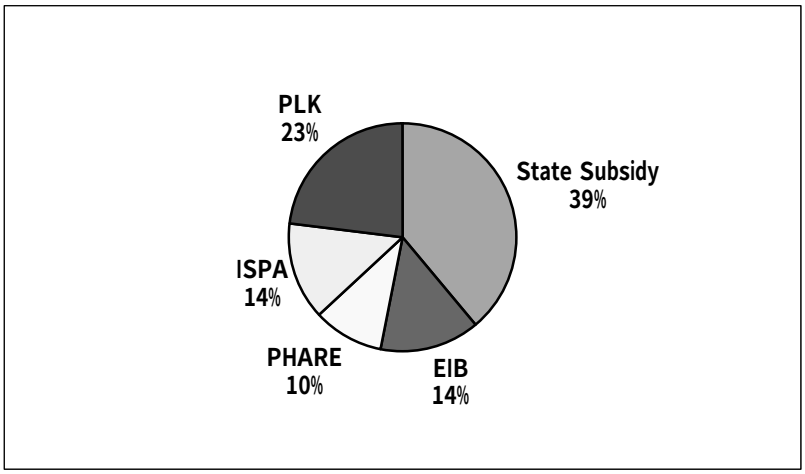
In addition to improving the technical standard to meet the required EU standards, it is also important to carry out railway investment from the viewpoint of improving the business of PKP group companies. That is to say, investment in essential infrastructure can increase the competitiveness of the railways against other transportation modes. Unfortunately, the emphasis of the current railway modernization plan is merely following EU principles; infrastructure investment has been not pursued from the economic and financial points of view. One example of this type of investment is Corridor I (E-75), the transport demand of which is forecasted to be at a low level.

7.1.2.2 Investment in Railway Infrastructure

(1) Investment amount

The investment of PKP PLK in 2002 amounted to 422 million PLN. Its financial resources are shown in Figure 7.1.3.

The modernization of PKP PLK infrastructure is carried out based on the railway infrastructure modernization program for the period 2001 to 2015 under the agreements of the 2nd and 3rd meetings of the Pan-European Ministers' Transport Conference. This program gives priority to investment in European transport corridors passing through the territory of Poland.



Source: PKP PLK Annual Report 2002

Figure 7.1.3 Financial Resources of PKP PLK Investment in 2002

With the above-mentioned financial resources, railway modernization is carried out to increase competitiveness of the railways against other transportation modes and to ensure the interoperability of Polish railways with railway systems in other EU countries. Investments are also made to eliminate weak spots in track substructure and recover the original maximum speed and permissible axle load, modernize stations, replace track together with improvement of track alignment, adjust traffic control and communication equipment, and modernize power supply system, etc.

Figure 7.1.4 shows the actual amounts of investment for the modernization of infrastructure between 1998 and 2002, the estimated amounts for the years until 2008, and a breakdown of the sources of funds.

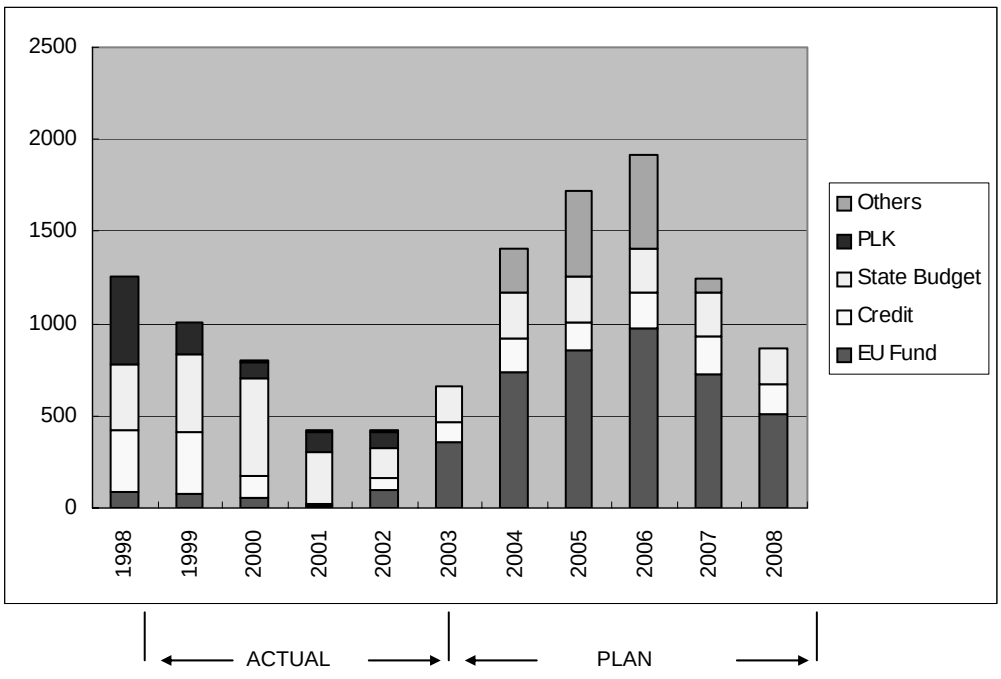


Figure 7.1.4 Railway Infrastructure Investment for Modernization (unit : million PLN)

Although the total investment in 1998 was almost 1.3 billion PLN, the amount decreased to 800 million PLN in 2000 and further down to 422 million PLN in 2002. The decline in total annual investments after the establishment of PKP PLK in 2001 was especially notable because they decreased sharply to one third of the level of infrastructure investment implemented during the era of PKP (Polish State Railways).

The unit cost for the modernization of double-track railway, including the reinforcement of tracks, catenaries, signaling and telecommunication systems, is estimated to be EUR 2.5 million per km (equivalent to 11.5 million PLN per km). Thus, only about 40 km of double-track can be modernized with an annual investment of 422 million PLN. (Currency rate at 1 Euro = 4.6 PLN, as of November 7, 2003).

(2) Government Funds

Government funds (State budget) available to PKP PLK for railway modernization averaged 352 million PLN per year for the five years between 1998 and 2002. Together with the decrease in total investment funds after the establishment of PKP PLK in 2001, government funds also decreased to 163 million PLN (39% of the total infrastructure investment of PKP PLK) in 2002. This reduced availability of government funds to PKP PLK is one of the reasons causing delay of modernization of the railway.

Despite the fact that the Polish government is responsible for disbursing the costs of modernizing the lines of national importance, maintaining national defense lines, and abolishing local lines pursuant to the Railway Transport Law (Article 38), the government has provided PKP PLK with only 6% of the amount required. As for the maintenance of national defense lines, the government has not provided any funds.

(3) EU Funds

The European Union provides financial support for the modernization of railway lines and border crossings through PHARE and ISPA (Instrument for Structural Policies for Pre-Accession). After Poland's accession to EU in 2004, the EU Cohesion Fund and ERDF (European Regional Development Fund) will become available for railway modernization projects.

Details about these EU funds, eligible projects, and amounts available to Poland are discussed below.

1) PHARE

The European Commission and the Polish government signed the Financing Memoranda for PHARE Funds. The Polish government received grants for EUR 130,947,152 between 1994 and June 2002. The funds were used for the following purposes:

a) Modernization of railway border-crossing facilities

b) Modernization of internationally important railway lines (Pan-European Transport Corridors) that have been designated in the European Conference on Ministers of Transport in Crete in 1994

Table 7.1.7 shows the modernization projects in Poland using PHARE funds.

Table 7.1.7 Modernization Projects Using PHARE Funds

Project	Number of Projects	Total Project Cost
Modernization of railway border-crossing facilities	6	EUR 22.9 million
Modernization of railway infrastructure (E20 & E30)	4	EUR 108 million

2) ISPA

The ISPA Fund was created pursuant to EU Regulation No. 1267 in June 1999. Between 2000 and 2006, 40 to 50% of the total funds for the transport sector in Poland have been allocated for railway investment projects. The conditions for receiving the ISPA funds are as follows:

a) To improve interoperability stipulated by EU Directive 2001/16/EC of March 19, 2001

b) To accept monitoring of PKP PLK restructuring on a regular basis

So far, ISPA funds have been used preferentially for the following projects:

a) Integration with the Trans-European Rail Network and combined transport based on the Decision on 1692/96/EC of the European Parliament and the Council of 23 July 1996 on the Guidelines of the Community for the Development of Trans-European Transport Network.

b) Improvement of transport system and development of national economy

Today, the ISPA program is used widely for railway modernization in Poland. It is agreed that 75% of the total project cost will be paid for by the EU and the remaining 25% co-financed by the Polish government. This financing scheme has a drawback in that if the government funds are insufficient, the EU funds cannot be fully utilized.

PKP and PKP PLK have together received EUR 346.2 million between January 1, 2000 and September 30, 2002. This amount corresponds to 62.6% of the EUR 552.8 million of the ISPA funds appropriated.

Table 7.1.8 shows the ISPA-funded railway modernization projects being implemented currently and their schedule.

Table 7.1.8 Updated List of Investment Projects Proposed for ISPA Co-Financing

No.	Title of the project	Pan-European Corridor	Total cost in MEUR	Foreseen implementation period						
				2000	2001	2002	2003	2004	2005	2006
1	Modernisation of the E-20 railway line on section Mińsk Mazowiecki-Siedlce, 52km;	II	133						-	-
2	Modernisation of the cross-border E-20 railway line on section Rzepin-Polish border, 15km;	II	25					-	-	-
3	Modernisation of the E-30 railway line Legnica-Węgliniec-Zgorzelec, 109km, inculding:	III	250	-						
3a	Modernisation of the section Legnica-Węgliniec,	III	160	-						
3b	Modernisation fo the sections Węgliniec-Zgorzelec and Węgliniec-Bielawa Dolna	III	90	-	-	-				
4	Mordernisation of the E-20 railway line on section Siedlce-Terespol, phase I, 121km;	II	191	-	-	-				
5	Mordernisation of the Poznań Rail Node, E-20 section;	II,III,VI	70	-	-					
6	Improvement of railway infrastructure and elimination of operational bottlenecks	VI	135	-	-					
7	Modernisation of the E-65 railway line on section Warszawa- Działdowo, 145km;	I,II,III,VI	270	-	-	-				
8	"Technical Assistance"-group of tasks for road and rail access to the Pan-European corridors in the urban areas of: Warszawa, Poznań, Wrocław, Kraków, Tricity, Łódź, GOP and for the preparation of realisation of the road and rail investment projects to be cofinanced under Cohesion Fund in the years 2004-2006		25							

Source: Ministry of Infrastructure, "National ISPA Strategy: Transport Sector, Supplement No. 2/2003," March 2003.

Table 7.1.9 gives a breakdown of the ISPA and government funds available for the above-mentioned projects.

Table 7.1.9 ISPA-funded Railway Projects in Poland

(Unit: million EUR)

Project Name	Section and Contents	Project Cost	ISPA Fund	State Budget	Completion Date
Modernization of E-20	Mińsk–Mazowiecki–Siedlce	124.6	93.4	31.2	Dec. 31, 2004
Modernization of E-20	Rzepin–state border	23.6	17.7	5.9	Dec.31, 2004
Modernization of railway infrastructure	Removal of operational bottlenecks	111	83.2	27.8	Dec. 31, 2006
Modernization of Poznań railway node		67.4	50.6	16.8	Dec.31, 2006
Modernization of E-30	Legnica–Węgliniec	123.8	92.8	31	Dec.31, 2007
Modernization of E-65	Warszawa–Działdowo-Gdynia	14.9	6	8.9	Dec.31, 2004
E-75 (Rail Baltica)	Warszawa–Białystok–Sokółka–Suwałki	3	2.4	0.6	Dec.31, 2005
Modernizationo f E-20	Siedlce–Terespol	191.2	139	55.2	Dec.31, 2007
Modernization of E-30	Węgliniec–Bielawa Dolna, Węgliniec–Zgorzelec	90.5	62.6	27.9	Dec. 31, 2007
CE-20	Łowicz–Skierniewice–Łuków	3	2.25	0.75	Dec. 31, 2005

3) Cohesion Fund

The Cohesion Fund was created pursuant to the Regulation of the Council 1164/94/EEC dated May 16, 1994. This fund provides financial assistance to projects related to the Trans-European Transport Network. Upon Poland's accession to the EU in 2004, the Cohesion Fund will become available to Poland, replacing the ISPA Fund. Currently, within the framework of the Cohesion Fund, five railway modernization projects are being planned in Poland. Of the estimated total project cost of EUR 1.5 - 1.8 billion, the Cohesion Fund is expected to furnish EUR 800 million. These projects include resumption of the unfinished modernization projects of E-20 and E-30, preparation of technical assistance for ISPA-funded works on E-65 and E-75, and undertaking of the new E-59 project scheduled for Poznan–Krzyż and Szczecin–Świnoujście.

4) European Regional Development Fund (ERDF)

The European Regional Development Fund is part of the EU Structural Funds. It is used to finance inter-regional transport projects. Within the framework of ERDF, modernization of lines of national importance that are not included in TEN and linkage of important cities are planned. Of the total amount of EUR 291 million necessary for the planned railway projects, EUR 204.8 million is to be furnished by ERDF from 2004 to 2006. Modernization of the Warszawa–Łódź, Warszawa–Radom–Kielce,

(Szczecin)–Stargard Szczeciński–Koszalin–Gdynia sections are being planned.

7.1.2.3 Railway Modernization Plan

Modernization works and plans are in progress in all four corridors designated by TINA. The first priority in modernization is Corridor II (E-20), where works have been carried out since 1994. The second is Corridor III (E-30) and its modernization has been carried out since 1998. The third is the modernization of CMK in Corridor VI (E-65), which has been carried out since 1998. A feasibility study for Corridor I (E-75) is under preparation.

The current modernization works are carried out in accordance with the "National Development Plan for the period 2004–2006."

In terms of the investment amount by corridor (line), EUR 571 million (2.6 billion PLN) was invested in Corridor II (E-20) until 2001 as shown in table 7.1.10. At present, the east section of Warszawa between Mińsk Mazowiecki and Siedlce is being modernized. In this Warszawa–Terespol section, although the number of suburban trains is relatively large, the numbers of long-distance passenger trains and freight trains are lower than those on E-30 and E-65. Furthermore, due to the difference in track gauge between Poland and Belarus, it is necessary to transship the cargos of freight trains or replace the bogies of passenger cars at the border. For these reasons, the financial and economic benefits that can be gained from the modernization of this section seem less attractive compared to other sections that are urgently in need of modernization.

Due to limited funds, modernization projects that can give more benefits to PKP PLK and the other railway operators (PKP Cargo, PKP Regional, PKP Intercity, etc.) should be given higher priority in investment.

Table 7.1.10 Investment in E-20 (Corridor II) Modernization

(Unit: million EUR)

	Project Name	Total Investment	Investment	
			until 2001	from 2002
I	**Completed Projects**			
1.	Modernization of the E-20 railway line on Warszawa–Kunowice section	487.0	487.0	
2.	Modernization of the E-20 railway line on Warszawa–Mińsk Mazowiecki section	80.0	80.0	
II	**Projects Under Construction**			
1.	Modernization of the E-20 railway line on Rzepin–State border section	24.8	2.8	22.0
2.	Modernization of the E-20 railway line on Mińsk Mazowiecki– Siedlce section	132.5	1.7	130.8
III.	**Projects Planned**			
1.	Modernization of the Poznań node (Węzeł poznański)	69.6		69.6
2.	Modernization of the E-20 railway line on Siedlce–Terespol section (Phase I)	193.3		193.3
3.	Modernization of the E-20 railway line on Siedlce–Terespol section (Phase II)	150.0		150.0
4.	Completion of the modernization of the Warszawa–Rzepin sector and modernization of the CE-20 Łowicz-Skierniewice–Łuków line	800.0		800.0
5.	Improvement of railway infrastructure in Poland by the E-20 extension	20.2		20.2
	Total Cost	**1,957.4**	**571.4**	**1,385.9**

Source: Ministry of Infrastructure

7.1.3 Prioritization of Railway Modernization

Infrastructure investment aimed at the modernization of the PKP PLK network must first take into consideration privatization of the PKP Group companies. This necessitates giving higher investment priority to railway lines that can improve the profitability of not only PKP PLK but also that of PKP Regional, PKP Intercity, PKP Cargo, and other operators. In other words, under the current modernization plan explained in Section 7.1.2.3, investment is concentrated too much on the E-20 Corridor. Priority must be reset to direct the limited financial resources to lines and sections that can give higher return on investment.

Meanwhile, with Poland's accession to the EU, modernization of its railway lines will become a prerequisite for providing market access to foreign operators. It is advisable, therefore, to conduct an analysis of lines that will require improvement of technological parameters.

Based on the number of trains in operation (number of passenger and freight trains operated in 2001) and demand forecast below, we review the importance and profitability of each section of the corridors (internationally important lines) at a planning stage or currently undergoing modernization works in order to set new priorities for modernization.

7.1.3.1 Number of Trains in Operation and Demand Forecast

Table 7.1.11 shows the numbers of trains operated in the main corridors of the TINA Network in 2001. Each figure represents the average number of trains operated in that section.

Table 7.1.11 Number of Trains Operated in Main Corridors (2001)

(Unit: number/day)

Corridor	Section	Passenger	Freight	Total
E-20	Rzepin–Poznań	39	29	68
	Poznań–Warszawa	*72*	18	*90*
	Siedlce–Łuków	43	8	51
	Łuków–Terespol	47	10	57
CE-20	Skierniewice–Łuków	5	8	13
E-30	Legnica–Wrocław	32	*51*	83
	Wrocław–Katowice	32	43	75
	Katowice–Kraków	*94*	32	*126*
	Kraków–Tarnów	*112*	*62*	*174*
E-59	Szczecin–Poznań	*59*	*48*	*107*
	Poznań–Wrocław	*69*	26	*95*
CE-59	Szczecin–Wrocław	41	*44*	85
E-65	Gdańsk–Warszawa	*66*	22	88
	Idzikowice–Zawiercie	*55*	15	70
CE-65	Gdańsk–Bydgoszcz	12	15	27
	Bydgoszcz–ZD Wola	32	*58*	*90*
E-75	Małkinia–Białystok	36	20	56
	Białystok–Suwałki	14	13	27

Note : Figures italicized indicate sections with high train frequency

Table 7.1.12 gives a demand forecast (Upper Values) of the same lines and sections listed in table 7.1.11 for the year 2010. Each figure also represents the average transportation volume in that section.

Table 7.1.12 Demand Forecast (2010 Upper Values)

Corridor	Section	Passenger (passenger/day)	Freight (ton/day)
E-20	Rzepin–Poznań	5,720	3,380
	Poznań–Warszawa	*14,657*	4,293
	Siedlce–Łuków	6,575	991
	Łukow–Terespol	7,437	3,514
CE-20	Skierniewice–Łuków	421	2,373
E-30	Legnica–Wrocław	7,386	2,585
	Wrocław–Katowice	5,053	*7,938*
	Katowice–Kraków	*17,281*	*9,415*
	Kraków–Tarnów	*22,864*	*9,650*
E-59	Szczecin–Poznań	7,920	*11,556*
	Poznań–Wrocław	*13,987*	3,369
CE-59	Szczecin–Wrocław	4,578	*8,574*
E-65	Gdańsk–Warszawa	*13,887*	4,164
	Idzikowice–Zawiercie	*11,241*	6,268
CE-65	Gdańsk–Bydgoszcz	1,627	348
	Bydgoszcz–ZD Wola	4,587	*12,944*
E-75	Małkinia–Białystok	6,390	3,030
	Białystok–Suwałki	1,005	1,828

Note : Figures italicized indicate high transportation volume

The following can be inferred from Tables 7.1.11 and 7.1.12.

1) Passenger Transport

a) At E-20, although the section between Poznań and Warszawa has both high train frequency and transport demand, the eastern section of E-20, where most of the modernization works are currently being carried out, has low train frequency and is not expected to have much transport demand.

b) Compared to the eastern section of E-20, the Katowice–Kraków–Tarnów section of E-30, the Poznań–Wrocław section of E-59, and the Gdańsk-Zawiercie section of E-65 seem to have far more demand.

c) Therefore, in terms of passenger transport, the priority of investment should be placed on E-30 (Katowice–Kraków–Tarnów), E-59 (Poznań–Wrocław), and E-65 (Gdańsk–Zawiercie) rather than on the eastern section of E-20.

2) Freight Transport

a) Based on the number of trains in operation and transport demand, the Wrocław–Katowice–Kraków–Tarnów section of E-30, Szczecin–Poznań section of E-59, and Bydgoszcz–ZD Wola section of CE-65 seem to have high transport demand.

b) In other words, the priority of investment for freight transport should be placed on

E-30 (Wrocław–Katowice–Kraków–Tarnów), E-59 (Szczecin–Poznań), and CE-65 (Bydgoszcz–ZD Wola) rather than on the eastern section of E-20.

7.1.3.2 Passenger Transport

The following reviews the sections that can improve profitability through modernization of the inter-city passenger transport lines. Table 7.1.13 shows the distances between Warszawa Centralna and major cities in Poland, journey time of the fastest trains, and commercial speeds.

Table 7.1.13 Journey Time and Commercial Speed from Warszawa Centralna to Major Cities

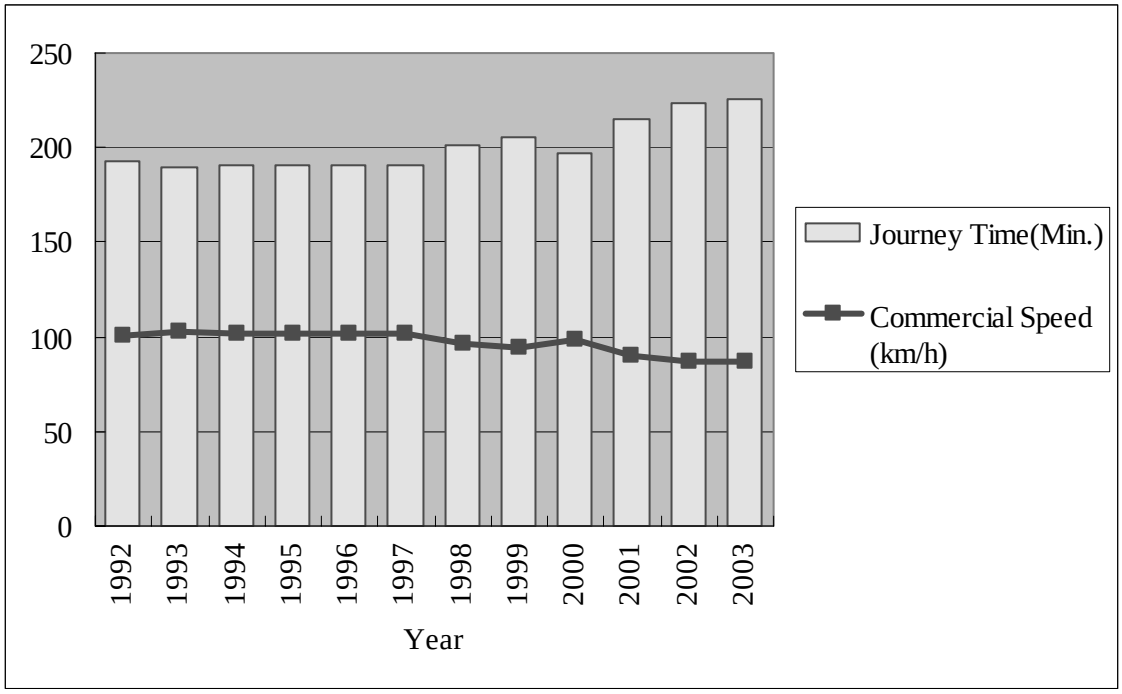
From Warszawa Centralna to	Distance (km)	Journey Time	Commercial Speed (km/h)
Poznań	306	2:41	114.0
Gdańsk	329	3:53	84.7
Katowice	298	2:33	116.8
Kraków	293	2:40	109.9
Wrocław	385	5:08[1]	75.0

Source: PKP Timetable 2003

Note 1: The fastest train via Poznań takes 4hours and 28minutes.

In terms of inter-city passenger transport, railways have a competitive edge over automobile and airlines to distances that can be covered in about three hours. Table 7.1.13 shows that although the journey time between Warszawa and Poznań, Warszawa and Katowice, and Warszawa and Kraków each requires no more than three hours, the travel between Warszawa and Gdańsk takes 3 hours and 46 minutes even by the fastest trains. Furthermore, as it takes more than five hours to travel from Warszawa to Wrocław, railways are not competitive enough.

Figure 7.1.5 summarizes the changes in journey time between Warszawa (Warszawa Wschodnia) and Gdańsk from 1992 to date. It shows that the journey time has increased 19% from the shortest 3 hours and 10 minutes (190 minutes) in 1993 to the current 3 hours and 46 minutes (226 minutes). To secure the share of railways in passenger transport in the trunk route between Warszawa-Gdańsk, it is necessary to give priority to the modernization of this line (E-65) and cut down journey time to the original level of approximately three hours.



Source: PKP Timetable

Figure 7.1.5 Trends of Journey Time from Warszawa Wschodnia Station to Gdańsk Gł. Station

The TINA corridors have been examined above. The following is a review of other lines with high investment potential.

Let us look at the railway line that links Warszawa, the largest city (population 1.8 million) in Poland and Łódź, the second largest city (population 790,000). The length of the present railway line between Warszawa Centralna station and Łódź Widzew station is 133 km and the journey time is 1 hours and 33 minutes. The commercial speed is merely 86 km/h. It is evident that this line, being Poland's most important inter-city rail route, needs immediate modernization. By upgrading this route and increasing the commercial speed to over 100 km/h can be attained on E-20 and CMK, the journey time can be reduced to less than an hour and a half. In doing so, the demand will increase, and would probably provide a high return on investment.

7.1.3.3 Freight Transport

According to the demand forecast results of the freight transport in 2010, the movement of freight along the North–South axis, centered on Katowice in the south, is expected to be far greater than that going in the east–west direction. CE-65, E-59, and CE-59 are main lines on the North–South axis. In the report "Strategy of Transport Infrastructure Development in 2004–2006 and the Following Years" (July 2003), the Ministry of Infrastructure plans to promote the development of inter-modal transport infrastructure. As combined transport is also emphasized as a future marketing strategy for PKP Cargo, priority should be given to the development of lines that link the ports of Gdynia and Szczecin with mining and industrial areas in the south.

Furthermore, a report that reviewed the present TEN program was submitted to the European Commission recently. With regard to the European priority railway projects proposed in the report, there was an opinion that the dedicated freight link from Gdańsk

to Katowice (North–South axis, CE-65) in Poland, which is indispensable to combined transport, should be modernized with higher priority than the East–West axis.

7.1.3.4 Urgent Investment Projects

Table 7.1.14 shows the EU technical standards. The AGC and AGTC lines in Poland should be developed in accordance with these standards.

Table 7.1.14 EU Technical Standards

Item	AGC Line (Passenger Train)	AGTC Line (Freight Train)
Maximum Speed (km/h)	160	120
Permissible Axle Load (kN)	225	225
Length of Platform (m)	400	-
Length of Station Track (m)	750	750

Even among the TINA lines (e.g. E-65 and CE-59), several sections have speed limitations. This means that the quality of railway services has declined compared to the past. When Poland becomes a member of the EU in 2004, the EU technical standards will become compulsory to railway lines in Poland that are designated as international corridors. Urgent investment is called for in order to upgrade the technical parameters of these sections.

The priority investment projects, which are to be implemented within the 3-year transitional period after Poland's accession to the EU in 2004, aim at removing speed limitations on internationally important lines.

7.1.3.5 Priority of Modernization

(1) Modernization

Table 7.1.15 is compiled based on the review results above. It shows the sections that should be given priority in modernization rather than the eastern section of E-20, where modernization works are currently being carried out.

Table 7.1.15 Priority Corridors and Sections for Modernization

Corridor	Line	Section
TINA Corridor III	E-30	Katowice–Kraków–Tarnów
TINA Corridor VI	E-65	Gdańsk–Warszawa
	CE-65	Bydgoszcz–ZD Wola
TINA Additional Network	E-59	Szczecin–Poznań Poznań–Wrocław
	CE-59	Szczecin–Wrocław
Others		Warszawa-Łódź

(2) Urgent Investment

With Poland's accession to the EU, speed limitations on lines of international importance must be eliminated. Giving top priority to urgent investment aimed at solving such maintenance backlog is recommended.

7.1.4 Estimation of Investment Cost and Investment Schedule

7.1.4.1 Modernization Cost

(1) Investment Amounts for the Modernization of TINA Corridors

Tables 7.1.16 and 7.1.17 show the amounts of investment required for the modernization of TINA corridors.

Table 7.1.16 Alignment of the "Backbone Network" (TINA)

Corridor	Alignment	Length (km)	Estimated Cost (million Euros)
I	Trakiszki–Sokółka–Białystok–Warszawa	340	1,047.0
I (to Gdańsk)	Gronowo–Braniewo–Bogaczewo–Malbork –Tczew–Gdańsk	141	253.2
II (E20, CE-20)	Kunowice–Rzepin–Zbąszynek–Poznań–Konin –Ponetów/Barłogi–Kutno–Łowicz–Warszawa –Łuków–Terespol Additional line for freight: Łowicz–Mszczonów –Pilawa–Łuków	869	1,839.1
III (E-30)	Wrocław–Opole–Gliwice–Chorzów–Katowice –Myslowice–Trzebinia–Kraków–Podleze–Tarnów–Przemyśl–Medyka Additional line for freight: Wrocław–Jelcz–Opole –Kędzierzyn–Koźle–Gliwice	669	1,353.0
III (to Dresden)	Zgorzelec–Węgliniec–Legnica–Wrocław	163	416.0
VI (E-65, CE-65)	Gdynia–Gdańsk–Tczew–Malbork–Iława–Warszawa –Grodzisk Maz.–Idzikowice–Psary–Zawiercie–Katowice –Czechowice–Dziedzice–Bielsko–Biała–Zwardoń Additional line for freight: Tczew–Inowrocław –Zduńska Wola–Tarnowskie Góry–Katowice –Gliwice–Rybnik–Pszczyna Planned new line: Psary–Trzebinia–Bielsko Biala	1526	4914.64
VI (to Breclav)	Czechowice–Dziedzice–Zebrzydowice	33	72.0
Total		3,741	9,894.94

Source: "TINA Final Report, October 1999," p. 46

Table 7.1.17 Alignment of "Additional Network Components"(TINA)

Alignment	Length (km)	Estimated Cost (million Euros)
Wrocław–Oleśnica–Kępno–Wieluń Dabrowa–Chorzów Siemkowice–Bełchatów–Miasto–Piotrków Tryb.–Idzikowice	252	1,112.0
Świnoujście–Szczecin–Rzepin–Poznań–Wrocław–Strzelin –Kamieniec Ząbk.–Krosnowice Kłodzkie–Międzylesie	999	2,034.72
Warszawa–Otwock–Pilawa–Lublin–Rejowiec–Dorohusk	267	632.0
Kędzierzyn Koźle–Chałupki	54	116.0
Poznań–Inowrocław	107	258.0
Podłęże–Tymbark–Nowy Sącz–Muszyna	141	658.0
Psary–Starzyny–Kozłów–Kraków	71	111.2
Total	1,891	4,921.92

Source: "TINA Final Report, October 1999," p. 46

(2) Cost for Modernization of the Warszawa–Łódź Section

Among the lines not included in the TINA network, the Warszawa – Łódź section should be modernized as soon as possible from the viewpoint of improving the balance between revenue and expenditure of inter-city passenger transport. The cost of modernization is estimated as follows:

133 km × 2.5 million euro/km

= 332.5 euro × 4.6 PLN/euro

= 1,530 million PLN

7.1.4.2 Infrastructure Maintenance Backlog Cost

In addition to the modernization of lines, immediate measures should be taken to eliminate the maintenance backlog of railway facilities (tracks, catenaries, and so forth).

Table 7.1.18 shows the speed-limit sections in the PKP PLK network. As these sections are responsible for prolonging travel time, improvement to these sections will bring about the most sensitive changes from an operational point of view.

Table 7.1.18 Speed-limit Sections

Line No.	Section	Length (km)	Remarks
1	Warszawa–Katowice	72.2	E-65
2	Warszawa–Terespol	144.2	E-20
3	Warszawa–Kunowice	41.9	E-20
8	Warszawa–Kraków	97.5	
9	Warszawa–Gdańsk	32.2	E-65
22	Tomaszów Mazowiecki–Radom	129.1	
61	Kielce–Fosowskie	43.2	
131	Chorzów Batory–Tczew	121.4	CE-65
143	Kalety–Wrocław Mikołajów	130.6	
181	Herby Nowe–Oleśnica	43.1	
271	Wrocław–Poznań	62.4	
272	Kluczbork–Poznań	132.6	
273	Wrocław–Szczecin	146.0	CE-59
351	Poznań–Szczecin	45.0	E-59
354	Poznań–Piła	53.2	
Total		1,294.6	

Source: PKP PLK Annual Report 2002

The speed-limit sections listed in Table 7.1.18 total 1,294.6 km. The cost of making improvement to these sections is estimated at 4,963 million PLN, assuming that the unit cost per kilometer of improvement works is one-third of the modernization cost required per kilometer.

1,294.6 km × 2.5 million euro/km × 1/3

= 1,078.8 million euro × 4.6 PLN/euro

= 4,963 million PLN

7.1.4.3 Investment Schedule

The following conditions were established when formulating the investment schedule for the railway infrastructure:

(1) Measures to Tackle Maintenance Backlog

Taking measures to deal with the maintenance backlog of railway facilities will help eliminate speed-limit sections on internationally important lines. The entire process should be completed in five years, to be started from 2005. Major works should be carried out during the transitional period after Poland's accession to the EU until the end of 2006.

(2) Modernization of TINA Corridors

Modernization of the TINA corridors should be completed by 2015. The modernization of high-priority lines should be carried out by the end of 2010 and low-priority lines should be modernized by the end of 2015.

Specifically, modernization should be carried out by 2010 with focus on the priority sections of Corridor III, Corridor VI, E-59, and CE-59 and by 2015 with respect to other sections.

Since EU funds are already committed until 2006, other sources of funds needs to be secured for any additional investment until 2006.

(3) Modernization of the Warszawa–Łódź Line

The ERDF (European Regional Development Fund) of the EU Structural Funds should be sought for the modernization of this line. The construction should be completed within five years starting from 2007.

(4) Annual Investment Amount

Taking into consideration the past investment, the amount of EU funds available, and the financial situation of the Polish government, the total amount of annual investment is estimated to be approximately EUR 1.3 billion (equivalent to 6 billion PLN). On this premise, modernization of lines and sections that are of low priority will have to be postponed until after 2015.

Table 7.1.19 shows the proposed investment schedule based on the above conditions.

Table 7.1.19 Proposed Investment Schedule and Required Funds

(unit: million PLN)

Year		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	After 2015	Total
Maintenance Backlog		1,418	1,418	709	709	709	0	0	0	0	0	0	0	4,963
TINA Corriors	I	4	5	100	100	100	997	997	997	997	997	687	0	5,981
	II	574	638	462	462	693	692	462	462	462	462	462	0	5,831
	III	574	638	1,730	1,730	870	865	865	865	0	0	0	0	8,137
	VI	574	638	1,750	1,750	1,750	1,750	1,750	1,955	1,955	1,955	1,955	5,157	22,939
TINA Others	E-59	0	0	936	936	936	936	936	936	936	936	936	936	9,360
	Others	0	0	0	0	300	300	600	700	1,500	1,500	1,800	6,581	13,281
Warsaw-Łódź		0	0	306	306	306	306	306	0	0	0	0	0	1,530
Total		3,144	3,337	5,993	5,993	5,664	5,846	5,916	5,915	5,850	5,850	5,840	12,674	72,022

7.1.5 Financial Resources for Investment

7.1.5.1 Funds Required for PKP PLK Railway Infrastructure Investment

Table 7.1.20 categorized the investment amounts shown in table 7.1.19 by year and source of funds (EU funds and funds from the Polish government).

The prerequisites are set as follows:

(1) The Polish government should bear the total cost of eliminating the maintenance backlog of railway lines for the following reasons: a) Poland's accession to the EU necessitates urgent solution to this issue; b) the EU budget has already been determined until 2006; and c) most of these lines are lines of national importance.

(2) Structural and Cohesion Funds of the EU Funds should be sought for the modernization of the TINA corridors. Eighty percent of the project cost should be paid

for with EU funds and the remaining twenty percent by Poland. The Polish government should furnish these funds as prescribed by Article 38 of the Railway Transport Law.

(3) Modernization of the Warszawa–Łódź line should also be implemented by EU Structural Fund (ERDF). Eighty percent of the project cost should be paid for with EU funds and the remaining twenty percent by Poland. As mentioned above, the Polish share should be borne by the Polish government.

Table 7.1.20 Sources of Funds for Railway Infrastructure Investment

(unit: million PLN)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	After 2015	Total
State Budget	1,763	1,802	1,766	1,766	1,700	1,169	1,183	1,183	1,170	1,170	1,168	2,535	18,375
EU Funds	1,381	1,535	4,227	4,227	3,964	4,677	4,733	4,732	4,680	4,680	4,672	10,139	53,647
Total	3,144	3,337	5,993	5,993	5,664	5,846	5,916	5,915	5,850	5,850	5,840	12,674	72,022

Based on the above, the Polish government will have to secure approximately 1.5 billion PLN (approximately EUR 330 million) annually for solving the maintenance backlog in railway infrastructure and modernizing the railways.

7.1.5.2 Examples of Subsidies for the Modernization of Railway Infrastructure in Germany

The use of subsidies for the modernization of railway infrastructure in neighboring Germany is introduced below for reference.

EU funds and subsidies from the Federal and local governments were used for investment in the railway infrastructure of DB Netz AG, the infrastructure management company of DB. The EU funds includes funds of the ERDF (European Regional Development Fund) for the development of the TEN plan (construction of new lines and modernization of existing lines).

Table 7.1.21 summarizes the total amounts of investment in railway infrastructure and subsidies from 1998 to 2001. According to the table, subsidies accounted for approximately 92% of the total investment in railway infrastructure in 2001. In particular, the Federal government contributed an average of over 75% of the total investment. On average, an annual amount of EUR 4.5 billion was invested in the development of railway infrastructure, which is comparable with the amount invested into road.

The major financial source of the Federal government is the mineral oil tax. Of the total EUR 40.7 billion of mineral oil tax collected each year, EUR 1.6 billion (4%) is used for investment in railway infrastructure.

Table 7.1.21 Subsidies to DB Netz AG

（Unit: billion EUR）

Year		1998		1999		2000		2001	
		Amount	%	Amount	%	Amount	%	Amount	%
Federal funds		2.8	60.0	3.5	73.1	3.3	74.7	3.7	79.3
Breakdown	Interest-free loans	0.5	9.9	0.8	16.1	0.6	12.6	0.9	18.5
	Subsidies	2.3	50.1	2.7	57.0	2.8	62.1	2.9	60.9
Other subsidies for construction, pursuant to the Regional Transport Subsidy Law		0.6	12.2	0.6	12.9	0.6	12.6	0.6	13.0
DB Netz AG funds		1.3	27.8	0.7	14.0	0.6	12.6	0.4	7.6
Total investment		4.6	100.0	4.8	100.0	4.4	100.0	4.7	100.0

Source: Data from DB Netz AG

7.1.5.3 Prospects of Funds for Modernization Investment

(1) If the Polish government allocates 1.5 billion PLN (approximately EUR 330 million) annually, the maintenance backlog would be resolved substantially, the lines required by TINA would be modernized, and the inter-city passenger transport line between Warszawa and Łódź would be improved.

(2) Compared to the use of subsidies for 75% of the annual investment in railway infrastructure in Germany, Poland's subsidies, as shown in Figure 7.1.3, accounted for only 39% of the infrastructure investment. The financial situation of the country is of course a determining factor; the rate of subsidies, however, should be raised.

(3) New financial sources for the development of transport infrastructure, including fuel tax, environment tax, and other such taxes, should be considered in the future.

(4) When the above sources fail to provide sufficient funds, the issuance of bonds should be considered.

7.1.6 System for the Implementation of Modernization Works

At present, PKP PLK is responsible for modernizing the railway. It issues work orders and supervises its implementation. Because the administration of projects implementation takes time, in 2002, only 19% of pledged EU funds were used. In other words, the funds allocated for modernization works have not been fully utilized.

The amount of modernization works is expected to increase in the future. However, given the limited capacity of PKP PLK, as an option, utilization of private sector funds and resources should be considered.

In this light, public-private partnership (PPP), which is widely practiced in Europe, is recommended. European experiences using the PPP method for developing railway infrastructure are given below.

(1) Construction of Channel Tunnel Rail Link (CTRL) in the United Kingdom

The CTRL which links the Channel Tunnel and London, is a high-speed line running at a maximum speed of 300 km/h. Section 1 of this rail link (74 km) was opened on September 28, 2003. The construction works were carried out under a PPP contract between the British government entity Network Rail and the private enterprise, London & Continental Railways.

(2) London Underground

The British government transferred control of the infrastructure of the London Underground to the private sector for a certain period under a PPP contract. It is utilizing the expertise of the private sector to carry out large-scale infrastructure modernization and maintenance.

(3) Modernization of Railways in Norway

The Norwegian government is planning to adopt the BOT method to upgrade the 14.3km section between Sandnes and Stavanger in western Norway to double track and construct a freight terminal near Stavanger. In this case, the contracting company will be responsible for the raising of funds, the design, construction, as well as railway operations for 25 years after the line's completion.

The public-private partnership recommended here has the following characteristics:

(1) Sharing risk effectively with the private sector

Because a PPP contract specifies in advance what risks the private sector is liable for, and gives strong incentive to the private sector to carry out the project as planned.

(2) Using private-sector funds to supplement Government investment

So far, the amounts of investment have been insufficient due to the government's budgetary constraints. Since state budget have been insufficient to carry out long term investment, utilization of private sector funds would supplement long-term infrastructure investment.

(3) Utilizing project management capability and know-how of the private sector

It is desirable that private firms having abundant engineering consulting experiences undertake such tasks as project managements.

Thus, in applying PPP to railway modernization projects, PKP PLK must fully understand the characteristics of PPP and assess the implication of the project if project is undertaken by a public initiative, or private initiative, or by the combination of the two.

7.1.7 Conclusion and Recommendations

In concluding our review of PKP PLK's infrastructure investment, we recommend the following:

(1) After completion of the modernization of E-20 (especially the eastern lines), the investment priority should be shifted to the modernization of lines and sections that would contribute to the increase of the revenue of a railway operator. Modernization of the following sections in the TINA corridors would especially give a high return on investment.

TINA Corridor	Line	Section
Corridor III	E-30	Katowice–Kraków–Tarnów
Corridor VI	E-65	Gdańsk–Warszawa
	CE-65	Bydgoszcz–ZD Wola
Additional Network	E-59	Szczecin–Poznań Poznań–Wrocław
	CE-59	Szczecin–Wrocław

(2) Investing in the modernization of the Warszawa–Łódź line, which would yield high return from inter-city passenger transport, is recommended.

(3) As it is necessary to eliminate as soon as possible speed-limit sections on internationally important lines, the use of government and private sector funds for these urgent projects is recommended.

(4) The investment schedule should be implemented in the following three phases:

Phase I: From 2004 (Poland's accession to the EU) to the end of 2006 (Short-term)

Phase II: From 2007 to the end of 2010 (Mid-term)

Phase III: From 2011 onwards (Long-term)

(5) In terms of the sources of funds for modernization, as a way to optimize availability of the Cohesion Fund and Structural Funds from the EU, the Polish government must bear the specified amount of the loan for the development of railway infrastructure.

(6) As a system for implementing modernization works, it is recommended to adopt PPP financing methods to utilize funds and capacities of the private sector in addition to utilizing the capacity of PKP PLK.

7.2 RAILWAY INFRASTRUCTURE MAINTENANCE

7.2.1 Issues

The following issues had been identified pertaining to the railway infrastructure maintenance that PKP PLK need to tackle.

1) Chronic deficiency of maintenance budget

2) Accumulation of backlog

3) Labor intensive maintenance system

4) Lack of consciousness for rationalization

5) Insufficient transparency of the current procurement system

The details of each of the issues are discussed below.

7.2.1.1 Chronic Deficiency of Maintenance Budget

The condition of the railway has deteriorated over the past decade due to lack of funds allocated for the regular maintenance, and resulted in the accumulation of a huge maintenance backlog.

Over the recent years PKP PLK has strived to allocate the limited budget for maintenance and have prioritized its usage on lines having strategically national importance and lines well utilized. In contrast, lines with low traffic were left unattended.

As a result of this rationed budgeting approach, lines not provided with sufficient maintenance funds were left behind to deteriorate. In proportion to the level of deterioration, PKP PLK have introduced speed restriction, and have limited the maximum axle load to conserve safe train operation. As a result of PKP PLK slotting in more allowance time into the timetable, the quality of the train services was impaired due to elongation of the journey time.

Except for the line sections where sufficient funds being allocated, there is evidence that substantial elements of the railway infrastructure system are deteriorating noticeably. Due to the limitation of the maintenance budget, PKP PLK is making its best effort in securing funds to uphold the technical parameters of lines having strategically importance at the cost of cutting down on the maintenance activities on lines having few traffic. As long as sufficient funds are not available, PKP PLK will continue this policy, and eventually the less maintained line sections will not be able to sustain train operations. The on-time performance achieved by PKP PLK will not be significant if more allowance time is built into the train schedule and the journey time being extended. There is an urgent need to find measures to secure sufficient funds for comprehensive maintenance activities.

7.2.1.2 Accumulation of Backlog

(1) Compounding of deferred maintenance

In the past decade, the financial constraint of the Government has caused PKP PLK to ration maintenance budget. The control report, "Information on Maintenance of PKP Railway Infrastructure", compiled in 2002 by the Department of Communication and Transport Systems of the Supreme Chamber of Control (NIK) illustrates the accumulation of the backlog of the maintenance has compounded over the past decade.

"Difficult economic situation of the state owned enterprise PKP, resulting in lack of sufficient funds for financing necessary repairs and light maintenance of the railway infrastructure. Limitations in the scope of maintenance of railway infrastructure; for instance in 1990 and 2000, the length of annually replaced tracks calculated per 1 million train-km was reduced almost by one-third (from 3.62km to 1.28km respectively), whereas the number of replaced turnouts decreased as many as ten times (from 9.86 to 0.99 pieces per 1 million train–km); in a result, the backlog in the replacement of permanent way in 2000 was 12,200 km of tracks and 17,300 pieces of turnouts; moreover, about 4.7 million pieces of sleepers of coniferous wood were used exceeding their lifetime, i.e. almost 31% of all sleepers."

(2) Deteriorated condition of the railway infrastructure

As is indicated in table 7.2.1, approximately 23 percent of the passenger and freight trains running on one line of the double track and 5 percent of same trains on the other line are restricted to operate at 30km per hour. Since the trailing speed limit of over the turnout is 40km per hour, we can infer that the defect is concentrated on one line of the double track.

Moreover, the network statement indicate that the length of lines subject to axle load limits of 177 kN (18 metric tons) is 2,658km, of which 1,975km of lines do not allow any train operation. Table 7.2.1 presents the result of the analysis.

Table 7.2.1 Analysis Result of Maximum Speed Limit of 30km per Hour

Type of Transport	Track	Total track length (km)	Number of lines with maximum speed of 30km/h	Length of lines with maximum speed of 30km/h (km)	Percentage of total track length (%)
Passenger.	N	24,543	553	5,545	23
Passenger	P	9,258	88	471	5
Freight	N	24,595	571	5,715	23
Freight	P	9,260	93	469	5

Source: *1) Enclosure 2.1, «Wykaz maksymalnych prędkości», Network Statement 2003/2004

Furthermore, the deterioration of the catenary system is becoming conspicuous.

At of the end of 2002, approximately 11,900km of railway lines were electrified. Since, approximately 7,000 kilometers of the overhead contact (OHC) system was installed in the 1970's, substantial amount is well over its service life. The power engineering department of PKP PLK has clarified that the frequencies of breakdown of the OHC system is increasing. For example, the following table presents the comparison of the number failures of the vital components of the OHC system of the last two years.

Table 7.2.2 Comparison of the Number of Failures of OHC System in 2002 and 2003

Description of Failure	2002	2003
Insulator cracking and wearing	33	54
Trolley wire failure	15	20
Hanger failure	16	16

Source : Biura Energetyki, PLK, Comparison of first five months

NIK comments as follows:

"Almost 40% of tracks and 38% of turnouts, 14% of engineering structures, about 19% of automatic devices, 7% of level crossing devices, 28% of rolling stock diagnostic devices, almost 33% of automatic marshalling devices and 14% of power supply devices are in unsatisfactory technical condition, i.e. require repair, force to impose speed restrictions in order to keep safety."

The POSEOR software utilized by PKP PLK is the database of the speed restrictions imposed on each line. The database provides a clear information what are the reasons for the restrictions. The POSEOR reports the majority of speed restrictions is due to the poor condition of the tracks, particularly the degradation of the sleepers, subgrade, and severely worn elements of turnouts.

PKP PLK has reported the critical situation of the infrastructure and has presented it to the Ministry of Infrastructure. In any case, further deferring of maintenance will eventually bring down the railway system to a which will trigger the loss of the patronage of the rail users.

(3) Estimation of maintenance backlog

Based on the cost information of the twelve representative lines provided from PKP PLK, cost estimate for the elimination of the maintenance backlog of the entire network was made. The estimated cost was approximately 7.266 billion PLN, as presented in the following table 7.2.3. With more data, the accuracy of the quantification and cost estimate can be substantially improved.

Table 7.2.3 Cost Estimation of the Maintenance Backlog of the Entire Railway Network

Kategoria linii kolejowych	Numery 3 linii reprezentatywnych dla danej kategorii	Długość handlowa linii reprezentatywnych dla danej kategorii (km)	Total Length of Representative Lines (km)	Total Length of Category Lines (km)	Łączna kwota srodków niezbednych na usunięcie zaległosci w utrzymaniu (x1000 PLN)			Representative Lines Total (x1000 PLN)	Estimated Total (x1000 PLN)
					Track	Over-head-catenary system	Signal & Telecom		
Linie znaczenia państwowego objęte umowami AGC/AGTC	3	946.633	1,724	5,100	106,250	91,331	20,600	594,401	1,758,689
	4	447.391			6,685	77,700	1,700		
	271	329.672			233,917	56,218	0		
Pozostałe linie znaczenia państwowego	38	241.436	1,415	6,900	47,968	831	1,000	306,084	1,492,860
	202	414.679			41,870	18,016	22,000		
	353	758.605			161,786	9,313	3,300		
Linie pozostałe (znaczenia lokalnego) ekonomicznie uzasadnione	25	470.892	763	5,000	353,876	38,070	500	421,735	2,763,953
	404	99.795			17,470	1,170	0		
	405	192.233			9,618	1,031	0		
Linie przewidziane do dalszych analiz rentowności	27	164.720	507	3,150	87,671	0	0	201,104	1,250,378
	32	76.434			59,390	0	1,000		
	201	265.475			47,726	4,817	500		
Total				20,150					7,265,880

Source: Various engineering departments of PKP PLK

7.2.1.3 Labor Intensive Maintenance System

(1) Heavy burden of personnel cost

Despite that substantial amount of maintenance works are outsourced to external companies, as of October 2003, PKP PLK employs 5,800 personnel for maintenance of tracks and turnouts, 1,400 for emergency standby for track maintenance, 3,800 for automatic equipment maintenance, and 21,800 for traffic engineering equipment services.

Table 7.2.4 indicates the breakdown of operation cost of PKP PLK, which includes the maintenance of railway infrastructure, traffic management, and rendering other services.

The table clearly indicates that 40 to 44 percent of the cost is the remuneration and 22 to 25 percent of the cost attributes to outsourced works. The reason for the high personnel cost is the necessity to retain large work force to operate and maintain the obsolete train operation control system.

Table 7.2.4 Operational Cost Breakdown of PKP PLK (million PLN)

Description/Year	2001 *1)	2002	2003 *2)
Operational Cost	872.3	3,109.0	3,115.9
Amortization	187.6	542.6	653.9
Materials and Energy	109.8	316.5	310.9
External Services	207.2	785.5	690.5
Taxes and Levies	11.7	47.6	49.9
Remuneration and Related Payments	349.4	1,379.5	1,379.0
Other Cost	1.9	20.3	20.0
Value of Sold Goods and Materials	4.7	17.0	11.7
Other Operational Costs	300.8	566.4	99.5
Financial Costs	1.6	39.9	32.4
Total operational cost	1,174.7	3,715. 3	3,247. 8

Source : PKP PLK
1) Last quarter of 2001; 2) estimate by PKP PLK

7.2.1.4 Lack of Consciousness for Rationalization

Except for the director of economic department (biura ekonomicznego), the majority of the directors of the engineering departments are not aware of the cost of their respective field. From several interviews it was confirmed that the task of cost monitoring, control, and reporting of the cost information relevant to their respective field are done by the chiefs of the regional offices (zakład linii kolejowich). Literally, all cost information bypass the directors of the engineering departments and is directly reported to the director of finance and accounting department. The cost information are summarized and sent to the head office in a consolidated form in which engineering information used on site, such as cost per unit length, unit weight, unit volume, et cetera is dropped. Indispensable information to identify the cost drivers is not pooled.

The lack of exposure and responsibility to cut down on costs has groomed the managers of the headquarters to be less cost-conscious. Under the current system, cost cutting measures are devised mostly on financial standpoint and few engineering contrivances are made.

The directors of the engineering departments should be provided with first-hand cost and engineering information and should be accountable for cost reduction measures. They should have the responsibility to analyze the information, identify what engineering elements are suppressing the profitability, what particular activities can be improved to increase productivity, and provide engineering solutions to eliminate bottlenecks. PKP PLK need to deal with this issue and perhaps initiate in the near future to alter the job descriptions and task responsibilities of the managers.

As was presented above and in section 7.2.1.1, PKP PLK is thriving to make best use of the limited funds for maintenance activities. The study team views that if PKP PLK need to take the following approach in convincing the Government to provide funds for the elimination of the maintenance backlogs.

- improve the accountability and transparency of the financial operations

- continue plan and implement rationalizing, and improving the productivity, and

monitor the outcome

- regularly report to the Government the plans, action taken, and outcomes, any achievements or failures, of the effort made by the company in rationalization and maximizing the productivity of the maintenance activities.

The three actions of above will demonstrate PKP PLK is continuously thriving to cut down costs and is continuously challenging the limits. Even though PKP PLK is not subject to privatization, PKP PLK still needs to operate transparently and be accountable to the public for its business operations as long as they seek government subsidy (tax money) for the elimination of the maintenance backlog.

If PKP PLK can demonstrate that they are ready to operate transparently and be accountable for every Złoty they use, the public will have few objection to the Government providing subsidies to the company.

7.2.1.5 Insufficient Transparency of the Current Procurement System

The restructuring that took place in 2001 spun-off the PKP maintenance companies. As presented in table 7.2.5, there are eight track maintenance companies, one traction power company, and one telecommunication company that carry out the maintenance works.

Table 7.2.5 Railway Infrastructure Maintenance Companies of PKP Group

No.	Infrastructure System	Company
1.	Telecommunication	PKP Telekomunikacja Sp. zoo.
2.	Overhead Contact	PKP Energetyka Sp. zoo.
3.	Track	Zakład Napraw Infrastruktury w Warszawie Sp. zoo.
4.	Track	Zakład Napraw Infrastruktury Radom Sp. zoo.
5.	Track	Przedsiębiorstwo Napraw i Utrzymania Infrastruktury Kolejowej w Krakowie Sp. zoo.
6.	Track	Zakład Napraw Infrastruktury w Stargardzie Szczecińskim Sp. zoo.
7.	Track	Zakład Robót Komunikacyjnych DOM w Poznaniu Sp. zoo.
8.	Track	Zakład Robót Inżynieryjnych Sp. zoo. (Ceased operation June 2003)
9.	Track	Przedsiębiorstwo Utrzymania Infrastruktury Kolejowej w Katowicach Sp. zoo.
10.	Track	Pomorskie Przedsiębiorstwo Mechaniczno – Torowe Sp. zoo.
11.	Track	Dolnośląskie Przedsiębiorstwo Napraw Infrastruktury Komunikacyjnej DOLKOM Sp. zoo.

Source: Excerpt of article, THE COMMUNICATION REVIEW)
* Companies established in December 2000, before the Act of 08.09.2000 became valid.

Despite these companies are commercially independent entities that should operate under competitive procurement rules, they still enjoy the privilege of getting maintenance contracts from PKP PLK without any competition.

For procurement of public procured contracts, the public procurement law is mandatory applied. However, the internal regulations of PKP PLK approves procedures other than competitive bidding for contracts implemented without from public funds. Procurement of contractors for light maintenance, conservation works, and diagnostic activities are concluded through negotiations.

The limited maintenance budget of PKP PLK in the past several years has compelled the maintenance companies to compete in regions their domain where they have less competitive advantage. For example, Pomorskie Przedsiębiorstwo Mechaniczno-Torowe Sp. Zo.o. (Mechanical and Track Maintenance Company Ltd.) based in Gdańsk won jobs in other voivodeships such as Zachodniopomorskie, Łódzkie, Śląskie and Małopolskie. This fact indicates that the track maintenance market have entered a new era where competition are geographically unconfined.

Moreover the competitive bidding procedures for maintenance contracts still lack transparency. For modernization contracts, implemented by EU loan, international competitive bidding procedures are mandatory adhered to.

PKP PLK has clarified that contractors for large modernization project are procured accordingly to the tender procedures set by the procedures public procurement law; however for regular maintenance works not using public funds, the procurement procedure is concluded through contract negotiations between PKP PLK and the maintenance companies. It is clear that the issue here is that there are no incentive mechanism is in place to minimize the cost of regular maintenance works if contracts are concluded by closed-door negotiation.

NIK reports that the procurement law, procedures, and rule for procuring contractors were not strictly observed.

7.2.2 Recommendations

The following solutions presented have been devised from peripheral information acquired by the study team. Since cost information of twelve representative lines were limitedly made available, the result of the analysis presented in the following section is a general approximation of the maintenance activities. The Team is confident that further identification of issues and enhancement of the analysis could be made if more information is provided.

Potential solutions and recommendations of the following were formulated to alleviate the issues presented in section 7.2.1.

1) Productivity improvement of maintenance system

2) Cost reduction measures for maintenance works

3) Introduction of infrastructure management information system

4) Finance for maintenance backlogs

The following section presents the details of each potential solution.

7.2.2.1 Productivity Improvement of Maintenance System

Under the current scheme, the only source of income PKP PLK is the track access charge. Since the Government does not provide financial support, except for modernization projects, PKP PLK can make best use of the limited funds by:

(1) strategic allocation of funds to the maintenance of specific lines,

(2) reducing the maintenance cost and reallocating the savings to the maintenance of other lines,

(3) improving the productivity of the maintenance system that enhances the throughput of the maintenance activities, and by

(4) combination of the three above.

Indeed PKP PLK has implemented (1) above but has not experimented with options (2) and (3), needless to say (4). The study team recommends PKP PLK to practice (2) and (3), before requesting the Government for extraordinary financial support for elimination of the maintenance backlog. It is commonly understood that the increase of productivity brings about cost reduction. The money saved by the improvement of productivity can be used to uplift the level of maintenance, or be reallocated to maintenance of other lines.

For reference, the following table 7.2.6 presents the comparison of productivity of PKP PLK and JR passenger transport companies.

Table 7.2.6 Comparison of Employee Productivity

Company	Line Length (km)	Number of Employee[1]	Number of Employee per line
PKP PLK	20,150	33,172	1.646
JR Hokkaido	3,103	1,974	0.636
JR East	12,742	17,127	1.344
JR Central	3,326	3,726	1.120
JR West	8,120	11,870	1.461
JR Shikoku	898	499	0.555
JR Kyushu	2,639	1,911	0.724
JR Passenger Transport Total	30,829	37,107	1.203

Note: Excludes employees of external maintenance companies.

Since information regarding the degree of outsourcing of maintenance works in Poland and in Japan was not available, the comparison of employee productivity lacks solid justification. However, it can concluded that substantial improvements to the employee productivity can be made by downsizing the network and modernization of the railway facilities.

7.2.2.2 Cost Reduction Measures for Maintenance Works

Attempt was made to confirm if any cost reduction can be achieved by investigating the cost structure of the maintenance activities and cost information of twelve representative lines that PKP PLK provided.

Following the analysis, the following measures were conceived that will contribute to the reduction of cost.

(1) Support from Government

The study team recommends the government reconsider to finance the funds required for the elimination of the backlog to relieve PKP PLK from the burden of high cost. By isolating the cost for eliminating the maintenance backlog from cost for day-to-day maintenance activities will substantially reduce the TAC, and will increase the turnover of the maintenance works.

Even after Poland's integration into EU, the Ministry of Infrastructure should be stand firm continue delivering the policy for new loans, as stated in their "National ISPA Strategy: Transport Sector Supplement No 1/2001", as follows:

"*the main factor in the project selection concerns implementation of a main goal of the national transport policy that is to improve transport connections between Poland and the EU Member States. And in parallel, one of the key goals of state policy is to eliminate backlogs in modernization of infrastructure, which hamper economic development and are dangerous to traffic*",

The responsibility for financing the fund for the elimination of the backlog mainly lies with the Government, however PKP PLK needs to make full commitment on their own

[1] JR figure excludes head office and station administration personnel. PLK figure as of Oct. 2003, and excludes head office personnel

to maximize the expected investment effect by continuously improving productivity and operational transparency. The Government must take full custody of the railway infrastructure.

(2) Application of durable material

PKP PLK should consider introduction of durable material that would minimize the frequency of maintenance activities, reduction of maintenance personnel, and long term procurement cost. In particular, the use of durable materials at places where the rolling stock and infrastructure come into contact, as represented by rail, wheel, etc., can save labor for maintenance and contribute to reduction of life cycle costs.

(3) Reinforcing the implementation of the competitive bidding process

The expected outcome from reinforcing the implementation of the competitive bidding process is that it will induce market entry of more companies, domestic and from abroad, and form a competitive market environment. The more competitors come into the market, the more pressure is exerted to lower the prices for the same technical requirements. PKP PLK will benefit from this action in the long run will result in the reduction of procurement cost for the works.

7.2.2.3 Introduction of Management Information System

(1) Existing infrastructure management system of PKP PLK

At present, PKP PLK utilizes the following decision supporting system to monitor and plan, and manage maintenance activities. PKP PLK has developed several software for various management administrative purposes. The OBLICO system records and compiles train operation information on all lines, such as annual passenger-km, train-km, and the corresponding track access charge revenue. For the preparation of the time table, the POS[2], OT[3], KWR[4], ESR[5], and POSEOR[6], were the internally developed as a system to automate the rigorous tasks of the time table preparation. Also, in pursuant for a systemized approach in administering the day to day activities of the infrastructure maintenance, PKP PLK developed the DONG and the KOMPLAN system to plan for repair works.

(2) Planned introduction of enterprise resource planning (ERP)

PKP PLK headquarter is planning to introduce an enterprise resource planning (ERP) in attempt to rationalize the accounting and financial administration functions. The system is expected to provide the economic department (biura ekonomicznego) tools to record, process, and analyze financial data and support making managerial decisions and business plans. The efficiency attained by the application is also expected to rationalize the organization in charge of financial administration, and consequentially

2 POS: Engineering information of the railway network, such as track geometry and track capacity.

3 OT: Using the POS information, this application prepares the running curves of the planned trains. Information from the operators is the inputs.

4 KWR: This application is used to prepare the operational train path diagram using the output information from the OT.

5 ESR: This application is utilized to prepare the administrative time table.

6 POSEOR: This application generates the speed restriction areas using the input from site.

make possible the downsizing of the organization.

(3) Infrastructure management decision support system

As was presented in section 7.2.1.4, the study team perceived PKP PLK lack the means to monitor the activities in quantitative terms and the cost arising at each regional office (Zakład Linii Kolejowych).

The development of a decision supporting system (DSS) for the railway infrastructure maintenance companies have been the aspiration of many railways around the world since the advent of inexpensive computing. In the past decade, substantial progress was made for developing such system tailored for use by railway maintenance companies. The following table summarizes the decision support system developed by various railways for track maintenances.

Table 7.2.7 Decision Support System Developed by Various Railways

Railway Entity	Developed System : Purpose	Main Features and Current Situation
Japan (JR Group)	COSMOS, SMIS (Shinkansen Management information system)	In function since 1975 and continuously improved
Germany (DB)	SYSTEM DYMANICS: Strategic planning supporting system	Efficient maintenance planning for IC train lines assuming resources are unlimited. Application besides track works are being considered.
Hungary （MAV）	PATER: Repair/replacement planning support system	Evaluation of track deficiencies, preparation of work program
France (SNCFT)	GOP: Maintenance system	Defining subgrade coefficient for ballast and middle ballast. Applied since 1983.
Switzerland (BLS/CFF)	FEV: Track maintenance management	Management of track deficiencies, Decision support for implementation of M&R works
Netherlands (NS)	BINCO: Maintenance planning support system	Includes planning module for rail grinding based on short wave length data.
UK (Network Rail)	MARPAS: Maintenance and replacement planning support system; RRNPV: Rail replacement planning	Monitoring of track deficiencies. Statistical analysis. Considers environmental impact and ridership quality by line characteristics. Estimation of M&R cost by implementation period. Also evaluates danger of derailment.
USA (Burlington Northern)	TMS: Track maintenance system; REPOMAN: Rail replacement planning	M&E decision support management system consisting of three modules, track deficiencies management, rail, and sleepers.

Souce : Kotsushinbunsha «Track Structure and Material»

The DSS is designed to record the progress of maintenance works, the input resource to analyze the productivity of the works, and produce work history. Answers to following questions can be obtained utilizing the decision support systems:

"What is the average quality of our main lines, or of our high speed main lines?",

"What tamping costs are expected to be in future and what renewal costs",

"What about rail-only renewal costs and how will these change if we decrease the budget by 10% or postpone the works planned till 2004 or 2005?", and et cetera.

The beneficial effects of introducing the DSS are:

- Uplift the cost-consciousness mentality across-the-board within the company

- Link all regional offices with the head office via internet connection enabling on demand as well as real-time consolidation of cost information

- Enhance monitoring and control capability exercise cost reduction measures,

- Increase the accountability of the activity of PKP PLK to the Government,

- Paving the way for transparent business management of PKP PLK, and

The European Rail Research Institute (ERRI) is the forerunner for the development of such system. From 1991 to 1998 the ERRI was commissioned the task by the Union International des Chemins de Fer (UIC) to develop a fully Conditioned-based Decision Support System for optimal management of track maintenance and renewal with a purpose of increasing the productivity of permanent way. The ECOTRACK system was developed with the participation of twenty-four European railways including Polish State Railways. The ECOTRACK system was supposed to be based on modern diagnostic methods including expert systems for the engineering (analysis of track sections, geometry and equipment) and medium and long-term management (planning and optimization of available resource allocation).

Several EU railway and infrastructure managers has implemented or considering its introduction. The Belgian Railways·(NMBS) is actively using the program.

- Swiss Federal Railways (SBB) and Network Rail have finalized feasibility studies. Network Rail has finalized evaluation and started implementation in one of its lines.

- Czech Railways (ÈD) and Slovenian Railways (SZ) have introduced the system without conducting a feasibility study.

(4) Management Information System (MIS)

Apart from the introduction of the ERP and the consideration of introducing the DSS, the study team recommends PKP PLK to consider establishing a comprehensive management information system (MIS) in the head office as well as in the regional offices which integrates the ERP and the DSS. The MIS system provides the basis of a total logistics and finance process, which is capable of further enhancement. The MIS will serve to record, organize, and analyze cost information of the maintenance activities, support scheduling and planning for maintenance and repair works, inventory control, supply chain activities, warehousing, distribution planning, financial control, monitoring, and forecasting.

7.3 TRAIN OPERATION CONTROL SYSTEM

7.3.1 Issues

The study team has identified the following issues pertaining to the train operation control system that PKP PLK need to tackle:

1) Chronic Deficiency of Budget for Rationalization / Modernization

2) Archaic Interlocking System

3) Labor Intensive Level Crossing Protection System

The details of each of the issues are discussed below.

7.3.1.1 Chronic Deficiency of Budget for Rationalization / Modernization

PKP PLK is caught in a vicious circle due to the lack of funds for rationalizing /modernizing the train operation control system. The financial constraints limiting PKP PLK to improve or modernize the system compels the company to maintain a large number of workforce to operate and maintain the system. And again the employment of a large number of personnel depresses the financial situation of the company. PKP PLK has cut down on the number of personnel for the train services (pociągowy) however; in turn the overtime expenses has increased. Thus, PKP PLK is now facing a new dilemma of striking the right balance of hiring the optimal number of personnel required for the train operation and minimizing the overtime expenses.

7.3.1.2 Archaic Interlocking System

The existing interlocking system utilized by PLK can be categorized into four types; from archaic mechanical interlocking system to modernized electronic interlocking system. Table 7.3.1 presents the number of control areas by interlocking type utilized by the regional department.

Table 7.3.1 Types of Interlocking and Quantities of Local Control Area Adopted in Each Regional Departments

Regional Departments	Mechanical Interlocking	Electric Mechanical Interlocking	Relay Interlocking	Electronic Interlocking	Total
IR WARSZAWA	371	6	123	15	515
IR LUBLIN	197	2	106	0	305
IR KRAKÓW	284	1	107	0	392
IR KATOWICE	228	22	229	3	482
IR GDAŃSK	422	33	105	0	560
IR WROCŁAW	247	22	110	1	380
IR POZNAŃ	276	25	91	12	404
IR SZCZECIN	195	10	78	1	284
Total	2,220	121	949	32	3,322

Source: Biura Automatyka i Telekomunikacja, PLK

Among the total 3,322 local control area (hereinafter, LCA) (okręgi nastawacze) controlling the train movements across the nation, approximately two-thirds of the LCA are mechanical interlocking, some of them installed more than a century ago. Approximately 4% are electric-mechanical interlocking which its installation dates back to the late 1930's. Quantities of more modern relay interlocking system and electronic interlocking system stand at 30% of the total.

The mix of primitive and modern interlocking systems requires the operation and maintenance by a large number of staff compared to the utilization of a single system. The spare parts of the old system are becoming difficult to procure and its deterioration is accelerating.

The malfunction ratio is defined by the number of breakdowns in a month over the total quantity of the interlocking devices in each LCA. The maximum ratio for the previous generation interlocking system stands at 47.5 percent, thus requiring standby of extra emergency maintenance crew around the clock.

The following table presents the failure statistics of the interlocking system.

Table 7.3.2 Failure Statistics of Interlocking System by Type and Regional Plants (Unit: %)

Regional Departments (IR)	Regional Plants (IZ)	Mechanical Interlocking	Electric Mechanical Interlocking	Relay Interlocking	Electronic Interlocking
WARSZAWA	Warszawa	13.5	26.2	47.5	14.3
	Łódź	0.4	0	0.6	10.3
	Białystok	8.7	0	3.7	0
	Siedlce	4.7	0	3.8	0
LUBLIN	Lublin	6.0	18.4	17.5	0
	Kielce	41.4	0	47.5	0
	Skarżysko Kamienna	15.2	0	0.7	0
KRAKÓW	Kraków	15.2	1.7	9.5	0
	Rzeszów	0.5	0	0.7	0
	Nowy Sącz	0.3	0	3.1	0
KATOWICE	Katowice	29.1	31.2	30.1	0
	Gliwice	16.1	21.1	16.5	0
	Częstochowa	33.0	0	44.5	0
	Tarnowskie Góry	3.3	6.3	3.2	0
GDAŃSK	Gdańsk	0.3	0.7	1.2	0
	Olsztyn	2.3	0.7	1.9	0
	Toruń	3.5	6.6	9.0	0
	Bydgoszcz	2.9	2.3	4.5	0
WROCŁAW	Wrocław	13.9	3.2	10.6	4.9
	Opole	2.5	1.6	4.8	0
	Wałbrzych	7.3	7.5	8.8	0
POZNAŃ	Poznań	1.5	1.1	3.1	3.1
	Ostrów Wielkopolski	2.3	15.2	4.1	0
	Zielona Góra	0.6	2.4	0.9	1.1
SZCZECIN	Szczecin	2.6	0	3.4	6.8
	Gorzów Wielkopolski	0.4	0.2	1.2	0
	Koszalin	0.7	0	0.8	0

Source: Biura Automatyka i Telekomunikacja, PLK

PLK needs to consider the trade off between the efficiency and productivity of the interlocking against the cost associated for retaining a large workforce to maintain the obsolete system. The implementation plan for its modernization need to consider the simultaneous phase-in introduction of the system and the reduction of the workforce, as well as the training for the introduction of the new system, and associated costs. By introducing the centralized traffic control system (CTC), it is envisaged that the modernization of interlocking system can rationalize substantial amount of traffic control personnel, improve the reliability of the interlocking system, as well as increase the productivity of the train operations control. The outlay of the program is discussed in section 7.3.2.2.

The effort of PKP PLK in centralizing and consolidating the function of the train services started from 2003. The director of human resources department has explained the recruiting policy of PKP PLK is that, except for specific tasks that are in short, in principle, PKP PLK will not hire new personnel.

7.3.1.3 Labor Intensive Level Crossing Protection System

As presented in table 7.3.3, there are approximately 18,500 level crossings along the railway network. Despite the existing level crossing system utilizes a motorized mechanical system that are usually unmanned, the number of signal man and switchman (gate keeper) amounts to approximately 8,000 persons.

Table 7.3.3 Classification of Existing Level Crossing (LX) Types

Category	Description of Facilities [7]	Quantity[8]
A	Public crossing with or without gates at which the traffic on the road is managed by the signals given by railway staff.	3,216
B	Public crossings with automatic light signaling and half barriers	385
C	Public crossings with automatic light signaling or operated by railway staff	1,388
D	Public crossings without gates, half-gates or automatic light signaling	12,031
E	Public crossing	543
F	Non public crossing and passages	957
Total		18,520

The reason for PLK retaining such a large number of workforce is the ministerial ordinance, "[ROZPORZ.DZENIE MINISTRA TRANSPORTU I GOSPODARKI MORSKIEJ] z dnia 26 lutego 1996 r." and the ordinance "w sprawie warunk w technicznych, jakim powinny odpowiada. Skrzy owania linii kolejowych z drogami publicznymi i ich usytuowanie" requiring class-A level crossings (LX) the deployment of a gate keeper.

Since the ministerial ordinance is currently being modified as per the requirement stipulated in the Railway Transport Law, confirmation is by when the particular clause will be amended. If the ministerial ordinance is amended, and assuming sufficient funds are secured, it is estimated that the existing level crossings can be automated and also would substantial reduction of the level crossing gate keepers.

7.3.2 Recommendations

Potential solutions and recommendations of the following were formulated to alleviate the issues presented in section 7.3.1.

1) Establishment of an incremental rationalization program

2) Establishment and implementation of a modernization program

The following section presents the details of each potential solution.

7.3.2.1 Establishment of an Incremental Rationalization Program

It is a fact that, PKP PLK will not be privatized and will continue to operate a state owned infrastructure manager. However, that does not mean the company can slacken

[7] Ordinance of the Minister of Transport and Maritime Economy

[8] Railway Communication and Signaling Department, PLK

on cost reduction efforts. Generally speaking, all corporate entities, public or private, profit or non-profit oriented, need to make effort in maximize revenue and cutting down on costs to continue a self-sustainable business operation.

[Downsizing Program]

To resolve the main issue of chronic deficiency in budget, PKP PLK needs to cut down on underutilized resources, namely excess railway network and excess workforce. As is presented in of table 2.1.3.1 of chapter 2, section 2.1.3.2, reductions of the redundant resources are recommended to be implemented in three incremental programs as follows:

1) Short term (2004-2006): Downsizing the railway network to the requirements of the needs of the railway operators

2) Medium term (2007-2010): Elimination of the backlog, rationalization of the traffic control system, and the modernization of the signaling system to accommodate the operation of new rolling stock

3) Long term (2011-2015): Upgrading of railway facility and optimization of existing facilities by modification

The reduction of the excess workforce personnel is proposed to be implemented.

The methods of reducing the excess workforce are discussed in section 2.2.4 dealing with early retirement program, training for redeployment, government employment policy, etc.

In each of the programs, specific action will be implemented that effectively reduces the excess workforce. They are:

Short term (2005-2006): Downsizing the workforce according to the optimal size of the railway network

Medium term (2007-2010): Integration of Local Control Areas (LCA) by centralization of signal boxes, train dispatcher offices, and level crossing posts. And simultaneous modernization of the signaling and traffic control system

Long term (2011-2015): Optimization of the railway facility by modification and modernization of the train control facility to fully comply EU standards.

The scheduling of the program for each specific action still needs to be deliberated. For instance, the completion of the modernization of the signaling system is heavily dependent on the timing of introduction of the new rolling stock and the operational requirements. The decision of the scheduling is also dependent on the financial strength to pay back the interest. The opportunity cost for deferring the investment also needs to be factored in making the final decision.

The study team proposes the downsizing of the workforce supervising the train services as per the following program:

The modernization of the train operation control system will have a significant effect in:

(1) improving the productivity,

(2) rationalize the work force, and

(3) minimize the life cycle cost of the system.

Cost information of infrastructure maintenance and train operation control of twelve representative lines was made available to the study team to generalize the issues of the whole line. The study team acknowledges that the result and analysis using the extrapolation of the data of the representative lines is rough since the number of sample is considerably small compared to the whole data. The study team believes that the precision of the analysis could be improved if full information is made available.

7.3.2.2 Establishment and Implementation of a Modernization Program

As was presented in the previous section, it is evident that the development of the train operation control system (TOCS) consisting of signaling, level crossing protection, interlocking system, and the train dispatcher system are unbalanced. In the recent years, PKP PLK has initiated the modernization of lines of strategically national importance with the assistance of EU funds, in which some of the TOCS facility has been replaced with cutting-edge technology. Among the TOCS facilities, signaling and level crossing systems, both are modernized to a certain degree; however there is still room for further automation, and the development of the interlocking system lags behind the most. As presented in table 7.3.1, the majority of the interlocking is out-of-date and labor intensive. The train dispatching system were confirmed that traffic control system are gradually being modernized by introducing a centralized traffic control (CTC) system however details have not been available to the study team.[9] Nevertheless, the study team attempted to look into the train dispatcher system, however our request to obtain information from the traffic management center had been denied.

In connection to 7.2.2.1, the increase of the productivity can be achieved substantially if modernization of the system is coupled with the reduction of the workforce. Since there is a tradeoff between the cost and the time, the system needs to be replaced in phases taking in consideration the balance between the numbers of personnel required for operating the particular type of train operation control system at a given point of time. In line with the restructuring program outlined in section 2.1.3.2, the modernization of the train operation control system is proposed to be implemented in sequential order as follows:

(1) Downsizing of the network size

(2) Modernization of train operation control system including automation of the level crossing protection system

(3) Modernization of remaining facility to conforming to EU standard

[9] The study team attempted to look into the train dispatcher system, however our request to obtain information from the traffic management center had been denied.

In conjunction to the modernization of the signaling and train operation control system, the modernization of the train dispatcher system needs to be planned in consistent with the modernization works PKP PLK is carrying out installing the GSM-R rail mobile phone and the European Train Control System (ETCS) which conforms to the European Rail Traffic Management System (ERTMS), a requirement of the EU railway system. Since foreign operators will be eligible for full access into the Polish railway network in 2007, the railway infrastructure needs to be developed in conformance to the required standard.

1) Cost estimate of modernization of the train operation control system

The study team estimates the quantity and the cost of the modernization of the train operation control system as follows:

From the excerpt of table 7.3.1, the following table indicates the percentage of the existing interlocking system

System	Mechanical Interlocking	Electric Mechanical Interlocking	Relay Interlocking	Electronic Interlocking	Total
LCA[10]	2,220	121	949	32	3,322
Percentage (%)	66.8	3.6	28.6	1.0	100
Assumed percentage (%) of LCA subject to modernization	10	90	100	-	-
Percentage (%)	6.7	3.3	28.6	-	38.6

Assuming that the train operation of the downsized network of 11,000km will be controlled by modernized train operation control system the estimated length of network subject to modernization is estimated to be,

11,000km x 0.386 = 4,252, say 4,200km

If we apply the unit cost of the signaling system modernization project implemented by the European Investment Bank (EIB) in the neighboring countries of Eastern Europe to approximate the modernization of the train operation control system. Since the unit cost includes the cost required for the modernization of the signaling system, interlocking system, level crossing protection system, as well as the cost for ETCS, the study team has applied it to estimate the cost for the modernizing the TOCS.

Thus the estimated cost for the modernization of the TOCS is,

4,200km x EUR0.6 million/km = EUR2,520 million

2) Estimated effect of reduction of personnel by implementing the modernization and rationalization program

The following table presents the estimated required number of personnel for PKP PLK in the future.

[10] Note: LCA – Local Control Area (okręgi nastawacze)

Table 7.3.4 Estimated Number of Personnel at Each Stage of Restructuring (x 1,000)

Cat.	Total Length of Cat. Lines (km)	[Stage I] Existing Situation (2003_10_31) – Network size 20,150km					[Stage II] Dec. 2006 - Network size 11,000km				
		M&R	TOC	Sub-total	Admin.	Total	M&R	TOC	Sub-total	Admin.	Total
A	5,100	6.743	8.720	15.463	3.554	19.017	6.743	8.172	14.914	2.998	17.912
B	6,900	3.645	6.999	10.644	2.069	12.714	3.117	5.985	9.102	1.126	10.228
C	5,000	2.500	5.435	7.935	1.409	9.344					
D	3,150	0.543	0.649	1.192	0.192	1,384					
Total						42.459					28.140

Cat.	Total Length of Category Lines (km)	[Stage III] Dec. 2010 – Completion of modernization of train operation. control system					[Stage IV] December 2015 - End of Modernization				
		M&R	TOC	Sub-total	Admin.	Total	M&R	TOC	Sub-total	Admin.	Total
A	5,100	6.406	2,451	8,857	2.848	11.705	6.085	2.451	8.537	2.706	11.242
B	6,900	2.961	1.796	4.756	1.070	5.826	2.813	1.796	4.608	1.016	5.624
Total						17.531					16.867

Legend	Description
Category-A	Lines of national importance conforming to AGC/AGTC standards
Category-B	Other lines of national importance
Category-C	Local lines of economic importance
Category-D	Lines requiring further analysis
M&R	Maintenance and repair
TOC	Train operation control
Admin.	Administration

[Assumptions of the Program]

i) Network downsizing from the current 20,150km to 11,000km completes by the end of 2006. (The effect of deferring the reduction of the network size to 11,000 km till 2010 is presented in table 7.3.6)

ii) Number of employees were approximated based on the personnel database list as of October 31st 2003 provided from the personnel department. The total number of employees as of October 31st 2003, was 45,505.

iii) For the purpose of fortifying the assumption and to simplify the analysis, the railway security personnel amounting to 3,046 was excluded. Thus the analysis of the personnel was based on 42,459 personnel.

iv) Particular attention was made to the train operation control personnel amounting to 21,804 persons, administration amounting 7,225, and the balance from the total of 42,459, amounting to 13,430 persons is assumed to be working for the maintenance and repair (M&R). Thus the M&R would include additional personnel (dodatkowa) of

5,108 personnel, and 1,514 personnel for technical service (obsługa techniczna), and others.

v) The average cost per employee per annum 29,997PLN was used to calculate the estimated number of personnel of M&R and train service from the cost information provided by PKP PLK. Due to the limited information, the number of personnel distributed in four categories of line was assumed to be equally distributed. Also, due to the same reason, the number of personnel was reduced in proportion to the network size.

vi) Elimination of backlog completes by the end of 2010.

vii) An aggressive modernization plan of the signaling system, level crossing protection system, and to the interlocking system are implemented and completed by the end of 2010.

viii) Productivity improvement plan is implemented in the maintenance repair business units contributing to the 5% reduction of personnel from 2006 to 2010, and 2011 to 2015.

ix) Productivity improvement plan is implemented in the administration units in the head office and the regional offices contribute to the 5% reduction of personnel from 2007 to 2010 and 2011 to 2015.

x) Introduction of the Management Information System (MIS) including the enterprise resource planning, and the infrastructure management system, completes and are in function by the end of 2006. The total number of personnel reduced in the administrative function in the head office and regional offices is estimated as 400 and 800, respectively, totaling to 1,200.

xi) The reduction of work force for category – C lines are assumed to be either liquidated or transferred to the voivodships. In reality, the voivodship may reconsign the maintenance and train operation tasks to PKP PLK. However to simplify the assumption, the workforce for along those line subject to liquidation / transfer become managed by the voivodships, thus PKP PLK is relieved from bearing the associated cost.

xii) The elimination of the backlog and the modernization of the infrastructure must be planned considering the result of the network downsizing and the downsizing of the personnel to avoid unwanted investments.

xiii) The study team confirmed with the human resources department that they have been utilizing an internally developed computer program that records the full information of the number of personnel of each task by each line. Since most of the personnel are stationed along the main lines, the required number of personnel for the reduced network size should not be estimated in proportion to the reduced network size. The study team believes that improvement to the reliability of the result can be made if complete information is available.

The policies for implementing the restructuring the PKP S.A. are indicated as follows:

（Policies for rationalization of personnel）

1）The reduction of the railway network size completes by the end of 2006. Personnel, except for the reassigned and retrained personnel, working on lines ceasing services will be laid-off.

2) Five percent (5%) of maintenance personnel will be reduced in 2010 from the 2006 level. Similar reduction will be taken in 2015 from the 2010 level.

3) Modernization of train operation control system will be completed by 2010, and thirty percent (30%) of train operation control personnel will be reduced in 2010 from the 2006 level.

4) The introduction of the MIS system will be completed by 2006, and 1,200 personnel of the administrative function in headquarters and regional offices of PKP PLK will be reduced.

5) Five percent (5%) of personnel of the administrative function at PKP PLK Headquarters and regional offices will be reduced in 2010 from the 2006 level. Similar reduction will be taken in 2015 from the 2010 level.

6) Railway police will be transferred to the national police.

（Policies contributing to the reduction of the sub-contract cost）

Since PKP PLK reports, in 2003, that they have succeeded in reducing the sub-contract cost at an average of twenty percent (20%), the assumption was made that the subcontract cost for the maintenance works in 2010 can be reduced by fifteen percent (15%) from the 2006 level, and similarly another fifteen percent reduction achieved in 2015 from the 2010 level.

If PKP PLK implements the policies presented above, the productivity will substantially be improved, and reduction of TAC can be achieved. Since the improvement of the productivity depends on the size of the railway network, two cases were analyzed as follows, 11,000 km and 15,000 km, to estimate the impact on the number of personnel required and the total operational cost.

Table 7.3.5 Projected Number of Personnel and Total Operational Expenses At The End of Target Year

Number of personnel required for maintenance and repair (M&R), and train operation control (TOC) Network size 11,000km									
		2003		2006		2010		2015	
Number of personnel	M&R	13,400	100%	9,900	74%	9,400	70%	8,900	66%
	TOC	21,800	100%	14,100	65%	4,200	19%	4,200	19%
	Admin.	7,200	100%	4,100	57%	3,900	54%	3,700	51%
Total		42,400	100%	28,100	66%	17,500	41%	16,800	40%
Projected personnel and subcontracted costs（x1,000 PLN）									
		2003		2006		2010		2015	
Personnel Cost	M&R	460,448	100%	295,752	64%	280,964	61%	266,916	58%
	TOC	612,922	100%	424,655	69%	127,397	21%	127,397	21%
Subtotal		1,073,370	100%	720,407	67%	408,361	38%	394,312	37%
Sub-contracted cost, etc.	M&R	1,401,332	100%	943,392	67%	801,883	57%	681,601	49%
	TOC	93,698	100%	53,713	57%	45,656	49%	38,807	41%
Subtotal		1,495,030	100%	997,104	67%	847,539	57%	720,408	48%
Administ. cost		528,650	100%	322,872	61%	306,729	58%	291,392	55%
Total		3,097,051	100%	2,040,384	66%	1,562,628	50%	1,406,113	45%

Number of personnel required for maintenance and repair (M&R), and train operation control (TOC) Network size 15,000km									
		2003		2006		2010		2015	
Number of personnel	M&R	13,400	100%	11,900	89%	11,300	84%	10,700	80%
	TOC	21,800	100%	18,400	84%	5,500	25%	5,500	25%
	Admin.	7,200	100%	5,900	82%	5,600	78%	5,300	74%
Total		42,400	100%	36,200	85%	22,400	53%	21,500	51%
Projected personnel and subcontracted costs（x1,000 PLN）									
		2003		2006		2010		2015	
Personnel Cost	M&R	460,448	100%	356,585	77%	338,756	74%	321,818	70%
	TOC	612,922	100%	552,912	90%	165,874	27%	165,874	27%
Subtotal		1,073,370	100%	909,497	85%	504,630	47%	487,692	45%
Sub-contracted cost, etc.	M&R	1,401,332	100%	1,165,347	83%	990,545	71%	841,963	60%
	TOC	93,698	100%	70,689	75%	60,085	64%	51,073	55%
Subtotal		1,495,030	100%	1,236,036	83%	1,050,630	70%	893,036	60%
Administ. cost		528,650	100%	458,868	87%	435,925	82%	414,129	78%
Total		3,097,051	100%	2,604,401	84%	1,991,185	64%	1,794,856	58%

The brief overview of the restructuring program of PKP PLK is presented as follows:

Shot Term Plan (2004-2006):	Reduction of railway network size according to the needs of the operators
Mid Term Plan (2007-2010):	Elimination of the maintenance backlog, maodernization and rationalization of existing train operation control system, modernization of signaling system consistant with the rolling stock modernization plan
Long Term Plan (2011-2015):	Continuous modernization of the railway facility

The implementation of the restructuring program will contribute to the 1) rationalization of personnel, 2) increase in productivity, and 3) minimizing the life-cycle-cost of the railway system.

If the network size is set at 11,000 km, the expected outcome of the restructuring program is summarized in table 7.3.6. It is projected that, in 2015, the total operation cost would fall to forty-five percent (45%) level of 2003.

PKP PLK can carry out the downsizing in two phases to alleviate the drastic reduction of personnel. It is recommended that PKP PLK carry out the reduction of the network size in two phases: downsize to 15,000 km by 2006, and downsize to 11,000 km by 2010. The result of this proposition of the downsizing is indicated in bold-italicized figures in table 7.3.6.

Table 7.3.6 Summary of Projected Number of PKP PLK Personnel and Total Operational Cost

Network size（km）	Description	2003	2006	2010	2015
11,000	Total number of persons	42,400	28,100	***17,500***	***16,800***
	Total operational cost（million PLN）	3,100	2,040	***1,560***	***1,407***
15,000	Total number of persons	***42,400***	***36,200***	22,400	21,500
	Total operational cost（million PLN）	***3,100***	***2,600***	1,990	1,800

Note：Excludes railway police (approximately 3,000 persons)

As indicated in figure 7.3.7, in 2010, the productivity of PKP PLK is projected to increase 1.65 times the level of 2002, if the restructuring program is implemented. If further effort for the increase of the productivity and rationalization is carried out, substantial reduction of the TAC can be accomplished.

Table 7.3.7 Projected Increase in Productivity

Year	Train-Kilometer per day (x 1,000)	Persons	Productivity (Train-kilometer per day per person)
2002	639.2	46,000	13.896
2010	415.5	16,900	22.956
		0.63	1.65