(a) accustomed to work under top down instructions;
(b) segregated from horizontal information flow;
(c) lack of experience of decision making or risk taking;
(d) highly dependence on the state;
(e) excessive specialization with seldom job rotation;
(f) lack of market orientation;
(g) lack of cost consciousness;
(h) lack of incentives for productivity improvement; and
(i) incompetence of English understanding.

4.1.2 Quantity of PKP Human Resources

Total number of employees of PKP has gradually been decreasing from 367,100 in 1988 to 348,800 in 1989, 337,300 in 1990 and 285,300 in 1991 with an annual average rate of decrease of 8.1% (Table 4.1.1). Employees are distributed to every region (DOKP) without particular concentration to the Central Region (Warsaw). In terms of the standard gauge section, transport services occupied a largest share of employment of 31.7% in 1990, followed by traction services of 27.2% and road services of 19.3%, total of these three services accounting for a share of as high as 78.2% (Table 4.1.2).

Table 4.1.1 Human Resources of PKP by Region (Total of Standard and Narrow Gauge)

	1988	1989	1990		1991
	number	number	number	%	number
Central	63,249	60,313	58,066	17.2	
Eastern	40,685	39,221	38,134	11.3	
Southern	39,486	37,411	36,655	10.9	
Silesian	53,464	51,318	49,537	14.7	
Northern	58,017	54,722	52,359	15.5	
Lower Silesian	38,090	35,768	34,554	10.2	
Western	41,542	39,251	38,034	11.3	
Seaside	26,797	25,226	24,551	7.3	
Total	367,063	348,846	337,270	100.0	285,288

Source: Statistics of Employment and Wages of PKP

Table 4.1.2 Human Resources of PKP by Services (Standard Gauge)

	1988	1989	1990		1991
	number	number	number	%	number
Transport Services	111,799	107,351	105,448	31.7	
Traction Services	97,232	93,138	90,250	27.2	
Wagon Services	27,039	25,950	25,053	7.5	
Road Services	74,472	67,712	64,269	19.3	
Automatics/Telecom	13,797	13,544	13,466	4.1	
Material/Technical	3,799	3,575	3,362	1.0	
Social Services	6,598	6,493	6,102	1.8	
Other Units	26,717	25,885	24,529	7.4	
Total	361,453	343,648	332,479	100.0	285,288

Source: Statistics of Employment and Wages of PKP

Of the total employment of 286,250 in 1991 (a slight discrepancy of data due to different sources of information), university graduates amount to 9,417 persons, that is, 3.3% of total employment. The remaining employment comprises graduates from technical high school of 68,712 persons (24.0%), those from usual high school of 17,640 persons (6.2%) and those from other schools including junior high and vocational schools of 190,481 (66.5%).

Total university graduates comprise:

* engineers of 6,060 persons (64.4% of total);
* economists of 1,732 persons (18.4%);
* lawyers of 632 persons (6.7%); and
* others of 993 persons (10.5%).

DOKP centers employ the largest number of university graduates of 2,566 persons which comprise:

* engineers of 1,314 persons (51.2% of total);
* economists of 686 persons (26.7%);
* lawyers of 307 persons (12,0%); and
* others of 259 persons (10.1%).

General Directorate of PKP has total staff of 837 persons including university graduates of 453 persons including:

* engineers of 244 persons (53.9%);
* economists of 114 persons (25.2%);
* lawyers of 44 persons (9.7%); and
* others of 51 persons (11.3%)

and lower level of graduates of 384 persons.

Specific characteristics of PKP human resouces are that engineers occupy about two-thirds of the university graduates who are qualified to be in the management of PKP. Due to the lack of job rotation, however, a majority of university graduate engineers seemingly has long been specialized in some specific engineering fields without any chance for understanding a wide scope of PKP operations. This would be one of the possible constraints on PKP restructuring from human resource point of view.

4.1.3 Human Resource Management of PKP

The Human Resource Department of PKP comprises:

(a) wages and employment section;
(b) wages fund section;
(c) new employment section;
(d) complaints and employment affairs section; and
(e) social affairs section.

Major roles of the department is to plan and control the employment budget through controlling the size of employment and level of wages as well as to secure a pleasant working environment for employees. A special importance has been placed on the latter aspect which comprises preparation and operation of retirement scheme, vacation and holiday centers, and kindergartens. Particular arrangements have not been made for job description, job rotation and promotion scheme, career development programs, and incentive wage system with a view to improving the capability of employees.

Conditions for job assignment are clarified principally based on the two factors of school background and continuance of services after graduation from school which are not directly connected with capabilities for fulfilling the responsibilities.

PKP has training centers aside from the human resource department. A manager education center is located in Warsaw with twenty-five staff and a training room equipped with audio and visual devices. The training program for 1992 expects participants of 606 managers on financing, purchasing, labor relations, commercial freight business, commercial passenger sales, computers, communications, rolling stock maintenance and wagon dispatching. In addition, PKP has nine training schools for staff at large. In 1991, they had total participants of 84,000 persons. Additional 2,360 staff had training programs sponsored by other institutions. Most of these training courses are short termed for the purpose of delivering technical information which is not necessarily updated to the present requirements.

Major issues of the human resource management of PKP are that:

(a) almost no action has been made for reforming the system of human resource management even in the face of urgent necessity;

(b) primary concern has been placed on keeping the vested interests of employees as used to be in the old regime, instead of attending to productivity improvement; and

(c) training programs have been continuing without redirecting to the current requirements.

4.2 Requirements for PKP Management in a Market Economy

4.2.1 Changing Business Environment of PKP

Business environment surrounding PKP has drastically been changing since the beginning of 1990. Because of the cessation of the centrally planned system and the introduction of the market economic principles, PKP has been required to be financially self reliant in the future although the government subvention, which has been decreasing due to the tight fiscal conditions of the government, has been continuing.

However, transport demand for passengers and cargoes has been decreasing due to the severe economic recession caused by the introduction of the economic transformation program. The significant decline of transport demand has badly affected the financial standing of PKP. In addition, a substantial part of railway transport has been shifting to road transport because of the advancing motorization and aggressive intrusion of private truckers into the railway market. The decline of demand for railways has resulted in sharp drop of real income.

PKP, therefore, is in an urgent need of reducing expenditures to the maximum possible extent as well as increasing income through the improvement of competitiveness with road transport. This consequence could be conceptually acceptable to the PKP management, but still it is dubious what percentage of the management is really concerned with this critical situation. PKP is required to develop their own management policy and strategies to cope with this severe economic situation now under the absence of top down instructions from the government as used to be in the old regime.

The government has strongly committed itself to join the European Community (EC) in about ten years. As an associate member of the EC, Poland is required to restructure and adjust its railway system compatible with those in the EC countries ranging from institutional to technical fields. PKP needs to prepare a detailed program for this integration by taking account of market demand, competition with road transport, streamlining of the existing enlarged railway systems, and availability of financial resources. Again, this necessity could be conceptually acceptable to the PKP management, but it is also dubious if they can work out any business policy and strategies which were completely absent in the old regime.

These drastic changes have been forcing PKP to break away from the convention in which revenue of PKP was secured by the government and the international relation was confined only to the CMEA League.

4.2.2 Restructuring of PKP

To cope with the changing business environment in a market economy, PKP needs to restructure the whole railway systems which were succeeded from the centrally planned system which attached a great importance to railways. The requirements for PKP restructuring would include:

(a) streamlining of extremely enlarged railway systems through withdrawal from unprofitable businesses and reduction of redundant employment;

(b) rationalization of management and operation to reduce unnecessary expenditures through introduction of costing and management information systems and relocation of resources;

(c) modernization of the services which should be the future profit centers for PKP, for example, international combined transport, inter-city passenger transport, bulky cargo transport over a long distance, and commuter transport in large urban agglomerations; and

(d) encouragement of international railway cooperation with the EC, the Baltic countries, CIS and the countries in the south.

The restructuring of PKP needs to be realized not through a discretionary judgement of the PKP management but through a close consultation with market demand. Centralized decision making system has a conspicuous tendency to think lightly of or neglect market demands. According to Professor Peter F. Drucker, the essence and strength of a market economy exists in the decision making which is to be done within easy reach of market and customers.

The centralized organization of PKP which was good for the centrally planned system needs to be restructured to a decentralized organization which enables decision making responsive to market demands and customers. One solution to this end would be to establish business units based on prospective market segments. At the same time, management layers needs to be reduced with the support of effective management information system. In the current organization, role of the middle management tends to be rather obscure because of the duplication of roles with one rank higher and one rank lower management.

The restructuring of PKP to cope with the changing market will entail a significant change to the existing organization and requirements for employees:

(a) reduction of total employment;
(b) changes in staff from unprofitable to profitable segments;
(c) introduction of incentive system; and
(d) increasing importance of training.

4.2.3 Requirements for PKP Management

Human resource, particularly managers, is the most critical factor for successful restructuring of PKP. Due to the familiarization with the centrally planned system for some decades, however, it is probable that the current human resource might be a serious constraint to the restructuring. Training of the PKP management is essential for future PKP, coupled with a change of corporate climate of PKP to encourage improvements, progress and innovation, instead of conservativeness to be obedient to the traditional way of doing things.

First, PKP management needs to understand what is a market economy. A market economy is not an economy in which competing suppliers set their prices higher than costs to recover them and gain profits. Instead, a market economy is an economy in which market prices are determined through price cutting race among competitors who are striving to reduce their costs to defend a margin of profit. Though the situation might not be directly applicable to railways, PKP management needs to clearly understand the principles of the market mechanism.

Second, PKP management needs to change their attitude from the passive docility to traditional systems into the active pursuit for change. It is obvious that if PKP follows the traditional way of management, PKP will inevitably be expelled from the transport market even though it might be undesirable for the country. PKP, based on its own judgement, should develop their own markets by introducing services satisfactory to customers at competitive prices on one hand while PKP should withdraw from market where road transport has absolute superiority over railways on the other. PKP needs to develop a new management system which effectively contributes to enhance the total productivity of the organization. It is a challenge to PKP to develop such market and management systems which are completely different from the traditional ones.

Third, PKP management needs to understand and be acquainted with leadership in an organization. Fundamental requirement for effective leadership is to clearly define the mission of an organization. A leader of an organization should develop and maintain the target of an organization, priority of actions, and standards for achievement. A leader should create clear visions to absorb energy of the members of an organization. This seems to be quite different from the leadership required in the old regime, that is, the role of fixer with an emphasis on settling the inter-organizational conflicts.

Fourth, PKP management should be familiar with the modern management tools and know-how adopted in a market economy. Managers should be capable of well integrating management resources of capital, technology and human resources for satisfying market demand. The management tools and know-how include: business policy, marketing, financial management, production and operations management, and human resource management. The centrally planned system completely lacks these management tools and know-how in that they have been developed in a market economy where companies are competing each other for customers satisfaction by best utilizing their limited resources.

Lastly, PKP managers should be well acquainted with foreign languages, particularly English, for meeting the immediate managerial needs and internationalization. Direct access to the theories and practices of foreign management will greatly contribute to change their way of thinking and learn the management tools and know-how.

4.3 Development of New Human Resource Management

4.3.1 General Framework of Human Resource Management

As discussed in the above, human resource is the most important and critical factor in the management. It is the human resource that develops new technologies and introduce new products into the market. Technologies and capitals can be moved from foreign countries to Poland through import, borrowing and direct foreign investments. However, a majority of human resource needs to be locally supplied, especially through the existing employees. In the case of PKP's particular situation, human resource is by far important because of the urgent needs of restructuring for survival in a market economy.

The companies which have developed and maintained a good human resource management system have shown a good business performance. They have paid full attention to human resource planning, employment of competent staff, offer of challenging jobs, and satisfaction of staff in terms of self-attainment and renumeration. The importance of human resource management has steadily been rising to cope with the intensifying competition domestically and internationally. Dismantling of pyramidal structure in view of quickly responding to market demand will disperse decision making to lower levels of management. In such a case, decision making needs to be managed not through top down instructions but through "Management based on Objectives (MBO)". With a view to developing PKP's responsiveness to market, the current centralized management system of PKP need to be decentralized through the establishment of business units which focus on specific market segments.

On the other hand, PKP needs to reduce the current size of employment and reorganize the employment structure in accordance with the medium/long term management policy of PKP. This process will accompany an exceptionally political discussions between the management and labor union. This process needs to be hastened from managerial point of view on one hand, while it should be gradually implemented from the union's point of view on the other. A compromising approach seems to be inevitable to mitigate possible social upheavals. Basically, reduction of employment should be pursued through encouragement of retirement and suspension of new recruitment. At the same time, it is preferable to introduce retraining programs for those who are willing to accept early retirement and staff relocation.

As can be understood from the above, human resource management should be highlighted ever than before to be closely knitted with the total restructuring of PKP. However, complete reorganization and upgrading of human resources are time consuming process. PKP needs to develop a medium/long term employment policy, for example, toward the year 2000. Under this policy, short term actions should be decided. The time horizon toward the year 2000 would be classified into:

(a) Transition period from the centrally planned system to a market economy (rationalization): focus on reduction of employment, staff relocation and orientation to a market economy;

(b) Period for improving competitiveness of PKP in the transport market (modernization): focus on creation of business units, decentralization of decision making, adaptation to a market economy and preparation for internationalization; and

(c) Period for integrating the Polish railway system with those of the EC (internationalization): focus on quality improvement, diversification of international transport services and financial independence from the state.

4.3.2 Restructuring of Human Resource Management Department

The present positioning and roles of the human resource department should be completely revised to comply with the objectives of the total restructuring of PKP. The current human resource department mainly deals with bureaucratic administration works of employment, wages and social affairs without any strategic missions for the future. However, the new missions of the department should be closely geared to the business policy of PKP in attracting capable new staff, cultivating their capacity, raising their moral, and best utilizing their capabilities, coupled with fulfilling another mission of rationalizing redundant employment.

A deputy director general needs to be assigned especially to the revised human resource management department. This will enhance the position of the department in PKP and facilitate inter-departmental as well as inter-business unit coordination and adjustment. Major functions of the department should include:

(a) job analyses and description;
(b) recruitment, employment, assignment;
(c) job rotation and career development;
(d) education and training;
(e) efficiency rating and promotion;
(f) wages and incentive systems; and
(g) reduction of employment (special mission).

Special attention should be paid to: (a) career development of employees; (b) education and training; (c) efficiency rating; and (d) wages and incentive systems. These aspects need to be closely linked to each other for the purpose of total productivity improvement of employees.

"Career development" program is important to provide possible professional guidance with the employees who would work many years for PKP. Employees have expectations for the future development of their capabilities, and if they can have some career development image for the future, they would make their best efforts to achieve the targets, which will greatly contribute to the business performance of PKP.

"Education and training" is important to make employees familiar with the principles of a market economy as well as modern management tools and know-how, and make them acquainted with newly assigned jobs. "Education and training" should be closely linked with "career development, efficiency rating, and wages and incentive systems" for the purpose of making the most of the output of "education of training".

"Efficiency rating and promotion" is also important to raise employees' moral in performing their duties. Rules and standards of the "efficiency rating" need to be clarified in view of the impartial application to each group of employees. Those who get higher than average rating are candidates for promotion and wage increase while those who get lower than average rating are candidates for "no change" or "demotion and wage cut" depending on the system to be introduced. This type of evaluation was not existent in the old regime in which everybody in the same wage scale was paid equally. The department needs to develop a most relevant rating system for PKP through thorough studies on foreign experiences and particular situation of PKP.

"Wages and incentive systems" needs to be improved to reflect the contribution of each employee to the sales increase and cost reduction depending on the efficiency rating. It should be reminded, however, that employees are motivated not only by wages but also by non-monetary reward. Attention should be paid, in developing "wages and

incentive systems", to make the merit of individuals coincide with that of the organization.

4.3.3 Education and Training

Positioning of the education and training system in an organization represents the degree of a company's determination how much importance is placed on the human resource development. In consideration of the urgency of restructuring PKP toward a market economy which is completely new to PKP, reformation of the human resource management, especially education and training, is one of the most important fields that the PKP should address. The positioning of the education and training system should include not only the place in the organization but also staff composition, budget allocation, training programs and facilities, and execution of education and training.

It would be reasonable to consider that the needs for education and training will be changed and diversified for the future as the restructuring of PKP progresses through the establishment of business units which could have different needs for training. However, at this moment, the basic needs of PKP seem to be in general acquaintance with and understanding of the principles of market economy as well as management tools and know-how used in the market economy which can be effectively applied to the PKP restructuring. The human resource department including education and training, therefore, should be positioned under a deputy director general who is responsible solely for that.

Strengthening of staff composition is an important issue to be addressed. Due to the fact that even the training staff of PKP have been deeply soaked in the centrally planned system, it is likely beyond their capacity to develop the education and training programs which are truly compatible with the current requirements. Systematic input from the western world would be indispensable in this regard. PKP needs to establish a collaboration framework with foreign experts based on bilateral or multi-lateral technical cooperation programs. In addition, this will help PKP in searching for relevant management training programs held outside Poland.

Only a limited amount of budget has been allocated to education and training until now. Due to the little importance attached to the training in the old regime, it has been vulnerable to the financial conditions of PKP. This situation needs to be revised to ensure uninterrupted upgrading of human resources. Primary efforts should be made to secure the budget for the education and training through the rationalization of the expanded railway systems including reduction of excessive employment. PKP needs to reduce the size of employment to save ineffective outlays on one hand while PKP needs to increase investment in human resources to increase productivity on the other.

The current training programs should be reviewed and revised to fully comply with the present needs by shifting a general emphasis from railway technologies to management methodologies. The major fields of education and training required are:

(a) orientation to the principles of a market economy;
(b) acquaintance with management tools and know-how in the market economy;
(c) preparation for internationalization of PKP operations;
(d) education and training to facilitate relocation of staff to their new assignment in PKP; and
(e) education and training to facilitate job switching from PKP to outside.

Under the circumstances, primary importance should be placed on the management training with a focus on (a) and (b) above, followed by (c). The next section discusses especially on the PKP management training program in this context.

4.4 PKP Management Training Program

4.4.1 Introduction

The restructuring of PKP is an extremely difficult task from every aspect of the management environment including competition in the transport market, relations with the state, relationship between management and labor union in PKP and all the legacies inherited from the centrally planned system. Among other things, lack of competent managers in a market economic sense is the most serious bottleneck against the restructuring toward a market economy.

The organization of PKP has a form of hierarchical structure which is efficient in delivery of top down instructions with vertical segregation of information. The main job of managers is to transmit the instructions from a higher to a lower levels and to submit reports from a lower to a higher levels in a traditionally established manner. A majority of managers receive sectional information without overall background of the situation.

As stated earlier, managers in a market economy are required to make quick decisions from time to time by taking account of every factor including market demand, competitors, and possible actions the company can take. Diagnosis of the whole aspect of the situation constitutes a basis for their decision making. In order to fulfill their duties, managers are required to develop good communications with their followers and inspire them to achieve the yearly targets. In a long term perspective, managers are also needed to educate and give training to the followers.

The managers of PKP are not only required to understand the principles of a market economy, but also needed to effectively fulfill their duties in a market economy through complete familiarization of management tools and know-how in a modern management. Conceptual understanding of these principles, and tools and know-how would not be so difficult when the high level of intelligence of PKP management is taken into account. However, it would be quite difficult and take several years to properly gear their perception and behavior with the new knowledge they have acquired.

4.4.2 Training Program of Principles of a Market Economy

Main objective of this program is to familiarize the managers of PKP with the principles of a market economy and the general business policies.

Contents of education and training on the principles of a market economy could be exemplified as follows:

(a) income earning by citizen and their behavior as consumers;
(b) price mechanism based on demand and supply;
(c) management of companies with a variety of possibilities for prosperity and bankruptcy;
(d) roles of the state in relation with consumers and producers; and
(e) gradual modification of a market economy to protect public interest.

Education and training on the general business policies focuses on the roles and responsibilities of managers in formulating corporate policy and strategies aiming at a long term prosperity in view of market demand, competitors, and own positioning in the market. Important points of this training could be to outline a picture of the expected managers in the newly structured organization of PKP.

Contents of this training could be exemplified as follows:

(a) to outline "a captain" who can effectively control the followers toward a target through his or her wide spectrum of knowledge on business activities;
(b) to outline "a captain" who can take the leadership in guiding the followers through increasing entrustment of tasks to them;
(c) to outline "a captain" who can develop the directions and objectives of business operations through deep foresight for the future; and
(d) to outline the tools and know-how of the modern management with which managers should be fully acquainted.

This training program is particularly important for the top management of PKP so that they could have a basic knowledge of a market economy and general business policies. Candidates of participants include high ranking staff (directors and above) in the head office and business units. Highly competent instructors need to be sought domestically and internationally. "European Federation of Productivity Councils", "Polish UN Experts (OPUNE)", "Productivity Movement in Poland", and "the Polish Fund International School of Management" would be candidate institutions to supply instructors. However, due attention should be paid to recruit instructors of Polish parentage who well understand Polish language as well as the shortcomings of the Polish managers.

This training program is useful for the lower managements as well for the purpose of general orientation to a market economy as well as the management skills required in a market economy. Education by correspondence and education through mass communication media need to be introduced for wider dissemination of the knowledge.

4.4.3 Training Program of Management Tools and Know-How

Main objective of this training program is to make the managers of PKP understand the major construction of management tools and know-how adopted in a market economy.

This program includes:

(a) business policy which further elaborate "the general business policies" delivered in the above program;

(b) organizational behavior in which managers learn how to promote the positive interactions between organization and human resources;

(c) marketing in which managers learn how to develop a marketing strategy based on clear understanding of market characteristics, competing companies and their own company;

(d) financial management in which managers learn principles of accounting system, investment decision making, capital management and fund raising;

(e) production and operation management in which managers learn how to develop an efficient production system through the appropriate combination of labor, technology and investment;

(f) human resource management in which managers learn how to motivate employees in improving their productivity; and

(g) management communication in which managers learn how to best communicate with others for winning consent.

The coverage of this program is extensive and each topic is profound. The training program should be prepared for the general orientation of every topic in a first session with a view to providing overall outlook of the tools and know-how in a modern management. Further detailed programs for each topic need to be prepared for looking to the need of those who try to improve their capacity in daily operations. Instructors should be sought in the same way as discussed in the preceding section.

It should be reminded, however, that the training program is not enough for managers to make these tools and know-how operational in their daily activities. Self-culture coupled with on-the-job practices is essential for their mastering of respective topics. Education by correspondence is again a useful measure to further their understanding.

4.4.4 Training Program of Management Behavioral Change

Although management behavioral change toward a new framework is very important, it is extremely difficult to formulate particular training program for this purpose. There are several training programs in the form of group session with a focus on management behavioral change:

(a) Case study method;
(b) In basket method;
(c) Business game method;
(d) Group discussion method;
(e) Role playing method;
(f) Sensitivity training method;
(g) Managerial grid method; and
(h) Transactional analysis method.

These programs, which are organized as group training program, provide an opportunity for participants to adjust or change their way of judgement and/or behavior through the understanding of oneself, others, and relationship between oneself and others in one way or another. However, it is uncertain whether or not this type of training would immediately produce the anticipated results when all participants behave as they used to do in the centrally planned system. Therefore, the timing of introduction of this type of training would be dependent on the progress of the two training programs discussed in the preceding sections.

4.4.5 Training Program for Internationalization

Training of English language is essential for PKP management in terms of both facilitating other training programs and preparation for the future integration with the international railways. Some type of facility should be developed to encourage learning English: (a) class room training in PKP; (b) participation in outside English classes with the support of PKP; and (c) provision of English learning materials for self-training.

If they become proficient in English, sphere of the management training program will be extended to include participation in the training curricula held in foreign countries. Currently, this possibility is extremely limited.

4.4.6 Execution of the Training Programs

The management training programs discussed in the above are, of course, important for PKP but they are not only for PKP. There are common features useful to any other Polish organizations which are going to restructure from the old to a market based systems. In order to diffuse the knowledge of training as well as to save training costs

incurred to PKP, there might be a possibility to develop the management training courses in cooperation with the Ministry of Transport and Maritime Economy (MTME) and the Productivity Movement of Poland.

According to the study carried out by Alexander Hamilton Institute, it revealed that a combination of on-the-job experience and interaction with co-workers is four times as important in shaping a manager's talent than training. Training cannot create a productive manager by itself. On the other hand, since the average manager spends about one percent of his time in formal training, these statistics indicate that training does make a significant contribution to the person's ability to perform. Training is not everything - it has to be backed up by a development program that includes job rotation and coaching. But training is a crucial link to excellence in managers.

The study enumerates several obstacles to successful management training. The following points would be especially worthy of noting in the case of PKP:

(a) Timing of training: to consider not only what managers need to know but when they need to know it. Information and skills that are not used immediately deteriorate quickly. Re-organization of PKP should be announced with due consideration to the period required for management training.

(b) Balance in training: no single key to becoming an effective manager. Every manager needs a spectrum of skills, from administrative abilities to technical knowledge. Management training must provide a balance if it is to produce well-rounded, capable managers.

(c) Accountability: to establish some objective criteria to evaluate management training program and to re-examine the program constantly.

(d) Renewal of training: to be alert in regularly reviewing the relevance of adopted training courses, in-house courses in particular by asking why managers need the courses they are taking.

As stated above, once the management training programs are implemented, incessant improvement should be sought for better application to the current situation of PKP. This is particularly true for this type of training because they are quite new in character to support a transition to a market economy.

CHAPTER 5 ROAD FINANCING SYSTEM

CHAPTER 5 ROAD FINANCING SYSTEM

Summary

1) Insufficient Budget Allocation to Road Maintenance and Development

The needs for improvement and development of road facilities has been increasing to cope with increasing road traffic demands. In contrast, the road facilities in Poland have been deteriorating due to insufficient budget allocation to road maintenance and development. The budget allocated to road infrastructures under the jurisdiction of GDDP has been significantly declining; the road budget in 1992 is only 25 percent of that in 1986. The expenditure for road maintenance and development in 1992 is only about 8.2 trillion zl. In contrast, the total amount of tax revenues related to road use is estimated at 31.8 trillion zl. in 1992. Consequently, only 25.8 percent of the revenue collected from road users turns out to be used for the road infrastructures. Fuel turnover tax is the most dominant and accounts for 71 percent of the total revenue. On the other hand, the required funds for road infrastructure estimated by the GDDP amounts to 30.9 trillion zl. annually. The shortage of the budget for road maintenance and development is apparent. If sufficient funds for road infrastructure are not obtained, the existing road network, in which deterioration has been recognized, cannot be well-maintained, and the quality of the road network cannot be maintained to cope with expected increase in vehicular traffic demands. The lack of maintenance and development of road network could be an obstacle for restructuring the economy by imposing higher transportation costs.

2) Necessity of the Special Funds Earmarked for Road Infrastructure

Obviously the road network cannot be developed in a short period because enormous amount of funds will be required. The programme financing should be implemented gradually according to the road network development plan. It is desirable to secure stable funds for road maintenance and development to avoid shortage of available funds which are influenced by the fluctuation of the national economy. Therefore, it is recommended to establish special funds earmarked for road infrastructure to secure the continuity and consistency of the road network development. The special fund aims to limit the range of use of taxes collected from road users for road maintenance and development based on the user-pay-principle.

3) Introducing of Road Tolls to Overcome Fiscal Constraints

However, it will be rather difficult to allocate all the road-related-taxes to road infrastructure in the present financial condition of Poland. If all the taxes were allocated to roads, it could result in suspending of public services currently provided, or collecting of user charges the other services. Under this financial circumstance, the government should make use of funds other than road user taxes to proceed with the development of motorways and express roads. Since it is difficult to allocate all the road user taxes to road maintenance and development at present, toll collection is one way of financing road development to overcome the budgetary constraints.

4) Encouragement of Private Participation into Motorway Development

Even though funds for motorway development can be supplemented by introducing tolls, it is not likely to develop all the road tolls required by the government with its own procurement of funds. Thus, a part of toll road projects, which could generate sufficient revenue, are expected to be implemented by concession financing. The characteristics of concession financing, however, do not make them easy to implement, particularly in the absence of a sophisticated commercial and legal environment or well-developed capital market. Since various competing projects exist in surrounding contries, the government should take substantial part of the project risks to attract private investors to road infrastructure projects against the uncertainties such as inflation, interest rates, and exchange rates, in the national economy of Poland. The government should encourage private participation into road development by lifting any regulations prohibiting or discouraging private investment. If the toll rate is fixed by the government at a low level for social welfare concerns, the total revenue would not be sufficient for repayment of loans and reasonable return of investment. Guarantee of minimum traffic volume or expansion of franchise period should be taken into account to cope with the uncertainties in concession finance.

5) The Roll of the Toll Road Agency in Motorway Development

The toll road agency should strengthen its function to enhance the standards of motorways, to make road network development plan, to monitor the progress of motorway construction, and to establish terms and conditions for concession financing and to supervise the projects financed by private investors.

5.1 Introduction

5.1.1 Background

Poland has been facing severe financial difficulties, requiring curtailment of expenditures on one hand and increase of revenue on the other. Due to the financial difficulties, the budget allocated to roads has been declining in recent years. This shortage of total funds has brought about not only delay of development of new roads but also inadequate resources to perform routine maintenance.

Insufficient provision of road infrastructures as well as deterioration of road facilities could impose more transportation costs on the society by increasing travel time and vehicle fuel consumption. The higher transport costs will lead to inefficiency of national economic development. Insufficient road maintenance could result in overhaul of road pavements or reconstruction of road sections, which is extremely expensive compared with the costs of routine maintenance.

Road network development is essential to achieve efficiency in regional development. At the same time, an adequate allocation of funds for road development can be used as a tool for a balanced regional development. Equity among regions should be taken into account in the allocation of funds. A well-organized road network is crucial not merely for fulfilling domestic transportation needs, but it should be viewed as forming a part of the international road network system. In particular, integration into the EC transportation system is of great importance.

A new road finance system, therefore, is needed to secure sufficient funds for maintenance of the existing roads and improvement and development of important arterial roads for the nation's future development.

5.1.2 Objectives

The objective of this study is to ensure continuity and consistency of funding so that road programs can be undertaken with confidence.

(1) to prepare a road user charging scheme to deal with expected increasing road expenditures;

(2) to propose a special budget/account/fund system earmarked for roads based on the road user charging scheme; and

(3) to propose an outline scheme of private participation in motorways development.

5.2 Present Road Financing System

5.2.1 Budget Allocated to Road Development and Maintenance

The national fiscal condition of Poland is in a crisis at present because of reduction in tax revenue due to the recent recession in spite that the central government has made efforts to reform the national economy.

Budgets allocated to road maintenance as well as development have been running short severely in recent years, due to the shortage of the total revenue.

The shortage of GDDP road budget is illustrated in the historic trend in Table 5.2.1. Although the total traffic demand of road transport shows continuing growth in spite of the recent serious recession, the budgets allocated to road maintenance and development have been decreasing dramatically. The budgets allocated to roads in 1992 is about 25 percent of those in 1986 for both maintenance and development. This reduction of road budget, in particular, for maintenance may bring about deterioration of road facilities, and may result in unnecessary expense for overhaul of pavements, although it is difficult to estimate required costs for road maintenance and development due to rapid change of prices and lack of a sophisticated accounting system.

Table 5.2.1 Historic Trends of GDDP Road Budget

(bil. zl. in 1992 constant price)

	1986	1987	1988	1989	1990	1991	1992
Road Transpor Demand (million veh. km)	87.6	91.2	94.8	98.4	102.0	105.6	109.2
(1986=100)	100	104	108	112	116	121	125
Total Road Budget	13,248	13,256	12,107	9,590	9,176	4,397	3,357
(1986=100)	100	100	91	72	69	33	25
Maintenance	9,460	9,249	7,469	6,083	4,661	2,600	2,179
(1986=100)	100	98	79	64	49	30	23
- Road Maintenance	9,069	8,896	7,143	5,768	4,399	2,422	1,930
- Bridge Maintenance	391	353	326	315	262	378	249
Improvement	2,493	2,664	2,667	1,820	3,287	884	832
(1986=100)	100	107	107	73	132	35	33
- Road Improvement	2,178	2,366	2,341	1,432	2,635	542	650
- Bridge Improvement	315	298	326	388	652	342	182
Development	1,295	1,343	1,971	1,687	1,228	713	346
(1986=100)	100	104	152	130	95	55	27

Source: GDDP

5.2.2 Required Funds for Road Infrastructures

The required funds for road maintenance and development were estimated by GDDP. The estimation Case 1 indicates a moderate budget requirement, while the estimation Case 2 shows a budget requirement for more rapid road development(Table 5.2.2). The required funds account for 30,922 billion zl. even for moderate development, while it amounts to 44,891 billion zl. for more rapid development. These financial requirements are far beyond the actual budget allocation in the past, and the shortage is expected to be appropriated by the present accounting system.

5.2.3 Revenue Related to Road Use

1) Range of Road User Charges

In general road user charges include any direct and indirect taxes or charges levied on the purchase, ownership and operation of motor vehicles. Types of taxes related to road usage vary from country to country to some extent. These taxes are usually classified into three categories; taxes on purchase of vehicles, taxes on ownership of vehicles, and taxes on operation. In general, taxes on purchase of vehicles are commodity tax, or sales tax. Taxes on ownership of vehicles are automobile tax, and/or axle weight tax. Taxes on operation include fuel tax, turnover tax for fuel consumption, and tire tax.

Theoretically road user charges should reflect marginal costs for the use of roads to promote efficient allocation of resources and to avoid distortions. However, taxes on road users are levied in most countries for general revenue purposes and do not necessarily to cover the cost of road infrastructures.

2) Road User Taxes Levied in Poland

The present road user taxes and fees in Poland primarily consist of fuel turnover tax, vehicle registration tax, vehicle import tax, and border crossing fees.

Road user taxes in Poland can not be specified due to lack of detailed tax information. Thus, each type of tax related to road use is estimated for the year 1992. The total of road user taxes and fees in 1992, is estimated as 31,835 billion zl. in case 1, which is based on the existing fuel prices and fuel turnover tax rates and 36,547 billion zl. in case 2, in which the road user charges are estimated with the new fuel prices and fuel tax rates to be applied from August 1, 1992 (Table 5.2.3).

Of the road user taxes in the present system, more than 70 percent is obtained from the turnover taxes on fuel consumption. Among others, of the total road user charges in 1992 (case 1), 16.7 percent is collected from vehicle import duties and 11.3 percent from vehicle registration tax.

Table 5.2.2 Required Costs for Road Maintenance and Development, 1992

Work Items by Road Type	Road Length (km)	Total Cost (bil. zl.)	Case 1 Planned Period (years)	Case 1 Annual Cost (bil. zl.)	Case 2 Planned Period (years)	Case 2 Annual Cost (bil. zl.)
National Roads: Total				**9,278**		**14,144**
Recurrent Costs				**4,530**		**6,240**
Routine Maintenance	42,951		annual	3,480	annual	4,640
Winter Maintenance			annual	500	annual	800
Adminstration			annual	550	annual	800
Development Costs				**4,748**		**7,904**
Modernization of Primary Roads	5,600	25,565	15	1,704	10	2,557
Modernization/Rehabilitation of Bridge	37,300	3,237	20	162	10	324
Strengthening of Pavement	3,070	4,200	10	420	5	840
Widening of Pavement		3,510	20	176	10	351
Motorway Construction	1,672	55,500	25	2,220	15	3,700
Construction of Large Bridges		660	10	66	5	132
Voivodship Roads: Total				**6,438**		**9,702**
Recurrent Costs				**4,139**		**5,612**
Routine Maintenance	114,808		annual	3,819	annual	5,092
Winter Maintenance			annual	300	annual	500
Maintenance of Dirt Roads	19,000		annual	20	annual	20
Development Costs				**2,299**		**4,090**
Strengthening of Pavement	10,572	5,286	10	529	5	1,057
Improvement of Pavement	9,470	5,000	10	250	10	500
New Pavement	19,000	38,000	25	1,520	15	2,533
Communal Roads				**3,056**		**4,845**
Recurrent Costs				**1,476**		**1,935**
Routine Maintenance	155,296		annual	1,226	annual	1,635
Winter Maintenance			annual	150	annual	200
Maintenance of Dirt Roads	90,000		annual	100	annual	100
Development Costs				**1,580**		**2,910**
Earth Road Pavement	3,000		annual	500	annual	750
Construction of Bituminous Roads	12,000	21,600	20	1,080	10	2,160
Urban Roads				**12,150**		**16,200**
Recurrent Costs				**3,640**		**4,600**
Routine Maintenance	70,525		annual	2,640	annual	3,300
Winter Maintenance			annual	400	annual	500
Administration			annual	600	annual	800
Development Costs				**8,510**		**11,600**
Rehabilitaion		51,000	15	3,710	10	5,100
Modernization and Investment			annual	4,800	annual	6,500
All Roads				**30,922**		**44,891**
Recurrent Costs				**13,785**		**18,387**
Development Costs				**17,137**		**26,504**

Source: GDDP
Note: Costs in 1992 Prices

Table 5.2.3 Taxes and Fees Related to Road Use, 1992

(billion zl.)

Taxes and Fees Related to Road Use, 1992 (Case 1)	
Fuel Turnover Tax	22,596
Registration Tax	3,610
Import Duties	5,326
Border Crossing Fees	303
Total	31,835
Taxes and Fees Related to Road Use, 1992 (Case 2)	
Fuel Turnover Tax	27,308
Registration Tax	3,610
Import Duties	5,326
Border Crossing Fees	303
Total	36,547

Source: Estimated by the Study Team based on information provided by the Road and Bridge Research Institute.

3) Concept of Road User Charges and Proper Taxation

(1) Fuel Tax

Motor fuel taxes vary by the amount and type of road use. The more distance an individual travels, more gasoline is required and thus more gasoline tax is implicitly paid. Similarly, larger or heavier vehicles generally require more gasoline than smaller or lighter ones to travel a given distance, which corresponds to road use if larger and heavier vehicles impose greater maintenance or safety costs on the highway system.

Motor fuel tax levies are, however, deemed imperfect due to the following reasons;

(a) All gasoline and diesel fuels are not necessarily used on highways; some is used for boats, airplanes, agriculture machinery, and off-road vehicles.

(b) Fuel usage does not correspond in relation to road use because vehicles differ in their fuel consumption.

(c) Fuel taxes do not differentiate road use by location and time, so they do not adequately represent congestion costs created by road users. Fuel taxes may have to be supplemented with some form of congestion charge.

Despite these problems, fuel taxes have been accepted and used as the primary road user tax in many countries.

(2) Other Vehicle Related Taxes

Many of the other taxes and fees collected from road users are not linked to the travel distance used by vehicles like fuel taxes and tolls. For instance, vehicle registration fees are usually not based on an accurate measure of road use. The

fees are based either on vehicle value or weight, neither of which correspond to actual road use. Since automobile owners have higher potential for road use than non-owners, some can argue that registration fees can be viewed as an admission fee into the road transport society. These fees, however, do not correspond to the amount of road transport benefits they receive and should be emphasized as a regulatory device rather than road user charges. A similar argument also applies to turnover tax for vehicle purchase, which are also based on size and prices of vehicles.

(3) Tolls on Road

Road tolls can also be adapted as road user charges, since tolls are differentiated by distance traveled and vehicle type, although collection of tolls impose relatively high administration and operation costs.

5.2.4 Problems in the Existing Road Financing System

Problems in the road financing system in Poland is illustrated in Table 5.2.4 by comparing budget, required costs, and road user taxes.

1) Insufficient Budget Allocation to Roads

Budget allocated to roads of 8,206 billion zl. in 1992 are far below the required cost of 30,922 billion zl. for road maintenance and development.[1)] Only 26.5 percent of the required costs of the estimate (Case 1) were allocated to the road budget in 1992.

Maintenance costs are insufficient even for national roads; moreover, inadequate funds were allocated to investments for road betterment and new road construction.

2) Inequitable Allocation of Road User Taxes

Compared with the estimated road user charges of 31,835 billion zl. in 1992, the budget of 8,206 billion zl. for road infrastructure maintenance and development is quite small; 25.8 percent of the road user charges has been allocated to the road infrastructure budget. This insufficient allocation to road infrastructure is attributable to the recent shortage of the central government revenue. The extreme imbalance between the road user charges and the expenditure for roads should be corrected because road users are imposed an excessive burden at present.

3) Comparison Between Revenue and Requirements

The budget for road maintenance and development has been running short substantially, compared with both required funds and collected road user charges. The estimated fund requirement for moderate road maintenance and development (Case 1), however, could be covered by the collected road user charges of the present system.

Therefore, it is desirable to establish a special fund earmarked for road infrastructures to ensured stable financial source for road maintenance and development.

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1) The road budget of 8,206 billion zl. indicated here is different from the amount of 3,357 billion zl. which appeared in Table 5.2.1. The latter indicates the budget available only for GDDP, excluding a part of administration costs, while the former includes the budget for communal roads as well.

Table 5.2.4 Comparison Between Revenue and Expenditure, 1992

Expenditure and Revenue Related to Roads	(billion zl.)
Budget for Road Maintenance and Development [1]:	
Maintenance of National Roads	2,725
Investment for National Roads	405
Maintenance of Voivodship Roads	726
Investment for Voivodship Roads	25
Maintenance and Investment of Commune Roads	1,300
Maintenance of Urban Roads	2,175
Investment for Urban Roads	850
Total	8,206
Required Expenditure (Case 1) [2]:	
Maintenance	13,785
Investment	17,137
Total	30,922
Taxes and Fees Related to Road Use (Case 1) [3]:	
Fuel Turnover Tax	22,596
Vehicle Registration Tax	3,610
Vehicle Import Duties	5,326
Border Crossing Fees	303
Total	31,835

Source:
1) Estimation by the Road and Bridge Research Institute
2) Table 5.2.2
3) Table 5.2.3

4) International Comparison of Road Account

A small amount of funds has been allocated to road development and maintenance in Poland. The proportion of road budget in the state budget is smaller than those in other countries(Table 5.2.5).

The imbalance between expenditure and revenue related to road use is observed in other countries as well(Table 5.2.6). Although the revenue and expenditure are not necessarily balanced, the extreme imbalance between road user charges and road expenditure is not desirable for equity concern between road users and non-road users. Balanced road accounts are seen more in countries such as Japan, former West Germany, Switzerland.

Table 5.2.5 Composition of Road Expenditure in State Revenue, 1989-90

Country	Percent
Switzerland	5.59
Finland	5.44
Japan	5.40
United States	3.66
Great Britain	2.51
Belgium	2.47
Sweden	2.42
Netherlands	1.60
Denmark	1.40
Poland	**1.10**

Source: International Road Federation, World Road Statistics 1990 Edition

Table 5.2.6 Road Expenditure as a Percentage of Road User Taxes, 1989-90

Country	Percent
Japan [1]	148
West Germany (1987) [2]	100
Norway (1980) [2]	98
Austria (1986 Budget) [2]	99
United States [1]	83
Switzerland (1988) [2]	79
Belgium (1986) [2]	70
Denmark [1]	33
Sweden [1]	33
Spain [1]	23
Great Britain [1]	23
Poland (1992)	**25**

Source:
1) International Road Federation, World RoadStatistics 1990 Edition;
2) Kousoku-douro-chousakai, Sekai no Kousoku-Douro [Motorways in the World]. 1990.

The level of gasoline tax of 57 percent in Poland is comparable to that in other European countries (Table 5.2.7). It can be said that Polish road users pay a reasonable amount of user charge for their road use.

However there is a considerable difference in the fuel tax rates between gasoline (57 percent) and diesel fuel (32 percent). In several countries, heavy vehicles using diesel fuel do not pay their fair share of road user taxes. While there is a growing awareness of the need to realign fuel prices by adjusting diesel fuel prices closer to gasoline prices, the governments have perceived practical difficulties in introducing the desired policy reforms.

A common argument against raising diesel fuel prices is that diesel fuel is used not merely by transport vehicles but by a number of essential industries as for agriculture tractors and fishing boats. Raising diesel fuel prices will thus go against equity considerations. There is another fairly widespread belief that raising taxes on diesel fuel will lead to higher transport costs that, in turn, would contribute to inflationary trends. On the contrary to these arguments, many governments have imposed almost the same fuel tax on gasoline and diesel fuel. Thus, the difference between gasoline and diesel fuel in Poland is recommended to be corrected to achieve equity between gasoline and diesel fuel users.

Table 5.2.7 Fuel Tax as a Percentage of Retail Price

Country	Gasoline	Diesel Fuel	Difference
United States	14	14	0
Austria	58	56	2
Germany	66	62	4
Switzerland	69	65	4
Finland	55	50	5
Hungary	74	68	6
Turkey	68	62	6
Great Britain	67	60	7
Spain	64	55	9
Netherlands	66	56	10
France	73	62	11
Denmark	75	64	11
Yugoslavia	60	49	11
Belgium	65	52	13
Italy	81	64	17
Poland(1992)	**57**	**32**	**25**
Sweden	60	32	28
Norway	68	28	40

Source: International Road Federation, World Road Statistics 1990 Edition

5.3 Future Requirements for Road Financing System

5.3.1 Increasing Demand for Quality Road Infrastructures

To cope with the expected increase in vehicular traffic, it is crucial to maintain and improve the existing road networks and to develop new road networks. Delay in road development leads to relative increase in transportation costs, such as vehicle operating costs and travel time costs, which will lessen Poland's competitiveness in the international arena.

Regional economic development is accelerated by development of the road network. The development benefits arise from lower transportation costs, some of which reduce costs of production to producers and prices paid by consumers. This leads to increase in both production and consumption.

Formulating the road network is important not merely for domestic regional development but for national economic development through international connection with neighboring countries.

5.3.2 Compliance with the EC Road Transport Policy

1) Fair Competition among International Transport Enterprises

A heavy burden has been imposed on the Polish transport industry at present. Polish trucking companies which are engaged in international cargo must pay 40 million zl. for trucks with a loading capacity of 20 tons and over, and 60 million zl. for trucks of less than 20 tons, and must deposit at least 50 million zl. in their bank account. Moreover, they must go at least once a week out of the country. When a truck goes out of the country, they must pay 600,000 zl. for every exit. In the case of a bus company, they must pay 50 million zl. for the license per bus and deposit the same amount as trucking company.

These taxes and fees discourage the Polish transport industry by decreasing the competitiveness among international trucking and bus companies. These fees should not be regarded as a device for securing revenue easily. The impact on national economy as well as domestic transport industry by imposing additional high transport costs should also be taken into account when determining the fee.

2) Efficient Border Crossing

A large market can be established by elimination of barriers in trade. At present long queues at borders make transport activities significantly inefficient. To achieve more efficient transport in the European Community, the EC has proposed to make border crossing easier with simpler documentation, and to foster free competition in the transport industry.

The border crossing fees currently levied on foreign truckers are 800 thousand zl. for trucks with a loading capacity less than 10 tons, and 1,300 thousand zl. for trucks of 10 tons to 24 tons. These fees can be viewed as a user charge for road use in Poland. But the charge is collected only from trucks. The border crossing fees for foreign vehicles should be determined in accordance with the transport policy on this matter in other countries.

3) Environmental Protection and Traffic Safety

Obviously the government should play an important role to protect public interests such as traffic safety and environmental protection. By the time Poland become a member of the EC, Poland is expected to adjust its standards on traffic safety and environmental protection to the EC standards.

The EC has already adopted anti-pollution standards to limit exhaust emissions from vehicles. At present the Polish regulations on exhaust emission by motor vehicles, however, are considerably below the current standard of the EC countries.

With regard to traffic safety, the EC has set the standard for technical checks on commercial vehicles, minimum depth of tire treads, and technical requirements for new vehicles. Obligatory wearing of seat belts, maximum blood-alcohol levels for drivers, bringing driving license regulations into line have been proposed as well.

The Polish government should develop a program to confirm to the EC standards by the year 2000 through close cooperation with car manufactures and automobile users. In order to conform with the EC standards, a part of funds collected as road user charges could be allocated to support traffic safety and environmental protection related to road transport because the cost of these externalities are usually ignored by the road users in their operation of automobiles.

5.3.3 Issues for the Future Road Financing System

1) Increasing Needs for Road Financing System

Road infrastructure requires enormous expenditures for new infrastructure investment and maintenance. Obviously all the needs cannot be met at once. The government must utilize all the means at their disposal to maximize the productivity of existing road network through maintenance and improvement before undertaking new investments.

2) Establishing an Efficient Accounting System

Establishing an efficient accounting system is an urgent issue in Poland. The government cannot make proper transport policies without monitoring and understanding the present conditions. Awareness of actual costs for road maintenance and development is of great importance. In the past, costs in Poland have been heavily influenced by subsidies and high rate of inflation. Thus reliable unit costs for road development are required, and should be updated at regular intervals to reflect the inflationary trend. In addition to construction costs, land acquisition costs are also of importance. An independent system of land valuation and compensation is required to bring a degree of uniformity to land transactions associated with infrastructure development.

3) Institutional Reforms

In order to expand the methods for procurement of funds for road development, institutional reforms will be required for introducing toll roads and a BOT scheme, which includes participation of foreign investment.

5.4 Future Direction of Road Financing Systems

5.4.1 Major Components of Road Financing Systems

There are three types of measures to cope with the financial difficulties in road financing systems: (a) cost reduction in road development and maintenance; (b) increase in road budget for road development and maintenance; and (c) introduction of new financial sources of investment. A focus will be given to (b) and (c) in this study.

The budget will be increased by adequate allocation of road user taxes for road maintenance and development. However, institutional arrangement is required for securing the increased road user charges to be allocated to road infrastructures.

Toll roads are another source of funding for developing road facilities, in particular, motorways and bridges. However, it is difficult for the government to finance all the toll road projects with its own procurement of funds.

Thus, in recent years there has been interest for concession financing in order to supplement insufficient governmental funds for infrastructure development. Absolute financial shortage in Poland has made the introduction of financial sources from the private sector necessary, particularly for initial capital investment.

5.4.2 Special Fund Earmarked for Road Infrastructure

1) Objective of the Special Fund

A special fund earmarked for road infrastructure, which is separated from the general accounts of the government, is the account in which the revenue will be proposed for specific expenditure such as development of road facilities.

The special funds consist of special purpose taxes (objective taxes) such as gasoline tax by which benefits can approximately be measured. The objective of the Special Fund is to achieve efficient allocation of resources and to secure stable funds for road infrastructure development and maintenance by minimizing the influence from fluctuating economic conditions.

2) Advantages of Special Fund Earmarked for Road Infrastructures

The special fund earmarked for road infrastructures has several advantages.

(1) Efficiency

The special fund system, which is based on the user-pay-principle, introduces market mechanism into development of road infrastructure. Needs for road development can be properly reflected in road investment and it leads to efficient allocation of resources.

(2) Stability

Social infrastructure such as roads should be planned and developed from the long-term perspective. The earmarked special fund can secure stable financial sources. If road development is financed by the general account, road development could suffer from fluctuations of fiscal and economic conditions.

(3) Equity

The user-pay-principle can be justified for the public services which are provided particular benefit to particular individuals from the equity point of view.

(4) Acceptability

Road user taxes and fees are collected on the condition that the revenue is used for road development in the special fund account, so that this system can be easily accepted by tax payers.

3) Disadvantages of the Special Funds

(1) Less Flexibility for Allocating Funds

The disadvantage of introducing special earmarked funds, on the other hand, is to lose flexibility in allocation of the state budget. This could result in reduction of budget allocation to other public services due to overall shortage of budget, or having to impose new or higher user charges to maintain such services.

(2) Difficulty to Deal with Congestion

Another difficultiy lies in the way in which the user charges are collected, since the rate of user taxes are not determined taking into account external costs caused by congestion at the moment. In practice, it is difficult to estimate and levy taxes on external costs which significantly differ from city to city and from time to time.

4) Necessity of the Special Funds

It is proposed to establish the special funds earmarked for road development and maintenance because it is urgent to restore deteriorated roads. The government should be aware of the actual costs through a relative closed accounting system. These benefits are considered to exceed the loss in flexibility in allocaton of funds. Another justification is that fuel taxes, a major sources of special funds, can be collected with relatively low administration costs, partly because they are collected from the wholesalor or distributor where there are fewer firms than the retail.

5) Simplification of Road User Charges

A variety of taxes are levied on road users, but the complicated road user charge system should be avoided for achieving efficient collection of taxes and fees. Moreover, a simple system is desirable and helpful for road users to monitor for the purposes the collected charges are used. In principle, fuel consumption tax is the most appropriate user charge for road use, because fuel consumption can be considered approximately proportional to road use. In addition, an axle load tax should be applied to supplement the expense of road maintenance because heavy-loaded vehicles damage roads more heavily than passenger cars.

6) Strategic Reinforcement of Road User Taxes

It is not likely to change the taxation system drastically under the current financial situation of Poland. In practice, the government should take a gradual transformation of the tax system to establish a special fund earmarked for road infrastructures.

(1) In the first phase, the government should establish the earmarked funds to secure at least the road maintenance and small improvement funds.

(2) In the second phase, road development costs as well as maintenance costs should be fully covered by the road user charges.

(3) In the third phase, not merely road maintenance and development but also urban public transport will be supported because road congestion can be relieved to some extent by provision of a public transport.

Consequently, in the short term, a shortage of road development fund is expected, so that the government needs to introduce new financial sources to roads.

7) Allocation of Funds

When the special fund earmarked for road infrastructure is applied, fuel turnover tax, the most dominant revenue will be collected by the central government. The road user taxes should be allocated to relevant authorities such as GDDP, voivodship, and communal governments, according to the needs for road maintenance and development of respective roads. In accordance with the concept of road user charges, it is recommended that the funds be earmarked for road maintenance and development not merely at the central government level but also at the local government level.

5.4.3 Introduction of Tolls and Private Participation in Road Development

1) Purposes of Introducing Tolls

The road budget in Poland has been significantly reduced due to a shortage of the state budget. Although road user taxes are expected to increase in accordance with the growth of automobile use, all the road user taxes are not likely to be allocated to road development and maintenance, taking into account of the current shortage of financial revenue of the nation. To overcome these budgetary constraints, toll collection is another way of financing road development.

Toll roads can be constructed either by the government with its own procurement of funds through the international loans and bond issuance or by the private sector participation. Collection of tolls as user charge can be justified for the savings in travel time as well as operation costs of users. In the case of finance by the government, tolls can be viewed as a method of generating revenue to reimburse international loans and relevant bonds. On the other hand, revenue through tolls will be required for not only repaying the loans partly used for initial investment but also for yielding profits for investors.

2) Establishment of Toll Road Agency

Establishment of a government agency or semi-autonomous authority will be required to manage toll road development financed by either public sector or private sector.

In case toll roads are developed by public funds, the agency is fully responsible for construction of the road facilities and operation of the toll road systems.

On the other hand, when toll roads are developed under concession financing, the agency should be responsible for ensuring that the provision and management of toll road is in accordance with national policies. The agency would also have a role in the acquisition of land for road development.

The toll road agency established this year which was supported by the EBRD(European Bank for Reconstruction and Development) and is now strengthened in its function. The success of the agency is essential for toll road development in Poland, so that the government as well as the EBRD should support its activities by securing finance and human resources.

3) Level of Tolls

The level of tolls should be determined by the following financial and economical considerations.

(1) The Principle of Benefit

Toll rates should not be more than the benefit which toll road users usually receive.

(2) The Principle of Own Cost Reimbursement

In principle, in order to redeem the loans for toll road development, the level of toll should be determined to balance the total revenue through toll collection and the total costs, taking into account the period of toll collection and estimated traffic demand.

The toll rate for each road should be set based on a feasibility study for toll road development.

4) Promotion of Private Participation

(1) BOT Operation Scheme

New financing instruments for developing motorways are needed due to the shortage of road budget in Poland. The BOT scheme is usually designed for major infrastructure projects which traditionally have been constructed by a government with its own procurement of funds. Some infrastructure projects, which generate enough revenue to cover the project risks, can be implemented on a BOT basis. Among several types of concession financing methods such as BOT(Build, Operate, and Transfer), BO(Build and Operate), and BOO(Build, Operate, and Own), BOT scheme is the most popular financing methods to utilize private sector funds and have attracted attention in many countries.

The characteristics of BOT projects, however, do not make them easy to implement, particularly in the absence of a sophisticated commercial and legal environment or well-developed capital market. Furthermore, many infrastructure projects, because of their public welfare purposes, can not be expected to generate sufficient revenue. Up to the present time, governments have granted few incentives to the private sector in the present BOT scheme. If a government takes a

more positive view and bears a part of the project risk, many more infrastructure projects could be realized on a BOT basis.

In order to attract private investors to road infrastructure development in Poland, the government should take some part of the project risk due to existence of competing projects in surrounding countries as well as uncertainties for the future of the country. Although sharing project risks under the BOT scheme might force a government to make a financial outlay, more benefits will yield for the society when compared with the case where the government is responsible for the entire project.

(2) Project Risks and Government Guarantee

There are a variety of risks in toll road projects on a BOT basis. The responsibility is examined by the type of cause as follows;

(a) Errors in Cost Estimation

Errors in cost estimation should be the responsibility of the project company. However, shortage of information on construction as well as maintenance costs in Poland makes accurate cost estimation difficult, so that some percentage of the total cost may be added as a contingency allowance.

(b) Change in Design

Design change caused by the government order and/or unexpected geological conditions will be partly attributable to the government's responsibility. The government should guarantee a part of the excess costs caused by the reasons beyond the control of the project company.

(c) Delay in Land Acquisition

Timely land acquisition is essential to avoid cost overrun for toll road projects, however, delays frequently occur. Besides, ambiguity in land ownership in Poland will make it more complicated. Therefore, at the beginning, the schedule of land acquisition must be clearly set up between the government and the project company. If land acquisition delays are encountered, the government must compensate the project company for the excess costs caused by the delay.

(d) Inflation

High inflation during the construction period will cause a cost-over-run. At the time of the project cost estimation, the inflationary tendency will be estimated on the basis of the past economical statistics. In order to avoid over estimation, an extraordinary inflation such as hyper inflation over a certain percentage could be partly attributable to the responsibility of the government.

On the other hand, an extraordinary inflation brings about high revenue from the toll collection as well. The cost-over-run caused by such high inflation can be recovered by high revenue if toll rate is adjusted in proportion to the actual inflation.

(e) Interest Rate

In the estimation of the project cost, the variation of interest is taken into account on the basis of its economic statistics. The government should have some responsibility on an unusual hike of interest rate above a certain percentage.

(g) Exchange Rate

Unstable value of currency in the country will make the estimation of revenues and expenditures of the project quite difficult; therefore, the government should play a part in guaranteeing a fixed exchange rate to realize the project finances.

(3) Countermeasures for Reducing Risks

(a) Toll Setting

In the case of toll road development based on the BOT scheme, toll rate is determined by taking account of time and fuel cost savings compared with the alternative road. However the toll rate is governed by the government policy, and the rate is tend to be fixed at a low level for social welfare concerns. In this manner, if enough traffic volume was not achieved, total revenue would be insufficient for repayment of the loan and reasonable return of investment. In such case the government should take a part in providing low cost and long term finance to the project company in order to make the project feasible.

(b) Traffic Demand

Traffic projections are basically the responsibility of the project company. However, in case traffic volume was quite lower than projections due to the unexpected change of economy, then the government should take a part in compensating the loss due to such difference. The government might guarantee minimum volume of traffic to avoid estimation on the safe side by the project company. Furthermore, the government must coordinate any new road construction projects which will directly compete with the project.

(c) Franchise Period

The franchise period must be long enough to cover the full repayment of the loan and a reasonable return of investment. Since the project has to be transferred to government without any compensation when the franchise period is over, it is required that the franchise period should be extended until investors receive a reasonable return of their investment.

5.4.4 Other Considerations in Road Financing System

1) Value Capture

Generally speaking, development or improvement of public infrastructure generates benefits of capital gain mainly to land owners, other than benefits to users of the services. The benefits are considered as economic externality of the public investment.

Development and improvement of transportation facilities yield direct benefits for the users in the form of savings in transport costs and travel time. In addition to these direct benefits, it brings about benefits for other transport users by reducing congestion in the relevant modes of transport. Furthermore, it causes an increase in the utility of real property around the developed transport facilities, in turn, population and economic activities are located, the land value increases. Development of transport facilities yields indirect benefits to the various related individuals and groups, however the costs for these indirect benefits are not paid, so that they are called external benefits. Among beneficiaries, users pay for the benefit in the form of fares and user charges, however in general benefits from increase in real property do not pay proper costs. This inequity among the beneficiaries has attracted attention in recent years partly because increasing difficulties have been experienced for funding public infrastructure.

It is difficult to internalize the enormous benefits which are induced by the development of transportation facilities. This divergence between the socially proper level of service and the level of service provided by the developer of transportation facilities may result in shortage of supply of transport services. The shortage of funds should be supplemented through the value capture to provide adequate levels of services.

In spite that necessity of value capture is widely recognized, it is difficult to impose such a tax due to the difficulties to specify the beneficiary and to estimate the amount of benefits. One way to absorb the benefits which is brought about by the development of transportation systems is to internalize the external benefits. In the case of motorway development, giving the rights of development in adjacent areas around the interchanges to developers is one of the measures to absorb the externality. More directly, a certain portion of increased real property tax, which is collected by the local governments, could be allocated to the development of motorways. These measures to increase funds for road development should be taken into account not merely for securing funds but also for equity concerns among beneficiaries.

2) Subsidy for Public Transport

Public subsidies for other transport services are sometimes justified by economic externalities and social considerations.

The most common example is subsidy for urban public transport services, whereby it can be argued that congestion on the roads will be relieved by provision of public transport services. This subsidy may serve as an indirect form of benefit charge if road users do benefit from the existence of mass transit systems.

Other examples include subsidies designated to transport services in rural areas, remote regions of the country, and relatively impoverished areas, whereby it is argued that public transport can foster (a) economic development, and (b) more equitable distribution of income and public services. This subsidy is justified by social considerations.

3) Peak Load Pricing in Urban Areas

With few exceptions, little effort has been made to recover the cost of urban road congestion through taxes on vehicles. Some attempts have been made to introduce congestion charges in urban areas to make the best use of scarce road space and mobilize extra revenue. The usual method has been area licenses: a part of the city, usually the congested central area, is cut off by the cordon line and all vehicles wishing to enter the area have to purchase an area entry license.

These financial instruments are of importance, however, further studies are required to apply these measures.

Annex

Table 1	Turnover Tax for Fuel Consumption by Vehicle Type: 1992 (Case 1)
Table 2	Turnover Tax for Fuel Consumption by Vehicle Type: 1992 (Case 2)
Table 3	Car Registration Tax: 1992
Table 4	Border Crossing Fees: 1992
Table 5	Import Duties on Motor Vehicles: 1992

Table 1 Turnover Tax for Fuel Consumption by Vehicle Type: 1992 (Case 1)

Vehicle Type	Number of Vehicles	Average Travel Distance (km/year)	Vehicle Kilometers (mln. km/yr)	Unit Fuel Consump. (ltr/100km)	Total Fuel Consump. (mln. ltr.)	Value of Fuel Consump. (bil. zl.)	Turnover Tax for Fuel Con. (bil. zl.)	Type of Fuel
Motorcycles and scooters	1,235,640	3,000	3,707	3.0	111	733	418	Gasoline
Private passenger cars	6,112,171	5,600	34,228				10,786	
- 1000 c.c.	2,444,868	4,000	9,779	6.5	636	4,198	2,393	Gasoline
1200 - 1500 c.c.	3,056,086	6,000	18,337	8.5	1,559	10,289	5,865	Gasoline
1800 c.c. -	611,217	10,000	6,112	11.0	672	4,435	2,528	Gasoline
Ambulances	16,812	20,000	336	8.0	27	178	101	Gasoline
Passenger and goods vans	221,107	15,000	3,317	11.0	365	2,409	1,373	Gasoline
Trucks: total	892,985	17,285	15,435				6,531	
Loading capacity - 2 tons	515,458	12,000	6,185	13.0	804	5,306	3,024	Gasoline
Loading capacity 2 - 8 tons	318,454	22,000	7,006	24.0	1,681	7,901	2,528	Diesel
Loading capacity 8 - tons	59,063	38,000	2,244	29.0	651	3,060	979	Diesel
Saddle tractors	38,220	45,000	1,720	35.0	602	2,829	905	Diesel
Ballast tractors	1,772	12,000	21	35.0	7	33	11	Diesel
Special trucks	73,575	15,000	1,104	29.0	320	1,504	481	Diesel
Buses: total	86,951	38,700	3,365					
Small buses	13,095	18,000	236	14.0	33	218	124	Gasoline
Medium buses	56,333	40,000	2,253	21.0	473	2,223	711	Diesel
Large buses	17,523	50,000	876	29.0	254	1,194	382	Diesel
Agriculture tractors	1,181,184	3,500	4,134	32.0	1,323	6,218	1,990	Diesel
Total	**9,860,417**		**67,367**		**2,755**	**13,904**	**22,596**	

Source: Central Statistical Office, Statistical Informations, May 1992

Note: Number of registered vehicles as of Dec. 31, 1991

Fuel Price: Gasoline	6600.0	zl./liter
Diesel	4700.0	zl./liter
Tax rate for gasoline	57	%
Tax rate for diesel	32	%

Table 2 Turnover Tax for Fuel Consumption by Vehicle Type: 1992 (Case 2)

Vehicle Type	Number of Vehicles	Average Travel Distance (km/year)	Vehicle Kilometers (mln. km/yr)	Unit Fuel Consump. (ltr/100km)	Total Fuel Consump. (mln. ltr.)	Value of Fuel Consump. (bil. zl.)	Turnover Tax for Fuel Con. (bil. zl.)	Type of Fuel
Motorcycles and scooters	1,235,640	3,000	3,707	3.0	111	799	519	Gasoline
Private passenger cars	6,112,171	5,600	34,228				13,417	
- 1000 c.c.	2,444,868	4,000	9,779	6.5	636	4,579	2,976	Gasoline
1200 - 1500 c.c.	3,056,086	6,000	18,337	8.5	1,559	11,225	7,296	Gasoline
1800 c.c. -	611,217	10,000	6,112	11.0	672	4,838	3,145	Gasoline
Ambulances	16,812	20,000	336	8.0	27	194	126	Gasoline
Passenger and goods vans	221,107	15,000	3,317	11.0	365	2,628	1,708	Gasoline
Trucks: total	892,985	17,285	15,435				7,718	
Loading capacity - 2 tons	515,458	12,000	6,185	13.0	804	5,789	3,763	Gasoline
Loading capacity 2 - 8 tons	318,454	22,000	7,006	24.0	1,681	8,909	2,851	Diesel
Loading capacity 8 - tons	59,063	38,000	2,244	29.0	651	3,450	1,104	Diesel
Saddle tractors	38,220	45,000	1,720	35.0	602	3,191	1,021	Diesel
Ballast tractors	1,772	12,000	21	35.0	7	37	12	Diesel
Special trucks	73,575	15,000	1,104	29.0	320	1,696	543	Diesel
Buses: total	86,951	38,700	3,365					
Small buses	13,095	18,000	236	14.0	33	238	155	Gasoline
Medium buses	56,333	40,000	2,253	21.0	473	2,507	802	Diesel
Large buses	17,523	50,000	876	29.0	254	1,346	431	Diesel
Agriculture tractors	1,181,184	3,500	4,134	32.0	1,323	7,012	2,244	Diesel
Total	**9,860,417**		**67,367**		**2,755**	**15,557**	**27,308**	

Source: Central Statistical Office, Statistical Informations, May 1992

Note: Number of registered vehicles as of Dec. 31, 1991

Fuel Price: Gasoline	7200.0	zl./liter	from Aug. 1 ,1992
Diesel	5300.0	zl./liter	
Tax rate for gasoline	65	%	from Aug. 1 ,1992
Tax rate for diesel	32	%	

Table 3 Car Registration Tax: 1992

Vehicle Type	Number of Registered Vehicles	Registration Tax per Vehicle (thousand zł.)	Total Registration Tax (million. zł.)
Motorcycles and scooters	1,235,640	102	126,035
Private passenger cars	6,112,171	348	2,127,036
Ambulances	16,812	540	9,078
Passenger and goods vans	221,107	348	76,945
Trucks: total	892,985		744,482
Loading capacity - 2 tons	515,458	548	282,471
Loading capacity 2 - 8 tons	318,464	1,098	349,673
Loading capacity 8 - tons	59,063	1,902	112,338
Saddle tractors	38,220	2,880	110,074
Ballast tractors	1,772	2,880	5,103
Special trucks	73,575	540	39,731
Buses: total	86,951		102,080
Small buses (- 16 seats)	13,095	540	7,071
Medium buses (16 - 45 seats)	56,333	996	56,108
Large buses (over 45 seats)	17,523	2,220	38,901
Agriculture tractors	1,181,184	228	269,310
Total	**9,860,417**		**3,609,874**

Source: Central Statistical Office, Statistical Informations, May 1992
Note: Number of registered vehicles as of Dec. 31, 1991

Table 4 Border Crossing Fees: 1992

(Veh.)

	Private Passenger Cars	Trucks
Entry and Exit	11,709,566	1,073,090
Entry	5,854,783	536,545
a. Domestic	2,634,652	284,369
b. Foreign	3,220,131	252,176
b-1. less than 10 tons	-	50,435
b-2. 10 to 24 tons	-	201,741

Entry Fees for Foreign Trucks

	(thousand zł.)		(thousand veh.)		(mil. zł.)
Truck loading capacity less than 10 tons:	800	*	50.4	=	40,320
Truck loading capacity 10 to 24 tons:	1300	*	201.7	=	262,210
Total					302,530

Table 5 Import Duties on Motor Vehicles: 1992

Vehicle Type	Imported Vehicles			Vehicle Price		Import Duties
	Total	New	Used	New (mln zl.)	Used 5 year old (mln zl.)	(mln zl.)
Motorcycles and scooters	11,263	6,324	4,939	15	6	11,263
Private passenger cars	509,500	125,462	384,038	100	40	4,076,000
Ambulances	40	34	6	120	48	0
Passenger and goods vans	14,885	1,224	13,661	120	48	164,548
Trucks: total	49,135	6,546	42,589			
Loading capacity - 2 tons	28,337	3,775 *	24,562 *	120	48	272,035
Loading capacity 2 - 8 tons	17,497	2,331 *	15,166 *	250	100	349,940
Loading capacity 8 - tons	3,301	763 *	2,538 *	800	320	211,264
Saddle tractors	2,688	595	2,093	800	320	172,032
Ballast tractors	44	9	35	800	320	2,816
Special trucks	94	21	73	250	100	1,880
Buses: total	1,280	258	1,022			
Small buses (- 16 seats)	191	38 *	153 *	120	48	3,056
Medium buses (16 - 45 seats)	824	166 *	658 *	300	120	32,960
Large buses (over 45 seats)	265	53 *	212 *	800	320	28,267
Agriculture tractors	5,263	3,025	2,238	50	20	0
Total	**594,192**	**143,498**	**450,694**			5,326,061

Source: Central Statistical Office, Statistical Informations, May 1992

*: Estimated in proportion to the total number of vehicles in each type

CHAPTER 6 PORT CARGO INFORMATION SYSTEM

CHAPTER 6 PORT CARGO INFORMATION SYSTEM

Summary

1) Introduction

With the complete change in the economic and political systems, Polish ports have been faced for the first time to compete with other European pots. At present, there is a significant reduction in the turnover of bulk cargoes such as coal and iron ore, in particular. The fact that general cargo has begun to elude the Polish ports should be recognized as a matter of vital importance. The introduction of port information systems is considered indispensable for the survival of Polish ports for the efficiency improvement.

2) Major Issues of the Present Information System

At present, only one computerized information system is working at the Baltic Container Terminal (BCT) in Poland. The system copes with container cargo handling service. In addition to the system at BCT, some major shipping companies and forwarders have computerized their system to prepare port cargo documents.

However, other cargo information systems shown below for example, which are equipped usually at modern Western ports, have not been introduced in Polish ports as yet.

- Port Management System
- Container Terminal Operation System
- Cargo Information Exchange System
- Cargo Information Tracing System

Lacking these information systems, cargo information is still exchanged by mail, by fax and by telex among the entities related to ports. Yard operation is not considered efficient. Location of cargoes cannot be traced in real time. These results in inefficiency to shippers of cargoes, forwarders, and shipping companies. They would rather avoid use of such ports without the information system because costs of transport increase significantly. Polish ports which are not equipped with cargo information systems would not be able to survive as long inter-port competition.

3) Expected Effects

Expected effects by the cargo information systems are opposite to the issues mentioned above.

The port Management System will reduce port management costs remarkably by obtaining accurate and quick information on port management.

The Container Terminal Operation System will help the optimum use of container yards. Instructions for yard equipment can be transmitted in a more efficient manner.

The Cargo Information Exchange System will save enormous time for exchanging various information among the port related entities.

The Cargo Information Tracing system will assist cargo shippers and various transport companies to obtain adequate information on their cargoes.

These will benefit not only the users of the port but also the port itself. The ports could survive and realize profits by the increased customers. The ports could reduce their operation costs significantly by adopting the system as well.

4) Conditions for Implementation

The following issues should be considered carefully to introduce the cargo information systems in Polish ports:

- Sufficient item, as well as substantial funds, are necessary for the system development.
- Works which would be computerized by the system should be carefully analyzed.
- Consensus to develop the systems should be established firmly among the port related participants.
- Compatibility with the existing European systems should be carefully examined.

The schedule of the development of the information system is considered as follows:

- Short term (until 1996)

Start study on the Port Management System, the Container Terminal Operation System and the Cargo Information Tracing System. As to the Cargo Information Exchange System, it is recommended to start with BCT and related port users.

- Medium term (2007 - 2000)

Develop all the Cargo Information Systems.

- Long term (2001 - 2005)

Start to operate the Cargo Information System at major ports in Poland. The Cargo Information Exchange System will hopefully be in operation at limited areas of the ports.

6.1 Introduction

When Poland was under the old, centrally planned economy, Polish shipping cargo was automatically collected at Polish Ports; both export and import cargo had to travel through these ports. It seems under the former COMECON, landlocked countries such as Czechoslovakia and Hungary, used mainly the Polish ports as their export and import centers. During this period, Polish ports did not have to engage in promotional activities to attract cargoes.

With the complete change in the economic and political systems, the automatic cargo collecting system has vanished, and Polish ports were exposed for the first time to competition with other Eastern ports. It is anticipated that especially in the field of general cargo transportation, and mainly container transportation in particular, which is the predominant trend in modern sea cargo transportation, the scramble for the container cargo with the gigantic ports in Germany and Holland will become more and more pronounced. At present, there is a significant reduction in the turnover of bulk cargo, especially coal and iron ore etc., through the Polish ports. It should be recognized as a matter of vital importance that general cargo has begun to elude the Polish ports. To reverse this recent trend, Polish ports which formerly could afford to be ignorant to the clients' needs, must not approach the cargo owner and attempt to respond to their wishes.

The main functions of a modern port include the discharge or loading of cargo from/to the ships and the transfer to/from the inland transport systems in a reliable, quick and inexpensive manner. Especially in the case of general cargo transport, mainly container cargo transport, reliability, quickness and cost effectiveness are key elements; these are thought to be the basic needs of the shippers.

To satisfy these needs, it is needless to say that rationalizing of cargo handling system is necessary. An introduction of an information system at the ports is also thought to be an extremely effective means to expedite cargo handling. An effective information system can heighten the reliability and quickness of the cargo handling, and thereby reduce the cost. Major ports in Western countries regard it as an important infrastructure that ensures their survival in such a competitive atmosphere through higher quality service.

The following information systems have been developed to rationalize the port management, heighten the efficiency of the container handling in the container terminal and smooth the circulation of the cargo information;

(1) Port Management System
(2) Container Terminal Operation System
(3) Port Cargo Information Network System

These systems enable them to provide their customers with higher quality service, and gives them a great advantage over rivals who have not installed such systems. These systems have become indispensable tools.

In this chapter, the program concerning the introduction of the information systems, mainly the above mentioned systems, to Polish ports will be described.

6.2 Present Information System

6.2.1 Port Management

1) Port Authority

Poland has three major ports, Gdansk, Gdynia, Szczecin - Swinoujscie; these three ports handle almost all Polish port cargo.

In former times, Port Authorities of these three ports belonged to the national government. In 1991, as the first step towards privatization, they were transformed into Joint Stock Companies, in which the government possessed 100 % of the shares.

In Gdansk and Szczecin - Swinoujscie, the cargo handling division, towage division, pilotage division, and repair division of the Port Authorities were privatized and separated from the Port Authorities. in Szczecin - Swinoujscie, for example, these divisions were separated into 16 private companies, which provide various services such as cargo handling, towage, pilotage, and repair work. The Port Authority and the employees own 50 % of the shares of the separated companies.

2) Management and Operation of Port Infrastructures and Facilities

Port Authorities manage port infrastructures and facilities, the quay walls, sheds and cranes, etc., lease them to the cargo handling companies, and provide energy and water. The Port Authorities collect the leasing charges, energy and water fees from the companies which are major sources of income for them.

In addition, however, Port Authorities collect tonnage fee from the ships which enter their ports. Port Authorities receive no subsidies from the government for their operations at he ports, and are expected to be self-sufficient.

3) Management and Operation of Container Terminal

In Gdynia, Poland has its sole full-scale container terminal named Baltic Container Terminal (BCT). The outline of the infrastructures and facilities of BCT is shown below.

Total Area of the terminal	about 50 ha
Length of the quay wall (-12 m)	800 m
Length of the quay wall (-10 m)	178 m
Gantry crane (35t)	x 3
Transtainer (with rubber tires)	x 7
Rail crane	x 2
Straddle carrier	x 5

BCT is not the type of cargo terminals as seen in the Western countries which are exclusively leased to shipping companies and operated by those companies. Gdynia Port Authority totally controls the container operation. Employees of Gdynia Port Authority are stationed at the terminal, and give instructions concerning cargo handling to the cargo handling bodies.

In 1991, BCT handled 114,500 TEU of container cargo. Major user was Polish Ocean Lines (POL) which is the sole liner shipping service company in Poland, though a new ferry service line has began to call at this terminal this year. New cars which are carried by Japanese flag ships from Asia are discharged at this terminal.

6.2.2 Cargo Documents and Port Cargo Information

1) Drawing up of Cargo Documents and Interchange of Port Cargo Information

Fig. 6.1.2 shows a flow chart of interchange of port cargo documents in Poland, the types of documents and flow of their interchange are almost the same as those in the Western countries.

Major shipping companies and forwarding companies in Poland have already computerized drawing up the port cargo documents with their computer systems. The method of interchange of cargo information, however, is still using the former one; almost all cargo information is usually exchanged by telex, fax, etc. Documents are sent by mail.

2) Cargo Information Tracing

POL (Polish Ocean Lines) can trance the container cargo information when cargo is on its ships. But, if the cargo is carried inland, location or time of delivery of the cargo cannot be accessed, because the information network between transport modes is inadequate.

6.2.3 Introduction of Computer System to Port Entities

1) Government Office

(1) Port Authorities

The representative computer system introduced to Port Authorities is the container yard plan operation system of BCT (Baltic Container Terminal). This system was introduced to rationalize the container handling in this terminal. The main functions of this system are shown as follows:

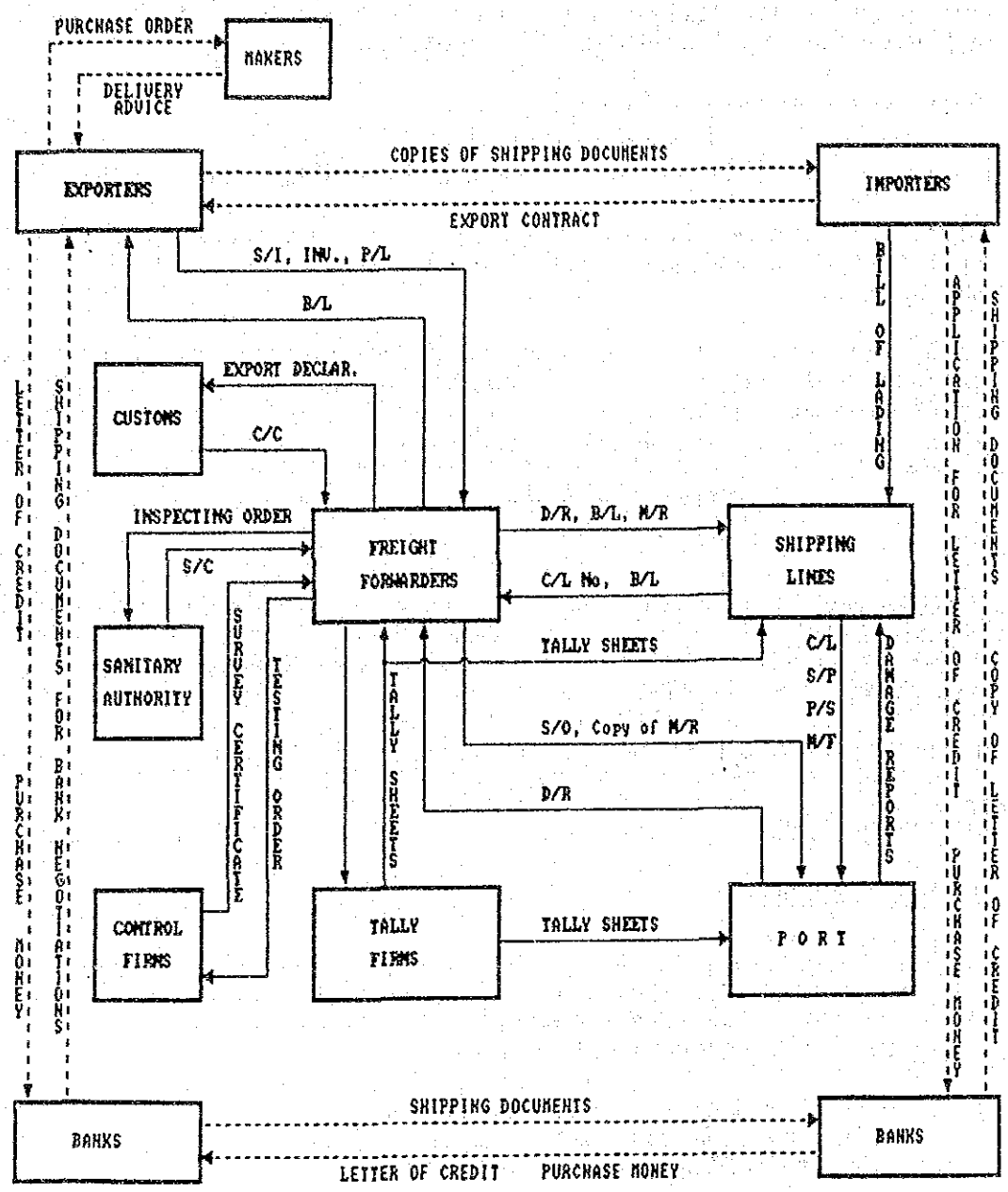
(1) Management of Containers in the Terminal
(2) Printing Out of Invoice
(3) Others (Wage management, Statistics)

Function (1) is comprised mainly of the two files described below.

One is the container data file which files data of the containers stacked in the terminal, for example, container number, invoice number, commodity, weight, name of the ship, seal number, and etc.

The other is the container location file which files location and the number of containers stacked in the terminal. This system has a capacity to file up to four stacks (currently in this terminal, containers are arranged two or three stacks).

BCT has system engineers in its employ, and this software was designed by themselves (not ordered from outside the organization).



Abbereviations:

C/C - Clearance Certificate
S/C - Sanitary Certificate
S/O - Shipping Order
S/I - Shipping Instructions
M/R - Mate's Receipt
C/L - Cargo List
M/T - Manifest
B/L - Bill of Lading
D/R - Dock Receipt
INV - Commercial Invoice
P/L - Packing List
S/P - Stowage Plan
P/S - Proper Stowage Certificate

Fig. 6.2.1 Simplified General Cargo Documents Flow in Poland (Export)

Hardware consists of a small scale computer; the capacity of main memory of the main computer is one MB (mega-byte) with hard disks of 150 MB. The main computer can be connected with up to 64 terminals. At present about 20 terminals are connected with this main computer. The terminals are placed in a central control room and seven terminal supervision rooms, etc. these supervision rooms are located in the main office building which is on the eastern side of BCT, and from these rooms it is possible to monitor the entire area of BCT. From these rooms the employees give directions to the operators of transtainers and gantry cranes by short wave radio.

But as this system is an in-house system, it has no computer connection with outer entities. Cargo information is interchanged by fax, telex, etc., between other port entities, for example, shipping companies, agencies, forwarding companies, etc.; BCT does not even have a data interchange system with POL which is the most important customer. When cargo information is delivered to BCT, operators of BCT must input the data into the computer system manually.

Except for the BCT computer system, no big computer system has been introduced in Polish Ports. In Szczecin, personal computers are used to a small degree such as preparation works for statistics, etc. In Gdynia, they intend to enlarge the system functions to wage management, stock control and personnel management, considering the introduction of a new main computer.

(2) Customs Office

In the Polish Customs Office, no computer system has been introduced. Since information is not interchanged by an on-line system, customers must visit the customs office when they require clearance.

In 1992 formats for customs clearance were synchronized with the form of the EC's, which are named SAD; They are now used as unified customs clearance form in Poland.

2) Shipping Company

In Poland, some of shipping companies have already installed in-house computer systems, computerized preparation of the port cargo documents; POL is representative example. POL draws up port cargo documents such as Booking List, Bill of Loading (B/L), Manifest (M/F), Mates Receipt (M/R) and etc., by the in-house computer system.

POL has an information network system that links its head office in Gdynia with branch offices in New York and Hamburg.

POL can, as mentioned above, trace the container cargo, when the cargo is on its ships. However, if the cargo is being carried inland, location or delivery time of the cargo cannot be accessed, because the information network with the other transport modes is inadequate.

3) Forwarder Company and PKP

C-Hartwick, which is one of the major forwarding companies in Poland, has already introduced an in-house system. C-Hartwick prepares port cargo documents, SAD, invoice, etc., by the computer system.

PKP has not introduced a computer system, except a wagon information system, which does not concern cargo information.

6.3 Major Issues of the Present Information System

6.3.1 Port Management and Operation

1) Container Terminal Operation

At BCT, which is the sole full-scale container terminal in Poland as mentioned before, a yard plan computer system has been introduced to rationalize the container handling in this terminal. There is no problem concerning container cargo handling works at present, because the system has enough capacity in comparison with its turnover.

But it is expected that when container cargo volume is increased in the future, present yard plan system will become insufficient. In this case, a yard operation system will be needed which automatically shows yard operation machines (i.e. transtainers and top lifters) and their optimum location to speed up container handling within the terminal.

2) Management of Port Infrastructures and Facilities

Except for the BCT computer system, no large scale computer system has been introduced in Polish Ports. In Gdynia the computer system is not used for port operations except at BCT. In Szczecin, only small-scale computers are used for preparation works of statistics, etc. Management of port infrastructures and facilities i.e. quay wall, sheds, cranes, collection of fees and charges are conducted without computers.

As higher quality of service will be required at Polish Ports, it will be necessary to increase the efficiency of port infrastructures and facilities. An accurate and speedy provision of statistical information will be needed from now on, as well.

6.3.2 Preparation of Cargo Documents and Interchange of Port Cargo Information

1) Preparation of Cargo Documents and Interchange of Port Cargo Information

Major shipping companies and forwarding companies, i.e. POL, C-Hartwick, etc., have already introduced in-house computer systems, computerized preparating of the port cargo documents. But, almost all cargo information is usually exchanged by telex, fax, etc. Documents are exchanged by mail. The electric data interchange (EDI) system by computer has not been realized yet in Poland. Therefore, it takes a lot of manual clerical work for information processing. It implies a possibility of typing errors which may result in rekeying operations.

As ship size becomes larger and containerization progresses rapidly around the world, a large quantity of shipping cargo documents must be processed. As the expedition of cargo information processing becomes important more and more, it is apparent that poor efficiency of cargo documents processing and interchanging will be a serious bottleneck for modern cargo operation in Polish ports. In case of container cargo handling, quicker processing and interchange of cargo documents are quite necessary. In Western countries, major container ports have constructed port cargo information network systems between port related entities. In Singapore, where the port plays an important role in the national economy, the national government led the way in constructing the network system. The rationalization of processing and interchanging of documents will be critical to raise the international competitiveness of Polish ports.

2) Interchange of Container Cargo Information around BCT

As mentioned above, the information system in BCT is an in-house system; it has no computer connection with related entities, therefore cargo information is interchanged by fax, telex and other means of communication with other offices.

Interchange of information, however, is not always handled smoothly. Sometimes delays occur. For example, sometimes if occurs that unloading container information is delivered to the terminal after a container ship calls at BCT. On the other hand, export container information is not delivered to trucks which carry container to BCT. Therefore, container handling and stowage plan cannot be prepared timely. This prevents smooth container operation in the terminal. This is because that Stowage Plan, Unloading Cargo List and other information for import container, which must be delivered before container ship calls, are not delivered in advance. Furthermore, Booking Lists are not delivered at an appropriate time form shipping companies and shipping agents (Fig. 6.3.1). It seems that this king of inadequacy of information network system is the bottleneck of container handling.

The cargo information is typed into the BCT system by a clerk-data entry-operator. There is a possibility of typing errors which may result in rekeying operations.

Port Authority of Gdynia started to examine the possibility of introducing a new system which would connect EDI (electric data interchange) with related entities.

3) Tracing of Cargo Information

Large scale ports in Germany and Holland take great interest in the smooth transport of their cargo to/from their hinterland and in providing accurate cargo information service concerning container cargo, i.e. where the cargo is and when the cargo will be delivered. Those ports have increased their turnover of transit cargo from/to the land-locked former Eastern European countries.

For Polish ports, which will compete with those of German and Dutch ports, arrangements for tracing container cargo and for providing efficient information service will become more and more important tasks from now on.

6.3.3 Communication Infrastructure in Poland

It is often said that present situation of communication infrastructure for the port related entities is not sufficient in Poland; computer data interchange by public telephone lines is not available because of the poor quality of the telephone lines. It seems that the present situation of Polish telephone communication is a bottleneck for introduction of information system to Polish ports.

As mentioned above, concerning the management of port infrastructures and facilities, the Port Authorities provided services not only for management of port infrastructures and facilities but also cargo handling service, towage service, pilotage service, etc. These services were transferred to private companies, which performed the cargo handling services.

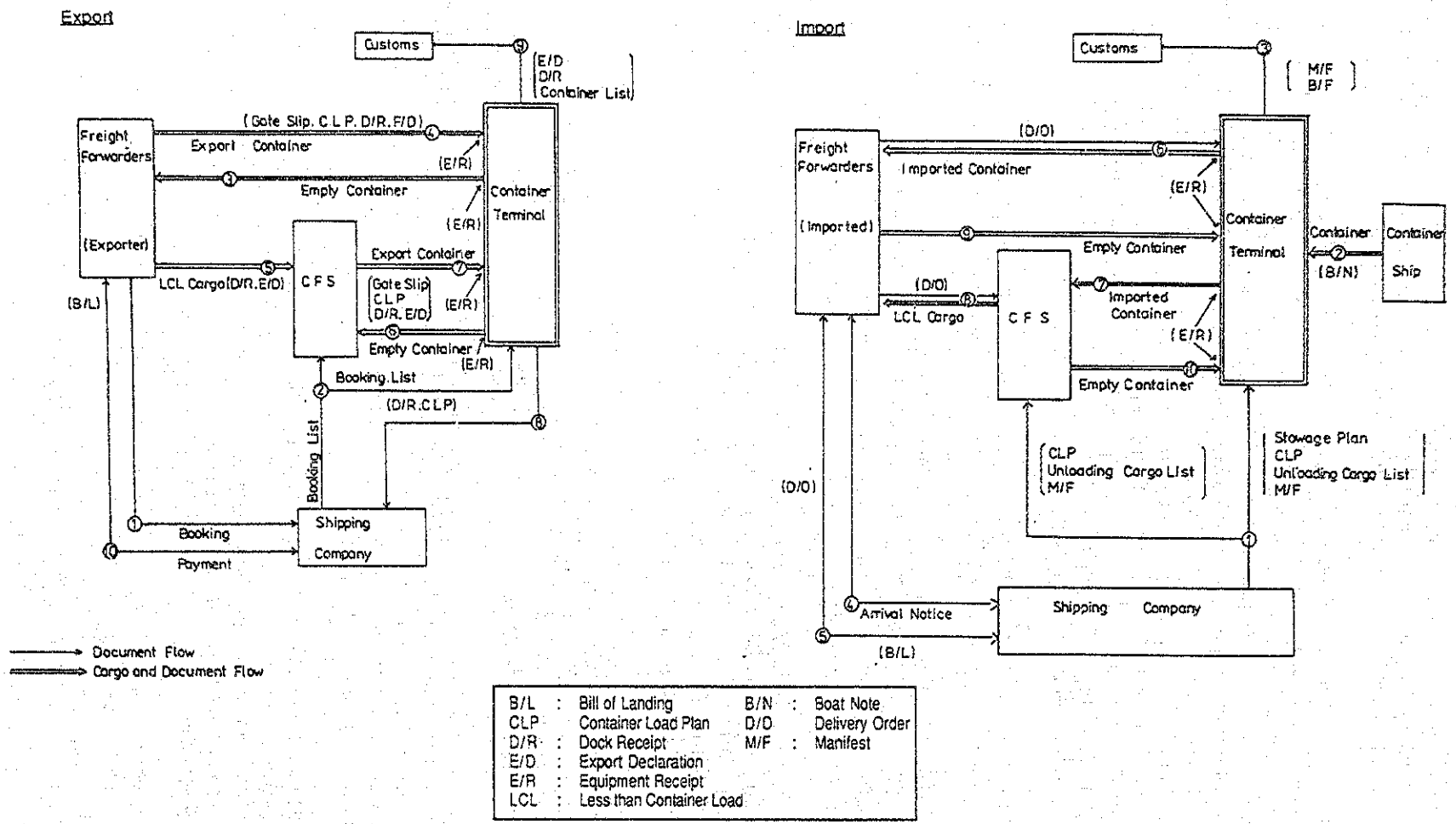


Fig. 6.3.1 General Document Flow Around Container Terminal

6.4 Policy for Developing Cargo Information System

6.4.1 Necessity and Merits of Cargo Information System

1) Introducing Information System to Port Management

(1) Necessity of the Information System

In Western countries, port authorities usually possesses and/or manage port infrastructures and facilities. They collect fees from port users. The Port Management System is very effective to manage such works. This system consists mainly of the following functions.

(a) Incoming/outgoing ship management system
(b) Infrastructure, facility operation management system
(c) Fee-management system
(d) Statistics management system

This kind of system has been introduced at Tokyo, and Yokohama in Japan, Southampton in UK.

In Polish ports, the introduction of the Port Management System is thought necessary to upgrade the quality of the service to port users and to improve efficiency of port management works.

(2) Merits of the Information System

The merits of the Port Management System are generally as follows:

(a) Port management works i.e. allotment of port infrastructures and facilities, fee collection, etc. can be rationalized and speeded up. The quality of the service to the port users can be upgraded.

(b) As accurate information concerning the condition of the port infrastructures and facilities can be quickly and easily obtained, efficient use of them is expected.

(c) As management of the information which the port authorities must obtained can be rationalized, quick information dispatch is possible, thus the image of the port can be improved.

(d) As an appropriate storage of the information and quick reference to it are possible, preparation of statistical data can be speeded up. As precise information for accurately judging the present condition can be obtained quickly and easily, it can be utilized to make port development plans.

2) Introducing Information System to Container Terminal Operation

(1) Necessity of Introducing the Information System

Container terminal operation can be conducted without a computer system. In fact, at some terminals, container operations are effectively conducted using the magnet board, etc. But, when the number of containers increases, delays and mistakes in handling works usually increase. Generally, it is said that 60 thousand TEU per year is the limit of manual processing of yard operation control. If container handling volume exceeds this limit, delays or mistakes increase remarkably. Therefore, it is apparent that a computer system for yard operation planning is necessary to avoid troubles. Moreover, if container handling number grows to over 150 thousand TEU, it is said that a semi-automatic control system of container handling machines are needed to improve efficiency of yard operations work.

At container terminals in Western major container ports, the following systems have been introduced gradually.

(a) Yard Plan System which is a system for yard operation planning and processing of documents.

(b) Yard Operation System which indicates yard operation machines optimum working location.

Furthermore, fully-automated yard operation systems are now being studied. In Rotterdam port, a terminal with a fully-automated yard operation system is under construction (only gantry crane is operated by humans).

At BCT in Gdynia a Yard Plan Computer system was introduced. However, the Port Authority needs to examine the introduction of a system i.e. Container Operation System to rationalize yard operation considering future container cargo volume.

(2) Merits of Introducing the Information System

The merits of introducing the system are considered as follows:

(a) The yard operation plan can be developed more quickly.

(b) The optimum yard operation plan can be developed.

(c) Utilization of container yard can be rationalized through the above procedure.

(d) Instructions to operators of yard equipment can be transmitted in a more efficient manner.

(e) Related information, such as preparation of an empty container storage list, etc. can be obtained easily.

Through those merits, terminal operation can be rationalized and high quality service can be provided as a result.

3) Introducing Information System for Drawing up of Port Cargo Documents and for Exchange of Port Cargo Information

(1) Necessity for introducing the Information System

a) Cargo Information Interchange System at Container Terminal

At BCT, container cargo information from shipping companies and shipping agents is not sent in a timely manner. Accurate and quick cargo operations are a basic matter for container cargo. As competition with major Western container ports becomes more intense, it can be a fatal defect of BCT that cargo information is not sent quickly and accurately. Therefore, it is thought that an information interchange system is needed as soon as possible to prevent containers to be taken away from Poland.

b) Port Cargo Information Network System

As many types and number of cargo information is interchanged among port related entities, the clerical work is extremely complicated. In recent years, ship size has become bigger and sea transport, especially container transport, has speeded up. Thus, the quantity of shipping cargo documents to be processed at one time has increased dramatically. It has become necessary to rationalize and speed up the processing of cargo documents among different industries.

To cope with this situation to this demand, an on line Port Cargo Information Network System, by which port cargo information among different industries can be interchanged, has been installed at the ports of Rotterdam and Hamburg. Through this system, interface between entities can be simplified. (Fig. 6.4.1). This system is effective where an information network is set up among many different entities which have different in-house hardware and software.

In Poland, it is considered important to expand the above mentioned information interchange system between BCT and, shipping companies, and/or between BCT and shipping agents in include related port entities.

(2) Merits of Introducing the Information System

a) Cargo Information Interchange System at Container Terminals

The merits of introducing the system are as follows:

(a) As BCT will obtain container cargo information in a timely manner, an appropriate container operation plan can be drafted, resulting in the smooth operation of the terminal.

(b) As the information is automatically input in BCT container system by on-line interchange system, the clerical work in BCT can be rationalized and will become more accurate.

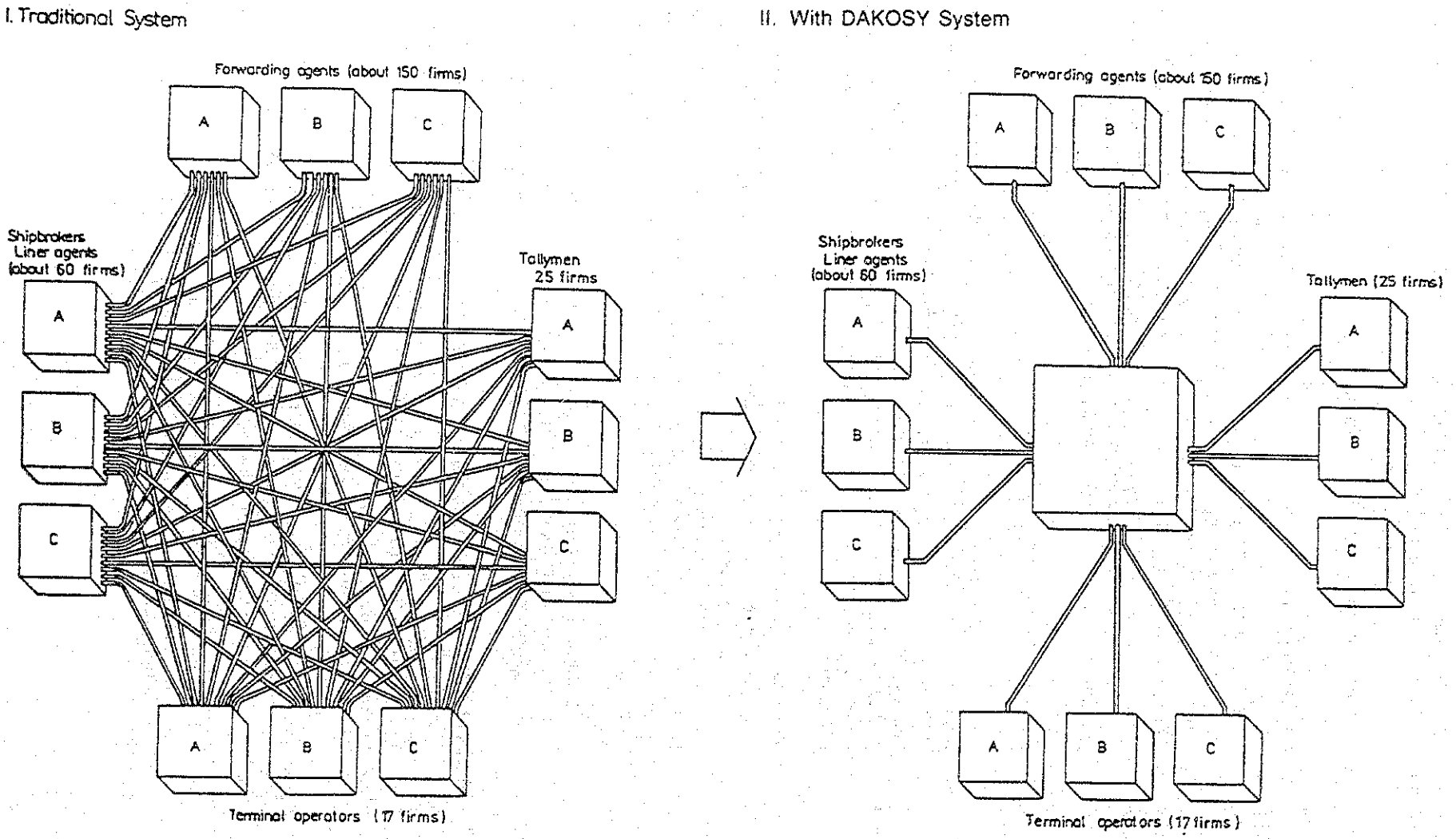


Fig. 6.4.1 Information Flow in a Seaport (Hamburg Port)

b) Port Cargo Information Network System

This type of system has been developed in several countries, though documents to be interchanged and related entities are different. The merits of introducing the network systems are as follows:

(a) Cargo information is interchanged through the on-line network, achieving quicker information processing and item savings in manual clerical work.

(b) Information input into the system by one entity is reciprocally utilized by relevant entities in other sectors. Therefore, the manual clerical workloads for data entires are rationalized.

(c) On-line data transmission makes it possible to reduce substantially the traditionally cumbersome volume of paperwork now in circulation.

(d) Data and programs for the exchange of information are standardized. Therefore, duplicated investments for development of systems are eliminated, reducing the system-development cost to a minimum.

4) Introducing information System for Cargo Information Tracing

(1) Necessity for Introducing the Information System

In recent years, the need for on-time transport of container cargo has become accute, especially in North America. A cargo information tracing service has become more important in providing shippers with higher quality service. Major shipping companies in Western countries, i.e. Sealand, APL, Maersk etc., have all developed cargo information tracing systems for North America. They can obtain information concerning cargo location through this system, and they can quickly respond to the inquiry of the shippers.

As an example, Seattle Port Authority itself conducts forwarding business. The Authority has developed its own cargo information tracing system to succeed in an extremely competitive market along the west coast of the United States.

Though the above mentioned system is too large (a smaller system will be sufficient in Europe), this kind of system should be examined in Poland.

(2) Merits of Introducing the Information System

The merits of introducing the system are as follows:

(a) Location of the cargo can be traced in real time.
(b) Cargo transport route can be accessed in real time.

Through these merits, higher quality information service can be provided to the shipper.

6.4.2 Basic Concept of Introducing Information System at Polish Ports

1) In Polish ports, to introduce the Port Management System, the Container Terminal Operation System (which has already been introduced in Western Ports) and to construct Port Cargo Information Network System to rationalize the interchange of cargo information among port related entities are desirable. In addition, the Cargo Information Tracing System which raises the quality of service to customers should be examined.

2) A certain amount of time is required together with substantial cost before the information system can become practical. The procedure should be conducted in stages, with the most urgent measures being taken first.

6.4.3 Outline of Information System to be Introduced

Designing of the information systems requires a detailed study and design work by the system engineers which is a lengthy process. Thus, in this study, only an outline of the systems will be presented in reference to examples of Western countries.

1) Port Management System

(1) Outline of System

To show an outline of the Port Management System including incoming/outgoing ship management system, port infrastructure, facility operation management system and fee-management system, as an example of the system is shown in Fig. 6.4.2.

Though the scale of the hardware differs according to the prescribed function, a main frame computer with a capacity of 10 to 20 MB (mega-byte) and magnetic disk storage units with a total capacity of five to 10 GB (giga-byte) are generally used. The stations are installed at necessary offices, usually connected by telephone line circuits.

(2) Outline of Input and Output Items

Concerning the incoming/outgoing ship management system, application for use of berth, ship movement notice, time of ships berthing and unmooring, etc., are input, while berth status list, notice of berth allotment, etc. are output.

Concerning the port infrastructure, facility operation management system and fee-management system, application for permission to use, port entry notice etc. are input, while tables of usage permissions granted, payment notice, etc. are output.

(3) Cost of System

An example of the system used at a Japanese major port is given below.

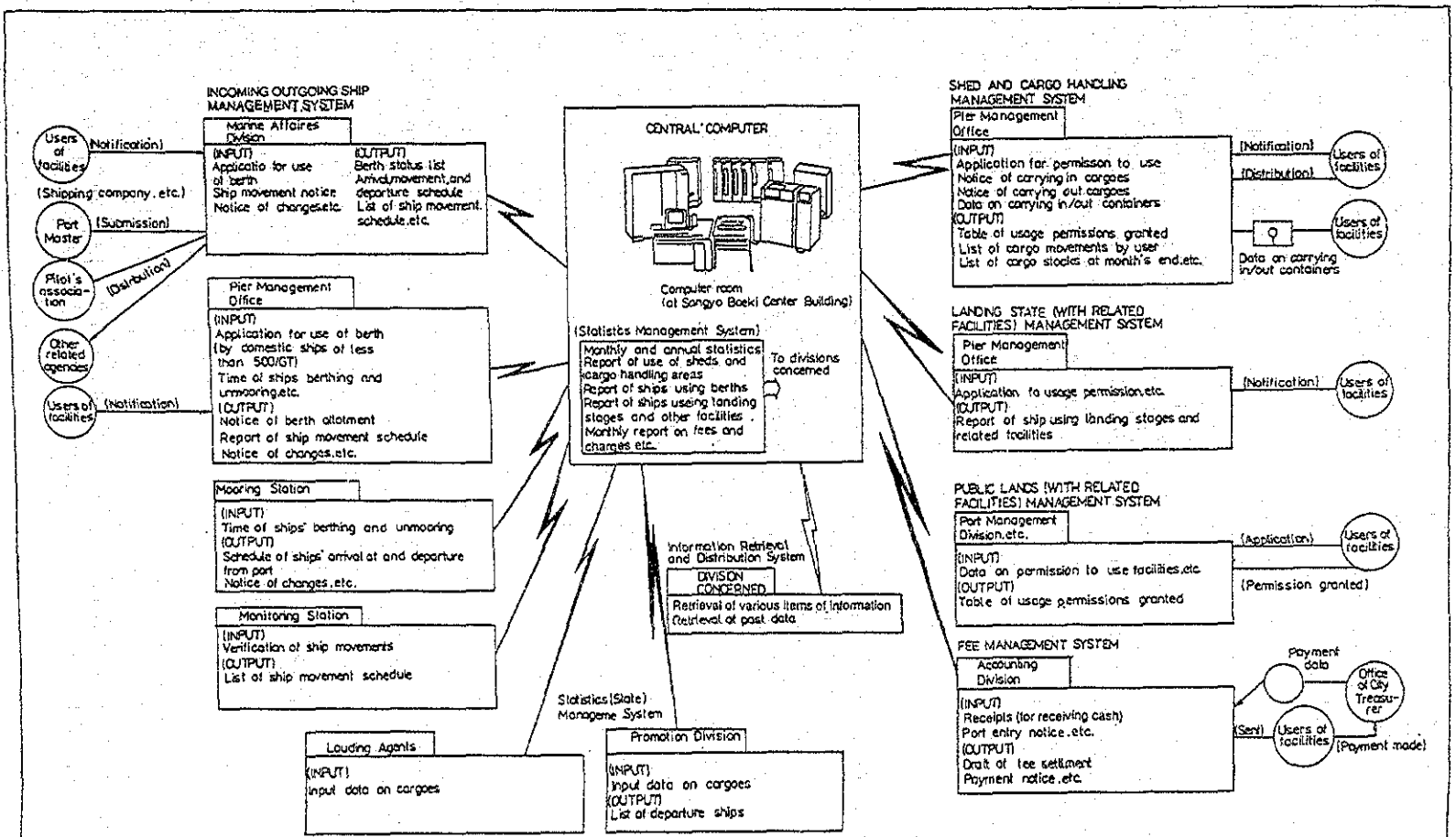


Fig. 6.4.2 Outline of the Port Management System

(a) Development Cost of Software
About 0.9 million US$. (Most of the cost represents personnel expenses for system engineers.)

(b) Hardware
In case of lease : About 0.3 million US$ per year
In case of purchase : About 1.2 million US$

(c) Maintenance
About 0.2 million US$ (Most of the cost represents personnel expenses for system engineers.)

Incidentally, the in-house system engineers are employed at BCT, and they are considered to have knowledge about software as well as enough know-how concerning port management work. Therefore, it seems logical that their expertise should be utilized when software is developed. Furthermore, the development cost will be minimized in this way.

2) Container Terminal Operation System

(1) Outline of System

At major container terminals of exclusive use for shipping companies in Western countries, the Container Terminal Operation Systems, which are originally developed by the shipping companies, are used. It is thought that they have basically similar functions, though there is a little difference in certain details.

At BCT in Gdynia, a Yard Plan System has already been introduced. The yard operation type is the transtainer type.

The following system is an example of how the Yard Plan System might be utilized at a transtainer type container terminal.

(a) Yard Operation System

This system provides work instructions for each transtainer; each transtainer is automatically assigned to the optimum location according to the yard operation plan which is made by the Yard Plan System. This system can also display yard conditions.

(b) Data Transmission System

This system transmits work instructions to the yard handling machines, i.e., transtainers, etc.

(2) Outline of Input and Output Items

Fig. 6.4.3 shows an outline of information flow of Container Terminal Operation System with the Yard Operation System serving as the nucleus.