

2.10 SAFETY AND POLLUTION

2.10.1 Safety

Safety is the highest priority for railway management. The PKP has steadily reduced the number of accidents and breakdowns in the last 15 years as the comparison between 1980 and 1995 below clearly illustrates.

	1980	1995
- Accidents caused by human error	10%	10%
- Accidents caused by equipment or technical breakdown	70%	30%
- Level crossing accidents caused by automobile driver	20%	60%

The annual number of casualties of traffic accidents in Poland is 7,000 deaths and 65,000 injuries.

Table 2-9-1 shows the number of railway accidents in Poland for the period between 1993 and 1995.

Table 2-9-1 Railway Accidents in Poland (1993 - 1995)

Type	1993	1994	1995	Remarks
Total Number of Accidents	422	446	437	
Total Number of Accidents Caused by Drivers of Motor Vehicles	255	226	290	
Accidents Caused by PKP (according to UIC criterion*)	26	28	25	
Victims of Train Collisions and Derailments				
Killed	2	4	1	
Injured	35	94	58	
Victims of Crossing Accidents Caused by PKP				
Killed	7	11	8	
Injured	7	11	4	
Victims of Crossing Accidents Caused by Drivers of Motor Vehicles				
Killed	57	61	74	
Injured	139	121	163	

* Accidents resulting in a loss in excess of 10,000 ECU

Source: Annual Report 1994, 1995

The expected increase of the mixed operation of high speed trains and low speed trains as a result of the extension of high speed sections will undoubtedly require more punctual train operation. Given the noticeable increase of the number of automobiles in Poland, a reduction of the number of level crossings and the redesign of such crossings to improve visibility should be conducted to prevent accidents. Moreover, the duration of the closure of automatic barriers should be variable to meet the different requirements for high speed trains and low speed trains. For high speed operation where the train speed exceeds 160 km/hr, the introduction of a cab signaling system should be considered as a matter of urgency.

2.10.2 Pollution

(1) Environmental administration of Polish government

The Ministry of Environmental Protection, Natural Resources and Forestry are the main governmental bodies responsible for environmental management. The followings are the broad scope of responsibilities including:

- environmental protection, pollution prevention and control;
- nature conservation;
- water management and protection against floods;
- protection and management of forests;
- mineral resource management including exploration and mining concessions.

The Ministry's duties include the development and implementation of national environmental policy. The formulation of regulations for environmental protection, include environmental quality standards, the supervision of subordinate environmental agencies and the co-ordination of environmental investments and of international co-operation on the environment.

(2) Legislation

1) Environmental legislation

In 1976, two environmental clauses were introduced into the Constitution of Poland. When the Constitution was substantially changed in December 1989, the clauses were consolidated into one:

“The citizens of the Republic of Poland have the right to use the values of the natural environment, as well as the obligation to protect it.”

The most important law currently governing environmental protection is the 1980, "Statute on the Protection and Shaping of the Environment". It provides the legal basis for the protection of separate elements of the environment (land, natural resources, air, water, flora and fauna), with specific provisions for air protection, prevention of noise and vibration, protection against waste, protection against non-ionising radiation and conservation of rural and urban flora and fauna.

The 1980 Statute has been amended several times, and separate laws have been passed on specific subjects, such as the 1984 Statute on Land Use Planning, the 1991 Statute on Nature Conservation, the 1991 Statute on Forests and the 1993 Statute on Mining and Geological Concessions. The 1991 Statute on the State Inspectorate for Environmental Protection created the Inspectorate and provided a much stronger legal basis for the enforcement of environmental law (Table 5.1).

Table 5.1 Selected environmental legislation

1973	Statute on the Protection of Agricultural and Forest Lands (amended in 1982)
1974	Statute on Water (replaced in 1990)
1980	Statute on Environmental Protection and Management(amended in 1989, 1990, 1993 and 1994)
1990	Decree on Environmental Impact Assessments (replaced in 1995)
1991	Statute on the State Inspectorate for Environmental Protection
1991	Statute on Forests
1991	Statute on Nature Conservation
1994	Statute on Construction
1994	Statute on Mining and Geological Concessions
1994	Statute on Physical Development
1995	Decree on Environmental Impact Assessments

There have been proposals to amend or replace the statutes governing water pollution, land use planning, waste management, air quality protection and noise pollution, in addition to proposals to replace the 1980 Statute with a new law on environmental protection.

2) Environmental Impact Assessment (EIA) in Poland

Polish EIA is linked to land use planning procedures - an Environmental Impact Statement (EIS) is one of the documents required for the siting of certain developments. The legal framework for EIA was first introduced in 1990. The main acts forming it were the Town and Country Planning Act 1984 and the Environmental Protection Act of 1980 (both with subsequent changes) and the Executive Order of the Minister of Environmental Protection, Natural Resources and Forestry of 1990 on developments particularly harmful to the environment and human health in terms to be met by the EIA.

In 1994, a number of legislative changes were finalized, and new regulations were passed, which considerably altered the EIA framework. A new planning act, the Space Management Act of 7 July 1994, which came into force on 1 January 1995, made considerable changes to the planning system. The new EIA regulation is the Executive Order of the Minister of Environmental Protection, Natural Resources and Forestry of 13 May 1995 on developments particularly harmful to the environment and human health and terms to be met by EISs.

Assessment of impact exerted on the environment is known as "Ocena Oddzia³ywania na £rodowisko" or "OOS", in Poland. Such a report is usually made at an early stage of establishing or verifying a location for the proposed development and in the main attempts to:

- Identify threats to the natural environment resulting from the proposed development;
- Determine the means of transmission of these;
- Anticipate the changes which may arise as a result of such impact;
- Describe the consequences of implementing the proposed development.

A number of basic methodologies are used within OOS, these are - interaction matrix, network analysis, adaptational, lists graduation and scales.

In Poland, OOS is compulsory in the case of harmful investments, or in some manner affecting the environment or human health. It is a legal requirement that any proposed investment at national, regional or local levels complies with and secures a satisfactory OOS assessment. This is obtained through the Ministry of Environmental Protection, Natural Resources and Forestry and the Chief Sanitary Inspector.

(3) Natural Environment

1) Geography

Poland covers a land area of 312,685 km² in central Europe. Poland is a lowland country with a mean altitude of 173m above sea level. Only 2.9% of the territory is higher than 500m above sea level. Poland has three main topographical zones that extend in east-west bands across the country. The north is a predominantly lowland area, part of the Great European Lowland that stretches from northern France to the Ural Mountains. It features low hills and two major lake districts in the north-west and north-east with over 9,300 lakes of more than a hectare in surface area. The second zone covers most of southern Poland and is formed by a hilly upland area crossed by flat, long river valleys. The third is that there are two mountain ranges along Poland's southern border where the Sudety (up to 1,602m high) in the west and the Carpathians (up to 2,499m) in the east.

2) Hydrography

Hydrographically, 99.7% of Poland lies in the Baltic Sea basin. The Vistula River provides some 55.7% of the total water input from Poland's territory to the Baltic Sea, and the Oder River 33.9%. The remainder of 9.3% is supplied by the coastal rivers. Surface water is the main source of drinking water for urban residents and for industry. High pollution levels, low available water reserves and limited storage capacity lead to drinking water shortages in a number of areas.

3) Climate

The temperature is influenced by both continental and oceanic geography. Poland's mean

temperature is -5°C in the winter, $+18^{\circ}\text{C}$ in the summer. Westerly winds prevail throughout the country. The average annual rainfall is 600 mm.

4) Mineral resources

Poland has rich mineral resources, including large quantities of hard coal in Silesia and major deposits of brown coal in the south-western and central parts of the country. Natural gas from south-eastern and western Poland covers about one-third of internal market demand. There are also major deposits of copper, zinc and lead ores, sulfur and salt, predominantly in the southern and central part of the country.

5) Species of plants and animals

According to study made in 1991, there are 46,900 species of living organisms in Poland. Among them, there are 5,000 species of fungi, about 2,200 species of vascular plants, about 24,400 species of insects, 116 species of fish, 18 species of amphibians, 9 species of reptiles, 360 species of birds and 98 species of mammals.

125 animal species and 111 plant species specified by the order are fully protected in Poland. Furthermore, another 7 species are partially protected.

6) National parks

National parks in Poland have a 70 year history. In 1921, in Bia³owieża forest division "Reserve" was created in 1932 and it become the National Park. Currently they have 22 national parks in Poland, which occupy 290,432 ha where 0.9% of the territory of the country.

Some of Polish national parks are listed on the International Union for the Conservation of Nature (IUNC). The national parks are confirmed by the fact that three of them (Babia Góra, Bia³owieża and S³owiński National Parks) were recognized by UNESCO in the International Network of Biosphere Reserves.

(4) Social Environment

1) Land use

In terms of land use, 60% of the total area is used for farming. About 9% of the total area is taken up by urban areas and industrial activities. Inland waters cover 3% of the territory.

Forests cover about 28% of land area. In terms of the overall size of its forested areas, Poland ranks 5th in Europe. The forests are dominated by coniferous species, in particular pine (70% of total cover) and spruce (7%); the north-western and south-western parts of the country are dominated by forests (4% of total cover) and mixed forests composed of 28 native tree species.

2) Cultural heritage

In Poland, there are many historical buildings and remains which have been exposed to two world wars. Among them, architectural monuments exist in southern part of Poland. Especially, there are many churches, monasteries, castles, and palaces built during the medieval period in Kraków which was the ancient capital. On the other hand, there are many cultural heritages along the Odra river basin near Wrocław. Regarding ethnographic monuments, there are churches, monasteries in the south and windmills in the central part. Archaeological monuments exist throughout Poland, especially many ancient earthworks. In Poland, several cultural landmarks are protected by law and regulation. Especially the following historical landmarks are registered as Convention for the Protection of the World Cultural and Natural Heritage;

- historical areas in Kraków and Warszawa
- salt mines in Wieliczka
- the concentration camp in Auschwitz (Oświęcim)
- the old town in Zambrze

3) Waste

Among the 128 million tons of industrial wastes produced in Poland in 1991 about half were created by the fuel and energy industries. Together with the wastes from the metallurgical and non-ferrous metal industries, they amounted to 83% of the total quantity of wastes. Among them:

- 43% were mining (including rock) wastes created in mines and processing plants;
- 29% were post-floatation sludge and washing wastes from the coal-mining, barite, sulfur, copper and zinc-lead industries;

- 15% were fly-ashes and slag from electric power stations and thermoelectric power stations as well as mineral dusts.

(5) Human Environment

1) Air pollution

Poland's air pollution level tends to decrease in the past several years. Dust pollution was about 63% lower in 1995 than in 1990, carbon-dioxide - 26% and nitrogen oxides - 13%. Pollution carried over the border has heavy production on the general air pollution condition of the country. The total amount of sulfur-dioxide which produced on the country's territory was estimated at 704,000 tons, of which 48% came from domestic and remaining 52% from foreign sources.

2) Noise and vibration

There are no regulations governing vibration limits in Poland at the present time. As a result not much data has been collected.

The average daily noise level on the national road network measures 70 dB, on the railway network with 69 dB, in the areas around the airports 80-100 dB and in surrounding areas of industrial plants - from 50 to 90 dB. The level of noise from road and railway vehicles ranges from 75 to 95 dB. For particular vehicles: motorcycles 79-87 dB, lorries 83-93 dB, buses and tractors 85-92 dB, passenger cars 75-84 dB, road maintenance and construction vehicles 75-85 dB, waste disposal lorries 75-95 dB. The above values violate by several dB specified by Polish safety norms. Allowable noise levels for the environment are set by other laws to a maximum level of 45 to 60 dB and are surpassed by as much as 12 to 37 dB.

3) Water pollution

① Rivers and lakes

Rivers and lakes are comprehensively monitored. Based on quality, three types of classifications are used: I (drinkable); II (suitable for domestic animals); III (suitable for industrial use) and "Non-classifiable"(overly polluted).

Fewer than ten of 118 monitored lakes were put in class I in 1991. One-quarter of the lakes were deemed non-classifiable. Regarding rivers, pollution from untreated

sewage is one of the great problems in Polish lakes, another being excessive nutrients.

② Groundwater quality

Generally, the quality of groundwater is superior to that of surface water. It is estimated that 17% of groundwater is of drinking water quality (class I); 2.5% is of very bad quality and 80% is of reasonable quality. However, contamination of groundwater is quite difficult to purify than surface water.

(6) Present Environmental Conditions of PKP

Environment problems from the railway operation are noise, vibration by train passing, discharging of waste water from passenger car's toilet and exhausting liquid including oil from workshops and diesel depots.

Environmental problem, will be getting worse, however, the environment preservation would become the public opinion in near future. PKP should have departments and experts on each environment item.

1) Noise and vibration

PKP should pay attention on the noise problem, because it is not easy to reduce noise from the railway operation. There are serious noise problems.

① Noise from corrugated rail

There is much rail corrugation in PKP, especially, on the CMK down track, which continues for about 200 km or for the entire length of the track.

② Noise from railway facilities

A complaint of noise for PKP, occurs from 12 stations surrounding residents. In addition a complaint for noise and vibration occurred from a workshop.

③ Concrete structure

Bridges and viaducts in town are should be constructed by concrete structure, because reduction of noise at steel structure is very difficult. Engine idling noise or locomotive whistles induces claims of residents.

However, in almost all cases, their noise did not pass a standard on the environment.

2) Discharging waste water from passenger car toilets

For almost all passenger cars in PKP, a waste water tank is not installed. Consequently, the surroundings of station and railroad track must be non-sanitary. Draining waste water from passenger car toilets should be regulated in the future.

3) Exhausting water from workshops and diesel depots

Drainage from an old passenger car washing machine is very dirty. However, PKP should install new drainage systems and facilities .

4) Disaster experience of PKP

PKP has not experienced a disaster in the past. Track substructure is weak in locations where there has been extensive coal mining especially in the Silesia. Hence, slow orders and axle loads should be carefully monitored in these locations.

5) General view

PKP is now preparing environmental protection. PKP is responding to the problem gradually. For example, PKP installs sound-proof walls. In addition, PKP has adopted the following environmental solutions:

- washing of a passenger car with circulation water;
- equip new-style passenger cars with dirty water tanks;
- PKP has prepared dirty water treatment facilities in depots;
- a gas fuel boiler house (instead of coal-fired one) was installed at railway hospital;
- cost inefficient and environmental polluting local boiler houses were liquidated;
- replacement of standard track with continuous welded rail (CWR) (in 1994 - 20,487 km of CWR or 63.2% of the main tracks were retrofitted) resulting in reduced noise;
- electrification of railway lines (11,613 km till 1994 or 49.8% of all the network) reduced consumption of energy and emission of exhaust gases;

All the efforts to mitigate environmental deterioration should be directed to satisfy the EU norms for the Polish integration with the EU in the future. Environmental improvement program needs to be developed by considering of the target EU norms, the present Polish

situation and various constraints impeding improvements including financial and technical issues.

(7) Environmental problem to be caused by a railway

PKP has recognized following matters as environmental problem.

1) Energy resource

- Air pollution because of fuel consumption.
- CO₂ discharges to affect a climate.
- SO₂, NO_x, PAH, VOC, Ash, Soot and heavy metal affect public health.
- Water pollution because of a hydraulic power plant.
- Danger of a nuclear power plant. (Radioactive waste)

2) Noise

Since noise characteristics depends on the noise source. There are two type of noise pattern.

- Linear sound source during transporting
- Surface source of sound in railway yard, factory etc.

3) Problem of a dangerous object transportation.

Dangerous object transportation, namely it is thought that a transportation of chemical substance and fuel affects a bad influence for a health and an environment, especially.

- Dangerous material discharge.
- Affects for a sewer.
- Soil and water. (contamination because of chemical substance and fuel.)
- Transportation of a dangerous object.

4) Problem in manufacturing plant

- Air pollution.
- Exhaust.
- Use of drinking water in a factory.
- Sewer problem.

- Waste.

5) Natural conservation

- Regional separation by railroad track.
- Destruction of animal habitant.
- Scenery destruction railroad track.

(8) Direction of countermeasures protection surrounding the railroad track for environment

PKP has recognized the importance of railway transport from view point of not only natural conservation but also energy saving and lower accident rate. In 1995, 15700000 PLN was spent for the purpose of a natural environment protection.

PKP has conducted an investigation of an environment protection state. An investigation of an environment protection state is called with CLER (Company Level Environmental Review). An investigation is done about a workshop and car washing machine in PKP. The method of CLER is summarized as following;

- ① Investigation is organized by a group of special association.
(Specialist, Top personnel, Labor union).
- ② Initial explanation on the environment impact with enterprise activity.
- ③ Identification of importance on the respective environment impact.
- ④ Countermeasures for ③.
- ⑤ Analysis on technical and economy requirement.(Expenses for an environment)
- ⑥ Plan for ⑤.

This investigation should be done, annually.

1) Present concrete countermeasure

Regarding environmental protection facilities of PKP, a public sanitary central inspection group (KIS) presents a report yearly. The report mentions present state of facilities. Accompanied with a modernization of facilities, in 1994, a detailed investigation regarding

a noise pollution was executed in the following place.

- Around track of E-20 (several place).
- Around stations modernized.
- Around tunnel and railway bridge modernized.

There are some anxiety for the noise pollution around station due to implementing future modernization plan, however, most of that are proved to be needless according to the preceding study.

In addition to these areas, in order to grasp present environment level monitoring system is indispensable. It can provide diagnosis on the necessary environment countermeasure. According to the report of KIS, PKP investigated 25 monitoring places in 1994. For the investigation, monitoring equipment were set up at the point from 25m of railway track and 1.5m of height.

2) Solution should be considered in the future

PKP proposes a noise pollution problem accompanied with a modernization and an analytic result of E-20, for the installment of facilities the following environment aspects are considered.

- ① Technological facilities.
 - Installment of the soundproof wall.
 - Installment of the vibration reducing track.
- ② Technological monitor.
 - Noise investigation.
 - And so on.

Concretely soundproof and vibration reducing facilities proposed are following.

- Sochaczew.....Two soundproof wall along the railway track.
(A length of 1300m and 3.5m of height.)

- Zychlin.....One soundproof wall along the railway bridge.
(A length of 360m and 3m of average height.)
- Kutno-Skleczki.....vibration reducing track in the railway bridge.
(A minimum length of 100m.)
- Budki Nowe.....Two soundproof wall along the railway track.
(A length of 560m and 3.5m of height.)
- Gutowo-Wrzesnia.....One soundproof wall along the railway bridge.
(A length of 150m and 3.5m of height.)
- Nekla.....One soundproof wall along the railway bridge.
(A length of 135m and 3.5m of height.)

Summing up above, the technological facilities for environment protection are as following;

- Vibrationproof track.....700~1000m²
- Soundproof wall along the railway track...6500m² (Total length of 1850m)
- Soundproof wall along the road.....2080m² (Total length of 650m)

(9) Environmental conservation objective (Instruction of UIC)

PKP considers an instruction of UIC as environmental conservation objective. According to the instruction of UIC establishment of environment protection preservation association is proposed.

The administration policy of PKP for the environmental protection is made by following procedure.

- ① Decision of environment protection standard to cope with the UIC instruction.
- ② Formulation of the action plan to meet above.
- ③ Implementation by the action plan.

UIC makes advice lists, regarding necessity of an environment protection. Fundamentally it indicates as following;

① Enforcement of CLER investigation

A. Establishment of a special organization.

- It conducts a related investigation of an enterprise and an environment.
- It decides the most priority matter which is related to.
- It makes an activity list for an environment protection.

Selection of environment protection plan, taking into consideration of the cost benefit comparison. (It means the regional scaled investigation from technical and economic point of view.)

- It sets up the partial plan based on enterprise administration.

B. Establishment of an instruction committee.

② Whole plan of technological and budgetary aspects is submitted to government, through CLAR investigation for an environment protection. It means not only environment protection activity of PKP, but also a plan to collect fund from government.

③ Due to limitation of PKP's property, environmental protection activity can't be made sufficiently. Consequently, a special law is prepared to assist the necessary fund collection for the environment protection activity. It is shown as following;

- Marine product ministry domestic foundation.
- Ecological foundation.
- Environment protection bank credit loan.(Contract)
- Polish domestic developed bank credit loan.
- Credit loan from World Bank.
- Fund for a location development and a change.

PKP requests a subsidy or a tax reduction for an ecological activity, at the same time as it collects fund. PKP is exempted another tax. (investment tax and income tax)

④ PKP decides an activity configuration, according to an instruction of UIC.

⑤ PKP appeals an environment protection activity.

- ⑥ PKP gets a government maintain it, by organizing ecological group.

(10) Guideline of facility and technology for privatization

There is necessity that PKP investigates technology and facility for an environment protection, by the statutory method. In addition, PKP is training for the personnel who uses the method.

PKP must decide on PKP's policy regarding enterprise and environment. Although such matters relate to another enterprise and administration, they are generally considered as following;

- ① Ecology investigation during manufacturing a facility.
- ② Periodical investigation.
- ③ Environmental impact examination
 - New construction, technological facility, structure plan and others.
 - New line, new station and others.
 - Quality of a purchase material.
- ④ CLER (Company Level Environmental Review)

When forming an environmental protection plan, PKP must investigate correctly, periodically the influence of the facility and technology for the environment. And an analysis on the influence of future plan harmful for environment is necessary.

The next 2 point is thought to be necessary to execute these plans.

- ER (Environmental Review)

Investigate an influence of a facility (machine) gives for environment.

- EIA (Environmental Impact Assessment)

Make an assessment of an impact for an environment from a cause and a result. And refer to it for a future investigation

APPENDIX 3

TRAFFIC DEMAND FORECAST

3.1 INTRODUCTION

Estimating future railway traffic volume of passengers and freight will be the most important issue of PKP business after their privatization. This can be attributed to their major role in assessing the suitable railway network for their efficient transport, their income and investment plans. Transport demand for railway is determined conjunction with socio-economic indices such as population, economic active population, GDP, production of commodities, ownership of car, etc.

3.2 ZONING SYSTEM

It is a principal matter in forecasting future traffic to divide the Study area into an appropriate number of zones.

The whole Poland is divided into 49 internal zones (voivodships) and neighboring countries, such as Czech, Slovakia, Ukraine, Belarus, Russia, Germany and countries surrounding Baltic Sea, are aggregated into 8 external zones shown in Fig.3.2.1 and Table 3.2.1. This zoning system is also used for macroscopic analysis of population, economic active population, GDP, ownership of car, etc.

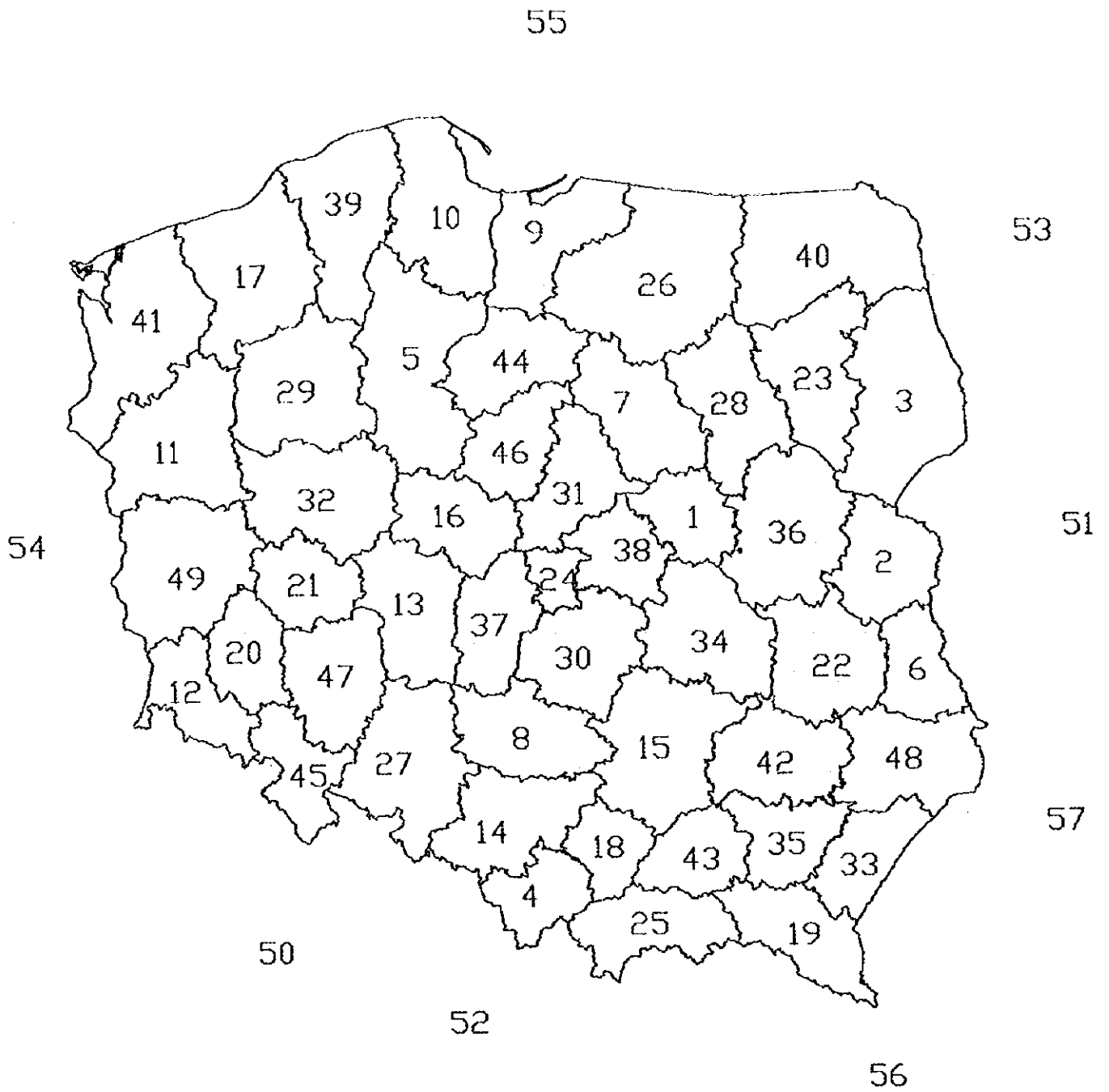


Fig. 3.2.1 Zoning Map

Table 3.2.1 Zoning System

Zone No.	Voivodship or Country	Capital	Macro Region	Area (Km ²)	Population in thousand	Economic Active Population in thousand
1	Warszawskie	Warszawa	STOLECZNY	3,788	2,417	1,132
2	Bialskopodlaskie	Biala Podlaska	SRODKOWO-WSCHODNI	5,318	310	131
3	Bialostockie	Bialystok	POLNOCNO-WSCHODNI	10,055	701	281
4	Bielskie	Bielsko-Biala	POLUDNIOWY	3,704	919	366
5	Bydgoskie	Bydgoszcz	SRODKOWO-ZACHODNI	10,349	1,132	411
6	Chelmskie	Chelm	SRODKOWO-WSCHODNI	3,866	250	100
7	Ciechanowskie	Ciechanow	STOLECZNY	6,362	436	159
8	Czestochowskie	Czestochowa	POLUDNIOWY	6,182	782	311
9	Elblaskie	Elblag	POLNOCNY	6,103	491	150
10	Gdanskie	Gdansk	POLNOCNY	7,394	1,456	513
11	Gorzowskie	Gorzow Wielkopolski	POLUDNIOWO-ZACHODNI	8,484	511	170
12	Jeleniogorskie	Jelenia Gora	POLUDNIOWO-ZACHODNI	4,379	525	168
13	Kaliskie	Kalisz	SRODKOWO-ZACHODNI	6,512	722	294
14	Katowickie	Katowice	POLUDNIOWY	6,650	3,925	1,513
15	Kieleckie	Kielce	POLUDNIOWO-WSCHODNI	9,211	1,137	485
16	Koninskie	Konin	SRODKOWO-ZACHODNI	5,139	480	193
17	Koszalinskie	Koszalin	POLNOCNY	8,470	522	168
18	Krakowskie	Krakow	POLUDNIOWO-WSCHODNI	3,254	1,241	507
19	Krosnienskie	Krosno	POLUDNIOWO-WSCHODNI	5,702	507	207
20	Legnickie	Legnica	POLUDNIOWO-ZACHODNI	4,037	524	189
21	Leszczynskie	Leszno	SRODKOWO-ZACHODNI	4,154	397	149
22	Lubelskie	Lublin	SRODKOWO-WSCHODNI	6,792	1,027	429
23	Lomzynskie	Lomza	POLNOCNO-WSCHODNI	6,684	354	146
24	Lodzkie	Lodz	SRODKOWY	1,523	1,116	405
25	Nowosadeckie	Nowy Sacz	POLUDNIOWO-WSCHODNI	5,576	733	306
26	Olsztynskie	Olsztyn	POLNOCNO-WSCHODNI	12,327	772	259
27	Opolskie	Opole	POLUDNIOWY	8,535	1,025	375
28	Ostroleckie	Ostroleka	STOLECZNY	6,498	408	161
29	Pilskie	Pila	SRODKOWO-ZACHODNI	8,205	494	163
30	Piotrkowskie	Piotrkow Trybunalski	SRODKOWY	6,266	644	271
31	Plockie	Plock	SRODKOWY	5,117	522	216
32	Poznanskie	Poznan	SRODKOWO-ZACHODNI	8,151	1,354	538
33	Przemyskie	Przemysl	POLUDNIOWO-WSCHODNI	4,437	415	174
34	Radomskie	Radom	STOLECZNY	7,294	764	316
35	Rzeszowskie	Rzeszow	POLUDNIOWO-WSCHODNI	4,397	746	314
36	Siedleckie	Siedlce	STOLECZNY	8,499	662	267
37	Sieradzkie	Sieradz	SRODKOWY	4,869	413	169
38	Skierniewickie	Skierniewice	SRODKOWY	3,960	424	160
39	Slupskie	Slupsk	POLNOCNY	7,453	426	135
40	Suwalskie	Suwalki	POLNOCNO-WSCHODNI	10,490	486	160
41	Szczecinskie	Szczecin	POLNOCNY	9,982	991	342
42	Tarnobrzegskie	Tarnobrzeg	POLUDNIOWO-WSCHODNI	6,283	609	272
43	Tarnowskie	Tarnow	POLUDNIOWO-WSCHODNI	4,151	694	293
44	Torunskie	Torun	SRODKOWO-ZACHODNI	5,348	671	239
45	Walbrzyskie	Walbrzych	POLUDNIOWO-ZACHODNI	4,168	739	227
46	Wloclawskie	Wloclawek	SRODKOWO-ZACHODNI	4,402	435	159
47	Wroclawskie	Wroclaw	POLUDNIOWO-ZACHODNI	6,287	1,138	429
48	Zamoskie	Zamosc	SRODKOWO-WSCHODNI	6,980	493	221
49	Zielonogorskie	Zielona Gora	POLUDNIOWO-ZACHODNI	8,868	674	228
	Total			312,685	38,609	14,968
50	Austria, Italy and countries beyond					
51	Belarus, Russia and countries beyond					
52	Czecho, Switzerland and countries beyond					
53	Estonia, Lithuania, Latvia and countries beyond					
54	Germany, France, UK and countries beyond					
55	Finland, Norway, Sweden and countries beyond					
56	Slovakia, Hungary, Yugoslavia and countries beyond					
57	Ukraine, Romania and countries beyond					

Source : Statistical Yearbook 1996 (GUS)

3.3 DEMAND FORECAST OF RAILWAY PASSENGERS

3.3.1 Forecasting Method

A demand forecast model aims at describing universal relationships in mathematical forms between trip data and socio-economic data, which are considered to be unchanging in the future. To forecast future traffic demand of railway passengers, the following modified “four-step method” was developed as shown in Fig.3.3.1.

First Step : Trip generation / attraction forecast

Second Step : Trip distribution forecast

Third Step : Modal choice by fare system

Fourth Step : Traffic assignment

Modal choice models of a disaggregate logit-type were calibrated to assess the effect of various improvements or fare system on the ridership share of railway passengers.

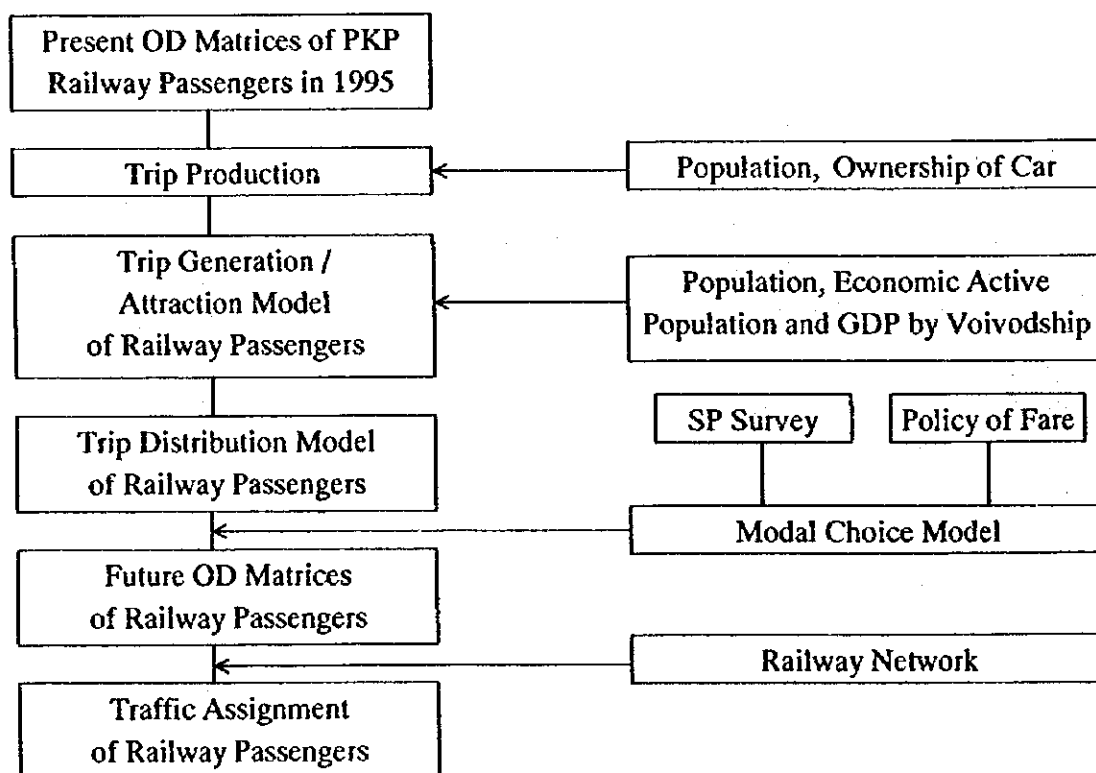


Fig. 3.3.1 Flow of Demand Forecast of Railway Passengers

3.3.2 Trip Generation

Through analysis of the current demand structure, it should be clarified that the trips by passenger cars are greatly affected the trips by rail. To estimate the future traffic volume of railway passengers, it will be necessary to project that by passenger car. The composition of OD trips by all modes are generally explained as shown in Fig.3.3.2.

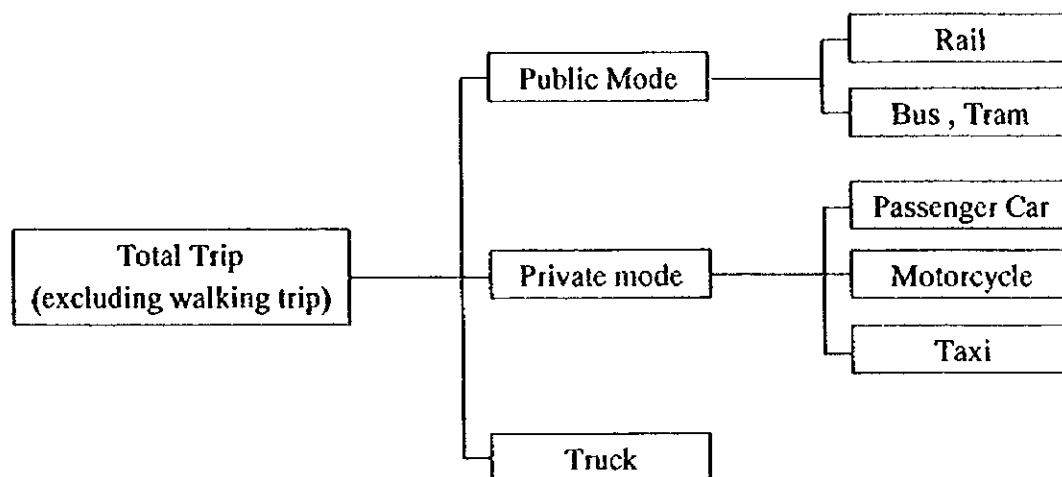


Fig.3.3.2 Composition of OD Trips

In Poland the usage of motorcycle and taxi is observed not so high. Therefore it is considered that almost trips of private mode are made by passenger car. Public modes of bus and tram are widely used in many urban areas.

The present trip production rate by rail for potential demand is considered as an unchanging factor in the future and used to forecast the total number of latent trips as a control total. According to the Statistical Yearbook 1996 (GUS), trip production rates by rail is calculated as follows :

	Population in thousand	Railway Passengers in thousand	Trips / day / person by rail
1991	38,309	651,991	0.0466
1992	38,418	549,302	0.0392
1993	38,505	541,089	0.0385
1994	38,581	494,617	0.0351
1995	38,609	465,901	0.0331
Average of recent 5 years	38,484	540,580	0.0385

The rate of 0.0385 trips / day / person was adopted to estimate the total number of latent railway passengers in 2005. On the other hand , the ratio of private mode (mainly by passenger car) will increase in 2005 and that of public mode (mainly by rail) will reduce for that.

To estimate the increment trips by car, the following steps were adopted.

- (1) Trend of the number of registered passenger cars.
- (2) Develop logistic model.
- (3) Project of the trips by car.

The number of passenger cars in Poland has increased in the past decade as shown in Table 3.3.1. Motorization in Poland has gradually accelerated from the beginning 80s'. The number of registered passenger cars was 2,383 thousand in 1980 and reached 7,517 thousand in 1995. The average increased rate during this period was about 8% per year.

Table 3.3.1 Registered Passenger Cars

Year	Population in million	Registered Passenger Cars in thousand	Ownership of Passenger car per 1,000 persons
1960	29.80	117	3.9
1970	32.66	479	14.7
1980	35.74	2,383	66.7
1990	38.18	5,261	137.8
1991	38.31	6,112	159.5
1992	38.42	6,505	169.3
1993	38.51	6,771	175.8
1994	38.58	7,153	185.4
1995	38.61	7,517	194.7

Source : Statistical Yearbook 1996 (GUS)

To formulate the trend of this increment of passenger cars, various models were examined. As the result of examinations, the logistic curve to explain the ownership per 1,000 persons was adopted. The total number of passenger cars can be obtained by multiplying the total population by M, using the following formula.

$$M = S / (1 + Ke^{-at})$$

where :

M: Ownership per 1,000 persons

t: Year (Base year is 1960 as 0.)

S, K, a: Parameters

S= 400

K= 18

a =0.08

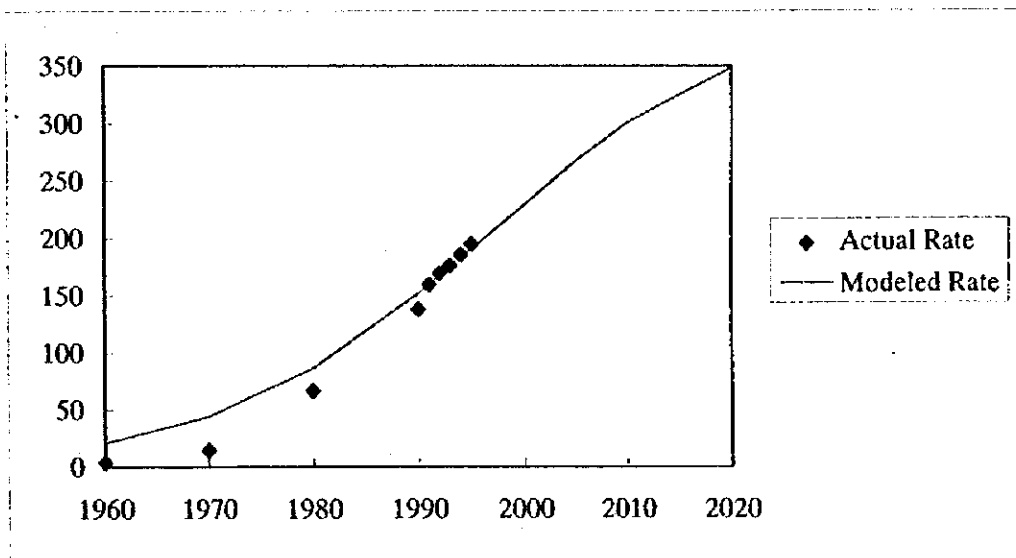


Fig. 3.3.3 Logistic Curve Representing the Trend for Ownership of Passenger Car

The existing ratio is 195 cars per 1,000 persons and it will reach 268 in 2005.

The number of passenger cars will be estimated 10,613 thousand in 2005. Present average person trips per day by passenger car is 1.28. Consequently the trips by passenger cars will be 4,958 million in 2005. 130 million trips (9% of increased trips by passenger car) will be converted from railways. The rest of trips will be assumed converted traffic from other modes including walking mode and induced traffic.

3.3.3 Trip Generation / Attraction Model

To calibrate the trip generation / attraction model, the following PKP data and the socio-economic indices were used for statistical analysis based on 49 internal zones.

- (a) No. of railway passengers by PKP data base as a dependent variable.
- (b) Population by voivodship as an independent variable.
- (c) Economic Active Population by voivodship as an independent variable.
- (d) Gross Domestic Product by voivodship as an independent variable.

The daily number of railway passengers generated from / attracted to each of 49 internal zones is estimated from statistical data from the PKP computer database and PKP statistical data. The database is available for interregional transport as whole months of the year 1995. The statistical data is also available for international transport and regional transport. The international transit traffic is estimated with the hearing from PKP Computer Information Center.

To develop the model, multi-regression method was adopted. Many trials for combination of independent variables have been done. Finally the following multi-regression model was established.

$$G = 1,836.4 \times (\text{POP}) + 4,696.8 \times (\text{EAP}) + 82,591.3 \times (\text{GDP}) \quad (\text{R} = 0.853)$$

$$A = 1,836.1 \times (\text{POP}) + 4,695.7 \times (\text{EAP}) + 82,583.1 \times (\text{GDP}) \quad (\text{R} = 0.853)$$

where:

G = Generated number of railway passengers per day

A = Attracted number of railway passengers per day

POP= Population by voivodship

EAP= Economic active population by voivodship

GDP= Gross Domestic Product by voivodship (PLN)

3.3.4 Trip Distribution Model

In this study the entire O-D matrices among major PKP stations are available for railway

passenger movements and this study is intended to project future railway passenger demand macroscopically. The Present Pattern method, therefore, is applied for the trip distribution model, and final trip distribution estimate is obtained by adjusting the initial estimate to trip generation/attraction, using “Fratar” method. The method is shown as follows:

$$X_{ij} = t_{ij} F_i G_j \frac{\sum_{j=1}^n t_{ij}}{\sum_{j=1}^n t_{ij} G_j}$$

where:

- X_{ij} = Adjusted future trip from zone i to zone j
- t_{ij} = Present trip from zone i to zone j
- F_i = Growth rate of origin zone i
- G_j = Growth rate of destination zone j

3.3.5 Modal Choice Model

To estimate future railway passenger demand, the impact from other competitive modes on the demand volume was analyzed. The competitive modes were considered passenger car and intercity bus. The Study Team, therefore, has conducted SP (stated preference) surveys for railway and bus passengers. The railway mode was analyzed against competitive modes. The data was calibrated to develop the multinomial logit model.

$$P_i = \frac{e^{-U_i}}{\sum_j e^{-U_j}}$$

Where:

- P_i = Probability of choosing mode i
- U_i = Utility function of mode i
- U_j = Utility function of mode j

The Mode Choice SP experiment requires the respondent to rate on a scale from 1 (Definitely prefer train) to 5 (Definitely not prefer train) a series of scenarios. Each scenario is examined in isolation, and presents times and fares of travelling by train. Hence, for each scenario in turn, there are two alternations (Train, not Train) and for each respondent there were eight scenarios.

The binomial logit model is expressed as follows :

$$P_i = \frac{e^{-U_i}}{e^{-U_i} + e^{-U_j}}$$

where :

P_i = Probability of choosing mode i

U_i = Utility function for mode i

U_j = Utility function for mode j

The utility function is assumed as a linear combination of explanatory variables as following :

$$U_i = a \times X_i + b \times Y_i + c$$

where :

U_i = Utility function of mode i

X_i, Y_i = Value of explanatory variables for mode i

a, b, c = Parameters estimated by Most Likelihood Estimation

This model will be used to determine the future ridership share of railway passengers in case of different privatization strategies such as enhancing the service level (speedup), changing the fare system, etc.

3.3.6 Passenger Assignment on the Railway Network

Based on PKP railway network total 1,200 links are modeled for passenger traffic assignment. The estimated OD matrices in target years were assigned on the railway network using all-or-nothing assignment method to estimate the sectional volume of railway passengers per day. Table 3.3.2 shows the summary of projected railway passenger transport. International traffic will be increased in proportion to GDP. Interregional traffic will also increased 15%. On the contrary regional traffic will be decreased to 85% of 1995 owing to the remarkable increment of passenger cars traffic. Total number of passengers will be decreased, but that of passenger-kms will be grown. Table 3.3.3 shows the typical passenger flow on selected sections of the railways network in 1995 and 2005.

It is observed that stations with over 2,000 thousand passengers per year for the interregional transport among PKP major 133 stations are seven stations of Warszawa (8,217 thousand passengers), Poznan (3,371 thousand passengers), Krakow (3,145 thousand passengers), Gdansk (3,023 thousand passengers), Wroclaw (2,953 thousand passengers), Katowice (2,562 thousand passengers) and Szczecin (2,060 thousand passengers) based on PKP Statistical Yearbook. The total number of in these stations is 25,331 thousands per year. This means that 39.4% of the interregional transport (64,266 thousand passengers per year) are concentrated on these seven stations.

Consequently traffic flows among these stations in 1995 are heavy. In particular traffic flows on Warszawa-Poznan line (D29 Line No. 3) and Krakow-Katowice-Wroclaw line (D29 Lines No. 132, 133) in the direction of East-West and those on Warszawa-Katowice line (D29 Line No.4) and Warszawa-Gdansk line (D29 Line No. 9) in the direction of North-South are remarkably heavy.

The projected traffic flows in 2005 will increase by over 12% against those in 1995. The lines connected to frontier countries will increase by 28% to 40% in proportion to the growth of international passengers.

Table 3.3.2 Summary of Projected Railway Passenger Transport

	1995		2005	
	No. of Passengers in thousand	Passenger-kms in million	No. of Passengers in thousand	Passenger-kms in million
International Transport	5,049	857	7,500	1,273
Interregional Transport	64,266	15,617	75,500	18,347
Regional Transport	395,744	10,149	344,000	8,822
Agglomeration Transport	262,969	6,425	263,000	6,426
Total	465,059	26,622	427,000	28,442

Table 3.3.3 Daily Passenger Flow on Selected Sections

D29 line No.	Section	Traffic Volume		Growth Rate
		1995	2005	
1	Warszawa - Katowice	2,018	2,296	114%
2	Warszawa - Terespol	7,242	10,164	140%
3	Warszawa - Kunowice	2,053	2,472	120%
4	Grodzisk Mazowiecki - Zawiercie	12,202	14,043	115%
6	Zielonka - Kuznica Bialostocka	4,446	5,278	119%
7	Warszawa - Dorohusk	7,248	8,845	122%
8	Warszawa - Krakow	6,211	7,534	121%
9	Warszawa - Gdansk	9,732	11,636	120%
18	Kutono - Pila	4,185	5,034	120%
91	Krakow - Medyka	13,487	17,018	126%
97	Skawina - Zywiec	3,720	4,749	128%
98	Sucha Beskidzka - Chabowka	5,410	6,941	128%
99	Chabowka - Zakopane	3,786	4,883	129%
131	Chorzow Batory - Tczew	3,637	4,069	112%
132	Bytom - Wroclaw Glowny	10,287	12,176	118%
133	D.G.Zabkowice - Krakow Glowny	12,373	15,103	122%
202	Gdansk - Stargard Szczecinski	2,695	3,303	123%
271	Wroclaw - Poznan	8,458	10,015	118%
273	Wroclaw Grabiszyn - Szczecin	3,591	4,294	120%
274	Wroclaw Muchobor - Gubinek	5,259	6,127	117%
276	Wroclaw - Miedzylesie	2,005	2,348	117%
351	Poznan - Szczecin	5,414	6,385	118%
353	Poznan Wsch. - Skandawa	2,644	3,221	122%
354	Poznan Pod - Pila	3,561	4,257	120%
404	Szczecinek - Kolobrzeg	4,347	5,207	120%
405	Pila - Ustka	3,151	3,758	119%

Passenger Volumes
in 1995
(two-way)

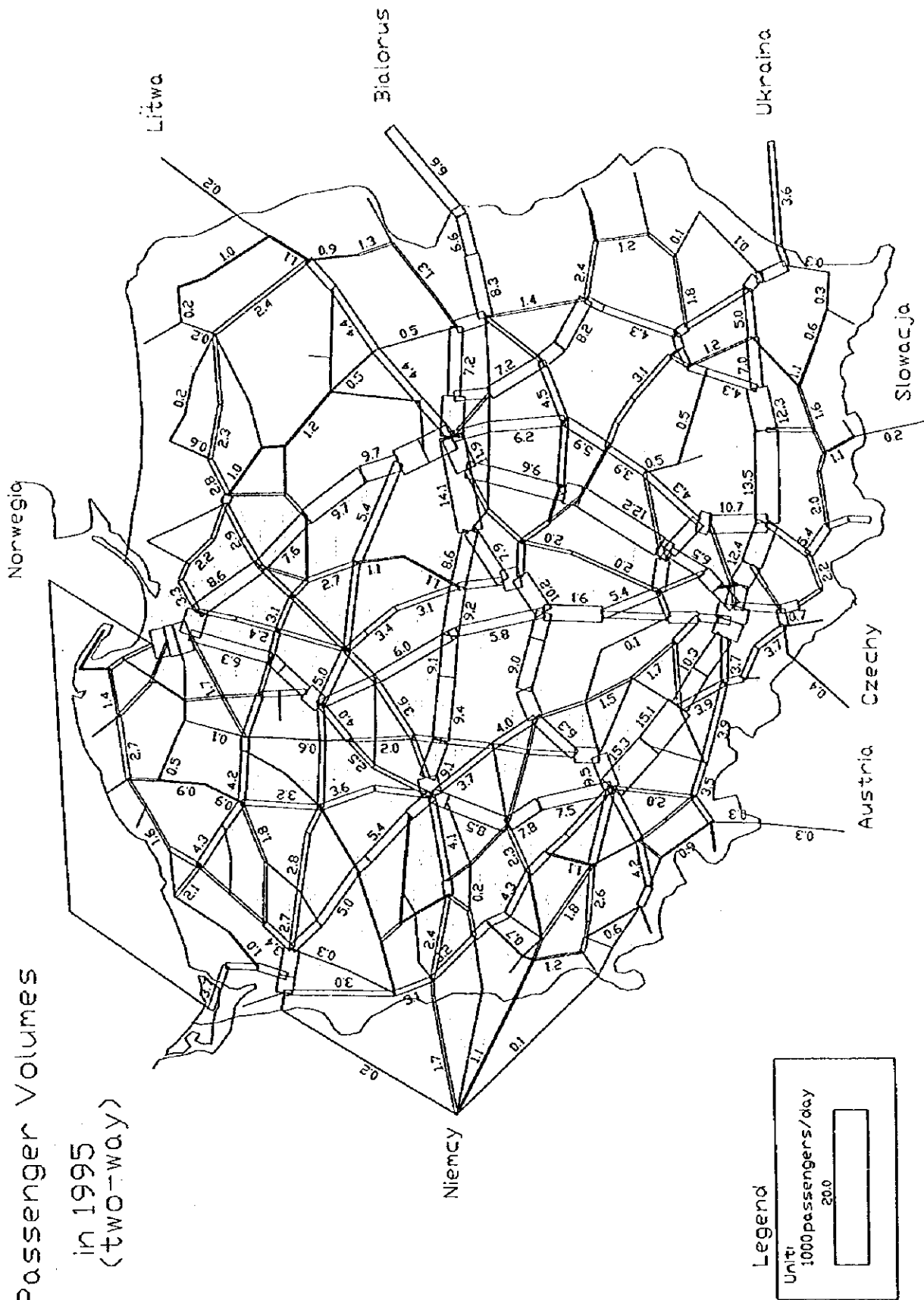


Fig. 3.3.4 Traffic Flow of Railway Passengers in 1995

Passenger Volumes
in 2005
(two-way)

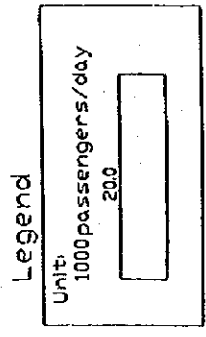
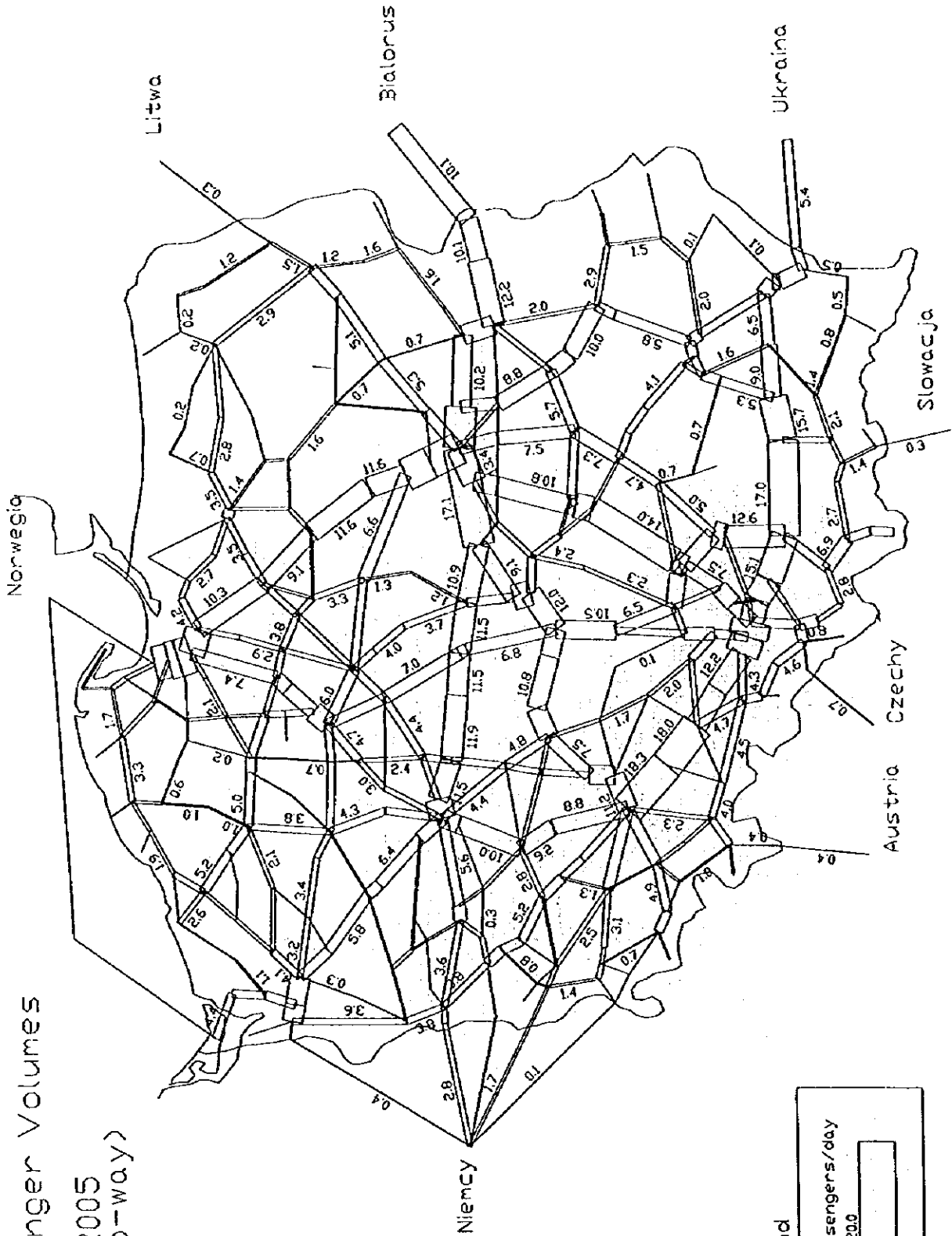


Fig. 3.3.5 Traffic Flow of Railway Passengers in 2005

3.4 DEMAND FORECAST FOR FREIGHT

3.4.1 Introduction

In this section, future railway freight traffic is forecast. The forecasting method for railway freight is simpler than that for passengers. The methodology depends in principal on the growth factor method.

Statistical data from the PKP data base, which contains originating station, destination station, number of commodity type, tonnage per trains and number of tons per wagon was processed and aggregated to build OD matrices for 223 main stations. Data was available for 1995 freight traffic including 17 commodity types. PKP statistical data concerning international freight transport was also used to establish and calibrate O-D matrices.

The growth factor was estimated in conjunction with previous marketing studies by the World Bank for freight service users and the production forecasts for major commodities.

General flows of these methods are shown in Fig.3.4.1.

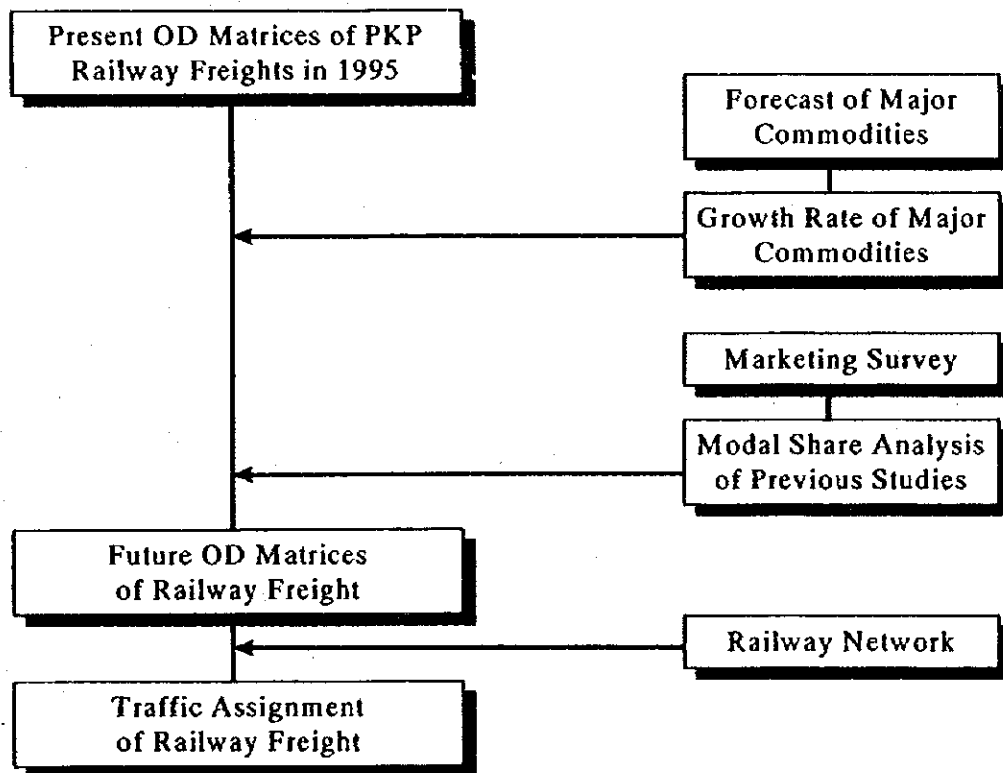


Fig. 3.4.1 Flow of Demand Forecast of Railway Freight

3.4.2 Generation for Each Commodity

Production of each commodity was adopted as determining freight traffic generation. Polish commodity production and trade, corresponding to major PKP commodities, has already been projected in the Study of Restructuring PKP by the World Bank in 1993 and 1995. Through the process of these commodity forecasts, the macroeconomic forces such as real GDP, investment, industrial production, trade, consumer price inflation, etc. were considered. In this study productions in 1993, 1994 and 1995 were updated depending on Statistical Yearbook (GUS) and other relative statistics. Table 3.4.1 shows the updated Production and Trade of Major products that could be shipped in Poland by all transport modes - rail, roadhaul and pipeline - not the volume that PKP will carry. The total production gradually increases in the mid-nineties before leveling off at the end of decade.

To project future commodities production in 2000 and 2005, the index of commodity production in each of PKP's 17 commodities, which was developed by the World Bank in 1993 and 1995 as shown in Table 3.4.2, was adopted. In this table indices of hard coal, brown coal, grain and sugar production will decrease. On the other hand those of stones, cement and fertilizers production will double. Indices of the rest commodities will be assumed to grow in proportion to the index of GDP growth which will be 149 in 2005 (1995=100).

Table 3.4.1 Production and Trade of Major Products

in million ton

PKP Code Number	Commodity	1991	1992	1993	1994	1995	2000	2005
1	Hard Coal	140.	136.	132.	136.	139.	119.	100.
2	Brown Coal & Coke	80.8	78.3	78.5	78.4	75.2	63.9	57.2
3	Ores	39.4	39.1	42.0	40.8	41.5	41.5	43.6
4	Stone	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	Sand & Gravel	35.3	33.3	34.3	35.1	35.8	41.9	47.7
6	Oil & Products	26.1	26.8	31.4	32.7	34.2	39.7	44.5
7	Metal & Products	30.3	28.9	28.9	32.5	34.7	40.0	43.8
8	Bricks	11.9	11.2	12.1	12.1	12.2	13.2	14.1
9	Cement	12.0	11.3	11.9	13.5	13.6	20.1	25.5
10	Fertilizers	9.6	8.1	9.4	11.0	13.0	16.4	19.9
11	Other Chemicals	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12	Grain	27.9	24.4	25.6	23.8	28.4	27.0	27.0
13	Potatoes	29.0	25.8	38.0	24.2	26.1	27.7	31.8
14	Sugar & Beets	11.4	11.3	15.7	11.7	13.4	12.7	12.7
15	Other Agricultural Products	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16	Timber & wood Products	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source : Statistical Yearbook 1996 (GUS), Study by the World Bank and JICA Study Team

Table 3.4.2 Index of Commodity Production

1995 = 100

PKP Code Number	Commodity	1995	2000	2005
1	Hard Coal	100	86	72
2	Brown Coal & Coke	100	85	76
3	Ores	100	100	105
4	Stone	100	150	207
5	Sand & Gravel	100	117	133
6	Oil & Products	100	116	130
7	Metal & Products	100	115	126
8	Bricks	100	108	115
9	Cement	100	148	188
10	Fertilizers	100	126	153
11	Other Chemicals	100	112	121
12	Grain	100	95	95
13	Potatoes	100	106	122
14	Sugar & Beets	100	95	95
15	Other Agricultural Products	100	113	125
16	Timber & wood Products	100	96	104
17	Other Products	100	128	149

Source : Study by the World Bank

3.4.3 Distribution of Each Commodity

In this study surveys for freight customers were not conducted, while detailed surveys for the modal preference of freight shipper were conducted and analyzed in the study by the World Bank in 1991. In the survey respondents to the shipper survey typically send more than 80% of their freight by rail. These respondents represent nearly 25% of PKP's 1991 freight tonnage. For the customers surveyed, road haulers carry a large share of lime, timber, cement, and household goods. Finally the railway share forecast shown in Table 3.4.3 was established on condition as follows:

Real economic growth
Industrial output
Commodity production and imports
Government policy , e.g., mine closings, export promotion
Increased competitiveness of other modes (mainly road hauler)
Relative cost of competing modes (mainly road hauler)
Transit time
Tariffs
Safety
Cost
Quality of service
Quality of rolling stock

To estimate future railway freight O-D matrices of 17 commodities, the existing O-D matrices were expanded using the production forecast and the railway share forecast as shown in Tables 3.4.1 and 3.4.3, respectively. Some commodities such as stone, other chemicals, other agricultural products, timber and other, which have not been estimated their share by railway, were assumed to keep their present share and grow in relation to the growth of the GDP. Distribution pattern of each commodity was assumed to stay as present pattern, because there will not expected changes of railway network except operating speedup in some lines. Under these assumption future O-D matrices of 17 commodities in 2005 were obtained. Table 3.4.4 shows the projected tonnage of 17 commodities in 2000 and 2005.

Table 3.4.3 Market Share of Railway Freight

PKP Code Number	Commodity	1991	1992	1993	1994	1995	2000	2005
1	Hard Coal	79.7%	72.3%	80.4%	77.6%	77.3%	77.1%	77.0%
2	Brown Coal & Coke	12.9%	12.6%	11.0%	12.0%	12.3%	12.1%	12.0%
3	Ores	27.4%	24.3%	20.7%	20.7%	33.7%	33.9%	34.0%
4	Stone	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	Sand & Gravel	9.0%	8.7%	10.1%	6.6%	3.9%	4.4%	5.0%
6	Oil & Products	39.2%	38.0%	34.5%	33.6%	34.2%	35.1%	36.0%
7	Metal & Products	58.9%	48.7%	35.2%	46.2%	48.7%	46.3%	44.0%
8	Bricks	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%
9	Cement	28.5%	29.0%	36.9%	41.5%	41.6%	48.3%	55.0%
10	Fertilizers	39.4%	47.1%	45.1%	34.1%	39.5%	42.3%	45.0%
11	Other Chemicals	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12	Grain	6.4%	9.2%	14.2%	3.5%	7.9%	7.5%	7.0%
13	Potatoes	2.9%	3.1%	1.5%	0.8%	0.6%	0.6%	0.6%
14	Sugar & Beets	11.4%	7.7%	9.2%	6.2%	7.0%	7.0%	7.0%
15	Other Agricultural Products	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16	Timber & wood Products	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source : Statistical Yearbook, PKP Yearbook and Study by the World Bank

Table 3.4.4 Forecast for Railway Freight Traffic in Tons

in thousand ton

PKP Code Number	Commodity	1991	1992	1993	1994	1995	2000	2005
1	Hard Coal	111,827	98,472	106,238	105,625	107,600	92,365	77,185
2	Brown Coal & Coke	10,440	9,841	8,671	9,400	9,234	7,761	6,860
3	Ores	10,826	9,508	8,693	8,465	13,997	14,054	14,817
4	Stone	13,157	10,902	11,166	12,104	17,438	20,926	23,102
5	Sand & Gravel	3,187	2,885	3,458	2,317	1,388	1,860	2,383
6	Oil & Products	10,242	10,194	10,864	10,971	11,696	13,923	16,002
7	Metal & Products	17,868	14,084	10,179	15,026	16,910	18,514	19,263
8	Bricks	16	4	7	8	7	10	14
9	Cement	3,425	3,286	4,394	5,601	5,651	9,711	14,047
10	Fertilizers	3,778	3,794	4,252	3,762	5,146	6,935	8,969
11	Other Chemicals	9,290	8,373	8,871	9,009	9,931	11,123	12,017
12	Grain	1,778	2,247	3,633	835	2,257	2,017	1,890
13	Potatoes	844	811	568	198	156	166	191
14	Sugar & Beets	1,295	871	1,434	721	935	888	888
15	Other Agricultural Products	3,471	2,179	2,174	2,012	2,520	2,848	3,150
16	Timber & wood Products	4,267	3,367	3,279	2,843	3,457	3,319	3,595
17	Other Products	19,601	18,981	24,784	24,662	16,022	18,457	19,337
18	Total	225,312	199,799	212,665	213,559	224,345	224,876	223,711

3.4.4 Assignment of Each Commodity

To estimate future ton-km of each commodity, the assignment of each commodity on PKP railway network is indispensable. The estimated matrices in the target year were assigned on the railway network using all-or-nothing assignment method. Table 3.4.5 shows the summary of projected railway freight transport. Transport of coal will be largely decreased. On the other hand that of others will be increasing. Total tonnage and ton-kms will be stay same level as those in 1995. Table 3.4.6 shows the typical freight flow on selected sections of railways network in 1995 and 2005. To understand the freight flow easily, assigned link volume were aggregated into three groups of coal, other commodity and total commodity. The flows of these commodity groups are shown in Fig. 3.4.2 to 3.4.7, respectively.

Table 3.4.5 Summary of Projected Railway Freight Transport

	1995		2005	
	Freight Tonnage in thousand	Ton-kms in million	Freight Tonnage in thousand	Ton-kms in million
Hard Coal	107,600	32,722	77,185	23,473
Other Commodity	116,745	36,372	146,526	45,650
Total	224,345	69,094	223,711	69,123

In 1995 48% of freight transport was hard coal. The main routes are D29 Lines No. 131 and 273 between Katowice of coal-mining area to Szczecin and Gdansk with export ports. The freight transport on D29 Line No.4 between Warszawa and Katowice is little.

The freight transport of hard coal will decrease to 72% of 1995 and traffic flows will also decrease to 64% to 72% of 1995.

Other commodity aggregating 16 commodities except hard coal includes raw material of iron ore, industrial products and agricultural products. This commodity are arrived at/departed from all PKP 223 freight stations. Comparing with the routes for hard coal transport, more railway lines are used to transport other commodity.

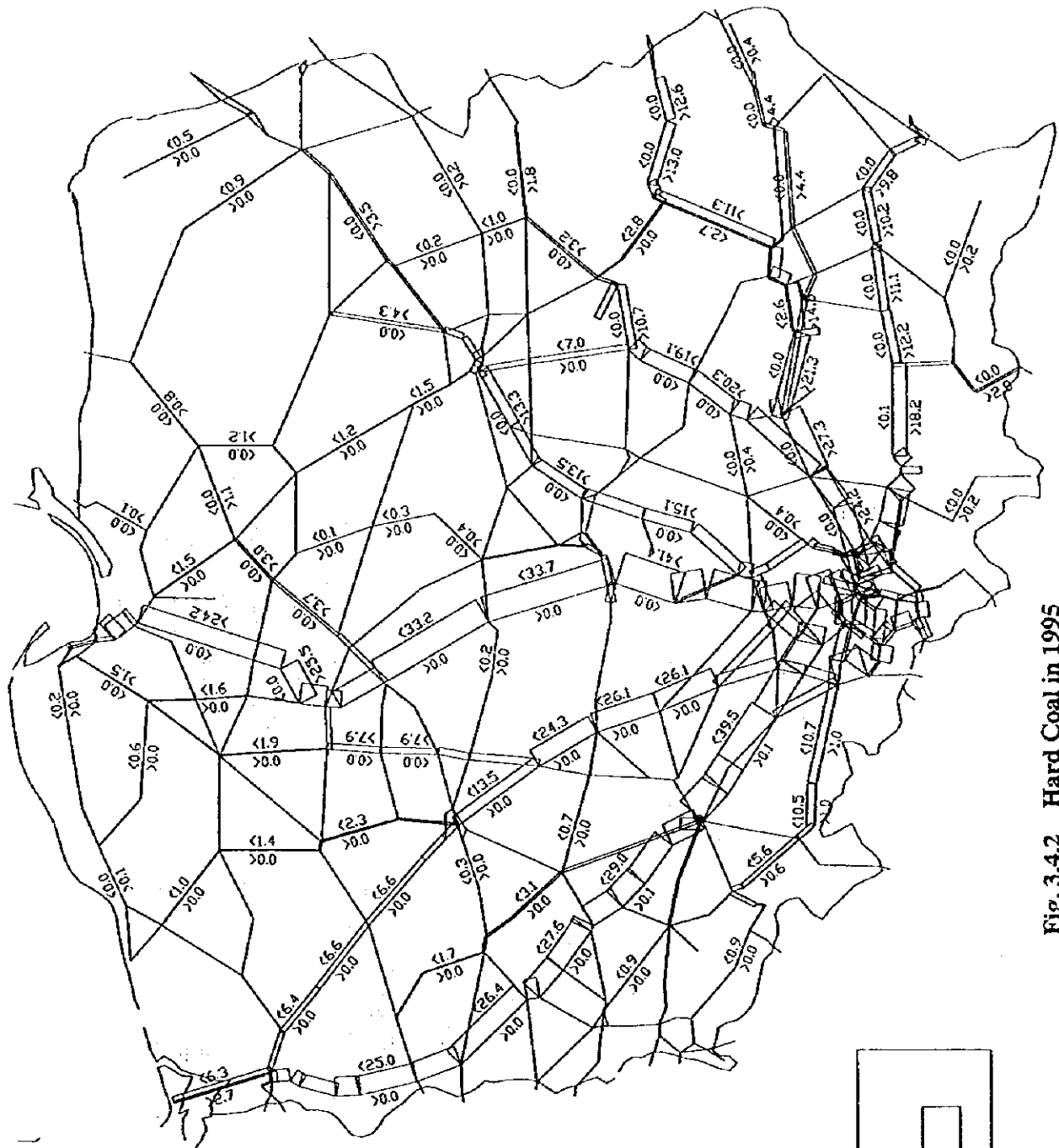
The projected transport of other commodity in 2005 will increase by 26% of 1995 and consequent growth of the traffic flows will be expected on almost all PKP lines.

Table 3.4.6 Daily Freight Flow on Selected Sections

in two-way

D29 line No	Section	Traffic Volume						Growth Rate		
		1995			2005			Coal	Others	Total
		Coal	Others	Total	Coal	Others	Total			
1	Warszawa - Katowice	0	0	0	0	0	0	0%	0%	0%
2	Warszawa - Terespol	0	1,165	1,165	0	1,468	1,468	0%	126%	126%
3	Warszawa - Kunowice	0	2,321	2,321	0	3,159	3,159	0%	136%	136%
4	Grodzisk Mazowiecki - Zawiercie	33,652	12,160	45,812	24,165	12,912	37,077	72%	106%	81%
6	Zielonka - Kuznica Bialostocka	3,233	4,313	7,546	2,318	5,798	8,116	72%	134%	108%
7	Warszawa - Dorohusk	68	8,308	8,376	49	14,206	14,255	72%	171%	170%
8	Warszawa - Krakow	6,999	13,087	20,086	5,028	18,228	23,256	72%	139%	116%
9	Warszawa - Gdansk	1,235	13,610	14,845	885	19,506	20,391	72%	143%	137%
18	Kutono - Pila	1	3,997	3,998	0	6,160	6,160	0%	154%	154%
91	Krakow - Medyka	18,237	24,449	42,686	13,101	25,611	38,712	72%	105%	91%
97	Skawina - Zywiec	234	531	765	171	669	840	73%	126%	110%
98	Sucha Beskidzka - Chabowka	213	472	685	155	594	749	73%	126%	109%
99	Chabowka - Zakopane	49	129	178	35	147	182	71%	114%	102%
131	Chorzow Batory - Tczew	39,471	7,752	47,223	28,343	10,059	38,402	72%	130%	81%
132	Bytom - Wroclaw Glowny	34,960	16,645	51,605	25,106	20,420	45,526	72%	123%	88%
133	D.G.Zabkowice - Krakow Glowny	30,986	23,971	54,903	22,256	27,720	49,976	72%	116%	91%
202	Gdansk - Stargard Szczecinski	0	699	699	0	907	907	0%	130%	130%
271	Wroclaw - Poznan	22	7,217	7,239	14	8,784	8,798	64%	122%	122%
273	Wroclaw Grabiszyn - Szczecin	29,716	18,462	48,178	21,339	22,053	43,392	72%	119%	90%
274	Wroclaw Muchobor - Gubinek	22	4,340	4,362	16	5,994	6,010	73%	138%	138%
276	Wroclaw - Miedzylesie	48	3,413	3,461	32	3,847	3,879	67%	113%	112%
351	Poznan - Szczecin	6,619	12,799	19,418	4,746	14,295	19,041	72%	112%	98%
353	Poznan Wsch. - Skandawa	931	6,785	7,716	665	8,975	9,640	71%	132%	125%
354	Poznan Pod - Pila	2,327	3,800	6,127	1,672	4,944	6,616	72%	130%	108%
404	Szczecinek - Kolobrzeg	1,019	1,743	2,762	731	2,162	2,893	72%	124%	105%
405	Pila - Ustka	1,448	2,329	3,777	1,039	2,894	3,933	72%	124%	104%

Hard Coal
in 1995



Legend

Unit:
1000 tons/day

50.0

Fig. 3.4.2 Hard Coal in 1995

Hard Coal
in 2005

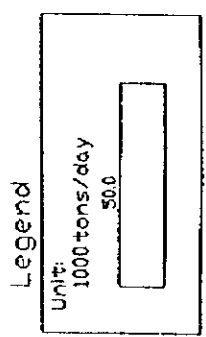
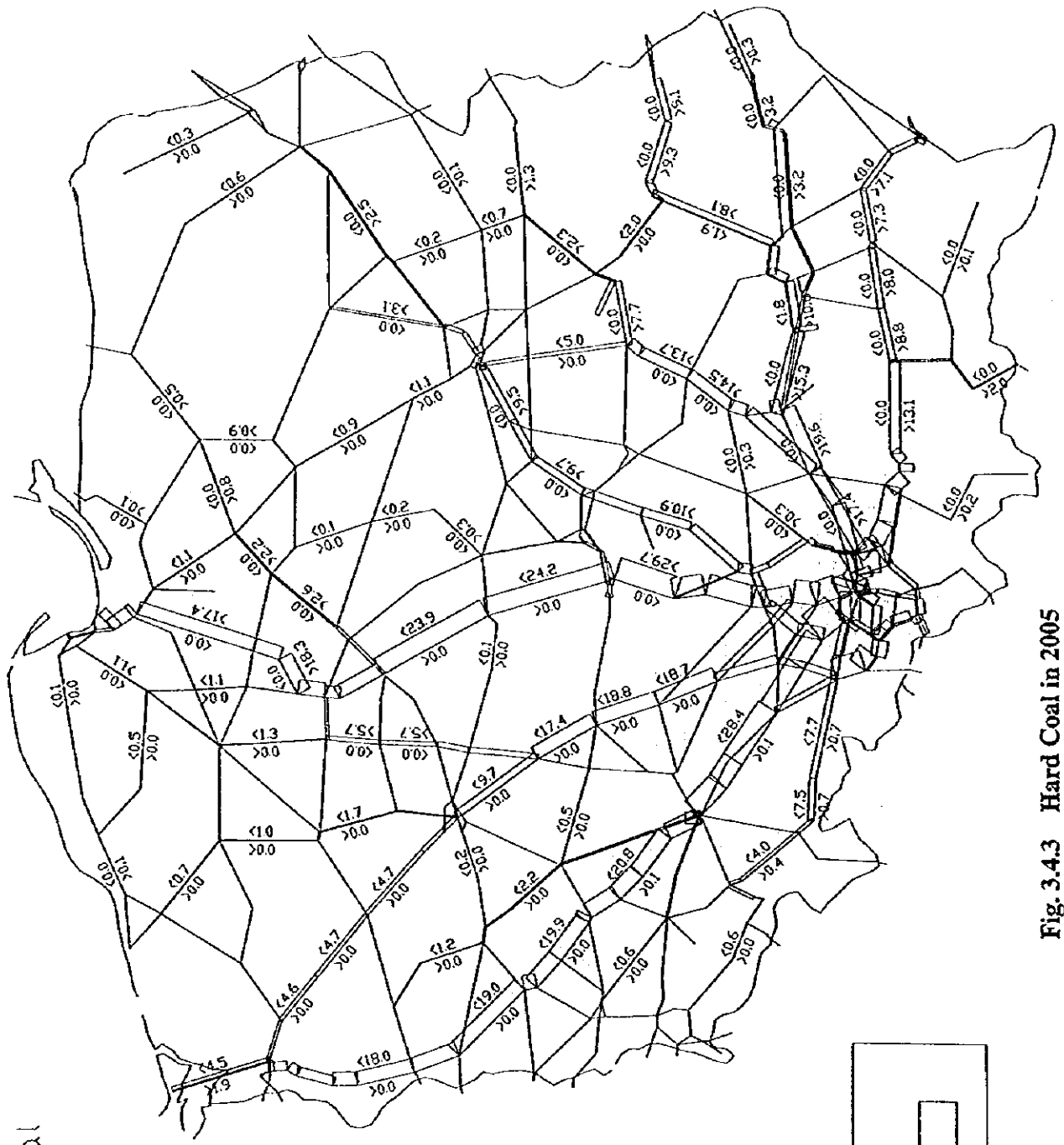


Fig. 3.4.3 Hard Coal in 2005

Other Commodity
in 1995

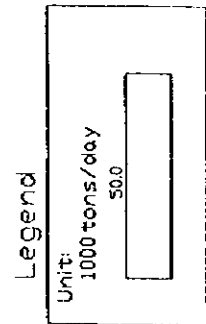
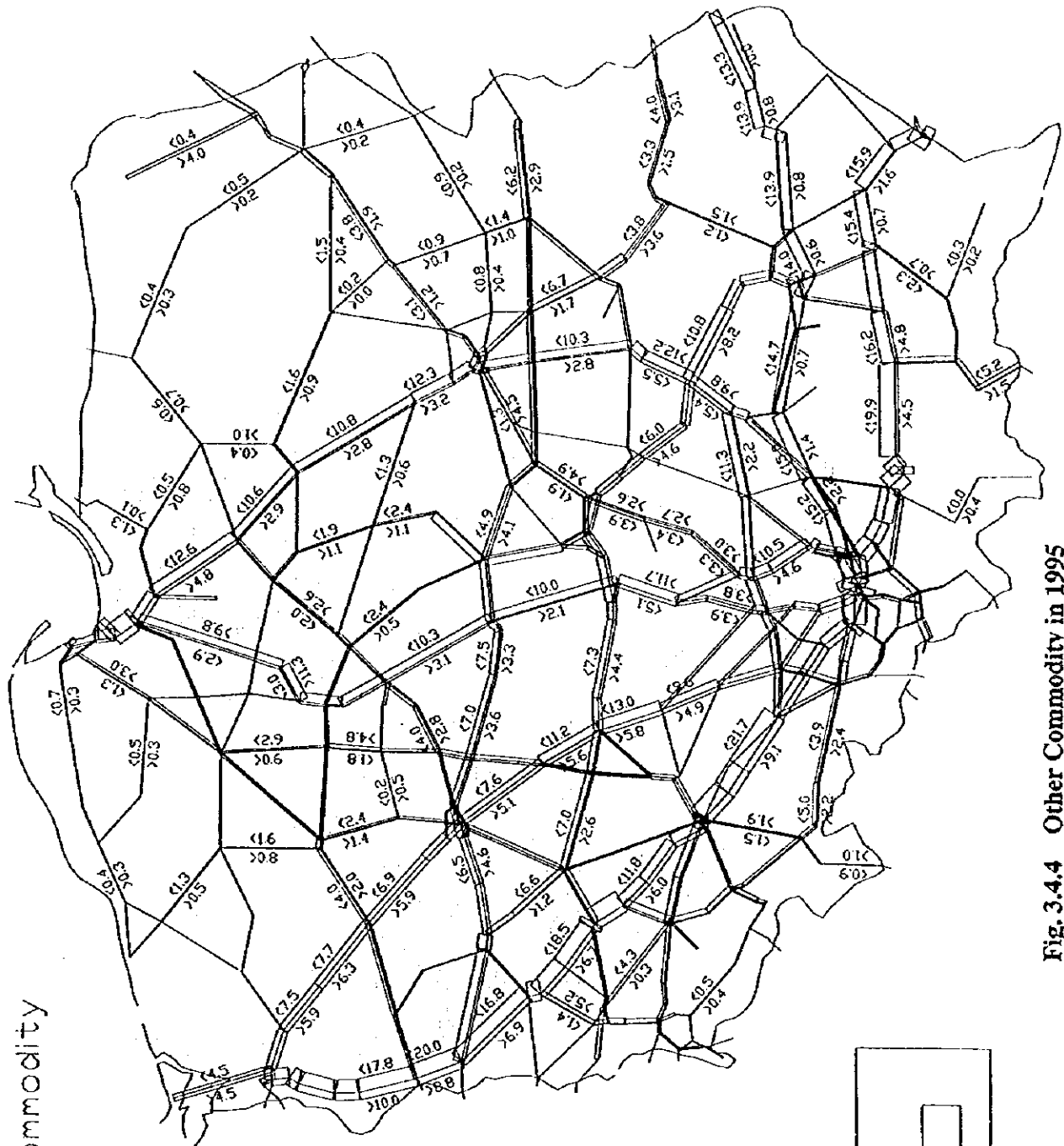


Fig. 3.4.4 Other Commodity in 1995

Other Commodity
in 2005

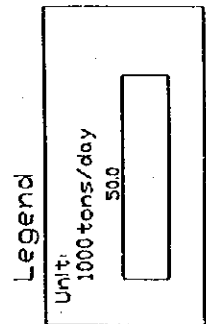
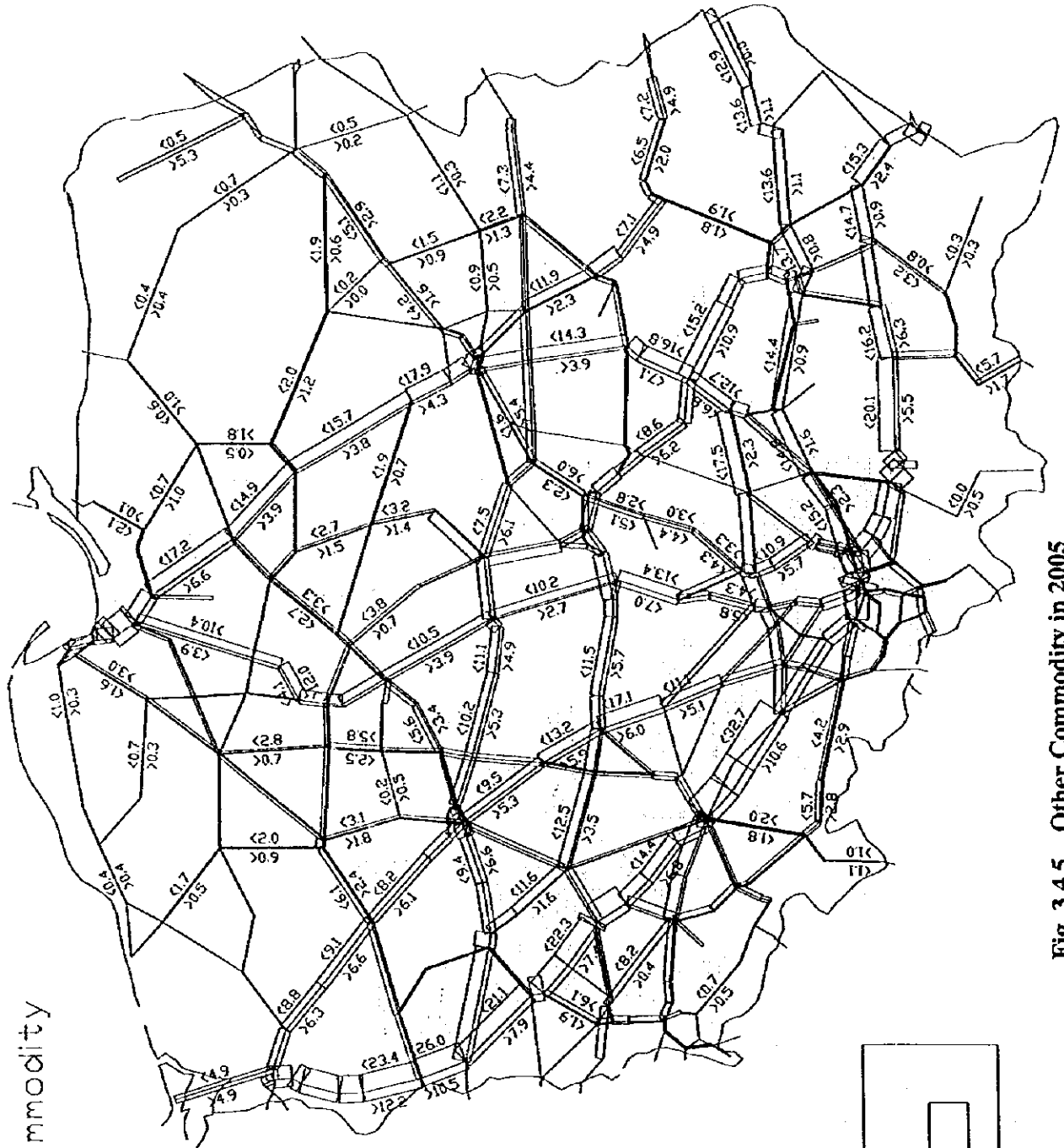


Fig. 3.4.5 Other Commodity in 2005

Total Commodity
in 1995

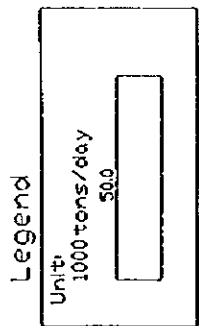
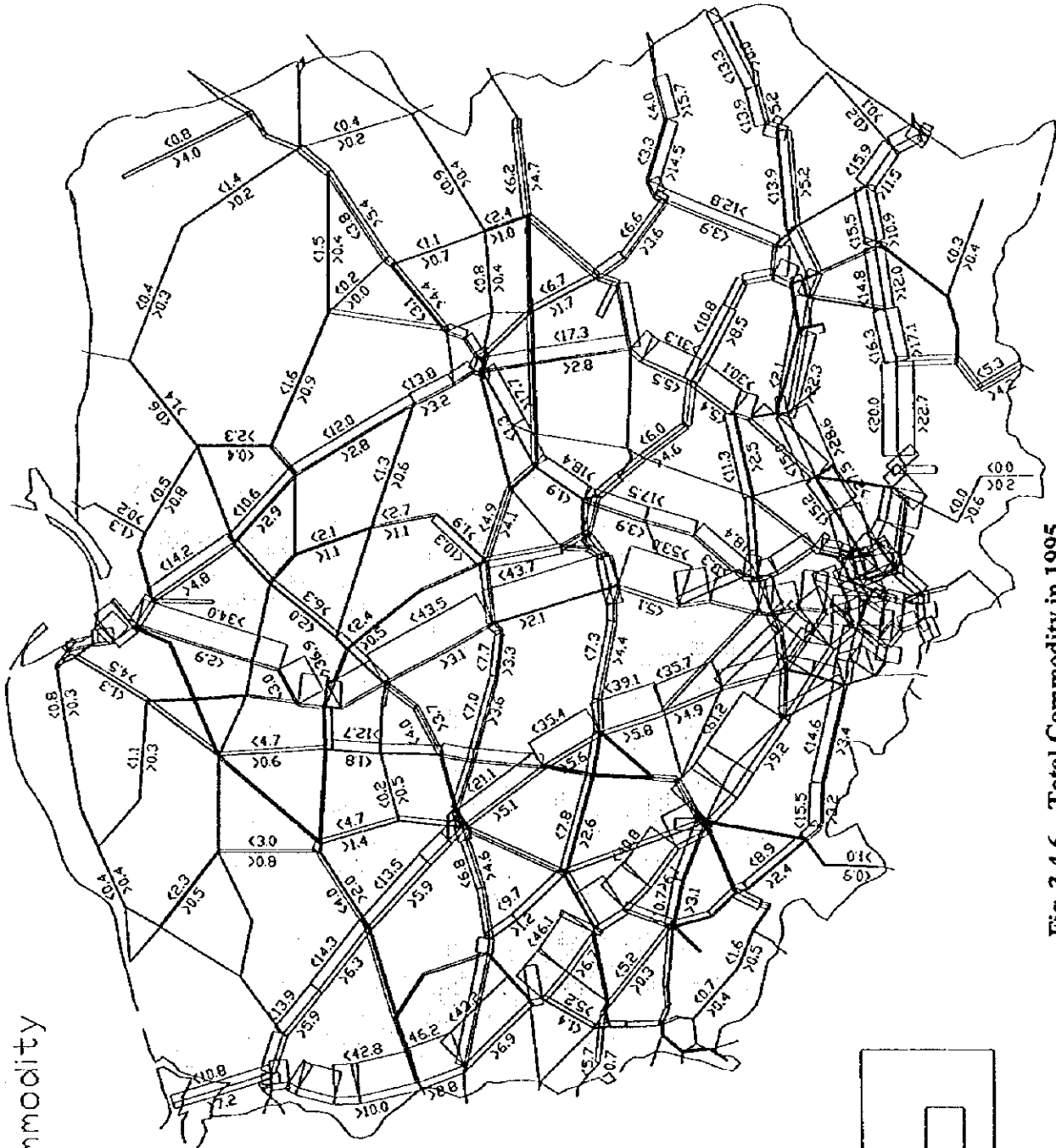


Fig. 3.4.6 Total Commodity in 1995

Total Commodity
in 2005

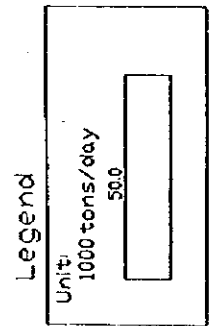
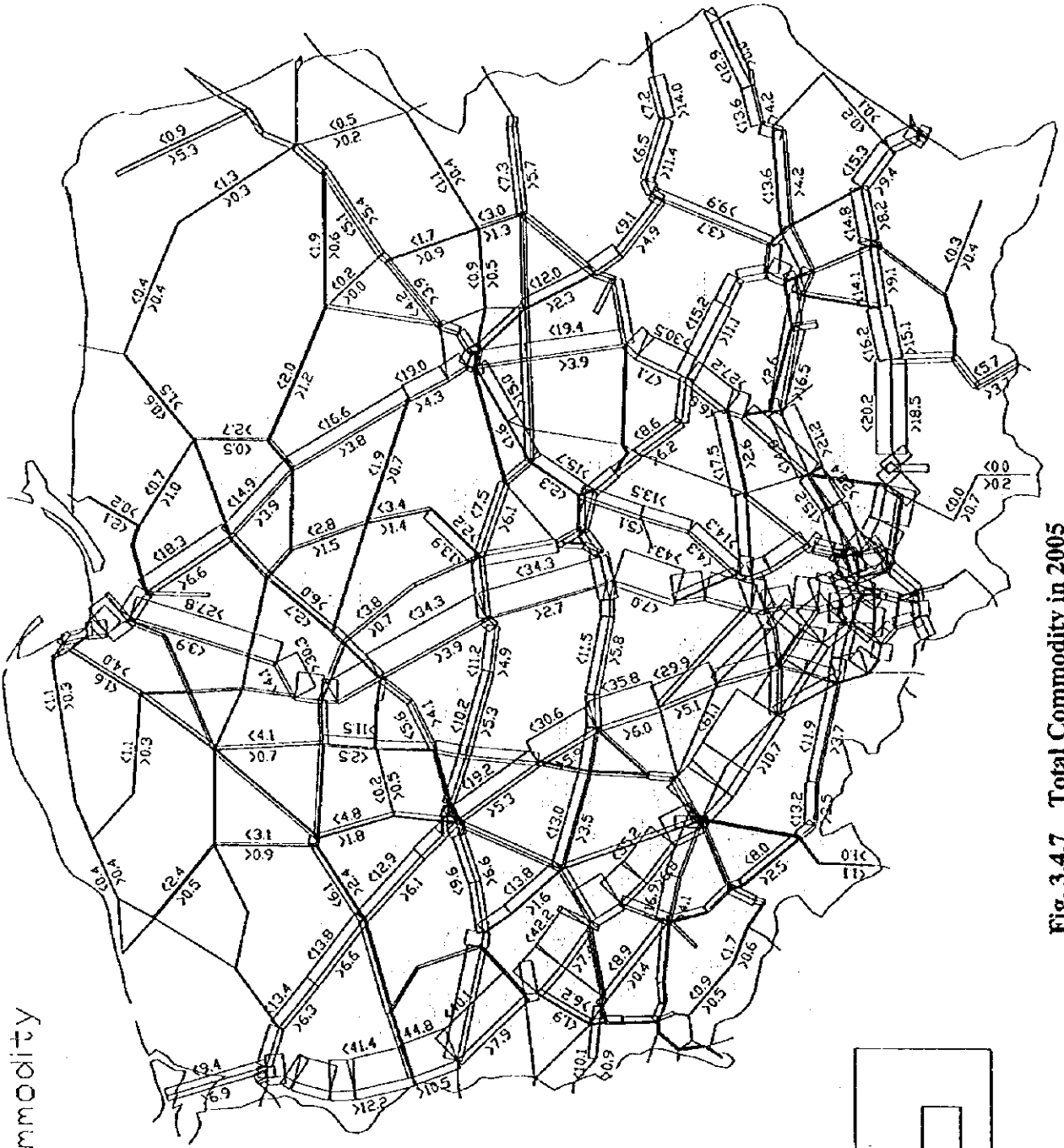


Fig. 3.4.7 Total Commodity in 2005

3.5 DESCRIPTION OF TRAFFIC SURVEYS

This section highlights the traffic surveys conducted by the Study Team to develop the model required in the transport demand forecast and clarify the current situation of PKP passenger and freight movements.

Following is a brief description of traffic surveys:

3.5.1 Outline of Surveys

(1) Traffic Surveys for Existing Railway Passenger Traffic

In order to forecast the future nationwide traffic demand for railways, it is indispensable to obtain existing railway traffic. In this study, three types of traffic surveys were carried out. These surveys are composed of aggregation of PKP ticket issue statistics, OD (origin-destination) interview survey for railway passengers on board, and SP (stated preference or opinion) survey for railway passengers.

The interview surveys have been conducted on the PKP trains in Warsaw, Gdansk and Katowice areas during the period December 2 to 21, 1996.

1) Aggregation of PKP Ticket Issue Statistics

Statistic data from PKP computer data base, which contains origin station, destination station and number of passenger trips by month, has been processed to make out passenger trip matrix among 133 main stations. This available data is for trips longer than 100 km, i.e. interregional traffic data for 1995. PKP statistic data of international passenger transport and regional ticket issue was also used to establish international railway traffic and regional railway traffic.

2) OD interview survey for railway passengers

The OD interview survey was carried out in the trains coming into agglomeration and going out of it to establish regional railway traffic in three agglomerations of Warsaw, Gdansk and Katowice. The interviewers were asking passengers on board as well as stations, preferred on board. The passengers have been asked mainly at peak hours, both morning and afternoon. Some of the interviews were done at off peak, Saturdays as well.

For OD interview survey several links of railway lines in Warsaw were chosen to carry out the survey and some 800 samples were obtained. There were 8 links in Warsaw agglomeration as follows:

Warszaw - Nasielsk (Ciechanow)
Warszaw - Tuszcz (Malkinia)
Warszaw - Minsk Maz. (Siedlce)
Warszaw - Otwock (Pilawa)
Warszaw - Warka (Radom)
Warszaw - Grodzisk Maz. (Skierniewice)
Warszaw - Sochaczew (Lowicz) and
Warszaw - Podkowa Lesna - Grodzisk Maz.

Gdansk agglomeration has different rail network than Warsaw. There is one main railway connected Gdansk, Sopot and Gdynia. The links and locations to carry out the survey were chosen as follows and some 550 samples were obtained.

Gdansk - Tczew (Elblag / Pelplin)
Gdynia - Zukowo (Kartuzy / Koscierzyna)
Gdynia - Reda (Wejherowo / Puck) and
Gdansk - Gdynia

Katowice agglomeration has also another type of railway network. Katowice is the main town and the capital of the region, but there are several another big towns surrounded Katowice, i.e. Gliwice, Bytom, Chorzow, Sosnowiec, Zabrze etc. The survey was carried out mainly in trains coming to and going out of Katowice, but several links to other towns were taken into account. The chosen links were as follows and some 600 samples were obtained.

Katowice - Sosnowiec - Zawiercie (Czestochowa)
Katowice - Jaworzno (Krakow)
Katowice - Sosnowiec - Olkusz
Katowice - Myslowice - Oswiecim
Katowice - Tychy - Bielsko Biala
Katowice - Orzesze - Rybnik / Zory
Katowice - Bytom - Lubliniec / Herby

Katowice - Gliwice - Kedzierzyn Kozle

The volume surveys were also conducted on the same rail links as described above to calibrate the regional passenger traffic. The method of carrying out the survey was to observe the rate of passenger congestion on each train in the same location as for OD survey.

3) Railway Passenger SP Survey

This survey is focused on establishing the future condition of the modal split between railways, buses and cars modes. The survey was carried out for two groups of railway users - long distance and regional trains. About two hundred and fifty passengers for each group were interviewed. They were asked about their preferences in choosing the type of train travel. For agglomeration trains the survey were conducted in connection with origin - destination survey. For long distance trains there were separated survey. Surveyors were asking passengers on board directly using survey questionnaire. Passengers have been asked about origin and destination of travel, cost and time of travel, all interviewing passengers have been asked, what would they chose, if they were not going by train. There were eight possibilities to be chosen with variable price and time of travel.

(2) Existing Bus Passenger Traffic

In order to forecast the future traffic demand for railway, it is also necessary to obtain existing competitive bus traffic. In this study, two types of surveys were carried out. These surveys are composed of review of some reports studied in recent years and S-P (stated preference) survey for bus passengers.

Following is a brief description of each of these three types of surveys.

1) Bus Passenger OD Data

The bus passenger OD data is necessary to compare with the shares of railway and bus passenger volume between big cities. There is not enough data to build national trip matrix for bus passengers. Some reports are available which can be used to prepare synthetic report containing comparison of volumes, travel time, travel cost for bus and train passengers on the same connection between two cities. The following connections were analyzed:

Warszaw - Gdynia

Warszaw - Krakow

Warszaw - Bialystok

Warszaw - Lublin

Warszaw - Bydgoszcz

Warszaw - Lodz

Analysis was carried out for two main bus companies: "Polski Express" and "Polbus - PKS".

The volume survey were also conducted on the same bus links as described above. The method of carrying out the survey was to observe the passenger congestion on the bus leaving station.

2) Bus Passenger SP Survey

The stated preference survey has been carried out for two groups of bus trips - international trips and regional trips. Two hundred and fifty passengers were interviewed for both groups. They were asked about their preferences in choosing the bus as a mode of transport. The survey form contained information about origin and destination. Surveyors were asking passengers directly using survey questionnaire, at the bus station. There were eight possibilities to be chosen with variable price and time of travel, etc.

(3) Freight Traffic

Existing Railway Freight Traffic

In order to forecast the future nationwide freight traffic demand by railways, it is indispensable to obtain existing railway freight traffic. In this study, statistic data from PKP data base for freight traffic was collected and aggregated. Following is a brief description of this work.

Aggregation of PKP Statistic Data for Freight Traffic

Statistic data from PKP data base, which contains origin station, destination station, number of commodity type, number of tones in trains and number of tones in wagons, was processed and aggregated to obtain freight trip tables among 223 main stations. This available data is for freight traffic data for 1995 including 17 commodity types. PKP statistic data of international freight transport will also be used to establish international railway freight traffic.

3.5.2 Results of SP Survey

This section gives details of the results of SP survey including the personal characteristics and trip characteristics of passengers interviewed during the rail and bus passenger SP

surveys.

(I) Personal Characteristics

This section gives details of the personal characteristics of passengers interviewed during the rail passenger survey. In particular, this section reports the sample by gender, age, working status and income, etc.

The distribution of age by gender is presented in Tables 3.5.1 to 3.5.3.

More than half of respondents were men and 63% of railway passengers were 20 to 39 years of age. Almost 70% of bus passengers were 10 to 29 years of age and high utilization of bus by teens were admitted. Passengers over 60 years of age were few for both railway and bus.

Table 3.5.1 Gender by Age (Railway passengers)

Age (years)	Railway					
	Male		Female		Total	
	N	%	N	%	N	%
<10	0	0%	0	0%	0	0%
10-19	8	3%	21	10%	29	6%
20-29	109	39%	84	39%	193	39%
30-39	62	22%	55	25%	117	24%
40-49	45	16%	22	10%	67	13%
50-59	27	10%	20	9%	47	9%
60-69	23	8%	10	5%	33	7%
70-79	4	1%	3	1%	7	1%
80-89	0	0%	1	0%	1	0%
90<	1	0%	2	1%	3	1%
Total	279	100%	218	100%	497	100%

Table 3.5.2 Gender by Age (Bus passengers)

Age (years)	Bus					
	Male		Female		Total	
	N	%	N	%	N	%
<10	0	0%	0	0%	0	0%
10-19	19	16%	34	26%	53	21%
20-29	61	51%	61	47%	122	49%
30-39	10	8%	10	8%	20	8%
40-49	11	9%	10	8%	21	8%
50-59	9	8%	7	5%	16	6%
60-69	7	6%	7	5%	14	6%
70-79	3	3%	1	1%	4	2%
80-89	0	0%	0	0%	0	0%
90<	0	0%	0	0%	0	0%
Total	120	100%	130	100%	250	100%

Table 3.5.3 Gender by Age (Total)

Age (years)	Total					
	Male		Female		Total	
	N	%	N	%	N	%
<10	0	0%	0	0%	0	0%
10-19	27	7%	55	16%	82	11%
20-29	170	43%	145	42%	315	42%
30-39	72	18%	65	19%	137	18%
40-49	56	14%	32	9%	88	12%
50-59	36	9%	27	8%	63	8%
60-69	30	8%	17	5%	47	6%
70-79	7	2%	4	1%	11	1%
80-89	0	0%	1	0%	1	0%
90<	1	0%	2	1%	3	0%
Total	399	100%	348	100%	747	100%

Table 3.5.4 reports the occupation of the sample. The results shows that 43% of railway passengers were worker, whilst 26% were student. On the other hand 47% of bus passengers were student, followed by worker.

Table 3.5.4 Occupation

Occupation	Railway		Bus		Total	
	N	%	N	%	N	%
intellectual	115	23%	41	16%	156	21%
worker	213	43%	55	22%	268	36%
pupil, student	98	20%	117	47%	215	29%
retired	33	7%	26	10%	59	8%
other	13	3%	7	3%	20	3%
unemployed	24	5%	4	2%	28	4%
missing data	1	0%	0	0%	1	0%
Total	497	100%	250	100%	747	100%

The monthly income of the sample is presented in Table 3.5.5. Except for missing data, 28% of railway passengers and 58% of bus passengers were on a monthly income of below PLN 500. The number of these passengers coincided with the total of students and retired in the classification of occupation. About 90% of bus passengers were also on a monthly income of under PLN 1,000.

Table 3.5.5 Monthly Income

Monthly income	Railway		Bus		Total	
	N	%	N	%	N	%
up to PLN 500	114	23%	110	44%	224	30%
PLN 500-1000	133	27%	58	23%	191	26%
PLN 1000-1500	62	12%	12	5%	74	10%
PLN 1500-2000	24	5%	5	2%	29	4%
over PLN 2000	69	14%	3	1%	72	10%
missing data	95	19%	62	25%	157	21%
Total	497	100%	250	100%	747	100%

(2) Trip Characteristics

This section focuses on the key trip characteristics of the sample. These include journey purpose, frequency, station origin and destination. This section reports the details of the trip segmented by whether passengers perceived they could have travelled by an alternative mode (to train or bus).

Table 3.5.6 shows respondents' alternative mode and its availability. 85% of railway passengers and 95% of bus passengers have alternative modes. Over half of the alternative mode, would select railway, though they could use both railway and bus modes.

Similarly, 36% of bus passengers with both alternatives would select bus.

Table 3.5.6 Alternative Mode

Railway passengers			Bus passengers		
Alternative mode	N	%	Alternative mode	N	%
PKS bus	129	26%	train	96	38%
car	224	45%	car	127	51%
other mode	71	14%	other mode	14	6%
Would not travel at all	73	15%	Would not travel at all	13	5%
Total	497	100%	Total	250	100%

Table 3.5.7 shows respondents' rail trip frequency segmented by whether an alternative mode of making the surveyed journey was available.

Tables 3.5.8 and 3.5.9 show respondents' bus trip frequency and total frequency in the same way, respectively.

Over half of respondents will travel less than once a week. 53% of railway passengers and

63% of bus passengers responded so, whilst 16% of railway passengers and 18% of bus passengers will travel every weekday.

47% of railway passengers without an alternative mode responded that they traveled every weekend or more than once a week. On the contrary almost bus passenger traveled once a week. There is a noticeable difference in the disadvantage and inconvenience without an alternative mode between railway and bus passengers.

**Table 3.5.7 Trip Frequency by Whether Respondent has an Alternative Mode
(Railway passengers)**

Frequency	Railway					
	With an alternative		No alternative		Total	
	N	%	N	%	N	%
every weekday	60	14%	21	29%	81	16%
more than once a week	81	19%	13	18%	94	19%
once a week	49	12%	9	12%	58	12%
less than once a week	234	55%	30	41%	264	53%
Total	424	100%	73	100%	497	100%

**Table 3.5.8 Trip Frequency by Whether Respondent has an Alternative Mode
(Bus passengers)**

Frequency	Bus					
	With an alternative		No alternative		Total	
	N	%	N	%	N	%
every weekday	44	19%	0	0%	44	18%
more than once a week	28	12%	0	0%	28	11%
once a week	18	8%	3	23%	21	8%
less than once a week	147	62%	10	77%	157	63%
Total	237	100%	13	100%	250	100%

**Table 3.5.9 Trip Frequency by Whether Respondent has an Alternative Mode
(Total)**

Frequency	Total					
	With an alternative		No alternative		Total	
	N	%	N	%	N	%
every weekday	104	16%	21	24%	125	17%
more than once a week	109	16%	13	15%	122	16%
once a week	67	10%	12	14%	79	11%
less than once a week	381	58%	40	47%	421	56%
Total	661	100%	86	100%	747	100%

The respondents' journey purposes with / without an alternative mode are reported in Tables 3.5.10 to 3.5.12. Most part of the samples (37% of railway passenger and 43% of bus passenger) were traveling on employer business or personal business. Following these purposes, 29% of railway passengers traveled on other purposes of shopping, family friends visiting, sport, etc., and 26% of bus passengers traveled to school.

Though the respondents' journey purpose should be analyzed considering with the time zone surveyed, the result will be justified with the fact that almost bus passenger were students.

Considering whether respondent has an alternative mode or not, all the bus passengers with journey purposes of work, school and other had an alternative mode, whilst 34 railway passengers with journey purposes of work (27 respondents) and school (7 respondents) had not an alternative mode.

**Table 3.5.10 Purpose by Whether Respondent has an Alternative Mode
(Railway passengers)**

Purpose	Railway					
	With an alternative		No alternative		Total	
	N	%	N	%	N	%
work	74	17%	27	37%	101	20%
school	55	13%	7	10%	62	12%
tourist, recreation, leisure	4	1%	1	1%	5	1%
employer business, personal business	169	40%	17	23%	186	37%
other	122	29%	21	29%	143	29%
Total	424	100%	73	100%	497	100%

**Table 3.5.11 Purpose by Whether Respondent has an Alternative Mode
(Bus passengers)**

Purpose	Bus					
	With an alternative		No alternative		Total	
	N	%	N	%	N	%
work	32	14%	0	0%	32	13%
school	64	27%	0	0%	64	26%
tourist, recreation, leisure	25	11%	6	46%	31	12%
employer business, personal business	101	43%	7	54%	108	43%
other	15	6%	0	0%	15	6%
Total	237	100%	13	100%	250	100%

**Table 3.5.12 Purpose by Whether Respondent has an Alternative Mode
(Total)**

Purpose	Total					
	With an alternative		No alternative		Total	
	N	%	N	%	N	%
work	106	16%	27	31%	133	18%
school	119	18%	7	8%	126	17%
tourist, recreation, leisure	29	4%	7	8%	36	5%
employer business, personal business	270	41%	24	28%	294	39%
other	137	21%	21	24%	158	21%
Total	661	100%	86	100%	747	100%

3.5.3 Railway Passenger Behavioral Model

To develop railway passenger behavioral model, the binomial logit model which has been already described in section 3.3.5 Modal Choice Model was adopted. In SP survey eight scenarios were prepared as shown in Table 3.5.13.

Table 3.5.13 Scenarios Prepared for SP Survey

Scenario	Definitely prefer train	Probably prefer	Not sure	Probably not prefer train	Definitely not prefer train
Time 100% x Fare 120%					
Time 100% x Fare 140%					
Time 80% x Fare 100%					
Time 80% x Fare 120%					
Time 80% x Fare 140%					
Time 60% x Fare 100%					
Time 60% x Fare 120%					
Time 60% x Fare 140%					

In modeling, time and cost (fare) were assumed as the explanatory variables including a choice constant. Parameters were obtained for each explanatory variables, using the Most Likelihood Estimation method. The estimation, however, was conducted by the group of trip purpose, because preliminary analysis showed there were some difference in the choice tendency by trip purpose. The estimation results are shown in Table 3.5.14.

Table 3.5.14 Estimation Results of SP Model for Long Distance Train

Purpose : Business			
Variable		Estimated Coefficient	t-Values
Level of Service	Time in Train	-0.01058542	-2.7448
	Fare	-0.22599060	-5.2807
Constant		-2.103971	-4.7970
Chi-square		46.0282	
I*(0)		-105.7190	
I*(*)		-82.7049	
Roh square		0.2177	
Estimated Time Value		0.0468 PLN/min.	
Purpose : Private & Recreation			
Variable		Estimated Coefficient	t-Values
Level of Service	Time in Train	-0.01006744	-2.0407
	Fare	-0.29058900	-3.6464
Constant		-2.071974	-3.1056
Chi-square		25.3780	
I*(0)		-44.1045	
I*(*)		-31.4155	
Roh square		0.2588	
Estimated Time Value		0.0346 PLN/min.	
Purpose : All Purposes			
Variable		Estimated Coefficient	t-Values
Level of Service	Time in Train	-0.00971716	-3.2576
	Fare	-0.24532640	-6.6636
Constant		-2.219059	-6.1621
Chi-square		73.9295	
I*(0)		-154.6162	
I*(*)		-117.6515	
Roh square		0.2309	
Estimated Time Value		0.0396 PLN/min.	

APPENDIX 4

EU'S TRANSPORT POLICY AND STATUS OF REFORM

4.1 EU'S TRANSPORT POLICY

The basic principle of the Rome Treaty, which stipulates the foundations for the establishment of the EU, states that the primary objective of the establishment of the EU is to create a uniform and integrated regional market through the creation of a common market and the enforcement of common policies by EU member states. Accordingly, it aims to realize the development of a harmonious market equilibrium in the EU region. To achieve this, it is essential to guarantee the movement of people, goods, services and capital within the region, and form borderless single movements in the region concerned. Among them, it must be said that the role of the transportation department is considerable especially for people and goods. To ensure the free movement of people and goods, it is vital to establish a united transportation market within the region. Thus, in the early days the European Commission's top priority was to harmonize the transportation market in different countries. However, the EU changed its policies in response to resistance encountered from state nationalism. Today EU basic policy is to create a free, common market within the EU region by the abolition and liberalization of market-entry regulations imposed on the transport businesses within member countries. Under this policy, the European Commission has taken liberalization measures in the field of land, marine and air transportation. Although quarrels do break out at times with member states periodically responding more to their domestic situation rather than liberalization, the European Commission has maintained its commitment to progress transport sector liberalization and deregulation.

4.2 RAILWAY REFORM STATUS

In EU countries, the worsening financial position of railways due to the decreasing use of railways is emerging as a social issue. In fact, it has become a major policy issue to restore their financial condition. As of 1994, the loss of EU railways as a whole amounted to 112 543 billion ECU, indicating that railways are losing market share. Between 1970 and 1994, the share of passenger transportation fell from 10.3% to 6.2% in person-km, and that of freight

transportation declined from 31.7% to 14.9% in ton-km. The falling popularity of railways is particularly acute for freight, and the European Commission (an organization serving as the government for the ECU) estimates that railway freight transportation might disappear from the ECU in 2010 unless something is done about it.

Under these circumstances, the European Commission has applied various measures to improve the constitution of the railway business rather than to deregulate, in order to boost the railways' competitiveness against other modes of transportation to stabilize and improve the financial status of railways. Currently, ECU railway policies are enforced on the basis of the EC Directive adopted in 1991 (91/440/EEC) concerning:

- 1) Autonomous management of railway companies;
- 2) Separate management of infrastructure and operation (in other words, the vertical separation of management);
- 3) Improvement of public-railway companies' financial status; and
- 4) Open access to railway infrastructure in different countries;

In addition to these, with regard to the railway-business license standards and the method of sharing the rights to use infrastructure as well as calculation standards for fees and dues required by EEC Directive 91/440, Directive 95/18 (June 19, 1995) has been adopted to provide for the former and Directive 95/19 (June 19, 1995) for the latter.

EU member states were required to enforce laws and ordinances and carry out railway reforms necessary to comply with the EU Directive domestically by 1993. There are 9 countries which deemed to have completed the process hitherto, namely, Austria, Denmark, Finland, France, Germany, Ireland, Holland, Sweden and Britain. On the other hand, Belgium, Italy, Luxembourg and Spain have still not fulfilled open-access requirements, and Portugal and Greece have not yet applied the Directive domestically. In response, at the Court of Justice, the European Commission is currently suing these countries which have failed to carry out sufficient railway reforms under the EU Directive.

4.3 PRESENT STATUS OF RAILWAY REFORM IN PRINCIPAL EU NATIONS

1) Britain

Britain is the country where railways originated, but the situation was problematic due to delays in the development and renewal of infrastructure. On January 1, 1994 a decision was made to divide British Rail (BR) into 60 companies, including one infrastructure business Railtrack, 25 passenger carriers, 5 freight forwarders and 3 rolling stock leasing businesses, and sell them by open bidding. Although the sales of railway companies were believed to be rather difficult excluding some companies, contrary to expectations, 13 passenger-carrier and 3 freight-forwarding businesses were sold to the private sector by March, 1996. In general, the division and sales of railways are highly evaluated for bringing about such benefits as faster services and lower fares, but in Britain there still are arguments against it on the grounds that the fractionation of railways confuses the customers. Therefore, if the Conservative Party, which has been eager to divide and privatize railways, loses in the next general election and the Labor Party comes into power, such dramatic division/privatization of railways might be brought to halt.

2) Germany

Compared with Britain, Germany has been carrying out division and privatization progressively in stages. On January 1, 1994, the national railways of former West Germany (DB, Deutsch Bundesbahn) and former East Germany (DR, Deutsch Reichsbahn) were united. As part of this process, the operations department (excluding those in charge of dealing with administrative duties, surplus labor and debts) was separated and formed into a stock corporation called DBAG, financed 100% by the German government. Its respective internal organizations covering the railway infrastructure sector, passenger transportation sector and freight transportation sector were separated and established as independent entities, both in accounting and organizational separation. To achieve the separation/ independence of the three companies in charge of these 3 different sectors by 1998, DBAG plans to make them into three independent stock companies under one holding company. The idea is to dissolve

the holding company and complete the privatization process within 5 years of the target year, that is, in the beginning of 21st century. As part of structural reform, short-distance passenger transportation services controlled by the national railways under the government (which used to be the case for all services) are now under the authority of local governments.

3) France

The reform of French National Railways (SNCF) has been facing severe difficulties, being terminated by massive strikes which broke out in the end of 1995. Nonetheless, the latest French government railway-reform plan aims to make the government develop the infrastructure which has been done conventionally at the national railway's expense; and transfer the ownership of the infrastructure to the new public infrastructure corporation EPIC to be established on January 1, 1997. This implies that the national railway is to rent the infrastructure and pay renting fees to EPIC. French railway reform is distinctive in the sense that it aims to keep railways under public management in this manner (there are no plans to privatize neither the infrastructure nor operations department), differing significantly from the British case.

4.4 EU'S RAILWAY POLICY IN THE FUTURE

On July 30, 1996, the European Commission announced the EU White Paper entitled "A Strategy for Revitalizing the Community's Railways", hammering out railway policy direction. As an emergency measure to revitalize the railways, the White Paper advises exemption of railway companies from the duty to pay for losses and to promote the separation of the management of the infrastructure department and railway operation department in railway companies, and proposes a freight-train freeway plan. Among EU member states, however, there are arguments for and against EU's further instructions on railway reform. France, Spain, Belgium, Portugal and Austria have expressed their doubts over the new measures proposed by the White Paper. In particular, France is strongly opposed to the idea, and claims that the enforcement of these new measures would be nothing but mechanical and unrealistic

considering that at present the EU Directive (91/440/EE) requiring member states to separate, in the accounts, the infrastructure and railway operations departments in railway companies has not been followed by some countries (Greece and Portugal), or where followed, not sufficiently (Spain, Belgium, Luxembourg). France also expresses concerns over the inevitable social impact (such as massive lay-offs associated with the streamlining of business) that would follow if the measures to revitalize railways are taken as the White Paper suggests. The White Paper also proposes a plan to make international lines formed by interconnecting railway lines designated by the countries become freeways open to the general public, so that people could utilize those lines (to operate freight trains). This assumes that the management of the operation of freight trains is centralized to meet the transport demand and common fares are set in advance. Many member states have responded favorably to this plan, and in October, 1996, agreed to establish a working group to study the problems that might arise in practice if the freeway plan is realized. Nonetheless, France, Spain, Portugal and Finland being against the idea of establishing these working groups are likely to refuse participation. To begin with, the working group is studying and experimenting with two routes linking Sweden and Italy, Rotterdam and Eastern European countries in order to see if they could be transformed into freeways by 1997.

APPENDIX 5

PRIVATIZATION EXPERIENCE IN JAPAN & MAJOR COUNTRIES

5.1 PRIVATIZATION OF THE JAPANESE NATIONAL RAILWAYS

5.1.1 Processes until privatization of the Japanese National Railways

(1) Background

The Japanese National Railways (JNR) started to have losses from 1964 due to the rapid progress in motorization and delays in responding to the market needs in 1960s which in turn reduced its market share in the transportation sector. Thus, the government legislated the Financial Reconstruction Act and established a 10-year reconstruction plan in 1969 in order to reconstruct its finances, and implemented various measures such as the revision of fares, assistance of the construction costs, reductions in the employment, discontinuation of slack local lines, and so on. However, the operating situations continued to worsen due to reduced productivity resulting from the conflicts between the capital and labor, failing freight transportation, substantial increases in the physical fees and labor costs, and others. Thereafter, repeated financial reconstruction plans and management improvement plans were established by the government and JNR in 1973, 1977, and 1981, however, the management of JNR was not improved by any of these measures.

Since then, the deficit of JNR increased year after year, and the financial spending by the government for the JNR became a substantial burden, and its long term debts substantially increased. As the result, the payment of the interest alone exceeded 30% of its total operating income in 1984. Thus, the government was obliged to implement a drastic measure to reform the JNR in order to cope with its management collapse.

(2) Procedure for the privatization

Since the national financial situations were worsened in early 1980, the government established the "Second Occasional Administration Investigation Committee" in 1981 as an advisory committee to the prime minister, and commenced reformations of the burden businesses such as JNR and others. In July, 1982, the committee made a recommendation to divide the JNR into seven blocks and to privatize them, and to establish another new

legitimate committee to tangibly determine the contents of the division and to settle the assets and debts of the JNR. The government established the "JNR Reconstruction Supervisory Committee" at the Prime Minister's Office to have it review a drastic improvement measure to reform the JNR.

After holding 130 or more meetings, the committee submitted a recommendation report to the prime minister in July, 1985.

Tangible and detailed recommendations were included in the report to reform the JNR, which recommended dividing the JNR into six passenger railway companies and one freight railway company, to privatize them, to establish a liquidation corporation to implement the measures such as the management of the long term debts, assets, and surplus labor after disassembling the JNR.

In 1986, the government prepared the as many as eight bills for the reconstruction of JNR based on the recommendations made by the committee and submitted them to the Diet.

The bills were legislated in November, 1986 after heated argument at the Diet among the government party and opposition parties. As the result, it was decided to divide the JNR and privatize the divided companies starting in April, 1987.

5.1.2 Current situations on the privatization of the JNR

(1) Form

It was judged appropriate to divide and privatize the JNR in order to implement the management that best matches with the real situations for a given local area and to stimulate the competition consciousness since the basic reasons for the collapse of the JNR lay in its system; the public corporation and nationally centralized organization

The JNR was divided into six passenger railway companies and one freight railway company after taking into consideration the actual flow situations of the passengers and freights, actual operating situations of the trains, technical problems anticipated after the division, minimization of the costs after the division, management basis for the respective companies after the division, etc.

Consideration were made for the three companies with weak management basis to exempt them from taking over the long term debts and to establish the management fund to stabilize their operation so that the operating profit can be secured by added the interest to their income. The amount of the fund was determined to give the operating profit of 1% after calculating the operating situations for those three companies.

The incorporated company was the most suitable as the management form, however, it was decided to form special companies to begin with, which were forcibly established under the initiative by the government in order to smoothly and positively materialize the division and privatization of the JNR. Although the capital for these special companies were initially paid 100% by the Japan National Railways Settlement Corporation (JNRSC), it was decided that their stocks be sold and to converted into genuine private companies as soon as their management bases had been established.

(2) Capital

The capital for each company was calculated based on the guideline which was set to 20% of the expected operating income. The total sum of the capital for the six passenger railway companies was Yen 440.5 billion with the total number of shares of 8.81 million. The same for the freight railway company were Yen 19 billion and 380,000 shares, respectively. The shares of the JR East was sold to the market by 62.5% in 1993, and those of the JR West by about 68.3% in 1996. Other stocks will be sold to the market after taking into the consideration the situations in the Japanese stock exchange market, operating basis of the respective companies, and so on.

(3) Management of the assets such as the real estate and others

The assets owned by the JNR were taken over to the newly established JNRSC and each of the divided companies. The Shinkansen lines and their assets were initially transferred to the Shinkansen Holding Corporation, which in turn leased them to the respective JR companies. However, they were sold to the three JR companies in 1990 in order to enable them to depreciate the costs thereof which was not possible with the lease system.

The JNRSC took over the stocks for the respective JR companies and surplus real estate owned by the JNR that was not used for the railway business. The total area of the real estate taken over was as much as 8,800 hectares, which was estimated to be sold at the price of Yen 7.7 trillion in April, 1987.

The respective JR companies took over the minimum assets including the real estate that was required for them to continue the business. It was decided to apply the book value for the business assets, current price for the assets of the related businesses and lodgings, and re-procurement price for the transfer price of Shinkansen lines when assessing the values of the assets including the real estate.

(4) Management of the past debts

The JNR had a total long term debts of Yen 37.2 trillion which included the accumulated debts of Yen 25.4 trillion, pension liability, and others. However, since it was expected that none of the JR companies would be able to make profit if they were to take over all the long term debts, it was decided that the respective JR companies take over the long term debts by a total of Yen 14.5 trillion, which included Yen 8.4 trillion that corresponded to the assets taken over from JNR, and the rest was transferred to the JNRSC. For the long term debts of Yen 22.7 trillion transferred to the JNRSC, it was expected in 1987 to repay 8.9 trillion by selling the stocks and real estate, and the remaining Yen 13.8 trillion be borne by the government.

Although the debts borne by the respective JR companies are now being repaid smoothly due to their favorable operating conditions, however, the debts of the JNRSC has become a serious problem since it increased due to the delays in selling the real estate and stocks and the interest burden has exceeded Yen 1 trillion.

(5) Management of the surplus labor

The optimum employment level was calculated to be 168,000 persons by the JNR reconstruction Supervisory Committee based on those for the private railway companies while JNR had a total employment of 277,000 persons in April, 1986. Thus, it was decided that the respective JR companies should employ a total of 200,000 persons after including additional 20% employment to the said optimum employment level. Thus, the government strongly worked with the nation, local autonomies, and general industries to employ the remaining 77,000 persons to be laid off. As the result, 39,000 persons were employed in the civil sector and 7,000 persons in the public sector, respectively.

47,000 persons were employed and 6,000 persons retired. The balance of 24,000 persons were transferred to the JNRSC and efforts were made to enable them to find a new job within a period of three years. As the result, most of them were employed, except for about 1,000 persons who didn't wish to find other jobs, and the measure for the surplus labor was completed.

(6) Handling of the unprofitable lines

The JNR Management Reconstruction Promotion Act legislated in 1980 specified that the unprofitable lines be abandoned or replaced by buses. At that time, the JNR had a total of 245 running lines and operating distance of 22,460 km, which were divided into 70 trunk lines for the distance of 12,300 km and 175 local lines for the distance of 10,160 km, respectively. A given line was regarded to be a local line if the number of its daily passengers was less than 8,000 persons. The local lines were further divided into two groups; the lines subject to shifting (83 lines for the distance of 3,160 km) and others (92 lines for the distance of 7,000 km). The selection criterion for the former was the passengers of less than 4,000 persons per day and kilometer. Thus, the lines subject to the shifting were either replaced by the bus or transferred to a third sector after splitting them from the JNR.

In order to stimulate the shifting from the JNR to either the bus, or railway operated by the third sector, the government granted a subsidy for all the amount for the loss of a given bus line and 50% of the same for a given railway operated by a third sector for a period of five

years, if the loss was declared by any one of them. In addition, the government also granted another subsidy of Yen 30 million per kilometer for the lines replaced by the bus.

5.1.3 Characteristics of the privatization with JNR

The reformation of JNR was commenced due to the financial reasons in view of its collapsed management.

The management at the JNR was understood to have collapsed due to the reasons such as that it continued uniform management all over the nation as a huge organization under the public corporation system, it was interfered with the government, it lacked independence of management, it permitted abnormal relationship to last between the capital and labor, the scope of its businesses was limited, it continued uniform management, it lacked consciousness of competition, and others.

Thus, it was judged necessary to properly settle the huge amount of debts and to eliminate the system that required excessive employment in addition to dividing and privatizing it in order to reconstruct the JNR business.

The JNR was divided by the area based on the expectation that it would be possible for the respective companies to become independent and declare profit after making some devices when viewed from the transportation density of the Japanese railways and the advantage to use the railway.

Based on the policy, the government allocated the debts to each of the divided companies based on their expected operating incomes, and exempted some of them from being allocated with the debts while granting the fund to stabilize their operation at the same time.

In addition, an incorporated company (JNRSC) was established to smoothly promote the division and privatization of the JNR in order to settle its long term debts and to provide a safety net for the surplus labor.

The characteristics of the JNR reformation were as follows :

(1) The JNR was divided into six passenger railway companies and one freight railway company, and adjustments were made for the debts and funds so that all the divided companies can declare profit based on the calculated operating incomes.

(2) The company was firstly divided into the special companies of which stocks were completely owned by the government (JNRSC), and aims were made to gradually privatize them while taking into consideration the operating situations at each of them and the situations in the stock exchange market.

(3) The JNRSC was established to settle the assets and debts that were not to be taken over by the divided companies and to implement the employment measures for the surplus labor.

(4) The government took a leadership in finding the new jobs for the majority of the surplus labor when the JNR was divided into the new companies.

5.1.4 Achievements after privatizing the JNR

The most appreciated point among the Japanese nationals after the division of the JNR into the JR companies is the customer-first service with substantially improved attitude of the employees due to their reformed consciousness.

Next point appreciated is the sound relationship between the capital and labor, which is currently being established. The relationship was unstable, there were disciplinary disorders at the work place, and illegal strikes were repeated at JNR. However, efforts have been made at JR companies to promote the cooperation between the capital and labor in order to develop the new company and to stabilize and improve the life level of their employees. As the result, the productivity has been substantially improved.

The productivity level at the respective JR companies has been substantially improved by more than 50% in last 10 years in term of the passenger or freight transported per JR employee when compared with that of the JNR, which is due to the reduction in the surplus labor, improvements in the work efficiency, and cooperation between the capital and labor.

No increase in the train fares in real terms has been made by the JR East, JR Tokai, or JR West in the last 10 years which reflects the improved productivity and transportation capacity at those companies.

The privatization of these JR companies has become a great advantage for the users since the train fares were revised almost every year by the JNR in the past.

All the JR companies are now seriously diversifying their business and have started many related businesses which in turn resulted in creation of new employment and enhancement of their operating basis. The main related businesses include leasing business of the real estates, advertisement business, travel agency business, hotel business, and others, which was 3 times of that with JNR and accounted 6.4% of the entire operating income for the seven JR companies in 1994.

The financial burden for the nation to operate the railway was substantially relieved by the improved operating income declared by the JR companies. The government was obliged to grant a subsidy of more than Yen 600 billion every year to the JNR, however, the JR companies are now paying the taxes of more than Yen 200 billion to the nation and local authorities, which has exceeded the subsidy granted.

5.1.5 Assignment upon privately managing the JNR

(1) Measures for the past debts

The debts from the JNR were split and transferred to the respective JR companies and JNRSC. The debts of Yen 25.5 trillion taken over by the JNRSC is to be repaid by selling the

real estate owned by the JNR and assets of the JR companies such as their stocks, however, it has not been successful and they are obliged to pay Yen 1.3 trillion every year for the interest alone. As the result, the balance of the debts has reached as much as Yen 28.3 trillion in 1996.

Reviews are now being made by the government how to settle these debts.

(2) Selling the stocks of the respective JR companies and complete privatization

It is planned to privatize all the JR companies after selling their stocks in several steps as soon as their conditions are fulfilled to establish their bases.

Since the solid operating basis has already been established at JR East, JR Tokai, and JR West, all of them are ready to sell their stocks. However, selling of their stocks was restricted due to the staggering stock exchange market situations, and only a portion of the stocks of JR East and JR West has been sold up to this date. The stocks are to be sold in the future while paying attention to the situations in the stock exchange market.

On the other hand, JR Hokkaido, JR Shikoku, JR Kyushu, and JR freight are still unable to achieve the profit level that is required to list their stocks in the stock exchange market due to their tight operating situations. This has been mainly caused by the low interest rate which resulted in the reduction in the fund to stabilize the management for those three passenger railway companies. Thus, application of the fixed interest rate is now being reviewed. The JR freight company is suffering from the reduced freight transportation, and reactivation of their business capability is to be sought for in the future by enhancing the cooperation with other distribution businesses.

5.2 PRIVATIZATION OF THE MALAYSIAN NATIONAL RAILWAY

5.2.1 History for the privatization

Reviews were commenced by the government to privately manage the Malaysian National Railways (KTM) starting in 1986 based on the government policy to convert the public corporations into private corporations.

In 1989, the government decided to privatize the KTM in two steps, as follows :

First step: To establish a company owned by the government, and

Second step: To complete the privatization after improving the financial aspect.

In September, 1991, the acts were legislated to privatize the KTM.

Railway Act 1991

Railway (Successor Company) Act 1991

Thus, the KTM was divided into two companies of the Railway Assets Corporation (RAC) which was responsible for the infrastructure and Malaysian Railway Company (KTMB) which was responsible for operating the trains.

The KTMB was established in August, 1996, which was an incorporated company with all the stocks owned by the government.

In September, 1996, the government announced that it was negotiating with the Malaysian industry group to sell it.

After commencing the privatization in August, 1992, the employment by the KTMB reduced from 7,596 in 1992 to 6,526 in 1995, and the productivity in term of transportation capacity (man-ton) per unit employee increased from 1,469 in 1992 to 2,026 in 1995.

In 1991, the KTM declared the operating loss of M\$66.30 million, however, the KTMB declared profits of M\$ 9.30 million in 1993 and M\$23.80 million in 1995 since the past debts were transferred to the RAC. The privatization provided ease in diversifying its businesses, and the asset income increased from M\$15.00 million in 1993 to M\$30.6 million in 1995.

5.2.2 Form of the management

The Malaysian National Railway (KTM) was divided into two companies; the Malaysian Railway Company that was responsible for operating the trains and the Railway Assets Corporation (RAC) which was responsible for maintaining and managing the infrastructure. However, all the maintenance and management costs for the infrastructure are currently borne by the KTMB, and no railway toll is paid by the KTMB to the RAC.

The government plans to complete the privatization of the KTMB before the end of 1997 by selling all its stocks to the market. At the same time, the government also plans to sell the RAC together with the KTMB to the same business organization.

5.2.3 Characteristics of the privatization

The Malaysian National Railway (KTM) had a long term debts of M\$1.377 billion in 1991 (7.2 times of its operating income in the same year) before it was privatized, and the amount of interest paid was as much as M\$60 million for the same year (31% of the total operating income). Thus, the government decided to transfer all the long terms debts of the KTM together with its assets to the RAC in order to improve the financing situations of KTMB and to allow it to concentrate on operating the trains. Additionally, the government permitted the KTMB to effectively use the real estate for the railways.

The government offered two options to its employees when privatization the KTM, either to be hired by the KTMB as a KTMB employee under its conditions or to join it as a government employee with the title and salary rate thereof rather than laying them off which might have

caused conflicts with the labor union. As the result, majority of the employees chose to be an KTMB employee.

In addition, the government prohibited the KTMB to layoff an employee who has been transferred from the KTM to the KTMB for a period of five years in order to facilitate the privatization.

5.2.4 Assignments after the privatization

The KTM was divided into the KTMB and RAC as the result, however, there were and still are as few as 12 employees at the RMC which is responsible for the infrastructure, and the provisions of the infrastructure are left in the KTMB's care. There is a contradiction between the system and actuality.

The government is currently reviewing to sell the KTMB and RAC together with its assets and debts. It is a question if the private company can be successfully managed despite such a substantial amount of debts and expected dense transportation required for the Malaysian railway.

A plan has been made by the government to make an investment for fulfilling the infrastructure for the railways, however, it will be a problem if the government is to make an investment to maintain the infrastructure of the privately managed railway business.

5.3 PRIVATIZATION OF THE NEW ZEALAND NATIONAL RAILWAY

5.3.1 History of the privatization

The New Zealand Railway had been operated by the government until 1982. However, it was suffering from chronic operating deficit since it gave a higher priority to the public aspect than the commercial aspect, had excessive employment, implemented ineffective management, and continued to maintain unprofitable lines due to the political reasons.

In 1982, the nationally operated New Zealand Railway (NZR) was reformed to a public business organization named the New Zealand Railway Corporation (NZRC). As the result, efforts were made to improve its productivity by enhancing the independence and profitability for operating the railway business, and reducing the involvement by the government and employment.

In 1990, the New Zealand Rail Limited (NZRL) was established which was an incorporated company completely owned by the government in order to shift the management and to promote further privatization. Before shifting to the private company, the government invested NZ\$360 million and dissolved the long term debts of NZ\$1.1 billion.

In order to sell the stocks of the NZRL owned by the government and to completely privatize it, the government made a financial assessment on its assets subject to the sale, and the sale of the NZRL by means of the open tender was approved by the Diet in December, 1992.

In July, 1993, the NZRL was auctioned off for NZ\$400 million to a group of companies including the Wisconsin Central, a U.S. railway company.

In 1993, the NZRL was completely managed privately and a new railway company was born.

5.3.2 Operating form

The company is a nationwide railway company that maintains and manages both the railway facilities and train operations, and runs both the passenger and freight lines.

5.3.3 Characteristics of the privatization

The New Zealand Railway was a freight oriented railway company that had a total operating distance of 3,793 km and freight transportation of 3.1 billion tons which accounted 70% of its total turnover on the railway business. Its employment of 21,000 persons in 1980 was reduced to 8,400 person in 1990. At present, the employment has been further reduced to 4,500 persons.

In this case, the shifting smoothly progressed without any disruption since it was implemented in multiple steps; from the national railway to the public business organization, to the government owned incorporated company, and then to the 100% privately managed incorporated company.

The railway assets and railway business were assessed by the civil consultants before the shifting, and the government took the leadership in shifting its management based on the assessment results.

The directors for the NZRL were nominated from the civil sector in order to provide it with the civil enterprise spirit and to smoothen the shift.

The railway business and non-railway business were divided, and the unprofitable bus business was not transferred to the railway company.

5.3.4 Assignments after the privatization

Upon selling the stocks owned by the government, the government stipulated a requirement to the tenders to maintain the same line network and passenger service, however, it is not clear how to secure the public interests.

It is not easy to make adjustments with the transportation policy to be stipulated by the government if the railway company were to focus only on the commercial aspect such as selling its assets (real estate etc.)

There is little room for competition upon running the railway business since the entire nation is covered by only one company.

5.4 PRIVATIZATION OF THE ARGENTINA NATIONAL RAILWAY

5.4.1 History for the privatization

1946 to 1947:

All the railways in Argentine were nationalized.

1960s:

An act was legislated to privatize the public companies in order to reconstruct the financial situation of the government, which included the National Railway that was a big burden for the finances of the country. At the time, the National Railway (FA) was declaring the deficit of USD 600 million every year.

1989s:

A government finances reconstruction law involving the privatization of public corporations was established, and the national railway, which had been a major burden on the national budget, was also privatized.

At the same time, the national railway (FA) was showing an annual deficit of roughly \$600,000,000.

June, 1990:

An agreement was made with the World Bank for the National Railway and a loan of USD 360 million was received. USD 200 million out of the received loan was allocated for the special retirement allowance of the former employees of the National Railway.

The basis policies for reforming the National Railway were as follows :

- (1) To abolish the compensation for the loss by the government (excluding that for the passenger transportation in the metropolitan Buenos Aires area),
- (2) To have the trains operated by the private companies which obtained the concession after the open tender,
- (3) To establish a new practice between the capital and labor in order to improve the productivity and to reduce the surplus employment,

- (4) To retain the railway assets nationalized, and
- (5) To redevelop or sell the surplus real estate by the FA.

November, 1991 to October, 1993:

The managing rights for the freight transportation and passenger transportation among the cities were transferred (conceded) to the private companies. Additionally, the passenger transportation lines in the metropolitan area were transferred from the FA to the state. The sections not accepted by the state were abolished.

5.4.2 Form of the management

The National Railway was divided into six freight transportation companies and seven passenger transportation companies in the metropolitan Buenos Aires area, and the management rights thereof were transferred to the respective private companies.

The concession was set for the period of 30 years for the freight transportation lines and 10 years for the passenger transportation lines in the metropolitan area, with each having an extension option by 10 years.

The exclusive rights were given to each of the company having the concession to operate the trains using the facilities and trains lent by the government, however, it was to assume the responsibility to make investments, to maintain, and to manage the infrastructure and trains.

Each of the freight transportation company having the exclusive operating rights was granted with the rights to transport passengers by a long distance, however, it did not have any obligation to do so. It was to receive the line charge if a third party was to operate the passenger trains.

5.4.3 Characteristics of the privatization

The main characteristic with the privatization of the Argentina National Railway is the transfer of only the management right (operating right) to the multiple private companies while the lines and trains remain nationalized, and a concession period is specified.

The National Railway was divided into multiple lines, and the management rights thereof were given to a private company. The reasons for the division were as follows :

- (1) The fund to operate the company was less for multiple companies than that for one company,
- (2) Effective management of the respective companies were expected due to the competition in the network, and
- (3) Ease was provided in changing the labor conditions and management basis.

The concession was given to the companies by means of the open tender that were expected to cause least burden to the government after examining the tenders' technical expertise to operate the trains, management plans for the respective lines, financing plans, and others.

The focus was placed on the freight transportation and passenger transportation in the metropolitan area and a given passenger transportation line was abolished if the state did not wish to share the costs thereof.

The companies that have obtained the concession are obliged to make investments to improve the tracks and trains.

5.4.4 Assignments after the privatization

After the privatization, all the companies that received the concession have been managed successfully, and the transportation by them have also increased. However, the rate of increase is not so much as expected before the privatization. The largest factor that contributed the most to the improvement in the profit was the reduction in employment. The

employment of 92,000 persons in 1990 decreased to 8,300 persons for the five freight lines and 8,500 persons for the seven passenger lines in the metropolitan area after the privatization.

It is suspected that the investments for the infrastructure required to operate the freight transportation lines for a prolonged period of time may be reduced due to the profit oriented management by the respective companies.

The freight charges and train fare still need to be approved by the government, of which revision may be limited by the political reasons.

The government is currently running one of the six freight lines since no company made a tender for it, and it is not likely that it will be sold in the near future.

5.5 PRIVATIZATION OF THE UNITED KINGDOM NATIONAL RAILWAY

5.5.1 History for the privatization

1947:

It was decided to nationalize all the transportation businesses including the railways and they were to be managed uniformly by the government by the Transport Act 1947.

1962:

The uniform management was reviewed and the nationally owned companies were converted into independent organizations for each of the businesses. In this year, the British Railways Board (British Rail) was established.

1980s:

The land transportation, bus, and airline businesses were privatized, however, the railway business was not since there was no prospect to sell its stocks due to its sluggish business situation.

July, 1992:

A white paper was announced by the government for the privatization of the railway business, which included the following points.

- (1) To divide the business into two companies; a company to run the trains and the other to maintain the infrastructure, and
- (2) To adopt a franchise method to give the management license to the private companies by means of the tender.

November, 1993:

The Railway Act 1993 was enacted that reflected the contents of the white paper announced by the government.

April, 1994:

The British Rail was divided into multiple companies, companies that are responsible for the infrastructure, for leasing the trains, and for running the trains.

5.5.2 Form of the management

The British Rail was divided into three groups; a group that is responsible for the infrastructure, one for leasing the trains, and another one for running the trains. Additionally the Office of the Rail Regulator and Office of Passenger Rail Franchising were established to control the privatized companies.

Group responsible for the infrastructure

Rail Track (RT), and a consignment companies were established. The latter is a contractor that implements the actual maintenance work of the tracks for the RT.

Group responsible for maintaining the trains

Three companies were established that maintain and lease the trains.

Group responsible for running the trains

A total of 30 companies were established; three freight transportation companies, one each of mail transportation company and express package transportation company, and 25 passenger transportation companies. Both the freight transportation companies were sold to the private companies, however, some of the 25 passenger transportation companies have not yet obtained the franchise license.

5.5.3 Characteristics of the privatization

The main feature with the privatization of the British Railways was its strict and complete division of the railway business in order to stimulate the competitions to the fullest extent possible. Thus, the franchise method was adopted in addition to separating the infrastructure section from the train running section, and establishing the train leasing section.

The sections responsible for supervising, regulating, and planning were established in the government in order to adjust the interests among the related parties such as the company responsible for the infrastructure, companies running the trains, and the users.

The company responsible for the infrastructure invoices the companies running the trains for the track charges in order to maintain the infrastructure, and the government is to give a subsidy to a train running company if it declares an operating loss due to the excessive track charges. In such a case, no subsidy will be given to the company responsible for the infrastructure.

5.5.4 Assignments after the privatization

The investments for maintaining the infrastructure are very risky for a private company since they tend to be excessive and range for a long period of time. Further, it is difficult to invest a public fund to a private company if the railway needs to be maintained from the traffic policy point of view.

The adjustments to enable effectively function of the railway network are difficult since there are many companies are involved.

The passenger transportation company was divided into 25 companies, however, most of them have questions on their profitability, which may result in the absence of the tenders and eventual delays in the privatization. Further, subsidy dependent management may continue.

5.6 PRIVATIZATION OF THE GERMAN NATIONAL RAILWAY

5.6.1 History for the privatization

1920:

The German National Railway was established by nationalizing the railways.

1951:

The German National Railway was divided into the Federal German Railway (DB) and East Germany National railway (DR) as the result of the division of Germany into two nations.

1974:

The Minister of Traffic made a recommendation to reconstruct the DB.

1983:

The Minister of Traffic made a proposal to rationalize the DB.

1989:

The Government Committee for Reconstructing the DB was established as an advisory organization to the government.

December, 1991:

The Government Committee for Reconstructing the DB submitted a final report to the government.

Key items:

- (1) To unify the DB and DR into one company named German Railway Company (DBAG),
and
- (2) To have the surplus labor and long term debts be borne by the government and to enact an act required thereof.

July, 1992:

A government bill relating to the railway reformation was decided.

December, 1993:

The railway reformation bill was enacted by the federal diet.

January, 1994:

DBAG was established that unified the DB and DR. Additionally, the Agency of Federal Railway (EBA) and Federal Railway Asset Organization (BEV) were established.

5.6.2 Form of the management

The DBAG as an incorporated company was established in January, 1994 after unifying the two national railways of the DB and DR. The DBAG was divided into three independent companies of passenger transportation, freight transportation, and trunk line holding companies.

To convert the DBAG was into a holding company after three years from 1994, and to divide it into three new private companies that are responsible for passenger transportation, freight transportation, and track holding.

Further, to break up the holding company five years thereafter and to divide and privately manage them until 2002.

The government is to own more than 50% of the stocks for the track holding company.

5.6.3 Characteristics of the privatization

The German National Railway will be divided into three companies that are responsible for passenger transportation, freight transportation, and track holding. One incorporated company was firstly established, which was to be divided into three companies in order to materialize the reformation while lessening the difficulties involved in it.

Since the substantial investments for the infrastructure are to be made by the government, the majority of the stocks for the holding company was owned by the government to essentially control it.

Before privatizing the DB and DR, the Federal Railway Asset Organization (BEV) was established in order to settle the long term debts for both the DB and DR, and to pay the repair and maintenance fees and charges for the decrepit facilities owned by the DR and to settle its surplus labor.

The state will assume the responsibilities to offer the services for the short distance passenger transportation and DBAG will implement them on a consignment basis, however, the deficit resulting thereof are to be compensated by the tax to be subsidized to the state by the government.

5.6.4 Assignments after the privatization

The final privatization of the German National Railway is expected to complete in 2002, which takes some more time.

The government has assumed a great amount of debts such as the long term debts of the DB and DR for the privatization, which is difficult for the BVD.

It is assumed difficult to successfully manage the DBAG even after the privatization since it requires a substantial amount of subsidies to be granted by the government.

DBAG still has surplus labor although it is being reduced gradually year by year (277,000 persons in 1995).

5.7 PRIVATIZATION OF THE SWEDISH NATIONAL RAILWAYS

5.7.1 History for the privatization

1856:

The railways were run both nationally and privately after the railway business had been started.

1939:

The Nationalization Act for the railways was enacted and the Swedish National Railways (SJ) was established.

1950s:

The motorization rapidly progressed and railway transportation continued to decrease.

1963:

The Transport Policy Act was enacted to specify the purchase of the unprofitable lines by the government.

1979:

The Transport Policy Act was modified. As the result, the SJ was to operate the profitable commercial lines, and to receive the subsidies from the local autonomies for the social economy lines that were socially required despite their unprofitability.

1988:

The Transport policy Act was once again modified to divide the national railway into the facility section and management section. The SJ, being as the National Railway, assumed responsibility for the management, and the Agency of Swedish Railway (BV) was newly established to assume the responsibilities for the facilities.

5.7.2 Form of the management

April, 1988:

The Swedish National Railways (SJ) was divided into the Swedish National Railways (SJ) and the Agency of Swedish Railway (BV) which assumes the responsibilities for the facilities.

Both the SJ and BV are public organizations, however, a plan has been made to privatize the SJ in the future.

The local traffic lines are operated by a railway company including SJ which is selected by the applicable local autonomy under its responsibility based on the agreement concluded between the two.

5.7.3 Characteristics of the privatization

Both the SJ and BV are the public organization which have not been privatized, however, the former assumes the responsibilities for the management and the latter the facilities. This is the first example with which the responsibilities for running the trains and maintaining the facilities have been clearly divided.

The SJ pays the line charges to the government and the BV receives the fees and costs for maintaining, managing, and investing the facilities from the general account of the nation.

The SJ is responsible for the freight transportation nationwide and passenger transportation for trunk lines. The passenger transportation for the local lines are left to the care by the respective local autonomies, and they are managed based on the contractual transportation method.

No open access for the trunk passenger transportation lines has not yet been implemented.

The restrictions of the fare and charges are abolished in general.

5.7.4 Assignments after the privatization

The line charges paid to the government accounts merely a portion of the maintenance and management costs assumed by the BV, and majority of them are borne by the government.

The total railway distance (approximately 10,000 km) is long for its land (410,000 km²) and population (8.70 million persons). Thus, there are many unprofitable lines due to the low transportation density. Therefore, it will not be possible to privatize the railways unless the line charge rate is set to a substantially lower level since the trunk lines alone account as long as 6,200 km.

Originally, the facilities and transportation are closely connected to each other in case of the railway. Therefore, it is the greatest assignment how to assure implementation of the smooth cooperation between the two if they are to be completely divided.

APPENDIX 6 SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACT

6.1 OVERVIEW

Proposed restructuring and privatization plan consist of many kind of components i.e disposal of assets, treatment of surplus employees and development of railway related business, therefore it can be seen to affect the existing social economic system.

However, it is difficult to estimate these social economic impact accurately because the framework of restructuring and privatization is not determined yet at this stage. Therefore the preliminary examination will be made to clarify the impact resulted from the implementation of restructuring and privatization.

The analysis focuses on following aspects;

- a) Impact on the Public sector
- b) Impact on the Railway sector
- c) Impact on the Labor market
- d) Impact on the Environment

6.2 IMPACT ON THE PUBLIC SECTOR

Regarding the impact on the public sector, 2 types of impact are foreseen. The first one is for the impact brought about through a functional change of State and local government. Another one is for the financial impact caused by cost saving in public sector.

Table 6.1 Impact on the public sector

Item	Content of impact	Magnitude
Functional Change	<ul style="list-style-type: none"> • It is required that burden sharing is made between State and Local governments when the certain local lines are impossible to maintain through a commercial operation of railway. 	<ul style="list-style-type: none"> • For the local government, the burden sharing is to be heavy. • It is foreseen to accelerate the local autonomy.
Financial impact	<ul style="list-style-type: none"> • Revenue from sales of assets • Cost for redundancy payments • Costs related to labor reduction • Costs related to asset sales 	<ul style="list-style-type: none"> • Net surplus is expected

6.3 IMPACT ON THE RAILWAY SECTOR

After 2nd stage of restructuring, railway enterprise is divided into specific management bodies, that is the passenger service, freight service and infrastructure management. These bodies are to be operated in sound management practice as a result of rationalization. Accordingly the positive impact is expected after the restructuring and privatization.

Table 6.2 Impact on the Railway sector

Item	Content of impact	Magnitude
Positive impact	<ul style="list-style-type: none"> • Wage saving is expected due to the rationalization. • Extra revenue from railway related business. • Expectancy of revenue increase through operation efficiency. 	<ul style="list-style-type: none"> • These are significant factors related to the success of railway restructuring.
Negative impact	<ul style="list-style-type: none"> • Strict competition is expected in railway business. 	<ul style="list-style-type: none"> • Market stability is reinforced by market choice.

6.4 IMPACT ON THE LABOR MARKET

When the restructuring plan is implemented, the issues on surplus labor will become the controversial matter. Because it is related to the individual life of PKP employees and the social interest of labor union. The restructuring agency will conduct the retraining scheme for the redundant employees to find a job.

However, it is not easy to make transition if the other industrial sector can not afford the quota.

Table 6.3 Impact on the Labor market

Item	Content of impact	Magnitude
Positive aspect	<ul style="list-style-type: none"> • Job creation based on the railway related business. • Social mobility will be revitalized with the labor shift to other sectors. 	<ul style="list-style-type: none"> • Internal labor shift will be made, however no change is expected in external labor market.
Negative aspect	<ul style="list-style-type: none"> • Temporal increase of unemployment. 	<ul style="list-style-type: none"> • The restructuring agency will deal with the problem.

6.5 IMPACT ON THE ENVIRONMENT

In case that PKP of privatization plans are executed, it may give harmful impact, which cannot be negligible for environment. Generally, it is said that modernization of facility could improve the environment, however, there is some possibility that excessive facility provision makes the environment level worse.

The impact of railway reform project to environment is assumed as following;

Table 6.4 Impact on the environment

Item	Content of impact	Magnitude
Positive impact	<ul style="list-style-type: none"> • Decrease of noise and vibration because of a modernization of vehicle and track. • Improvement of a sanitary environment because of a modernization of vehicle facilities. • Relaxation of a road traffic delay accompanied with the modal shift from car to railway. • Decrease of air pollution accompanied with that. 	<ul style="list-style-type: none"> • Contribution to the promotion of public health.
Negative impact	<ul style="list-style-type: none"> • Resettlement of inhabitant because of land acquisition. • Higher level of noise and vibration due to the increase train speed. • Waste accompanied with development of facility improvement and new business. 	<ul style="list-style-type: none"> • Possibility of some conflict between residents and railway enterprise.

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