JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF TRANSPORT AND COMMUNICATIONS
THE SOCIALIST REPUBLIC OF VIET NAM

FINAL REPORT
OF
THE FEASIBILITY STUDIES
ON
THE REHABILITATION AND IMPROVEMENT
OF
THE RAILWAY IN VIET NAM

Volume III

Feasibility Studies on Rehabilitation and Improvement of Lao Cai – Cai Lan Line

February, 1996

JAPAN RAILWAY TECHNICAL SERVICE
PACIFIC CONSULTANTS INTERNATIONAL
JAPAN TRANSPORTATION CONSULTANTS, INC.

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The composition of this report

The report of "The Feasibility Studies on the Rehabilitation and Improvement of the Railway in Viet Nam" is composed of 3 volumes.

Vol. I : "Master Plan on Hanoi - Ho Chi Minh Line up to 2010".

Vol. II : "Feasibility Studies on Rehabilitation and Improvement of Hanoi - Ho Chi Minh Line".

Vol. III : "Feasibility Studies on Rehabilitation and Improvement of Lao Cai - Cai Lan Line".

The summary is provided for each volume.

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Volume 3 Feasibility Studies on Rehabilitation and Improvement of the Lao Cai-Cai Lan Line

CONTENTS

Part I Introduction, Plans and Projects for National Railway Rehabilitation and Improvement up to 2000

Chapter 1 Introduction

The Study Team was required to select an urgent project for a feasibility study through consultations with the Ministry of Transport and Communications of Vietnam based on the Master Plan Study on Transport Development in the Northern Part of Vietnam (JICA) within the given Scope of Work.

Lao Cai - Cai Lan Line was selected for a feasibility based on the mutual agreement between Vietnamese government and JICA.

As described in 7.2 and 11.2, the Lao Cai - Cai Lan Line would play a variety of roles, including cargo transportation necessitated by the development along the line and of Port Cai Lan and its surrounding areas, the role of a lifeline for people living in areas between Hanoi and Lao Cai, the transportation of tourists to Ha Long Bay and international cargo transportation to and from China.

When considered in terms of a short timespan of, say, the year 2000, however, the development along the line and of Port Cai Lan and its surrounding areas will not have been completely conducted and the railway is expected to transport not so much traffic. Accordingly the emphasis will be on the improved safety and reliability of railway transportation services with a minimum level of investment.

However, when the focus is placed on a long timespan upto the year 2010, the development along the line and of Port Cai Lan and its surrounding areas will have progressed and the required traffic will be considerably large. The transportation demand will be further boosted by an increase of tourists to Ha Long. Consequently, the issues to be addressed by a long-term improvement plan upto the year 2010 for the Lao Cai - Cai Lan Line will significantly differ from those to be addressed by a short-term improvement plan upto the year 2000. It is desirable to firstly formulate a conceptual improvement plan with the long timespan of upto 2010.

A feasibility study for a short-term improvement plan for the Lao Cai - Cai Lan Line upto the year 2000 should be conducted based on this long term improvement plan. In formulating the long-

term conceptual improvement plan, the possibility of introducing a short cut route will be examined together with examination of the preferable timing to change the standard gauge on the Hanoi - Cai Lan section to the meter gauge in accordance with the government policy.

The necessary measures or management improvement (such as manpower reduction, marketing of passenger and freight services and an improved service level) would be carefully examined together with those for the improved operational safety and reliability of the Lao Cai - Cai Lan Line.

This volume includes the analysis of current institutional issues in whole VNR, development framework of Viet Nam and demand forecast of whole VNR in Part I. Part II includes the analysis of current managerial and operational issues on Lao Cai - Cai Lan Line and formulates projects necessary up to 2000. Recommendations on further study items are also included in the projects.

Evaluation for the projects recommended in Part II is executed.

Chapter 2. Role of Railway and Objectives of Rehabilitation and Improvement up to 2000

2.1 Role of Railway

Here are five (5) roles now the VNR is performing. And it is also noteworthy that all of them have been diminishing because of deteriorated infrastructures and a progress of a competing road rehabilitation.

- To form a backbone of national transport network
- To form a part of dual transport mode system on major national artery
- To perform a role of inter-regional transport mode
- To provide a transport mean for industrial products
- To be a more flexible and less expensive mode to meet the increasing demand of transport
- To assure a long-term advantage of the railway

(1) To form a backbone of national transport network

This country has a long and narrow shape of land; long north-south axis with narrow width. And the Hanoi - Ho Chi Minh line forms a backbone of national transport network, penetrating this long and narrow land. Its traffic volume reaches more than 1 million passengers per year (sectional volume), and more than 0.7 million tons per year (same volume) at a peak section in 1994.

Same situation can be envisaged in the Hanoi - Cai Lan line when the new deep sea port opens.

(2) To form a part of dual transport mode system on major national artery

Railway has been functioning to guarantee a not-interrupted transport flow in terms of total transport network. Hanoi - Ho Chi Minh railway line supplements a function of National Road 1. Other typical case of dual mode system is an artery between Hanoi and Hai Phong,

and there the railway line is competing with National Road 5. In future, a up-graded National Road 18 will run in parallel with Ha Long railway line.

(3) To perform a role of inter-regional transport mode

The railway has a competitive power to serve for medium distance passenger trips of less than 500 km. This is too short for aviation service, and too long for road transports to be comfortable. Actually, average distance of railway passengers was a bit longer than 200 km in 1993. It turns to be almost 400 km for passengers of the Hanoi - Ho Chi Minh railway line. These facts indicates that the railway is performing a significant role in inter-regional transport with medium distance.

(4) To provide a transport mean for industrial products

Selection of transport mode is not so flexible for some products that the service level of the railway can determine a framework for the production plans concerned. This is especially true with mining companies. Apatite production plan is dependent on the railway capacity of Lao Cai line and an exploitation of ore mining has been suspended due to railway fare problem at near Bao Ha station.

Others such as cement factories are also largely dependent on railway in terms of service and charges.

(5) To be a more flexible and less expensive mode to meet the increasing demand of transport

Two railroad tracks can carry as many people an hour as sixteen lanes of highway. In this sense, the railway is more absorptive of an increasing demand and can be a cost saving mean. When there is a stubborn resistance against a land expropriation for new lanes and/or lines, this elements highlights its significance.

It is said that the existing railway service is contributing to calm a rapid increase in road construction demand.

(6) To assure a long-term advantage of the railway

The railway has some advantages compared with the road and other transport modes. Those points are issues that the world has paid attention so much.

1) Greater energy efficiency

An inter-city passenger train is three times as energy-efficient as commercial air and six times as efficient as a car with one occupant.

2) Less air pollution

For every ton of goods moved one kilometer freight rail emits one-third the nitrogen oxide and carbon monoxide, and one-tenth the volatile organic compounds and diesel particulate emitted by heavy trucks.

3) Fewer injuries and deaths

The ratio of killed and/or injured persons are only 5.5 persons per one billion passenger-km according to the Japanese government statistics in 1991, while the same ratio of the roads accidents is 786 persons per billion passenger-km. This means road traffic experiences fatal accident 140 times as much as the railway traffic.

4) Greater social equity

Majority of the people can not afford neither an auto mobile nor an airline tickets; rail is a vital option for people who are disabled, or too young or old to drive.

Railway's roles are being challenged:

Those roles of railway has been diminishing gradually as the share of railway transport volume has declined. This is because all the features peculiar to the railway are losing its foundation. Those features are:

- high safety
- non-interrupted (= stable) operation
- punctuality
- high speed
- comfort

And failure in performing to the full extent of the railway's roles is attributable to the devastated railway infrastructure and the poor performance in rehabilitation and improvement works.

2.2 Objectives of Railway Rehabilitation and Improvement

It is the main objective to make the railway service under a condition of severe competition with other modes, and to make it possible to perform the roles to a full extension. Surrounding circumstance is the same as the proverb says: To rehabilitate, or to perish.

Here are three (3) objectives this rehabilitation and improvement plan is aiming at. And it is also noteworthy that all of them have been diminishing because of deteriorated infrastructures and a progress of a competing road rehabilitation.

- To consolidate safety, and stable operation
- To make the railway competitive with road and other modes
- To transform the VNR into a more profit-seeking and a more self-sustainable company

(1) To consolidate safety, and stable operation

This rehabilitation and improvement plan underlines the most fundamental features of railway: a safety of operation and a not-interrupted service. This will be applied to the whole line rehabilitation, and is applicable to the priority sections, too. This is in line with the Master Plan, and covers the following subjects:

- remove of dangerous railway structures that are indicated by a limited speed
- improvement of track
- anti-submerge measures

(2) To make the railway competitive with road and other modes

This aims at improving service level in various approaches. As for the Hanoi - Ho Chi Minh railway line, the National Road 1 is planned to complete its improvement works and will open its major parts with two lanes to the public by the year 2000 at latest. In the north, the National

Road 18 will be up-graded by the year 2000, and can compete with the railway to attract the freight from/to the Cai Lan Port.

This covers the following subjects:

- improvement of train frequency, average train speed and feeder service
- introduction of priority rehabilitation and improvement sections as a model section
- expansion of transport capacity at the Hai Van Pass that is at the limit

(3) To transform the VNR into a more profit-seeking and a more self-sustainable company

The VNR had recorded a continuous financial deficit in the past, facing a severe competition with other modes. No clear vision to create railway demand is envisaged.

Being specializing in the management of railway company, the VNR has to perform a new duty to use the national railway properties efficiently to its potential, and to generate the profit at least equivalent to the investment cost of the government.

This task requires to make the rehabilitation plan attractive to increase the railway demand on one hand, and to rationalize the number of the VNR's staff and the management body on the other hand. It is also an important task to make all the staff to get an appropriate education and training so as to catch up the latest knowledge and technology.

This covers the following issues:

- modernization and efficiency improvement of the VNR's management
- improvement of railway education and management education

2.3 Principles in Formulating Projects up to 2000

Here are seven (7) principles that give guidelines when this rehabilitation and improvement plans are prepared.

Objectives below are embodied by various projects listed in "Program 2000"

- To improve an overall capacity and ability of the railway industry as a total system
- To assure safety and stable operation all over the line
- To seek for a demonstration effect, and to expand an investment fund in involvement of increasing supporters
- To set priority sections for an intensive rehabilitation
- To formulate projects in a small scale of investment
- To contribute to financial improvement of the VNR
- To include in the project list the recommended study and projects

(1) To improve an overall capacity and ability of the railway industry as a total system

Railway is a kind of total system that requires various kinds of knowledge, and the level of this industry is basically determined by the quality of human resources and the planning capability.

Based on this idea, strengthening of maintenance capability, expansion of education and training, optimization of rehabilitation works in coordination with the strengthening of decision making functions on the planning and management strategy. Those are followed by the assessment of the organization in terms of efficiency and effectiveness.

(2) To assure safety and stable operation all over the line

These are the most important and basic features of the railway, and has a top priority among the rehabilitation works. Safety-related rehabilitation is planned all over the line, including the priority sections.

Many of these are related with bridges, track, and operation speed. And the objective bridges are selected according to the restricted speed that is now the best indicators to show a deterioration level. Detail scientific inspection requires equipment, and this Study can not conduct this kind of inspection within the scope of works. The Team has to leave this task to other studies.

(3) To seek for a demonstration effect, and to expand an investment fund in involvement of increasing supporters

This aims at attracting loan provision from the international financial organizations, donor countries, and private investors. Many of them show few interest in railway rehabilitation because of its low investment efficiency.

In order to have a definite performance, it is better to request the international community to take part in the railway rehabilitation works in Viet Nam. The Team judges this is the most practical and risk-avoiding approach to achieve the target at the year 2010 as defined in the Master Plan.

(4) To set priority sections for an intensive rehabilitation

Priority sections for the Hanoi - Ho Chi Minh line are selected for an intensive investment for rehabilitation. Within this section, almost all the rehabilitation and improvement works are all subjects, and are designed to generate a definite results up to the year 2000. This section can be a model section for other remaining sections.

Three priority sections are selected for the Hanoi - Ho Chi Minh line, allocating one to each union.

Priority section for the Lao Cai - Cai Lan line is selected to attract and to cope with a drastic change in freight demand from/to the new Cai Lan Port.

One priority section for the Lao Cai - Cai Lan line is the section between Yen Vein and Cai Lan.

(5) To formulate projects in a small scale of investment

This aims at making the project easier to implement one by one in terms of fund availability. With this principle, all the projects are broken down into many small projects and/or studies each of which has a specific purpose.

These kinds of various small projects are especially useful when the whole rehabilitation works are executed step by step, and the demonstration effects are required.

(6) To contribute to financial improvement of the VNR

This is related with the principle above. All the rehabilitation plan are designed to make the VNR more attractive and effective to increase the passengers and cargo handling volume, aiming at improving the financial status of the VNR.

However, the plan is carefully prepared not to aggravate the VNR's financial conditions. A tremendous amount of investment at the early stage is avoided, and an execution of one project will proceed to the next one after a definite performance of one small project become apparent. This kind of "step by step" policy is indispensable so as not to aggravate the financial conditions, especially when rehabilitation plans seeks for a dual purposes: rehabilitation and financial improvement.

It is also necessary to go into the analysis of the management in depth. This is also an indispensable task to rationalize the size in personnel and to strengthen the planning section.

(7) To include in the project list the recommended study and projects

This Study covers a very wide range of problems, and there are too many projects to conduct within the frame and period of this Study. Some require equipment, others require long period of time. Those are suggested to conduct by other projects.

Typical issue is the level crossing problem in the urban areas. The Team recognizes the significance of this matter, however, the Team judges that this kind of matter should be studied more appropriately by the next coming JICA Study entitled "Hanoi Urban Transport Mater Plan Study". This is because the study should cover variety of problems including a compulsory expropriation of land, future plan of new railway lines in the urban area, and a reallocation plan of the station etc. These are beyond the responsibility and capacity of the present Team.

2.4 List of Projects up to 2000

Here all the projects necessary up to the year 2000 are presented in "Program 2000."

[General Recommendation]

Four (4) general recommendations are prepared in Program 2000. Those form a foundation of the rehabilitation work in the future.

In quality, all the staff have to be acquainted with a new and appropriate technology concerned. This can apply to both the management class and the worker class. In quantity, the more the VNR staff get acquainted with a new knowledge, the better the VNR's capacity of management can be improved.

These matter is actually out of the scope of works of the feasibility study. However, the Team would like to remind the VNR and the government that those can contribute to lay a groundwork for the railway industry as an agglomerated industries so as to function well.

Program 2000

	Components	Objectives	Major Contents	Priority
I. General Recommendation				
1.	Modernization and Efficiency Improvement of VNR Management	• Contribute to more rationale planning, and to cope with competitive circumstance • Contribute to save a management and operation cost	• Strengthening of planning function with scientific data • Introduction of management information system (MIS) - Computerized management of accounting, staff, material stock, and rehabilitation works. - Computerized ticketing system (booking, ticketing etc.), and sales performance reporting system • Readjustment of regulation, and procedure	A
2.	Expansion and Improvement of Railway School	• Catching-up to the modern technology • Modernization of railway management • Overall training	• Expansion of training school • Introduction of sufficient training equipment • Introduction of new technology • Overseas training of instructors • Strengthening management capability under the sever competitive circumstance • Re-training of engineers and technical staff • Vocational training of new staff	A
3.	Establishment of Bridge Technology Center	• Improvement in bridge inspection and design capability • Contribution to bridge safety • Contribution to a VN-made bridge rehabilitation plan	• Sufficient capability to perform scientific survey and inspection works (with a modern equipment and knowledge) • Date compilation of each bridge • Determination of rehabilitation an and Improvement method, and design works • Preparation of long-, medium- and short- term plans of bridge rehabilitation	A
4.	Improvement of Freight Transport Capability	• Contribution to increase in freight transport	• Transport plan by commodity (cement, coal, etc.) • Containerization	

Program 2000 (continued)

	Components	Objectives	Major Contents	Priority
II. Hanoi - Ho Chi Minh Line				
1. Priority Section ; Model Rehabilitation Section				
(1)	Overall Rehabilitation at the Hanoi - Thanh Ho Section (175 km) (Union 1)	• Safety • Stable operation • Model rehabilitation project for cost-saving and revenue increase • User-oriented rehabilitation, and contribution to an increase in railway users • Overall rehabilitation of every technical aspects	• Railway structure rehabilitation • Frequent service of inter-city and local trains • Ticket booking system • Renovation of main stations (ticket counter, shopping, waiting room, parking) • Un-manned station (only signal man with color lighting signal) • Integration of freight handling station • Introduction of loading machine • Modernization an rationalization of track maintenance (tool & machine, rail welding, new clash stone workshop, turnout workshop)	A
(2)	Overall Rehabilitation at the Hue - Da Nang Section (103 km) (Union 2)	ditto	ditto	B
(3)	Overall Rehabilitation at the Saigon - Mung Man Section (175 km) (Union 3)	ditto	ditto • Installation of cross-exchanger system at Son Than	A
2. Rehabilitation of Whole Line (= Outside Priority Sections)				
2-1. Railway Structure Rehabilitation				
(1)	Bridge Structure Inspection (for All the Railway Bridges in Viet Nam)	• Safety • Stable operation	• Inspection to collect a scientific data about strength of existing bridges (Most dangerous ones at first stage, less dangerous one at the latter stages) • Selection of appropriate rehabilitation measures for all bridges • Determination of appropriate rehabilitation priority	A

Program 2000 (continued)

	Components	Objectives	Major Contents	Priority
(2)	Bridge Replacement and Rehabilitation	• Safety • Stable operation	• Determination of appropriate method • Cost Estimation • Execution of replacement and rehabilitation works	A
(3)	Bridge Re-painting	• Prolongation of material's life span • Saving in bridge rehabilitation cost • Job creation	• Painting of bridges, especially for bridges near sea (roughly 40% of necessary works should be completed by the year 2000)	A
(4)	Tunnel Structure Inspection	• Safety • Stable operation	• Inspection to collect a scientific data about strength of existing tunnels (Most dangerous ones at first stage, less dangerous one at the latter stages) • Selection of appropriate rehabilitation measures for all tunnels • Determination of appropriate rehabilitation priority	A
(5)	Tunnel Rehabilitation	• Safety • Stable operation	• Determination of appropriate method • Cost Estimation • Execution of replacement and rehabilitation works	B
(6)	Anti-submerge Measure	• Stable operation	• Determination of real causes of submerge • Selection of appropriate counter-measures	A
(7)	Track-Crossing Drain Widening and Construction	• Stable operation	• Selection of appropriate spots and a width of track-crossing drain construction • This should be completed by 2000.	B
2-2. Railway Track Rehabilitation				
(1)	Track Rehabilitation & Improvement	• Safety • Stable operation • Speed up	• Replacement of 27 and 30 kg rails with 50 kg rail • Supply assurance of track rehabilitation materials	A
(2)	Station Improvement	• Comfort • Good access	• Improvement of station building • Setting of station plaze	B
2-3. Signaling and Communication Rehabilitation				
(1)	Signalling	• Safety • Efficient train operation • Foundation of management information system	• Installation of color light signal	A
(2)	Tele-ommunication	• Safety • Efficient train operation • Foundation of management information system	• Laying of communication cable	A

Program 2000 (continued)

	Components	Objectives	Major Contents	Priority
2-4. Rolling Stock Rehabilitation				
(1)	Rolling Stock Plan			
(2)	Gia Lam Rolling Stock Workshop Improvement	• Safety • Reliable supply of rolling stocks • Saving in rolling stock purchasing cost	• Design of new layout for workshop • Installation of new equipment and facilities • Cost estimation	A
(3)	Increase in New Rolling Stocks for the Ha Noi - Saigon Section	• Comfortability • Service improvement	• Increase in number of long-distance trains for Ha Noi - Ho Chi Minh	A
2.5 Hai Van Tunnel Construction Study				
(1)	Hai Van Pass Transport Capacity Improvement	• To solve the transport bottleneck • to increase transport capacity	• To select the best alternative to improve transport capacity at Hai Ban Pass • To compare the maintenance costs and operation costs between existing and new lines	A
(2)	Feasibility Study on the New Hai Van Tunnel			
	Phase 1; Best Route Selection of the New Hai Van Tunnel Construction	• Indispensable technical foundation of F/S study	• Geological study (including an elastic wave test) • Selection of the best route • Detail estimation of cost • Mapping	A
	Phase 2; Selection on Appropriate Timing of New Hai Ban Tunnel Construction	• To draw a final decision of the best timing of new tunnel construction	• To conduct cost-benefit analysis • To conduct overall evaluation so as to decide the best construction timing.	A
2.6 Urban Transport Related Study				
(1)	Solution to Level Crossing in Hanoi City	• To solve a traffic inerruption bythe railway atthe level crossing secigon in Hanoi urban area	• To study how to solve a traffic interruption problem athte level crossing sections in Hanoi. • To coordinate solutions of this mater with a total urban planning and a urbna transport system • It is strongly suggested that "Hanoi Urban Transport Master Plan Study ; (forthcoming JICA Study) presents solutions to a level crossing matters.	A
(2)	Solution to Level Crossing in Ho Chi Minh City	• ditto	• To study how to solve a traffic interruption problem athte level crossing sections in Hanoi. • To coordinate solutions of this mater with a total urban planning and a urbna transport system	A

Program 2000 (continued)

	Components	Objectives	Major Contents	Priority
III. Lao Cai - Cai Lan Line				
1. Hanoi - Lao Cai Line				
1.1 Safety Operation Improvement Project				
(1)	Whole Line Rehabilitation	• Safety • Stable operation	• Track improvement • Bridge rehabilitation • Installation of anti-natural disaster measures • Renewal of signal and communication line	B
(2)	Track Maintenance Modernization	• Safety • Stable operation • Saving in track maintenance cost • Model project of track maintenance modernization	• Rail welding • Introduction of new equipment and machines (track and motor car, clashed tone machine, potter car, etc.)	B
1.2 Others				
(1)	Overall Rationalization	• Overall management improvement and rationalization • More user-oriented rehabilitation • Contribution to higher revenue • Contribution to lower maintenance cost	• Renovation of main station buildings • Improvement of ticket booking system • Increase in unmanned stations (only one signal man with color lighting signal, spring point) • Integration of freight handling stations and installation of loading machines (Viet Tri, Yen Bai, and Lao Cai)	B
(2)	International Transport Improvement	• Attraction of more cargo and passengers	• Car improvement	C
2. Hanoi - Cai Lan Line				
2.1 Cai Lan Port Related Transport Capacity Improvement Project				
(1)	Ha Long - Cai Lan Section Rail Installation	• Commencement of railway operation at the Cai Lan Port Station prior to grade-up of QL18 and new highway construction	• Installation of rail	A

Program 2000 (continued)

	Components	Objectives	Major Contents	Priority
(2)	Meter Gauge Installation	• To follow Prime Minister's decision • To perform at the best timing (cost-minimum, and benefit-maximum)	• Gauge conversion to meter gauge by the year 2000 is recommended. (Refer to Vol.III, 13.12)	A
(3)	Short-Cut Route Construction	• To clarify when a new short cut line will be feasible	• Short-cut line should be constructed after 2010 (Refer to Vol.III, 13.13, 16.1.4)	
(4)	Inland Container Depot Construction	• Challenge to attract container demand • Constant revenue source	• Preparation of integrated container transport plan • Tariff analysis and its competitiveness with other transport modes • Assessment of feasibility • Preparation of staged plan	B
2.2	Others			
(1)	Ha Long Bay Tourist Transport Improve-ment	• Challenge to attract tourists to Ha Long Bay • Model project so as to get a competitive power with other modes	• Preparation of plan sufficiently competitive with other modes • Introduction of new passenger cars • Preparation of access service to/from Ha Long Station • Assessment of feasibility	B
(2)	Cement Transport Improve-ment	• Cheapest cement transport method • Attraction of cargo demand • Constant revenue source	• Preparation of cement terminal plan • Introduction of new cement tank car • Cost estimation • Assessment of feasibility	C

Note; Priority A; Very urgently necessary
Priority B; Urgently necessary
Priority C; Necessary

Cost of Program 2000(unit: US$ million)

Project for cost-benefit analysis in feasibility studies	Total Cost	Local Currency	Foreign Currency
Modernization and Efficiency of VNR Management	7.12	0.18	6.94
Overall Rehabilitation at Hanoi-Thanh Hoa Section	45.83	14.64	31.19
Overall Rehabilitation at Hue-Da Nang Section	41.52	12.10	29.42
Overall Rehabilitation at Muong Man-Saigon Section	59.01	18.67	40.34
Bridge Replacement and Rehabilitation	82.37	12.80	69.57
Tunnel Rehabilitation	7.26	1.27	5.99
Track-crossing Drain and Side Drain Widening and Construction	1.36	1.19	0.17
Track and Other Structure Rehabilitation and Improvement	42.59	10.82	31.77
Station Improvement	0.84	0.77	0.07
Signal Rehabilitation and Improvement	13.06	2.20	10.86
Telecommunication Rehabilitation and Improvement	4.48	0.76	3.72
Rolling Stock Plan	107.80	29.00	78.80
Gia Lam Rolling Stock Workshop Improvement	30.04	6.46	23.58
High Speed Train for Hanoi-Saigon Section	28.00	6.50	21.50
Hai Van Pass Transport Capacity Improvement	9.62	8.33	1.29
Total Cost	480.90	125.69	355.21

Projects for other recommendation	Total Cost	Local Currency	Foreign Currency
Expansion and Improvement of Railway School	11.30	1.30	10.00
Establishment of Bridge Technology Center	2.50	0.30	2.20
Improvement of Freight Transport Capacity Study	1.50	0.20	1.30
Bridge Structure Inspection	4.80	0.40	4.40
Tunnel Structure Inspection	1.20	0.24	0.96
Anti-submerged Measure Study	1.21	0.19	1.02
Route Selection of the New Hai Van tunnel	2.31	0.64	1.67
Emergency Solution to Level Crossing Issues In Hanoi City	9.41	7.33	2.08
Emergency Solution to Level Crossing Issues in Ho Chi Minh City	17.37	16.23	1.14
	51.60	26.83	24.77

Lao Cai Line

Project for Cost-benefit Analysis in the Feasibility Studies

(unit: US$ million)

Project for Cost-benefit Analysis in the Feasibility Studies	Total Cost	Local Currency	Foreign Currency
Whole Line Rehabilitation	27.34	7.82	19.52
Track Maintenance Modernization	1.59	0.12	1.47
Overall Rationalization	1.24	0.71	0.53
Total cost	30.17	8.65	21.52

Cai Lan Line

Projects for cost benefit analysis in feasibility studies:

(Gaueg conversion is by meter gauge by 2000) (unit: US$ million)

Project for Cost-benefit Analysis in the Feasibility Studies	Total Cost	Local Currency	Foreign Currency
Ha Long-Cai Lan Section Track Installation	3.37	2.30	1.07
Ha Long Bay Tourist Transport Improvement	6.94	2.01	4.93
Track Maintenance Modernization	4.28	1.29	2.99
Gauge Conversion (MG)	23.10	11.94	11.16
Total cost	37.69	17.54	20.15

Projects for other recommendation

(unit: US$ million)

Other Recommendation Projects	Total Cost	Local Currency	Foreign Currency
Inland Container Depot Construction	6.25	1.56	4.69
Cement Transport Improvement	3.20	0.40	2.80
Total cost	9.45	1.96	7.49

[Priority Section]

The Team sets four priority sections: three for the Hanoi - Ho Chi Minh line, and one for Lao Cai - Cai Lan line. These sections are a subject of intensive and overall rehabilitation and improvement.

Reasons of selection and a selected section are as follows:

[Hanoi - Ho Chi Minh line]

1. one priority section for each union
2. densely populated region and/or economic focal region
3. area with high demand of railway
4. appropriate distance to be competitive with other modes

Priority section selected is :

1. Hanoi - Than Hoa section
2. Hue - Da Nang
3. Saigon - Muong Man

Those sections aim at coping with a high demand and at competing with the road transport service.

[Lao Cai - Cai Lan line]

1. densely populated region and/or economic focal region
2. area with high demand of railway (present and/or future)
3. appropriate section to compete with other modes
4. selection of necessary; new line or existing line

Priority section selected is : Yen Vien - Cai Lan section

Priority section of the Lao Cai - Cai Lan line; Yen Vein - Cai Lan section aims at coping with a drastic change in transport demand generated/attracted at the new Cai Lan Port. This is integratedly studies since this matter relates with the gauge problem and a new short-cut line construction. And the most urgently required task is the following:

[Rail installation at the section between Ha Long and Cai Lan]

The Team proposes to complete a rail installation work between Ha Long and Cai Lan (4 km) by the year 2000, if possible by the end of the year 1998. This is because a commencement of railway service at the new Cai Lan station can be a very turning point for the prosperity of the railway in the North. Once the railway can commence its service prior to the completion of up-grade works of National Road 18 (= 1 lane) and of a construction of new highway running along National Road 18, the railway can attract the demand of freight cargo and can establish a definite transport corridor by railway. Otherwise, the railway will be positioned behind the road.

[Section outside Priority Sections]

Even outside the priority sections, there are important projects. Those are designed to guarantee the most fundamental features of railway i.e. the safety and stable operation.

[Hanoi - Ho Chi Minh line]

The Team suggests five packages of projects,. They are:

1. railway structure rehabilitation (including anti-submerge measures)
2. railway track rehabilitation
3. signaling and communication rehabilitation
4. rolling stock rehabilitation
5. Hai Van tunnel construction

[Lao Cai - Cai Lan line]

1. safety operation improvement project
2. others

"Priority" in Program 2000 indicates the urgency of project and categorized into three:

A ; very urgently necessary to implement

B ; urgently necessary to implement

C ; necessary to implement

Chapter 3 Socio-Economic Framework

3.1 Economic Growth

This Study adopts an economic growth scenario suggested by the State Planning Committee and the Ministry of Transport. Figures reaches 10.7%, remarkably high for the period 1996 - 2000. A higher level is set for the period 2000 - 2010.

The setting of GDP growth rate in the future is aiming at achieving a national policy; "to double per capita GDP during the period 1990 - 2000," which original target was set at the Communist Party of Viet Nam 7th national Congress and was revised in 1994. In this sense, the figures of GDP growth in the future is a kind of policy target, and cannot be a figure of scientific forecast.

Forecast of economic growth rate in Vietnam is always a hot issue. No formal forecast and its back data are open to the public. Its figures appeared in the government documents are at more than 11 % for the period 1996 - 2000, while many economists of the advanced countries and of the international financial organization make comments on it.

For instance, the Japan International Cooperation Agency (JICA) calls attentions on the vulnerable foundation of the high growth scenario of the Viet Nam. Main reason is as follows;

Table 3.1.1 Economic Performance

	1991	1992	1993	1994
Growth rate of GDP (%)	6.0	8.6	8.1	8.8
Internal accumulation / GDP (%)	10.1	13.8	14.8	-
Investment / GDP	15.0	17.6	20.5	-
ICOR	2.5	2.05	2.5	-

Table 3.1.2 Growth Scenarios

	Per Capita GDP(US$)	Targets of Growth Rate		
	1993	1994-95	1996 -2000	2001-2010
SPC Scenario 1 (Low Growth)	263	8.6%	9.8%	10.0%
SPC Scenario 2 (High Growth)	263	9.0%	10.7%	11.5%
World Bank	-	-	8.0%	8.0%
This Study's Scenario	242	8.5%	10.7%	11.5%

Note; SPC revised its growth forecast in May 1994, and previous figure of GDP per capita of US$220 (at least) in 1992 (refereed in "Vietnam: A Development Perspective," prepared for the Donor Conference, September 1993) to US$263 in 1993.

(1) High growth performance in 1990 - 1994 is achieved by rather low investment rate as proved by a low incremental capital-output ratio (ICOR: investment rate divided by GDP growth rate; 2.3 in 1990, 2.4 in 1993). This kind of phenomenon is peculiar to the economic revival stage. However, in pursuing the high growth scenario as the SPC does, a remarkable increase in investment rate is indispensable. The ICOR must rise to 3 or 4 in parallel with an increase of investment productivity.

However, no clear vision is apparent on how to increase in saving rate far beyond the target of 23 - 30% set in 1991. The government has not yet announced a policy for a great conversion to a surplus of the government saving, and a more efficient mobilization of private sector's saving. It seems so difficult to achieve the required level of domestic investment under a circumstance of insufficient financial system.

(2) If the projection follows exactly the growth target of three economic focal areas, it will result in a widening of per capita income among the regions. It is expected a gap will be more than sixth-fold.

It is judged that the high growth scenario is largely dependent of increase in domestic saving (private sector and the government). If the Viet Nam fails to achieve the required level of saving and therefore a investment, it will result in a hyper inflation and an expansion of current account deficit. It is sure that this will be followed by a lower growth rate.

In line with an analysis above, there is one GDP projection by the bank outside the Viet Nam. The World Bank conducted a projection study of GDP growth in 1994. It presents far less rate of the growth (8%) for the period 1995 - 1999. This works aims at providing a base for a loan with a condition of its structural adjustment proposal, and there must be a solid consensus on the GDP growth rate of 8%.

3.2 Population

Three kinds of population projection are available. This study adopted Scenario 3, showing a moderate growth rate among three projection. This is because the latest population figures by province was released from the SPC in the publication.

Table 3.2.1 Population Forecast

	Population (unit; million persons)				Growth Rate (% per annum)	
	1993	1995	2000	2010	1995 - 2000	2001 - 2010
Projection 1	72.0	75.0	82.0	95.0	1.80%	1.48%
Projection 2	70.2	73.2	80.2	91.6	1.84%	1.34%
Projection 3 (The Study Team)	70.0	73.0	80.3	93.5	1.92%	1.53%

Note; Scenario 1 is compiled by the General Statistics Department. These figures are tabulated together with GDP scenarios.

Scenario 2 is quoted from "Vietnam Population Census - 1989, The Population of Vietnam," Statistical Publishing House, 1992. Figures are forecast at 1994, 1999, 2004, and 2009. Those were adjusted into the each target year by interpolated.

This projection assumes that the growth rate of population will be controlled to calm down to 1.4% at the year 2010. Population projection is thus totally dependent of a performance of population control policy; family planning. Compared with a natural growth rate (2.1%) in the period between two census years (1979 - 1989), it is said that each population projection sets a remarkable assumption on growth rate, ranging from 1.34% to 1.53% during a period 2000 - 2010.

However, population increase between the 1989 and 1994 reaches 2.28%, and shows a reverse effect of population control and raises a question that the population can really controlled as the SPC assumes. If it is not achieved, the government can not fulfill a national target of "double per capita income in the period 1990 - 1990.

CHAPTER 4 TRANSPORT MODELONG AND DEMAND FORECAST

4.1 Introduction

This chapter sets forth the objectives, methodologies of transport modeling and results of a traffic demand forecast.

Demand forecast of railway can be conducted with an explicit role of the railway and an objective of railway rehabilitation and improvement. Thus this quantitative forecast is much dependent of the vision of railway's role and service levels.

4.1.1 Approach and Objectives

In the former stage of this study, the master plan for rehabilitation and improvement on the Hanoi - Ho Chi Minh line (the Master Plan) was formulated. This master plan was established based on the future socio-economic framework (GDP and population) developed by the State Planning Committee of the Viet Nam. It also indicates some urgent tasks to be performed within a short-term perspective, which are dealt with in this feasibility study stage

In this feasibility study stage, various sub-projects up to the year 2000 are formulated, aiming at making it easier to achieve the rehabilitation target at the year 2010 that the master plan sets. And new aspects are introduced as fundamental principles in formulating rehabilitation sub-projects. Those are; (1) seeking for sound financial status of the VNR, (2) seeking for small scale of investment with high investment efficiency. Because of emphasis on these new aspects, the rehabilitation target at the year 2000 prepared in the Master Plan were modified in some extent. Instead of the overall rehabilitation plan over the whole line, three priority sections of the Hanoi - Ho Chi Minh line are set for the intensive rehabilitation projects. And the Hanoi - Cai Lan line are focused on in order to cope with a transport demand originated at a new Cai Lan port. But basic view towards the year 2000 is the same as shown in the Master Plan and the "Master Plan Study on the Transportation Development in the Northern Part in the Socialist Republic of Viet Nam", JICA, 1993.

And based on the request of the State Planning Committee, future socio-economic framework were modified due to the present miraculous economic performance of Viet Nam. And the reliable traffic data were collected by the Team's field survey.

In these situation, the transport models developed during the Master Plan was modified.

In addition, detail analyses on regional development issues and some technical modifications in transport modeling are executed. This is because; first, since the railway system in Viet Nam is expected to play an important role in development frontiers such as transporting mineral resources from the remote areas to factories in urban areas or to a gateway port for export, an analysis goes to the careful examination on a micro level development framework (i.e., industrial policies / strategies indicating locations, volume of mining, demand of products in the market, etc.). Secondly, since service levels of three priority sections are upgraded in order to attract more passengers and cargo transport, it is required to develop a transportation model to deal with such service improvements (see Figure 4.1.1).

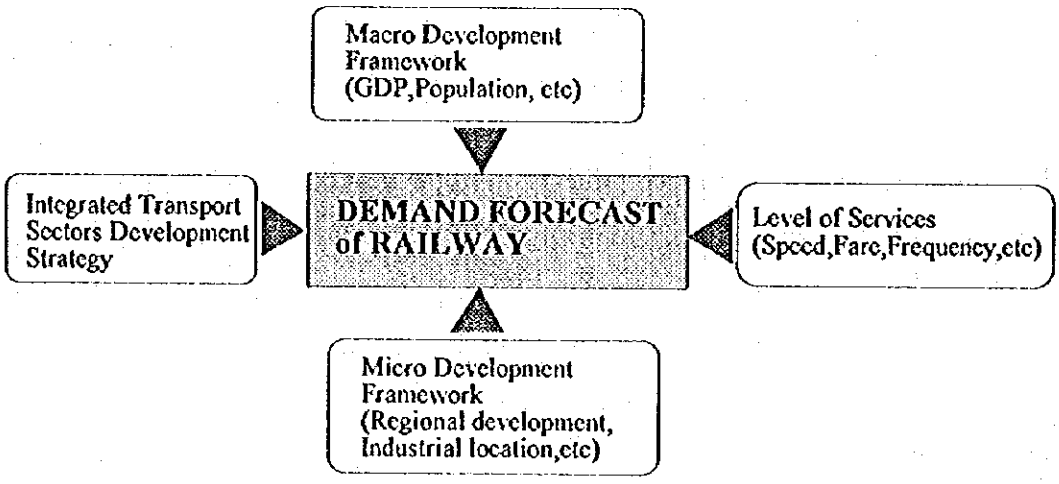


Fig. 4.1.1 Overall Approach of Demand Forecast

Rehabilitation and improvement projects of each line include such the important development objectives/characteristics for demand forecasting as described below.

(1) Hanoi - Ho Chi Minh Line as a Whole

1. To establish an inter-regional trunk line to connect the three "Focal Economic Area (FEA)": Northern FEA, Central FEA, and Southern FEA.

2. To establish safe and punctual train operation systems to attract passengers and cargo transport.

(2) Three Priority Sections : Hanoi - Thanh , Hue - Da Nang, and Muong Man - Ho Chi Minh City

1. To upgrade the level of services (i.e., speedup, frequent operation, loading / unloading machine, etc.) in order to meet intra-regional transport demand (commuter services between large cities, tourists' transport demand at the section Hue - Da Nang for instance, etc.)

2. To upgrade the quality of transport i.e. improvement of coaches, modernization of ticketing system.

3. To establish competitive railway transport system in order to demonstrate an efficiency of railway investment.

(3) Hanoi - Lao Cai Line

1. To meet and maintain the existing cargo (border trading with China, etc.) and passenger transport demand.(provide safe, punctual and comfortable travel)

2. To upgrade the level of services in order to attract more tourists visiting Sapa in the Lao Cai province.

3. To meet the future cargo (apatite, iron ore, etc.) transport demand to the Cai Lan port and the southern part of Viet Nam as well as factories in the Red River Delta.

(4) Hanoi - Cai Lan Line

1. To meet and maintain the existing cargo (coal, cement, etc.) and passenger transport demand. (provide safe, punctual and comfortable travel)

2. To upgrade the level of service in order to attract more tourists whose destination is the Ha Long bay.

3. To meet the future cargo transport demand to/from the Cai Lan port.

Note: The Cai Lan port construction is expected to be completed by the year 2000. So the demand will increase after the year 2000.

In this context, a transport model in the feasibility study is required to estimate demand catalyzed both by the macro and micro socio-economic development frameworks and by project components. This leads to evaluate consequent impacts upon transport infrastructure.

The development and application of a transport model, which actually consists of a series of nested and cascading sub-models, is designed to;

- dealing with a broad range of modal transport demand including demand of all the other transport modes (that can be competitors to each railway line section),
- offering sufficient flexibility to permit a strategic evaluation of the macro and micro socio-economic framework,
- offering sufficient flexibility to permit a change of level of services determined by design of the each priority railway section, and
- enhancing the "base year" simulation of railway transport via the application of information obtained through extensive data collection efforts.

4.1.2 Goals of This Project

The transport analysis is designed consistent with the approach of the study, and aiming at:

- Demand forecast at the year 1994, the "base year" which provides the foundation of demand forecast in the future.
- Demand forecast at the year 2000, the target year for a short-term rehabilitation perspective when priority projects are designated, and
- Demand forecast at the year 2010, the target year for a long-term rehabilitation perspective.

Future demand projection assumes the perfect achievement of a socio-economic scenario which may or may not be achieved actually in the postulated year.

4.1.3 Area and Zone System

The 53 provinces, whose transport activities can be described in socio-economic and demographic terms, are designated as comprising zone structure (Figure 4.1.2). Additional six external zones represent transport activity between 53 Vietnamese provinces and outside of Viet Nam. Thus, the study area includes a total of 59 zones. However, external traffic flow to and from outside of Viet Nam is not explicitly treated because the railway traffic demand consists of mostly domestic traffic demands.

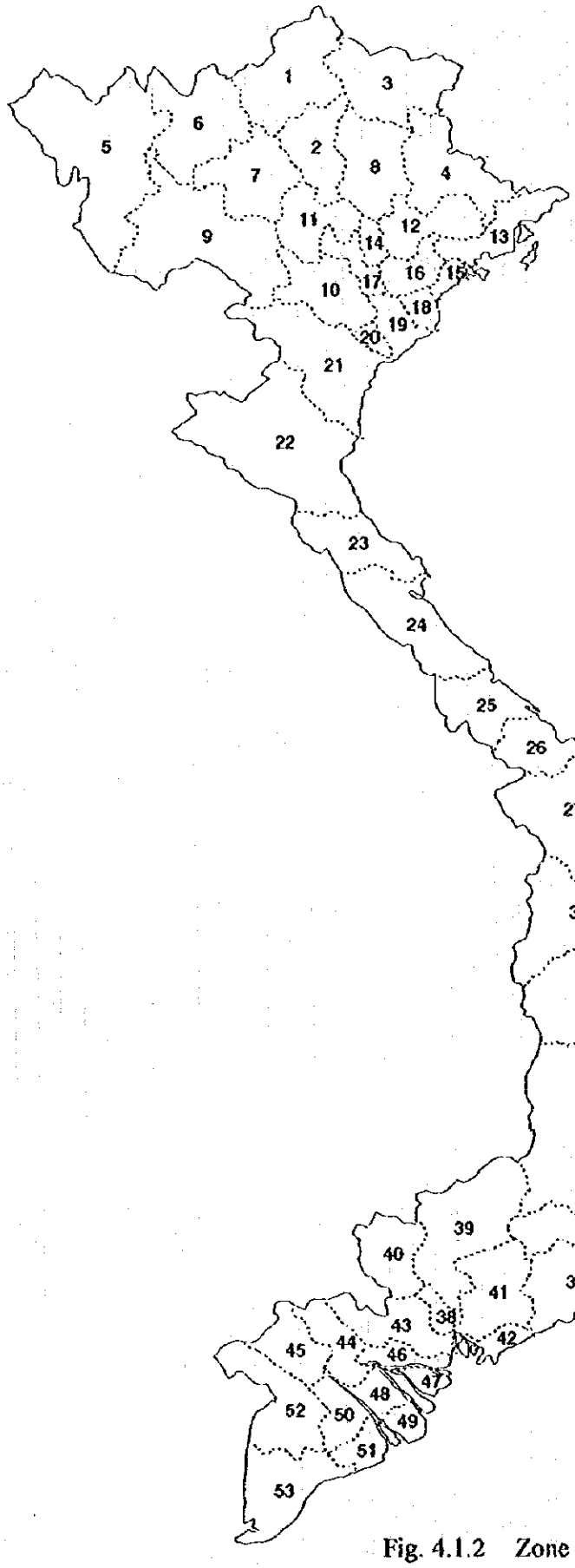


Fig. 4.1.2 Zone System

PROV. CODE NO.	
1	Ha Giang
2	Tuyen Quang
3	Cao Bang
4	Lang Son
5	Lai Chau
6	Lao Cai
7	Yen Bai
8	Bac Thai
9	Son La
10	Hoa Binh
11	Vinh Phu
12	Ha Bac
13	Quang Ninh
14	Ha Noi
15	Hai Phong
16	Hai Hung
17	Ha Tay
18	Thai Binh
19	Nam Ha
20	Ninh Binh
21	Thanh Hoa
22	Nghe An
23	Ha Tinh
24	Quang Binh
25	Quang Tri
26	Thua Thien-Hue
27	Quang Nam-Da Nang
28	Quang Ngai
29	Binh Dinh
30	Phu Yen
31	Khanh Hoa
32	Ninh Thuan
33	Binh Thuan
34	Gia Lai
35	Kon Tum
36	Dac Lac
37	Lam Dong
38	T.P Ho Chi Minh
39	Song Be
40	Tay Ninh
41	Dong Nai
42	Ba Ria-Vung Tau
43	Long An
44	Dong Thap
45	An Giang
46	Tien Giang
47	Ben Tre
48	Vinh Long
49	Tra Vinh
50	Can Tho
51	Soc Trang
52	Kien Giang
53	Minh Hai

4.2 Overview of Base Year Conditions

The overview on traffic demands in the base year 1994 is presented in this section.

4.2.1 Traffic Modes

Passengers have a choice of traveling by rail, by road, or by air transportation. Inland waterway is also available, but it is not considered in this study because the network is not competitive with other modes. Total volume of trips made by travelers and commuters in Vietnam is estimated 191 million trips (excluding intra province trips) in the year 1994. This represents 2.7 trips per person in a year, reflecting small activities among provinces.

The most popular traffic modes among the travelers and commuters are bus and automobiles. The share of railway is about 5%. Share of air traffic is very small as shown in Fig. 4.2.1..

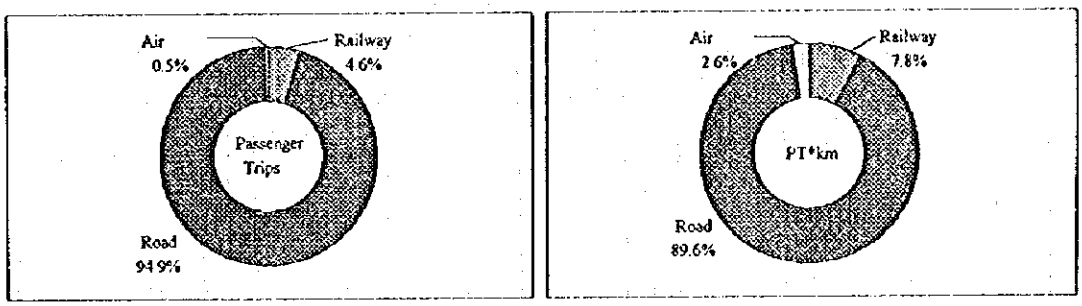
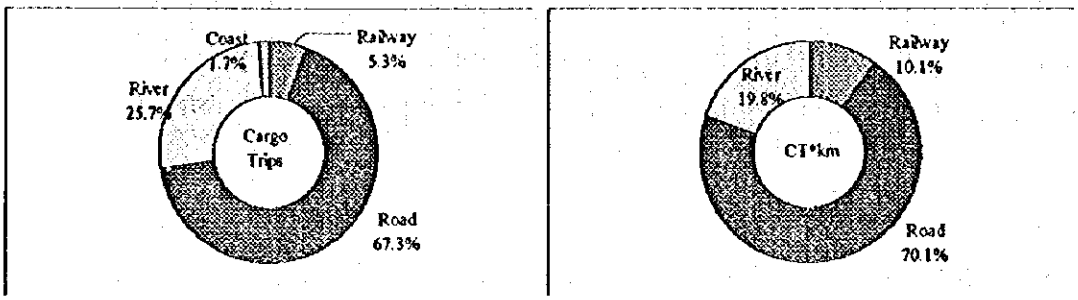


Fig. 4.2.1 Passengers analysis by transportation (1994)

Cargo is transported mostly by trucks. The share of truck freight is about 67% in the year 1994, which is relatively low compared to the percentage of passengers, because railway, inland waterway and coastal shipping are also available for cargo freights. The share of each mode are shows in Fig. 4.2.2. Total volume of cargo trips is 60.5 million tons.



*) The volume of CT*km by coastal shipping is unknown.

Fig. 4.2.2 Cargo Analysis by Transportation (1994)

4.2.2 Railway Demand

The number of passengers using railway stations in the Hanoi zone marks the largest figure. It is approximately 1.6 million trips in the year 1994. The second largest is generated in the Ho Chi Minh zone. Total number of passengers were 8.8 million trips. This number has been consistent for a few years. The Hanoi - Ho Chi Minh line transported 5 million, which is 57% of the whole railway passengers in Vietnam. Along the Lao Cai line, the number of passenger was 2.2 million trips including connecting trips to/from other lines. The passengers at stations in Quang Ninh and Ha Bac zones was 0.6 million trips.

Total volume of cargo handled by railway was 3.2 million tons in the year 1994. The volume is almost the same as that in the year 1993 but it has been grown up since the year 1990. The share of the Hanoi - Ho Chi Minh line accounts for 60%, including cargoes that go to/from other lines.

Main cargo items by railway are cement along The Hanoi - Ho Chi Minh line, apatite along Lao Cai line and coal along Cai Lan line. Along The Hanoi - Ho Chi Minh line, cement is loaded at Thanh Hoa and goes to Hanoi and southern direction as far as Quang Ngai. Coal is transported from the northern area to Thanh Hoa or from Ninh Binh to Thanh Hoa. The trip distance of coal is not so long.

Table 4.2.1 Cargo Items by Railway (1994)

unit: ton/year

	All Vietnam		Hanoi-HCM Line		Lao Cai Line		Cai Lan Line	
	1994	Ratio	1994	Ratio	1994	Ratio	1994	Ratio
Coal	756,974	20.7%	305,468	13.9%	37,856	3.7%	493,948	82.1%
Gasoline, kerosene	72,306	2.0%	22,853	1.0%	24,243	2.4%	121	0.0%
Minerals	82,551	2.3%	9,177	0.4%	21,284	2.1%	52,115	8.7%
Machinery, Equipment	78,711	2.2%	26,281	1.2%	4,578	0.4%	769	0.1%
Apatite	504,902	13.8%	30,558	1.4%	504,446	48.9%	1,044	0.2%
Fertilizer	270,448	7.4%	233,997	10.6%	176,319	17.1%	2,946	0.5%
Chemical	64,482	1.8%	27,112	1.2%	34,617	3.4%	476	0.1%
Cement	775,355	21.2%	607,020	27.5%	99,466	9.6%	24,725	4.1%
Stone, Sand, Soil, Gravel	594,431	16.3%	532,690	24.2%	54,292	5.3%	14,987	2.5%
Lime, Brick, Tile	25,281	0.7%	17,760	0.8%	149	0.0%	113	0.0%
Wood, Wood furniture	134,388	3.7%	126,027	5.7%	5,364	0.5%	6,024	1.0%
Forest product	11,778	0.3%	11,552	0.5%	3,987	0.4%	769	0.1%
Other agricultural product	6,262	0.2%	3,399	0.2%	2,575	0.2%	441	0.1%
Rice, Corn	43,661	1.2%	41,245	1.9%	3,439	0.3%	642	0.1%
Salt	20,806	0.6%	5,178	0.2%	19,470	1.9%	0	0.0%
Foodstuff	80,304	2.2%	80,043	3.6%	353	0.0%	0	0.0%
Cotton, Silk fabric	1,587	0.0%	1,587	0.1%	0	0.0%	0	0.0%
Cotton yarn	13,270	0.4%	12,943	0.6%	171	0.0%	0	0.0%
Other commodity	45,479	1.2%	44,500	2.0%	11,513	1.1%	0	0.0%
Animals	74,326	2.0%	65,078	3.0%	27,434	2.7%	2,443	0.4%
Total	3,657,302	100.0%	2,204,468	100.0%	1,031,556	100.0%	601,563	100.0%

*) excluding intra province trips
*) generated/attracted trips to/from zones along each railway line
*) trips are double counted in the other lines
Source: VNR

4.2.3 Traffic Demand of Other Modes

(1) Road Transportation

Figure 4.2.3 shows the average daily traffic excluding motor cycle on the National Route No. 1. Rather heavy vehicular volumes are observed at the section between Hanoi - Thanh Hoa, around cities of Vinh, Da Nang, Qui Nhon and Ho Chi Minh. This traffic count data will be used for modifying the roadway passenger OD matrix developed in the Master Plan.

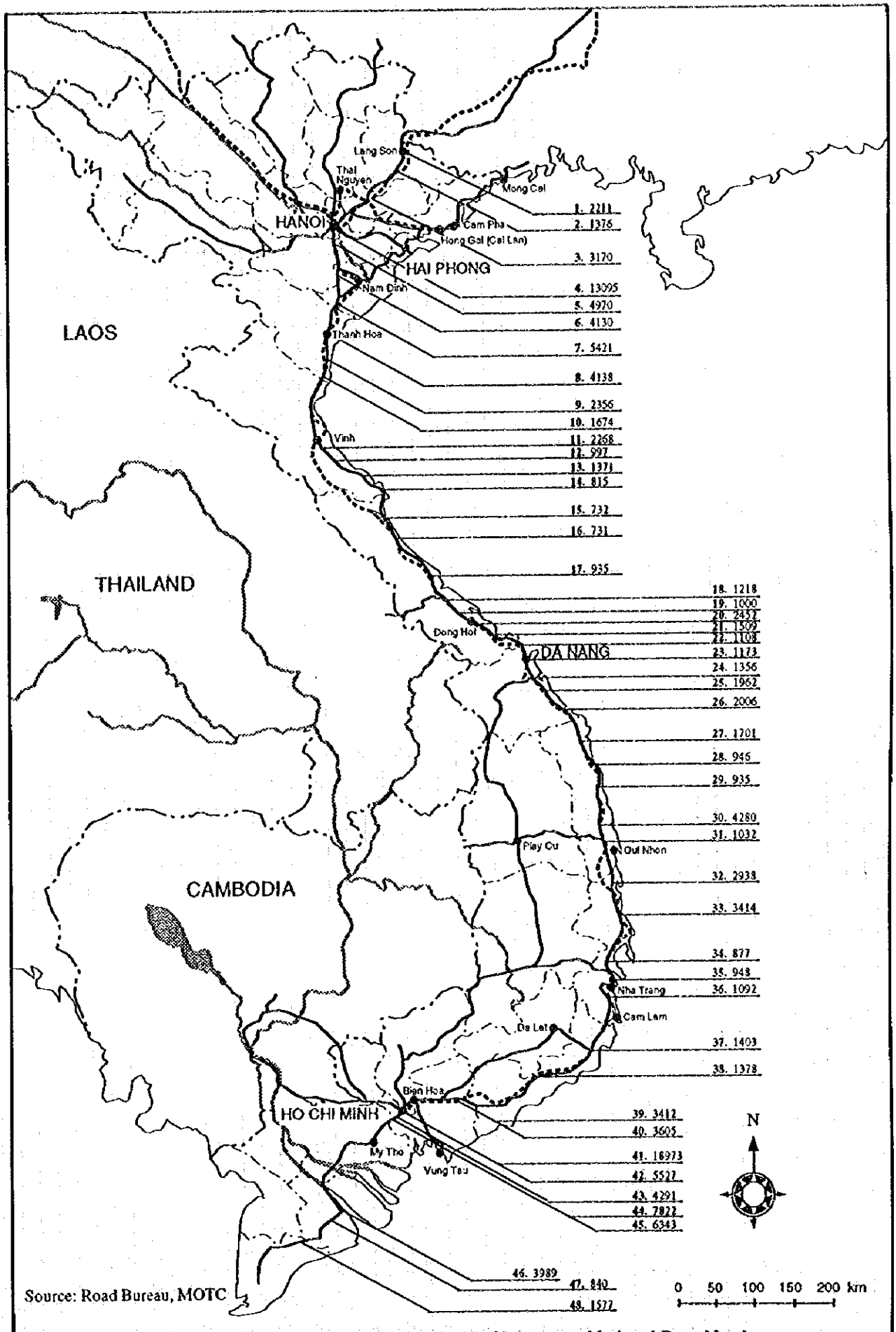
In order to confirm the volume and distribution pattern of dominant traffic generation zones, traffic count and roadside interview survey was conducted at the end of June, 1995 on the Hanoi cordon line.

Total volume of traffic generation and attraction of Hanoi accounts for 74,000 in non-motorized-vehicle (NMV), 90,000 in motor cycle (MC), and 24,000 in motorized vehicles of more than four wheels (MV). More than 80 % of traffic is made by NMV and MC, while only 13 % of traffic is made by MV.

(2) Air Transportation

Airlines carried 0.25 million passengers in 1993 according to the government statistics. Major airport to airport passenger OD matrix in the year 1993 was obtained. According to the matrix, the air transportation demand between Hanoi and Ho Chi Minh city was 180 thousand passengers in one way trip counts. The third large airport was Da Nang. The air fare is relatively cheap considering the time needed for traveling, but absolutely expensive as compared with average income level of the average Vietnamese people. Thus the majority of the passengers are people with high-income, and with official purpose. But in the future this mode will be more popular as GDP per capita increases, and become competitive traffic mode to land transport.

Air cargo was 1.4 thousand tons from Hanoi and 2 thousand tons from Ho Chi Minh city in the year 1993. The volume at these years is very small. The target demand by the government in the year 2010 is 3 thousand tons from Hanoi and 7.6 thousand tons from Ho Chi Minh city including international cargo. The small volume is not expected to increase so drastically by the year 2010, so it is decided to exclude air cargo from the modal split model in this study.



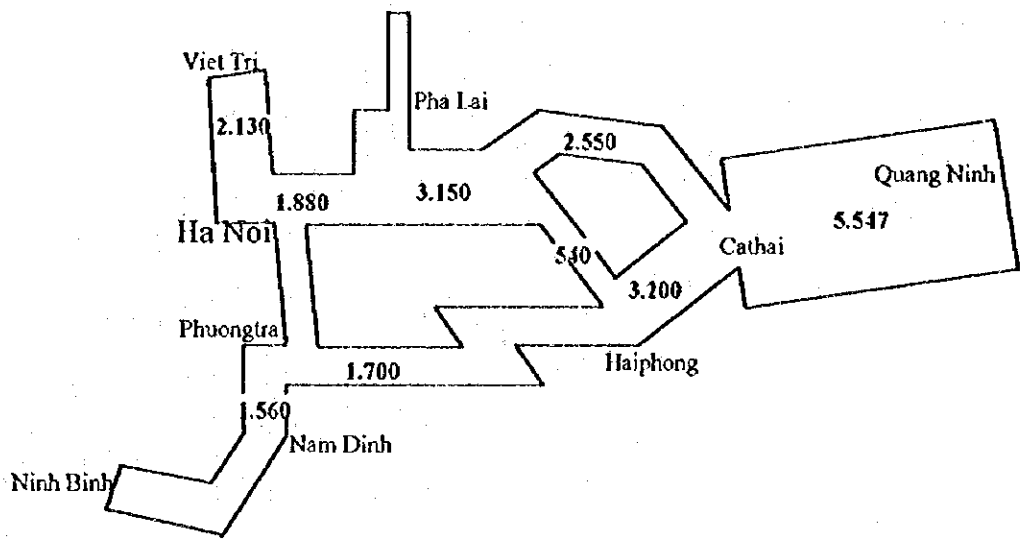
Source: Road Bureau, MOTC

Figure 4.2.3 Average Daily Traffic Volume on National Root No. 1

(3) Inland Waterway

The Red river delta and the Mekong river delta form important network for cargo transportation. In the Red river delta, total volume of cargo is about 8.8 million tons and in the Mekong river delta it is 7.8 million tons in the year 1995 according to the estimation by Vietnam Inland Waterway Bureau. Major items of cargo are construction materials (4.2 million tons) and coal (4 million tons) in the Red river delta. In the Mekong river delta, they are agricultural products (3.5 million tons) and construction materials (2.5 million tons).

The transport system by inland waterways is competitive with railways only in the northern districts. The route between Hanoi and Hai Phong connects with Quang Ninh through the sea and the other direction reaches to Viet Tri. The details of cargo volume in each section are shown in Fig. 4.2.4.



Source: Vietnam Inland Waterway Bureau

Fig. 4.2.4 Cargo Flow in the Year 1995 (unit: 000 tons)

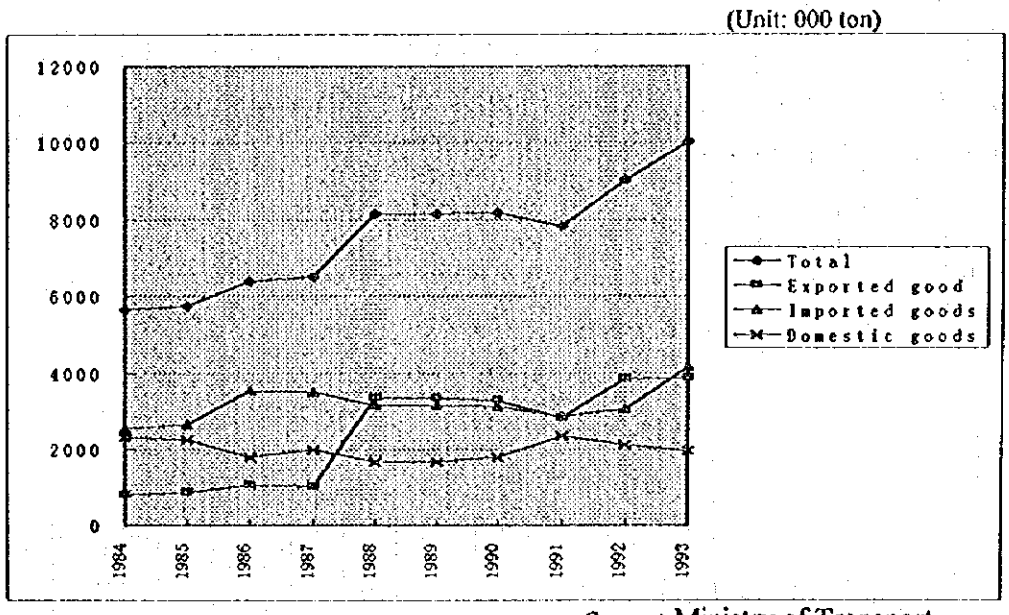
(4) Coastal Shipping

MOT statistics indicates that the total cargo volume of major coastal ports shows increase in recent years. Increases amount 10 million tons in the year 1993, and consists of export/import cargo. The volume of domestic cargo is consistently about 2 million tons.

On domestic cargo the analysis of the transport between railway and coastal shipping needs two kinds of data, the demand matrix from/to ports to/from inland and the cargo flows among ports. But these data are not available at present, so any traffic models with the demand of coastal shipping can not be prepared until those research will be completed in the future.

Nevertheless, export/import cargoes that build up the most of the cargo at major ports have to be transported from the port toward inland or vice versa by road, railway or inland waterway. So it will co-exist and not compete with other traffic modes.

The demand of traffic between the port and inland towns depends on the cargo volume which each port can handle. In this study the share of railway cargo was estimated based on the plan of Cai Lan port.



Source: Ministry of Transport

Fig. 4.2.5 Cargo Volume

4.2.4 Major Result of the Traffic Survey

Questionnaire surveys were conducted in order to find the traffic characteristics of long distance passengers in Viet Nam as well as to collect the necessary data for developing discrete choice model for railway passengers. The survey forms are translated into Vietnamese and the trained survey staffs from the TEDI and the VRDI asked domestic passengers to answer the questions at various points; the Noi Bai airport, the three bus terminals in Hanoi, the three railway sections of the Hanoi - Ho Chi Minh line, the Hanoi - Lao Cai line and the Hanoi - Ha Long line. The survey was carried out from June 1995 to July 1995.

About half of the air passengers and 13.9 % of the Hanoi - Ho Chi Minh railway passengers have "official" purpose for their trips. Other transport modes except the air are mainly used by the passenger whose trip purpose is "self-business", which accounts for about 30 to 40 % of the total. Almost all the air passengers selected "time" for their dominant decision making factor. The significant share of railway passengers prefers the transport modes that guarantee the "Safety" and "Comfort," whilst the majority of bus passengers selected its mode because of its "Frequency" and "Time". The most frequent answer for the fare evaluation is voted for "Reasonable", which well exceed 50 % of total passengers by each mode except the Hanoi - Ho Chi Minh line passenger. There are variations in the railway passengers' responses for the travel time evaluation. Majority of the railway passengers on the Hanoi - Ho Chi Minh line and the Hanoi - Ha Long line voted for "Rather long." On the contrary the passengers on the Lao Cai line responded "Rather short".

4.3 Transport Modeling

This section sets forth the transport model.

4.3.1 Trip Matrix Calibration

The base-year matrices developed in other relevant studies needs to be modified due to the recent rapid growth and development of the Viet Nam's economy.

(1) The Base Year Person Trip Matrix Calibration

Three trip matrices, (1) those are the railway station to station OD matrix at the year 1992 obtained in the period of the Master Plan development phase, (2) the land transport (rail + road) matrix developed in the National Transport Sector Review in 1992, and (3) the major airport to airport matrix in 1993; will be calibrated into a comprehensive base-year person trip matrix. A flow chart of calibration process is presented in Figure 4.3.1. The number of passengers at railway stations is updated according to the VNR's statistics for the year 1994. The result of traffic survey carried out in this study is also utilized for calibration.

Administrative system has been changed since 1990, the traffic zone system and the zonal parameters are modified by using a macro economic indicator (i.e. population) as an adjusting factor.

Passenger travels made by river transport mode is excluded from this demand forecast study because the capacity of the river transport is very limited at present. For instance it is 1,000 persons/day at the Hon Gai, the Hanoi and the Nam Dinh river port, and 100 persons/day at the Viet Tri river port. It seems reasonable to assume that there is no competitive river transport systems used for the same trip purpose of the passengers on the selected priority sections of the Hanoi - Ho Chi Minh line and the Lao Cai - Ha Long line from the transport network point of view as well.

(2) The Base Year Cargo Trip Matrix Calibration

Although the basic approach is the same as the procedure applied for the estimation of the passenger OD matrices, starting point of calibration is different.

The beginning point was set at the railway station to station OD matrix in 1994; the NTSR's land transport and inland waterway OD matrices in 1992. The inland waterway system in the Red River Delta is a good competitor for the East - West railway system (the Lao Cai - Cai Lan line). Therefore, in contrast with the person OD matrix, the inland waterway OD was included into a comprehensive base-year matrix of cargo.

Coastal shipping data is preferred as one of the component of the consolidated cargo OD matrix because major cargo transport of the North - South direction is made by shipping as well as railway and trucks. It, however, can not be included directly in the models because of data availability at present. But the volume and competition are considered after modeling, and explanation are given in section 4.4.3.

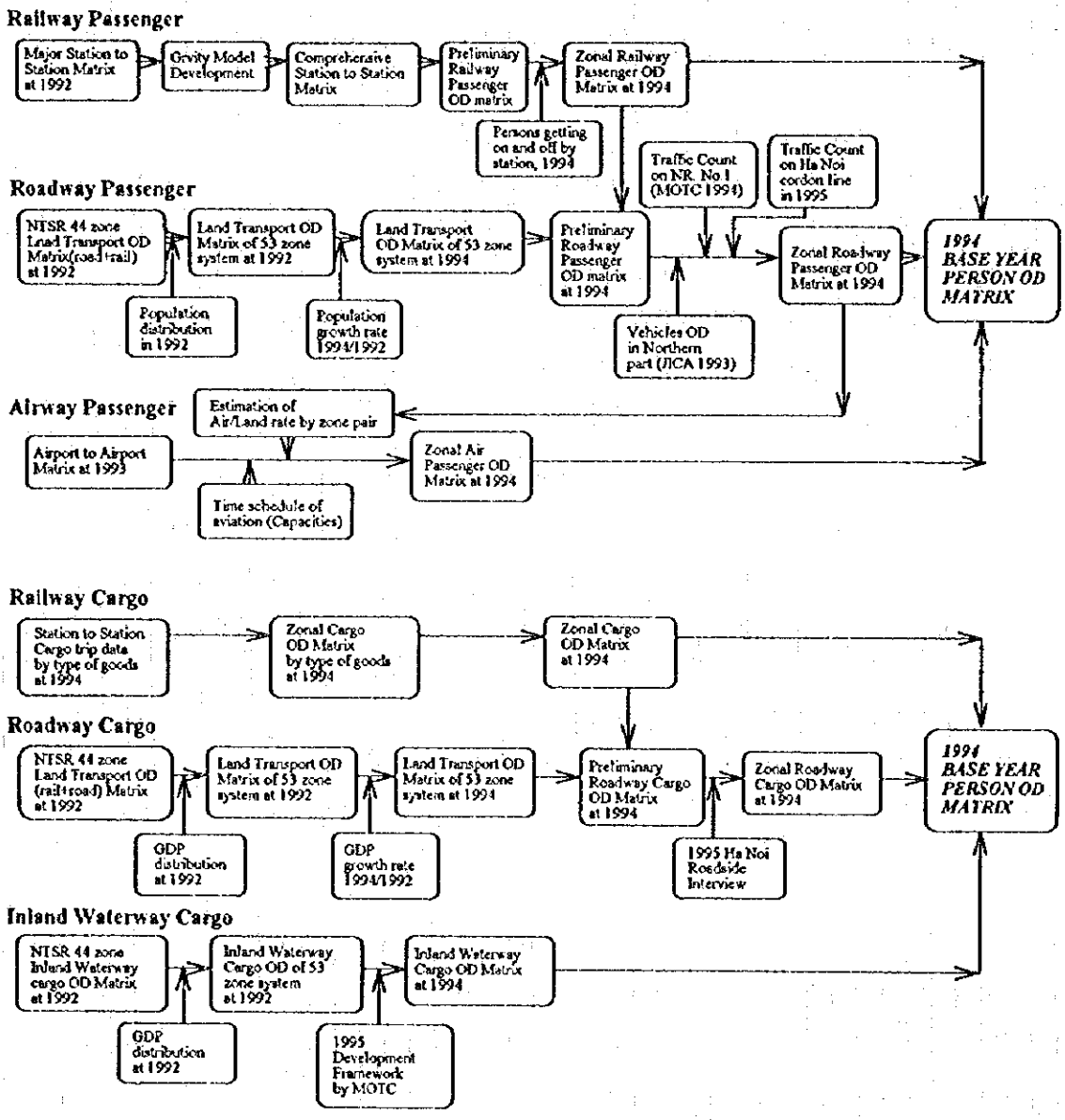


Fig. 4.3.1 Calibration Procedure of the Base Year OD Matrix

(3) OD Matrices in Base Year 1994

Passenger trip OD table in the base year 1994 is calibrated as shown in Table 4.3.1. The total number of passenger trips excluding intra province trips was 191 million trips in all Viet Nam. This table is summed up by person trip OD tables of roadway, railway and airway that is adjusted in each.

Cargo trip OD table is shown in Table 4.3.2. Total volume was 59 million tons in all Viet Nam.

Table 4.3.1 Passenger Trips (Road+Railway+Air) in Year 1994

(unit: 000 persons)	1	2	3	4	5	6	7	Total
1 Northern Upland	5,430	16,784	203	53	23	71	5	22,570
2 Red River Delta	17,058	35,732	2,665	976	291	845	127	57,694
3 North Central	210	2,645	2,962	1,484	174	624	36	8,135
4 Central Coast	50	921	1,446	5,236	1,537	3,871	446	13,506
5 Central Highlands	22	282	167	1,538	68	1,434	73	3,582
6 Southeast	65	781	567	3,868	1,415	37,245	16,297	60,238
7 Mekong River Delta	4	113	34	438	72	16,265	8,596	25,524
Total	22,838	57,257	8,044	13,592	3,582	60,354	25,580	191,248

Table 4.3.2 Cargo Trips (Road+Railway+Inland waterway) in Year 1994

(unit: 000 tons)	1	2	3	4	5	6	7	Total
1 Northern Upland	4,429	11,686	1,077	283	11	117	2	17,605
2 Red River Delta	6,496	3,006	1,075	347	0	73	29	11,026
3 North Central	842	1,605	1,315	737	29	110	11	4,648
4 Central Coast	247	322	596	1,843	600	711	145	4,464
5 Central Highlands	10	0	29	607	1	187	68	902
6 Southeast	90	320	104	695	190	2,579	5,118	9,096
7 Mekong River Delta	3	35	12	154	71	6,342	4,217	10,834
Total	12,116	16,974	4,207	4,666	902	10,120	9,590	58,575

4.3.2 Procedure

(1) Flow Chart

Since it is likely that any trend based-transport demand forecasts can not reflect a drastic structural change in Vietnam, it is a key task to build a transport model which can trace the present travel pattern in the most fitted manner, and can be compatible with structural changes in the future. In this context, a conventional four - stage transport model is adopted. It is presented as a sequence of four sub models : 1) trip generation/attraction models as function of socio-economic variables, 2) trip distribution model, 3) modal split model and 4) trip assignment.

(2) Estimated Time and Cost

Time and fare data of all traffic modes is necessary to simulate modal split model because this model has the difference value of time and fare in the formula. These data are researched and estimated in the following procedure.

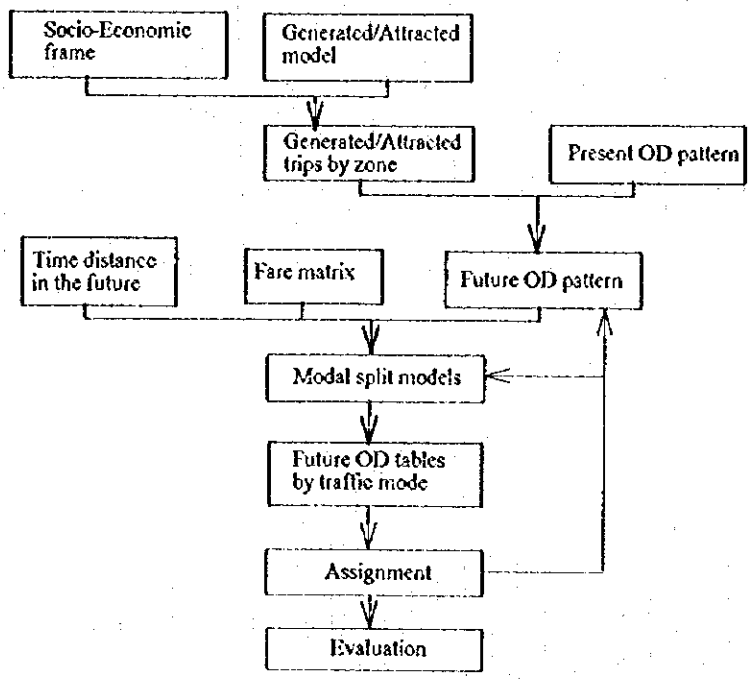


Fig. 4.3.2 Overall Flow Chart of Demand Forecast

Time distance matrix of road network is estimated from the average speed in each road that is surveyed by our trips and some hearing surveys at the bus terminals. Those of railway and air transport are compiled by using time tables. Time distances of inland waterway are calculated by the estimation of the average speed.

The fare matrix of railway is calculated by the fare system and the distance matrix. Because the fare of railway cargo differs by the category, the average fare is used to simulate modal split model. The result of our survey on the unit fare of bus is shown in Fig. 4.3.3. As the unit fare at the bus terminals decreases according to the distance, the fare model is estimated. The relations between ticket price and distance of air transportation are plotted in Fig. 4.3.4. From these plots the unit fare of air is calculated.

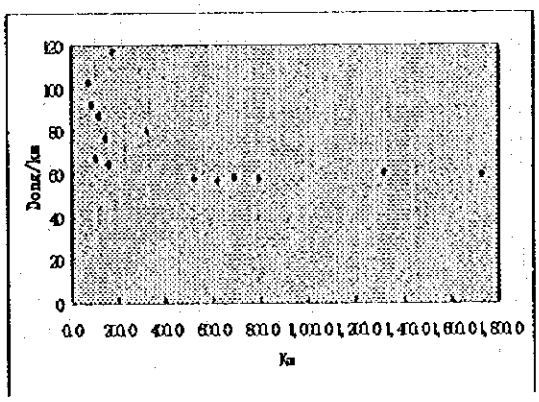


Fig. 4.3.3 Unit fare by bus

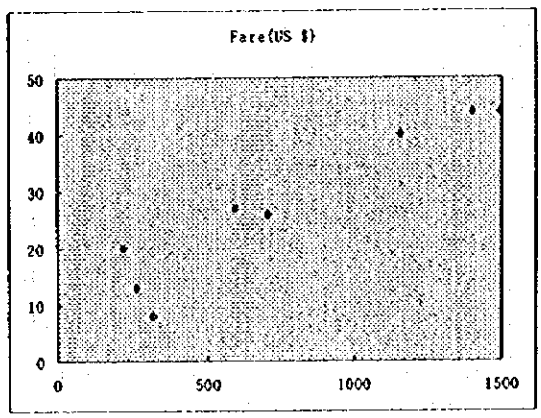


Fig. 4.3.4 Fare by air

There are other survey data as shown in Table 4.3.3. These data are also used for supplementing the data that we could not survey. The following survey shows that the fare of truck is about three times of railway.

Table 4.3.3 Unit Fare by Modes

Items		1990	1991	1995
Passenger Trips (Dong/pass-km)	Bus			120
	Railway			140
	Inland waterway			70
Cargo Trips (Dong/ton-km)	Truck	296.0	370.0	600
	Railway	105.0	131.0	200
	Inland waterway	94.6	118.0	140
	Coastal shipping	60.0	75.0	

*) 1990,1991: MOC Report
1995 June, Vietnam Inland Waterway Bureau

4.3.3 Modeling

(1) Generated and Attracted Model

Person trips increase in proportion to the growth of population. Person trips also tend to increase as the GDP grows. This is because the socio-economic activities result in person trips. Correlation between generated/attracted passenger trips and socio-economic indices by zone are shown in Table 4.3.4. Trips correlate highly with density of population and GDP. The correlation factor of density of population is higher than that of population because of inter province trips.

Referring the correlation coefficients, regression functions based trip generation and attraction models are derived. The variables of the model are density of population, labor force, GDP and area for an adjustable factor. Although the assumption that number of generated trips is the same as number of attracted trips because all persons come back to the original departure place is reasonable, in this study we build up two models for generated and attracted trips. The outputs of two models were almost same. The correlation coefficient of each regression model is over 0.9.

Table 4.3.4 Correlation Coefficients with Person Trips and Socio-economic Indices

	Area(Km^2)	Population	Person/Sq-km	Labor Force	Labor Force Ratio	GDP	Per capita GDP
Generated Trips	-0.3580	0.5735	0.8256	0.6563	0.5042	0.8676	0.4989
Attracted Trips	-0.3586	0.5724	0.8251	0.6553	0.5048	0.8685	0.4999

Number of cargo freights generally depends on economic parameters because economic activities generate cargo freight demand. However, the correlation coefficients between generated trips of cargo and economic indices are not high at present. It is estimated that the reason of this weak correlation is attributable to the limitation in manufacturing capacity at some facilities and to the fact some types of cargoes are not closely related with whole economic activities in the district overall. In addition, some types of cargo have no freedom in selecting the transportation mode due to governmental restrictions. In the future, the correlation coefficient of cargo generation with socio-economic parameters will be higher as same as cargo attraction. The variables of regression models by transportation modes were selected in order to increase the coefficient. Total estimation is made of the summation of all transportation modes.

Table 4.3.5 Correlation Coefficients with Cargo Trips and Socio-Economic Indices

	Area(Km^2)	Population	Person/Sq-km	Labor Force	Labor Force Ratio	GDP	Per capita GDP
Generated Trips	-0.1840	0.3810	0.3579	0.4068	0.2768	0.4348	0.1824
Attracted Trips	-0.3071	0.6107	0.7074	0.6655	0.4443	0.6923	0.2528

(2) Trip Distribution Model

In estimating trip distributions, there are two methods that are present pattern method and gravity model method. The gravity model method is suitable if the socio-economic character in each district will become a uniform condition in the future. But, our research suggests that Vietnam will preserve its local differentials until the year 2010, so it is judged that the present pattern method is more preferable. With this method, we obtained the estimated total future generation of trips as a sum to the matrix, and converge the current traffic distribution patterns to fit the sum. The calculations were performed by using the Fratar method.

(3) Modal Split Model

We have assumed that the distribution factors of traffic mode transfer is designated by the differences in time and fare. The following equation was used as the model. The equation is originally a model used by the Japan Highway Public Corporation to calculate the distribution factor of normal roads and highways, but is also applicable for other modeling of mode distribution.

$$P = \frac{100}{1 + \alpha(\frac{C}{T} / S)^{\beta} / T^{\gamma}}$$

P = Mode ratio of faster traffic mode (unit: %)
C = Difference of fare/cost
T = Time difference
S = Shift factor

This function demonstrates that transportation mode-change to faster transportation is accelerated when the fare/cost parameter difference is small, and the bigger the fare difference, the smaller the mode change. In the same way, when the fare/cost parameter is a fixed value,

the mode-change is accelerated by the amount of time difference it can earn. The value "S" is the shift factor showing the need by society to more advanced traffic-modes. The value is approximately 1.3 per 5 years with regard the Japanese road to highway switch.

Person trip models have been generated by deducting the air transportation passengers from total person trips, and then separating the railway trips. The competitors of air transportation have selected the faster mode between road and rail.

With regard cargo transportation, truck deliveries were deducted from total cargo trips. In zone pairs where railways and inland waterways were available, the competition between railways and trucks were modeled, and then rail transportation has been separated. Model have been built by zone pairs where trucks and rail are both available and cases where inland waterways and trucks are available.

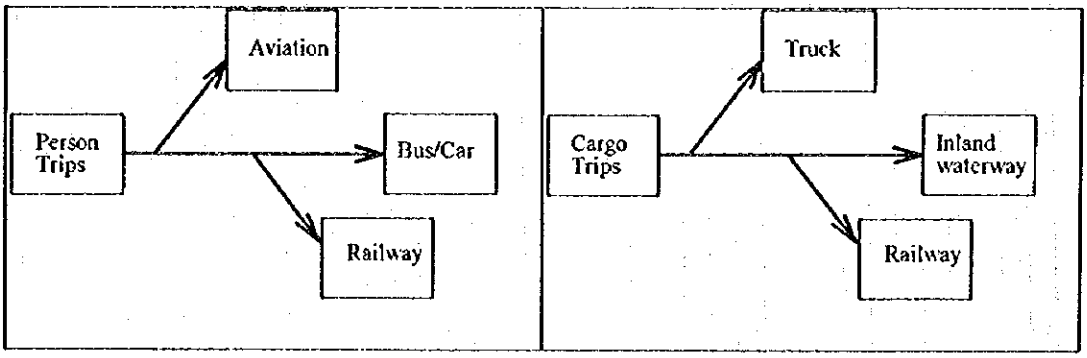


Fig. 4.3.5 Modal Split of Person Trips and Cargo Trips

Each coefficient of the modal split model formulas are shown in Table 4.3.6. Although these correlation factors are at sufficiently significant level, there are differences between the real ratios and the values by the model in some zones. So in assuming that the differences will gradually decrease toward the model within 20 years in the case of passenger trips and 30 years in the case of cargo trips, these ratios are adjusted.

Table 4.3.6 Coefficient of Modal Split Model Formula

	Traffic Mode	Competitor	α	β	γ	R
Passenger Trips	Aviation	Railway + Road	0.8067	1.0581	0.8152	0.69
	Railway	Road	1.0679	0.7216	0.5690	0.66
Cargo Trips	Road	Railway + River	0.0850	1.0741	1.7953	0.71
	Road	River	0.1748	0.7819	0.9063	0.45
	Railway	River	47.6014	0.3664	0.7150	0.71

4.3.4 Forecast Conditions

The conditions for traffic demand forecast are designed by taking into the considerations the future network plan and the socio-economic framework. The future GDP and populations that give the generated/attracted trips, depends on the socio-economic framework. The road network is given based on the improvement plans of main national roads and the speed of each road are estimated to increase according to the plan. The network of inland waterway includes the future routes. The routes of aviation are set to two way between present routes. The fare of each mode are assumed to the same conditions.

The speed of railway are given by the plan of this study as shown in Table 4.3.7. The frequent service is discussed in the section 4.4.3.

Table 4.3.7 Speed of Passenger Train in Each Railway Line

Line	Section	Year 1994	Year 2000	Year 2005	Year 2010
Hanoi - Ho Chi Minh Line	Hanoi - Than Hoa	51.8	65.6	67.0	70.1
	Hue - Da Nang	37.9	41.2	44.3	51.6
	Muong Man - HCM	45.8	65.6	67.6	72.3
	Other section	49.3	50.6	57.8	74.5
Cai Lan Line		22.0	38.9	44.8	58.4
Lao Cai Line		30.0	32.6	33.8	36.7
Other lines		30.0	30.0	30.0	30.0

Table 4.3.8 Speed of Cargo Train in Each Railway Line

Line	Year 1994	Year 2000	Year 2005	Year 2010
Hanoi - Ho Chi Minh Line	29.8	37.1	38.8	42.6
Cai Lan Line	19.3	31.6	35.1	43.4
Lao Cai Line	17.0	20.6	21.1	22.2
Other lines	17.0	17.0	17.0	17.0

4.4 Future Demand Forecast of Railway Transport

4.4.1 Overview of Future Demand

(1) Passenger Traffic

The total amount of passenger traffic is estimated to be 384 million trips in the year 2,000 and 1,094 million trips in the year 2010. The growth rate behind these numbers are 12% from 1994 to 2000, 11% from 2000 to 2010. The higher growth rate in the earlier stage is caused by the rapid increase in population until the year 2000. The examination of trips per person reveals a higher rate after the year 2000. Tables 4.4.1 and 4.4.2 do not contain numbers of intra province trips. The estimation of passenger traffic shows that the trips are centered around Ho Chi Minh City, Hanoi, and Da Nang.

Table 4.4.1 Forecast of Passenger Trips in the Year 2000

(unit: 000 persons)	1	2	3	4	5	6	7	Total
1 Northern Upland	8,840	27,260	638	147	34	135	6	37,060
2 Red River Delta	27,478	61,111	5,984	1,833	374	1,338	252	98,369
3 North Central	654	5,922	6,646	3,997	280	1,347	93	18,939
4 Central Coast	138	1,778	3,939	10,476	2,515	7,735	784	27,364
5 Central Highlands	32	374	273	2,508	115	2,596	151	6,048
6 Southeast	123	1,278	1,303	7,726	2,563	91,238	34,190	138,422
7 Mekong River Delta	5	234	89	769	150	34,241	22,943	58,431
Total	37,271	97,958	18,871	27,455	6,031	138,630	58,419	384,634

Table 4.4.2 Forecast of Passenger Trips in the Year 2010

(unit: 000 tons)	1	2	3	4	5	6	7	Total
1 Northern Upland	24,620	69,619	2,493	491	148	310	10	97,690
2 Red River Delta	69,684	143,201	18,531	4,712	1,451	2,720	604	240,904
3 North Central	2,530	18,335	21,498	12,567	1,297	3,340	312	59,880
4 Central Coast	460	4,640	12,418	27,532	10,417	20,008	2,461	77,936
5 Central Highlands	137	1,470	1,273	10,354	809	9,597	606	24,246
6 Southeast	281	2,630	3,354	19,961	9,459	293,254	89,270	418,209
7 Mekong River Delta	9	568	300	2,403	600	89,554	81,839	175,272
Total	97,722	240,462	59,866	78,021	24,181	418,782	175,102	1,094,137

The average trip per person rate in 1994 is 2.7 trips, resulting a 1.5 times return-trips from other zones. By the year 2000, this number is expected to raise to 2 return-trips, and by the year 2010, 6 return-trips. With regard per laborer trip rate, there will be approximately 1 trip going out to other zones every month.

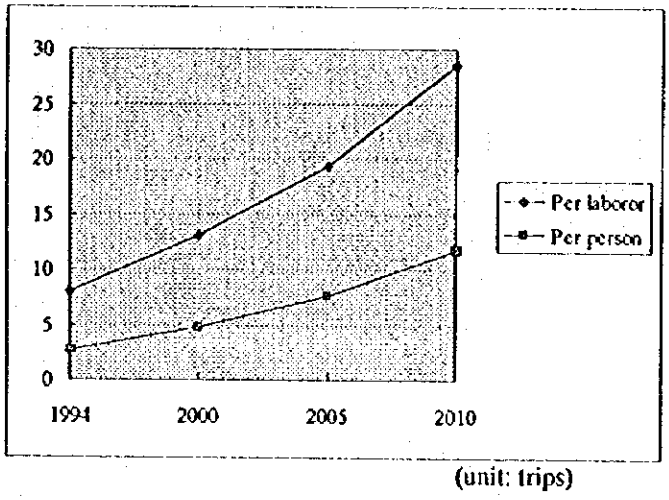


Fig. 4.4.1 Passenger Trips per Person

The traffic mode diversities are shown in Tables 4.4.3 (with) and 4.4.4 (without). Table 4.4.3 (with project) shows the growth based on the railway rehabilitation executed, showing increase in passengers from 8.8 million trips in 1994 to 12.4 million trips in the year 2000, and 23.1 trips in 2010. Table 4.4.4 (without project) shows the growth when the rehabilitation is not

performed. There will be a slight increase because the total number of person trips will increase with the population, but the share of railway travelers will go down significantly. The rehabilitation and improvement of railway transportation will prevent the railway's share from going down rapidly.

The 1994 share of railway passenger trips is 4.6%, but advancements in air traffic and road conditions result in higher growth rates of these transportation, leaving the railway a subtle 2.1% share in the year 2010.

But these numbers are based on the current preference of transportation model. If railways can prove that railways are much more comfortable and convenient than using airplanes or buses, there is a possibility that the preference model itself may change. The quality of service is another key factor in increasing railway demand, in addition to time savings and cost saving factors that we have previously observed.

Table. 4.4.4 (without project) shows that demand for air travel will increase to 11 million trips. However the Vietnam Aviation Bureau only plans for expansion to 7 million trips, which means that demand overflows the supply. It is assumed that the excess passengers will convert to road traffic.

Table 4.4.3 Mode Share of Passenger Traffic (With Project)

		Year 1994	Year 2000	Year 2005	Year 2010
Passenger Trips	Total	191,247,726	384,634,395	659,719,208	1,094,136,576
	Railway	8,807,434	12,416,816	17,040,539	23,119,926
	Road	181,527,512	370,381,435	639,307,353	1,063,572,945
	Air	912,780	1,836,144	3,371,317	7,443,706
Ratio (%)	Total	100.0	100.0	100.0	100.0
	Railway	4.6	3.2	2.6	2.1
	Road	94.9	96.3	96.9	97.2
	Air	0.5	0.5	0.5	0.7

Table 4.4.4 Mode Share of Passenger Traffic (Without Project)

		Year 1994	Year 2000	Year 2005	Year 2010
Passenger Trips	Total	191,247,726	384,634,395	659,719,208	1,094,136,576
	Railway	8,807,434	9,894,442	11,064,520	11,222,673
	Road	181,527,512	372,839,234	644,780,172	1,072,297,377
	Air	912,780	1,900,719	3,874,517	10,616,527
Ratio	Total	100.0	100.0	100.0	100.0
	Railway	4.6	2.6	1.7	1.0
	Road	94.9	96.9	97.7	98.0
	Air	0.5	0.5	0.6	1.0

(2) Cargo Transportation

The total amount of cargo transportation is 58 million tons for 1994, and estimates project 96.8 million tons for 2000, and 209.4 million tons for the year 2010. The growth rate behind these numbers are 8.7% from 1994 to 2000 and, 8.0% from 2000 to 2010. The larger growth rate in the earlier section reflects that the current traffic demands have not yet grown to the size appropriate for the economic activities of this country, and model shows a rapid growth to follow. Tables 4.4.5 and 4.4.6 do not include intra province trips. In comparison with passenger traffic data which showed a large amount of movement inside the large zones, cargo freight traffic shows large transactions and traffic flows between neighboring large zones. Cargo traffic also center around Ho Chi Minh City, Hanoi, and Da Nang.

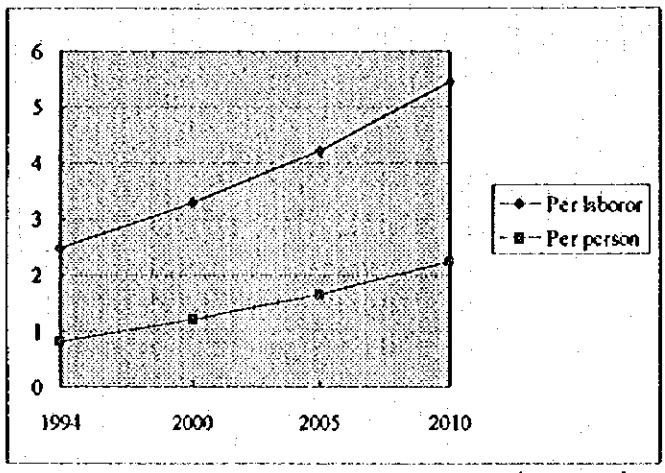
Table 4.4.5 Forecast of Cargo Trips in the Year 2000

(unit: 000 persons)	1	2	3	4	5	6	7	Total
1 Northern Upland	6,066	15,773	1,496	320	22	191	3	23,871
2 Red River Delta	9,881	4,910	1,695	444	0	138	31	17,099
3 North Central	1,402	2,591	2,332	1,180	54	244	15	7,818
4 Central Coast	436	573	1,107	2,784	882	1,476	178	7,436
5 Central Highlands	28	0	59	903	2	450	98	1,541
6 Southeast	227	804	280	1,504	475	6,490	11,052	20,833
7 Mekong River Delta	5	49	15	179	100	12,005	5,892	18,244
Total	18,046	24,700	6,984	7,314	1,535	20,994	17,271	96,843

Table 4.4.6 Forecast of Cargo Trips in the Year 2010

(unit: 000 tons)	1	2	3	4	5	6	7	Total
1 Northern Upland	10,795	28,313	2,711	438	58	354	7	42,676
2 Red River Delta	19,781	10,257	3,526	679	0	314	46	34,604
3 North Central	3,130	5,542	5,086	2,092	141	595	27	16,612
4 Central Coast	941	1,205	2,276	4,690	1,779	3,531	298	14,720
5 Central Highlands	100	1	171	1,815	7	1,414	219	3,726
6 Southeast	582	2,254	790	3,381	1,420	21,141	27,530	57,098
7 Mekong River Delta	15	100	22	277	223	28,278	11,019	39,934
Total	35,343	47,673	14,582	13,372	3,628	55,626	39,145	209,370

The number of cargo trips per person was 0.8 tons in the year 1994 and will be 1.2 tons in the year 2000 and 2.2 tons in the year 2010. The growth ratio is forecast to be sharply raised. As shown in Fig. 4.4.2, the ratio after the year 2000 is higher than that before the year 2000. Observing the data from another angle, the number is about 3 tons - 2 tons per GDP (US$1000). The per GDP ratio will decrease slightly, because the growth of GDP is very sharp.



(unit: ton)

Fig. 4.4.2 Cargo Trips per Person

The demand forecast of cargo trips by each traffic mode gets the results as shown in Table 4.4.7 (with project) in case of that the railways will be reformed according the plan in this study. Table 4.4.8 (without project) represents without improvement plan.

Total volume of cargo trips by railway will grow up to 4.7 million tons in the year 2000 and 14.8 million tons in the year 2010, from 3 million tons in the base year 1994 and the share will also increase in the case of improvements. However without improvements of railway, the volume will grow at a stagnating rate because the growth ratio of cargo demand is totally high but the share of railway cargo will gradually decrease.

The forecast volume of cargo by inland waterway in this study is higher than the forecast in the study of UNDP, but is smaller than the target volume according to Vietnam inland waterway bureau. This fluctuation depends on not only time/cost model but also management strategy.

Because characteristic item of cargo has the adequate mode by the size and the weight, each traffic mode for cargo transportation plays the role on the adequate items. But the competition in the future will become more keen on general cargo. Under these competitions the transportation mode only that supply suitable services in high quality to customers can survive and can remain the share. So the demand forecast might be reflected by the none economic factors.

Table 4.4.7 Mode Share of Cargo Trips (With Project)

		Year 1994	Year 2000	Year 2005	Year 2010
Cargo Trips	Total	58,575,307	96,843,098	143,394,707	209,369,882
	Railway	3,182,951	4,654,907	8,644,116	14,831,757
	Road	40,085,187	68,772,556	105,516,391	160,131,563
	River	15,307,170	23,415,635	29,234,200	34,406,562
Ratio (%)	Total	100.0	100.0	100.0	100.0
	Railway	5.4	4.8	6.0	7.1
	Road	68.4	71.0	73.6	76.5
	River	26.1	24.2	20.4	16.4

Table 4.4.8 Mode Share of Cargo Trips (Without Project)

		Year 1994	Year 2000	Year 2005	Year 2010
Cargo Trips	Total	58,575,307	96,843,098	143,394,707	209,369,882
	Railway	3,182,951	3,525,095	6,491,746	8,406,388
	Road	40,085,187	70,110,882	108,080,702	167,422,468
	River	15,307,170	23,207,121	28,822,259	33,541,026
Ratio (%)	Total	100.0	100.0	100.0	100.0
	Railway	5.4	3.6	4.5	4.0
	Road	68.4	72.4	75.4	80.0
	River	26.1	24.0	20.1	16.0

4.4.2 Railway Transport of Lao Cai - Cai Lan Line

(1) Passenger Traffic

Passenger transportation by railways along the Lao Cai line is expected to grow at an annual growth rate of 5% up to the year 2000, and to increase at 7% after the year 2000. Road network is not well established in this area, and trains play an important role of transportation. This condition is not likely to change in the future, whilst developments in bus transportation might affect the share of railway transportation. If railways neglect their effort to improve their quality of service, the growing demand for transportation may emphasize the growth of bus transportation. Other modes of traffic are weak in this route, and there is a very strong possibility that railways can continue to maintain the important role of transportation by improving their services. International trains connecting into China is difficult to forecast due to political conditions, but has a potential demand in the future.

Passenger transportation by railway along the Cai Lan line is expected to grow at an annual growth rate of 10%. This rate is totally in proportion with the total growth rate of all traffic demands in this area, and the numbers show that there is a possibility that railways can maintain their share if they reform their services adequately. If not, the total growth rate will cause the demand to increase, but the share of railway will decrease rapidly.

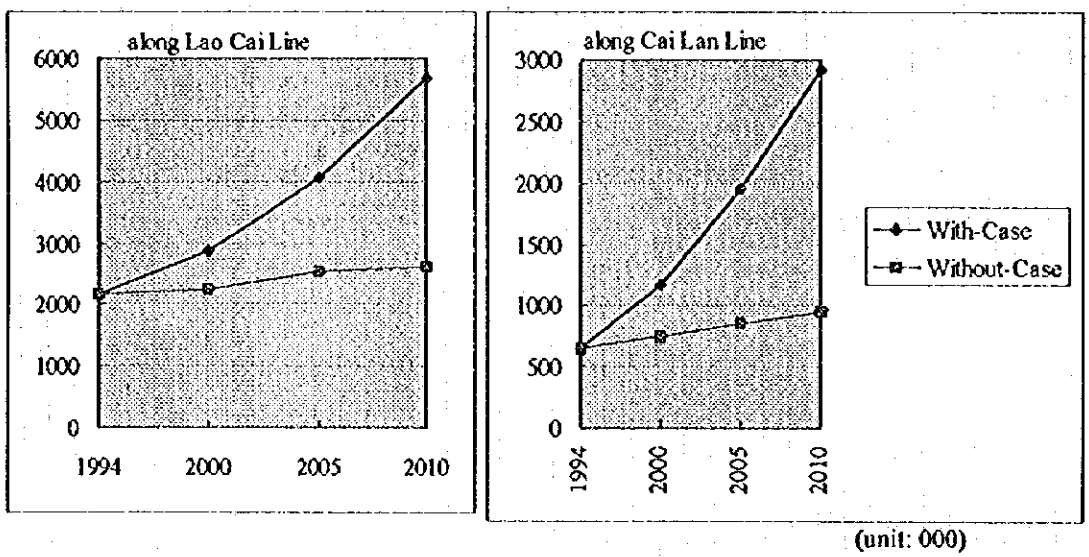


Fig. 4.4.3 Person Trips by Railway along Lao Cai-Cai Lan Line

(2) Cargo Transportation

Rail cargo transportation along the Lao Cai line is estimated to grow at an annual growth rate of 3%, due to the fact that cargo demand on this route is lower than the other routes. However, the low growth rate does not mean that the share of railroad transportation is low in contrast to other transportation. Railway share is 8% to 10% which is not a small fraction. Short distance freights meet competition with inland waterways, but for long distance freight, railways still play an important role. Nevertheless, if no rehabilitation is made for railway services in the future, the role of railways will decrease from the year 2005.

Cargo transportation along the Cai Lan line is expected to grow rapidly in amount, although the share by railway is only 3% in the future. There will be only a 2% annual growth rate until the year 2000, but a rapid economic growth in the area will accelerate the annual growth rate up to a 10% order. If railway services neglect the expansion of necessary facilities, they will lose freight to heavy competition from inland waterways and trucks. The following chart does not contain cargo in connection to the Cai Lan port. Further demand can be generated by transporting the cargo from Cai Lan port. Details will be discussed in the next section.

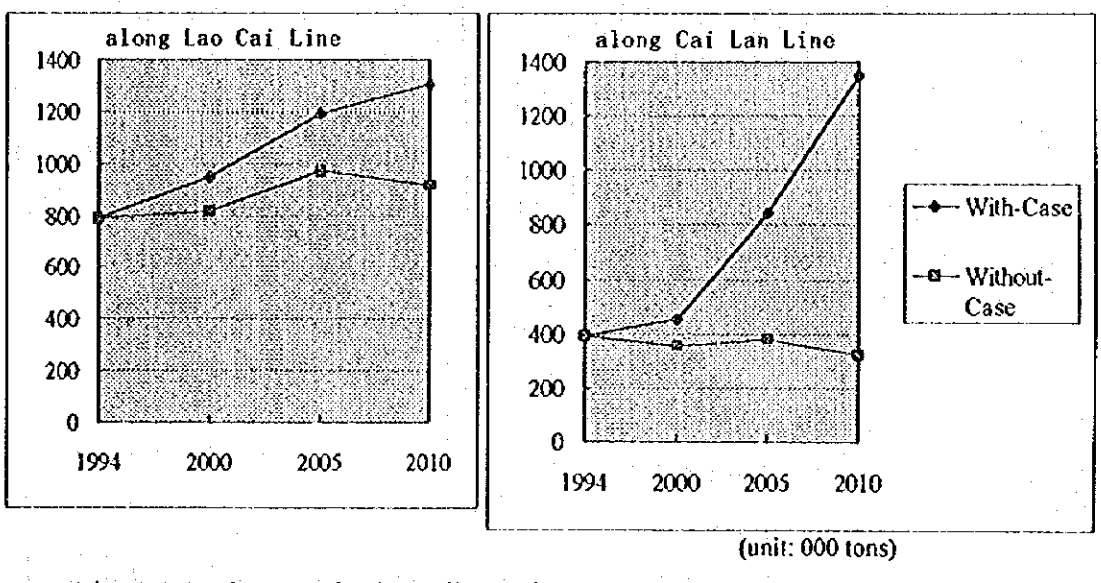


Fig. 4.4.4 Cargo Trips by Railway along Lao Cai-Cai Lan Line

4.4.3 Other Conditions

(1) Cai Lan Port

The commencement of the Cai Lan port services is planned at the year 2000. Therefore there will be small amounts of cargo until 2000. If the railway freight tracks are extended to Cai Lan port by the year 2010, and the quality of railway service were improved, it will be possible for railways to maintain its current share in cargo transportation to this area. This will result in 600 thousand tons of demand increase for railway cargo transport.

(2) Tourism

In 1994, the number of tourists to Quang Ninh totaled approximately 400 thousand visitors, of which 130 thousand were from overseas. Quang Ning now has 1400 rooms of hotels available for these tourists, and 3700 rooms are expected to be necessary in the future. However, foreign visitors have not used railway transportation, and railway demand for sightseeing purposes consists of local Vietnamese travelers only.

There are hotel construction plans taking place in the Cai Lan area, and visitors to this zone are expected to increase. To emphasize railway services as transportation of tourists in this area, it is necessary to shorten the time-to-destination and also introduce air-conditioned cars to compete with buses.

Along the Lao Cai line, the number of tourists will not increase on a large scale because there are only a few hotels at present and there not so much for new hotel construction targeted at tourists. So the railway demand by tourists can not be expected in the year 2010.

Table 4.4.9 Railway Cargo from/to Cai Lan Port

Export(000 ton)			Estimated railway share	Railway cargo	
Item	2000	2010		2000	2010
Ore		545		0	0
Metal		71		0	0
Rice	200	513	5%	10	26
Maize	300	316	5%	15	16
Grained Wheat	30	125	5%	2	6
Cement	240	2060		0	0
Container	131	1550	10%	13	155
Total	901	5180		40	203

Import (000 ton)			Estimated railway share	Railway cargo	
Item	2000	2010		2000	2010
Coal	10	31		0	0
Other ore		204		0	0
Scrap	287	854		0	0
Fertilizer	103	124	5%	5	6
Chemicals	89	525		0	0
Asphalt	30	120		0	0
Wheat	240	1001	5%	12	50
Container	312	3509	10%	31	351
Total	1071	6368		48	407

Table 4.4.10 Future Plan of New High Quality Tourist Hotels

Number of rooms	Year 1990	Year 1992	Year 1995	Year 2000	Year 2005
Total in Northern Districts	1,565	1,690	4,662	9,470	14,762
Hanoi	415	736	936	2,869	4,769
Ha Long Bay		20	120	420	820
Hai Phong		42	42	42	42
Do Son		58	174	174	174
Lao Cai				60	60

Source: Tourism Development Master Plan, UNDP 1991

(3) Competitive Capacity of Railway

Comparison of the competitive capacity between the railway and highway is conducted in terms of travel time. Feasibility study on rehabilitation of National Highway 18 suggests that the existing road be up-graded, and the full access-controlled highway is not feasible. And thus the competitive road of the Lao Cai line is the up-graded National Highway 18; ordinal highway.

Travel time between sightseeing and commercial spot; Cai Lan port and Hanoi at the year 2000 is 4 hours and half for the railway passengers, whilst 3 hours and 20 minutes for the highway users. Since the frequency of train operation is low, the railway passengers have to wait the next train coming for a long time and it causes inconvenience. In this sense, the road transpiration modes such as buses are more advantageous. In the year 2010, the train speed will be improved to shorten the travel time up to 3 hours, and guarantees enough competitive power against the buses.

As for the cargo transportation, it is required to guarantee a punctual operation, safety, stable operation, and the railway has an advantage against road traffic. This stands true and appropriate if the inland container depot (ICD) will be facilitated around Hanoi urban area, major destination of cargoes that the Cai Lan port handles. In this sense, some facilities of un-loading and loading, container handling facilities, telecommunication facilities etc. are indispensable to guarantee the railway's competitive power against road traffic.

In addition, the railway has its features related with the high energy efficiency, mass capacity of transport volume, high cost saving ratio, low environmental impact. These features will be more apparent when the railway rehabilitation will be completed and the road will get congested. All these factors proves the competitive capability of the railway service in this region.

Inland waterway service has a significant role in the northern regions since its is convenient to transport heavy and bulk cargoes. At present, it is specialized in coal and construction material transportation. However, it has some deficiency;

a. Water level of rivers will drastically changes by season, and the heavy rain makes it difficult to the transport the commodities. In some season, the inland waterway has to cease its services. This kind of unstable operation causes deficiency for the commercial activities.

b. There are much room to improve the access conditions to other transportation modes.

Thus, the inland waterway faces difficulties to expand its handling commodities and increase its share in cargo transportation. In terms of these stable, safe operation and access to other modes, the railway is more advantageous than the inland waterway.

Chapter 5 Management Issues

5.1 Management

There are many obstacles to be tackled to modernize the VNR. For the purpose of strengthening of managerial and financial structure, the VNR should have visions and directions which are acquired by (i) grasping accurately users' needs, (ii) taking into account of dual aspects of railway as publicity and business and (iii) recognizing the role and function of railway in transportation system. The followings are the major managerial problems to be solved and policies to cope with them.

5.1.1 Managerial Form and Organization

(1) Restructuring of Management Form

A drastic management restructure was executed January 1, 1996. An infrastructure management was transferred from the VNR to the government. These infrastructures include tracks, bridges, tunnels, signal and tele-communication facilities and stations. Then maintenance costs and depreciation of these infrastructures are burdened by the Government, and the VNR is responsible only for the service of railway operation. It results in a reduction of financial deficit of the VNR.

(2) The Characteristics of New Form

The new managerial system of the VNR has the following features;

1) The VNR can be free from a financial burden for infrastructure construction and maintenance works, and can lessen the managerial risk that leads to the bankruptcy.

2) The subject and the field of the VNR's management responsibility became clear and limited to the railway operation alone.

3) Track lease system in this new system can lessen the financial burden of the VNR compared with that of the maintenance cost for track. The VNR has to pay rental fee of track alone instead of overall infrastructure maintenance cost.

4) By transferring responsibility for raising fund of infrastructure construction to the Government, the VNR can pursuit their management efficiency by utilizing the financial saving in infrastructure construction cost.

5) The new system can contribute to be more free from the heavy burden attributable to a public service, and make the VNR can transform itself to be more flexible in seeking for a profit that can be realized only by the efficient management of operation. The VNR has to keep the railway services on the non-profitable line, but its financial burden is lessened since the cost of infrastructure construction and maintenance is not financed by the VNR.

6) By transferring infrastructure management of the railway to the Government, the VNR can concentrate its effort on the service improvement in more integrated manner, and can make all the efforts align to make the management efficient. It can also sufficiently exhibit technological characters of the which consists of the Transportation Division, the Construction Division, the Industrial Division and the Service Division.

7) The new system is well corresponding to present scale of management and technological level of the VNR.

8) The headquarters of the VNR can control each bloc, and can keep a close relationship among blocs in a integrated manner. This can contribute to flexibly correspond to the needs since this can control a supply according to a demand.

9) Three unions are kept as they are in terms of finance and organization. This can contribute to secure the unified railway transport service.

10) The new system can lessen the interference of the Government to the management of the VNR, and the VNR can keep a managerial independence even though the government control over the VNR is maintained.

11) The new system can afford to restructure of the VNR's headquarters, and can conduct the restructuring on a cost basis, which reflects price mechanism in the market.

But it is noteworthy that the new system is not complete, but has some rooms to be improved. For example, a transport service and a management are not completely free from the national control. Since the separation of transport management from expenditure for infrastructure is not possible organizationally while it is possible financially. If the VNR's management is completely independent from the infrastructure management, the VNR's burden can be considerably reduced, and it can contribute to gain more competitive power with other transport modes.

(3) Experience of Foreign Countries

There are many countries which have already separated infrastructure management from transport management. Now these examples are classified as follows:

1) Separation as a policy

The separation is carried out to realize equal footing and policy for competition in transport market mainly from view point of transport (railway) policy. This kind of separation is carried out in Sweden, England and EC.

This type of separation has a nature to be introduced into the "Open Network" which means that the track of railway would be opened to other railway company. When the track will be opened, the most important matter is who should be approved to the right to access to the network or how the charge to use the track should be decided.

In Sweden, the trunk lines and the branch lines are categorized and the branch lines were opened to the other company and the trunk lines will be planned to be opened in the near future. The ownership of infrastructure was transferred to the newly established agency, the Railway Board, and the management right of branch lines was also transferred to local autonomy. Then Swedish National Railway (SJ) was released from the obligation to continue their management.

The local autonomy will entrust the railway corporations including SJ to provide the passenger transport service, and the "Franchise Bidding" was introduced to select the corporations and then it was made possible to bid a corporation who could accept the management at the minimum cost.

The open access system was experienced not only by Sweden but by Britain and Japan. This system will be useful for the VNR in future. Now, only Transport Division can use the track, but if other corporations will operate transport service by using the track owned by the Government, Transport Division must make efforts to make the more effective management to compete with other corporations. But to open the right to access to the railway network does not always mean to privatize railway of the VNR but to change from closed conference situation to the more opened situation to competitive market oriented transport management.

2) Separation in Limited Market

The subject of ownership of track is either freight transport or passenger transport and the one of them operate the transport management by lease of the other's track.

Ex. North America : Amtrak, Canadian Passenger Transport Corporation (VIA); Japan Freight Railway Company

3) Separation for reducing burden of capital cost (avoiding management risk)

It can reduce burden of capital cost and avoid the managerial risk by separating construction of infrastructure, which takes long period to complete with huge amounts of construction cost, from the subject of transport.

Ex. Japan : Kobe Express, Kansai Express, Kyoto Express and etc.

4) Convenience oriented separation

This type of separation was introduced for the purpose of users' convenience to carry out the cross extension of different company's train operation and the improvement of transport service. This is limited in space and operation times.

Ex. Lufthansa Airport Express, Orient Express and etc.

Most of examples as mentioned above are that infrastructure is separated from train operation not only in accounting system but in organization or institution. The infrastructure of the VNR is separated from train operation only in accounting system. Judging from the examples mentioned above, the reform of organization of the VNR is categorized into mainly (a) and (c). Separating accounting system of infrastructure and train operation is applied by railways of Switzerland, Austrian Railway , Norway, Finland and etc.

(4) Improvement of Rental Fee for Railway

It will be a burden more or less for Transport Division to pay the rental fee of railway. The level of fee is very important. Now 10% of revenue must be paid to the Government. But it is not clear the theoretical basis of deciding the level of the fee. There are many examples for rental fees in foreign countries like (i) "Avoidable Costing" by Amtrak, VIA and Japan Freight Railway Company, (ii) "Imposing two kinds of charges" which are the variable charge and the fixed charge" by the National Railway of Sweden and Euro Tunnel, (iii) "Difference between revenue of fare and operating cost as toll or charge for management" by Kobe Express of Japan, (iv) "Redemption of Debts or Construction Cost" by the Public Corporation of Japan Railway Construction and Shinkansen Holding Company.

The more rational principle for deciding the level of the rental fee for track use of the VNR must be established. Whatever principle would be applied to decide the level, the view point of costing accurately for maintenance and management generated by use of track must be kept in mind.

(5) Innovation of Organization

The organizational structure of the VNR is shown in Fig. 5.1.1. It is noticeable that the VNR is a kind of conglomerate, and the business activities of which are not restricted to transport but including manufacturing, construction and service industries. This is why the VNR employs as many as 42,200 in 1995 despite the modest railway track length 2,600 km.

1) Restructure of Supporting Industries

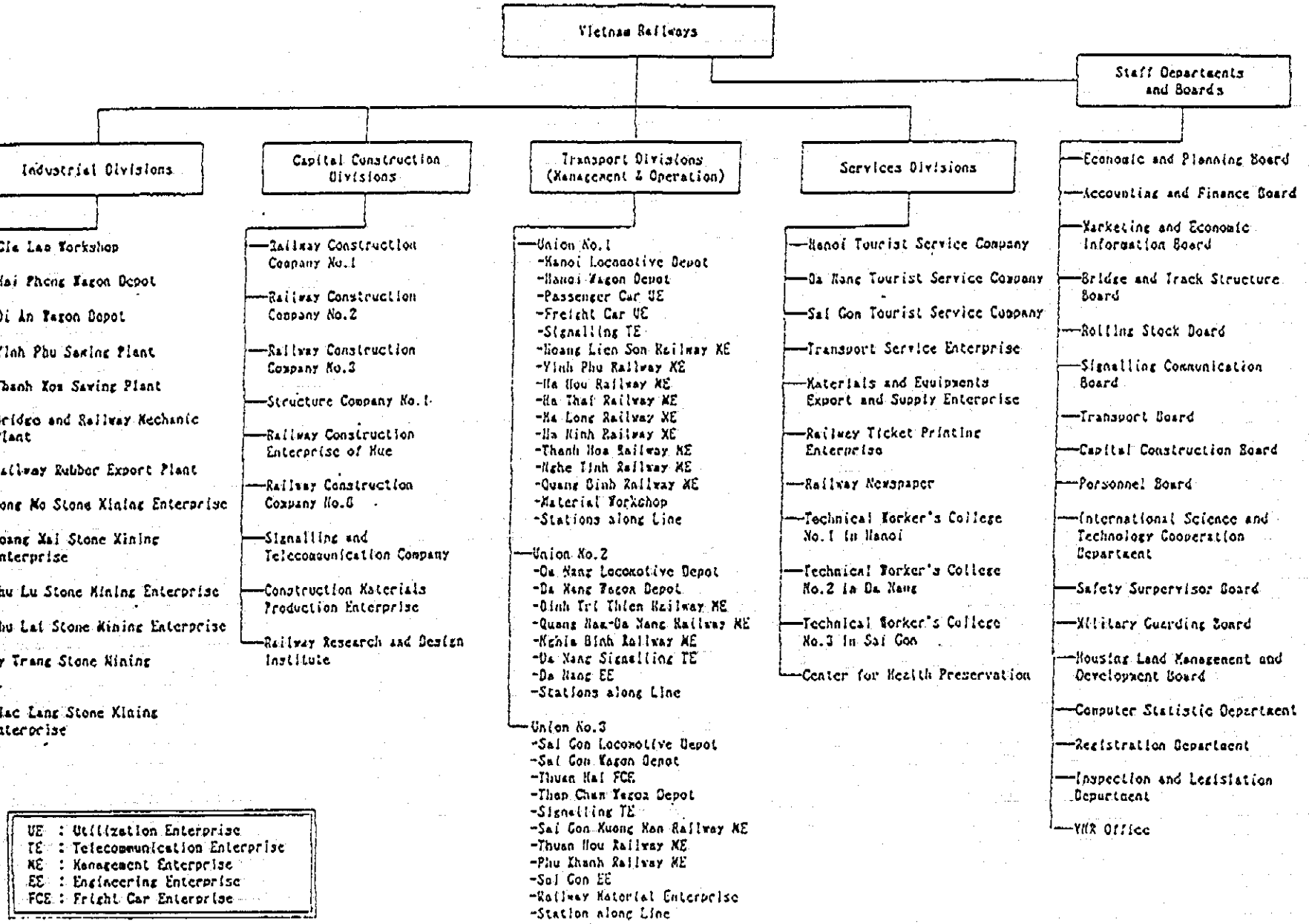
The existence of powerful supporting industries is indispensable for the VNR to fulfill its function as a business enterprise specialized in railway transportation. The construction, industry and service divisions under the VNR have conventionally played the roles as supporting industries. Although, these divisions are now more or less independent accounting units. They are still under the control of organization of the VNR. We are afraid of their losing chances and vitality for further development because of confining themselves inside the VNR family.

The purposes of restructure can be summarized as follows;

- To create employment opportunities to advance rationalization of the VNR

- To provide opportunities for the participation of private sector with capital investment, which will facilitate wider absorption of technical know-how and diversify business, particularly in the field of domestic production of railway goods and equipment

Fig. 5.1.1 Organizational Structure of VNR (1994)



We would like to propose the process of two stages to achieve these objectives;

i. The First Stage

To make the three divisions of Construction, Industry and Service independent from the VNR. They are to be incorporated respectively as state-owned companies at the first stage.

ii. The Second Stage

To rearrange the enterprise belonging to each division for assorting them into business oriented combination by function or by region. There may be many ways of rearrangement according to the actual situation: unification, abolition and etc. In this context, the development program for Gia Lam plant to high level for railway management would be regarded as a model case of the reform of organization.

2) Optimum Management Scale

The VNR is composed of three Unions which are different in the number of staffs, railway distance traffic volume and financial situation. Especially Union 1 is the biggest management scale. The optimum management unit should be searched for Union 1 on the condition that accountability of management will be evident and limited, management efficiency will be improved and the headquarters can control it well. Union 1 is composed of many lines different from each other with regard to the kinds of freight and passengers to be transported, and the roles and functions in regional economy and transportation network.

Before privatization, Japan National Railway has an experience to manage railway by line as a management unit. The control in the form of management organization by line as a unit contributed visibly and invisibly much to the management improvement of JNR. Then it is one alternative that Union 1 is managed by line as a management unit.

3) Reform of Headquarters

It is urgently necessary for the headquarters of the VNR to establish the following new departments with few staffs of high skill and strong leadership.

a. Strategic Planning Department

b. Personnel Management Department

c. Management Information Department

5.1.2 Improvement of Productivity and Rationalization

The productivity of the VNR is extremely low level in comparison with surrounding countries such as Thailand, Malaysia and etc. and it is desirable to set target of raising productivity at least up to same level with them in near future. In order to achieve this target, reduction of surplus personnel through introduction of the system of fixing the number of staffs, improvement of skill level of staff and higher intensification of works with aim of increasing transport distance per staff are keenly required. At the same time, raise of wage level and general expansion of welfare benefits for personnel of the VNR are indispensable. Because the staff of the VNR will be promoted their morale by these policies.

It is also necessary to review personnel recruitment and the effective rating system and strive to achieve the proper allocation of staff to proper section. It goes without saying to carry out strictly the reduction of surplus staff according to the Government Regulation for reduction of 10% of the VNR staffs so that the productivity might increase.

5.1.3 Modernization of Financial and Accounting System

(1) Present Situation

Existing authorized financial statements of the VNR are correspond to balance sheet and income statement except cash flow statement. These two kinds of financial statements are reported by each division. Transport Division is divided into three divisions and these three divisions are also making the two kinds of financial statements.

(2) Major Problems and Direction for Modernization

Accounting system is needed to be improved according to international standard as soon as possible. The major problems of present accounting system are as follows;

1) Income Statement

The major problem of the Income Statement is that there are two kinds of depreciation cost. One is basic depreciation cost and the other is depreciation cost of big repairs. The latter is transferred from capital accounting in which depreciation cost is divided into investment cost and big repairs. The standard method of calculation of depreciation cost is conducted according to its service life and the rate of residual value. Basic deprecation cost is assumed to be calculated by this standard method. But it not suitable that big repairs is listed as depreciation cost. Cost of repairs should be independent item of cost different from depreciation cost.

2) Balance Sheet

Accumulated depreciation cost in balance sheet is usually equal to amounts summed up of annual depreciation cost in income statement. But actual figures of accumulated depreciation cost do not always coincide with the summed up amounts of annual depreciation cost. This is only one example for non-coincidence or inconsistency of figures.

Then, the names of accounts for both financial statements are necessary to be urgently rearranged and revised according to international standard and accurate relation of figures of each account between income statement and balance sheet must be established so that non coincidence of figures will be removed. These innovations are indispensable for accurate financial and management analysis.

5.1.4 Strategic Fare Policy

By aiming at low level of fares on the basis of reduction of transportation cost by rationalization, it is necessary to construct flexible fare system to be able to compete with other modes.

(a) Passenger Fare

Raising up of passenger fare of the VNR is regulated by the Ministry of Transportation and Communication. Its present system is mixed of basic fare and special charge by class. But for the convenience of passengers, it is desirable to divide passenger fare into basic fare and charge. In competitive market, by keeping low level of basic fare, it is necessary to set up the elastic charge by take into consideration of users' willingness to pay, the income level of users and the fare level of other modes competing with railway. In monopolistic market for railway transport, the VNR can raise up the fare level but raising up fare level is not desirable for the optimum distribution of resources. But it is desirable to set flexible fare under the limit of maximum level. In this context, "Price Cap Regulation" method is very useful for setting the maximum level of fare. This method was introduced by British electric corporation and is now being studied in Japanese Railway.

The basic idea of this method is that a corporation can freely set the fare level less than the maximum rate of raising up fare which is decided by the difference between raising up ratio of consumer price index and of productivity. This method has advantage to give an incentive to a corporation to strive to make efforts for management efficiency. There seems to be regulations more or less with regard to the revision of fare level. Then for the purpose of elastic setting of

fare level, deregulation will be necessary. Needless to say, in any market situation, it is indispensable to save cost and to keep fare low level as possible.

(2) Freight Fare

The same strategy of passenger fare will be applied to the freight fare in principle. But there is a basically different fare system for freight from that of passenger. The system of freight fare of the VNR is restructured on the basis of the principle of charging "What the Traffic Will Bear" which means that the consignor of cargoes must pay their fares corresponding to the commercial value of their cargoes. Because the cargoes to be transported are classified into five categories by their commercial values. But this principle is being out of date.

Because this principle is reasonable only on the condition the transport market is monopolized by railway but actual transport market is not always monopolistic for railway but fiercely competitive with other modes. In the market monopolized by railway, consignors has no choice other than railway, then they must pay any level of fare requested by railway. Furthermore, the present fare for freight is not always coincided with the transporting cost because the fare is not decided not by the cost but by the values of cargoes.

Then the deficits generated by cargoes with low value and high cost is cross-subsidized by the profits by cargoes with high value and low cost. Then if the lower fare than cost for cargoes with low value is set up, this fare would lead to distortion of effective distribution of resources. Therefore it is desirable that the existing fare system of freight should be restructured on the basis of transporting cost or weight of cargoes and the system of fare ranges with upper and lower limit or the fare by special contracts with consignors as soon as possible.

5.1.5 Policy for Increasing Revenue

(1) Passenger

For the purpose of increasing revenue from passengers, it is required to generate traffic demand by speeding up , frequency service, raising up comfort by improvement of accommodation of passenger coach, smoothing feeder service and so on.

(2) Freight

For the purpose of increasing revenue from freights in the market of general cargoes, it is indispensable that thorough efficiency oriented devices should be applied by introducing container suitable for rail transportation, adopting pallets, positive investment of handling machines and integrating cargo stations so that the VNR would be able to overcome fierce

competition with other modes. Furthermore, it is also necessary to promote freight forwarder service to play important role for door-to-door service.

In the market of bulk cargoes, railway has advantages in transportation from inland to sea ports. Because there is no other competitive transport mode than railway with big capacity to transport bulky cargoes. But it is competing with ship from producing area near port to other area. the VNR is required to set cheaper fare than ship by thorough reduction of transportation cost and to promote container transportation by constructing inland container depots (ICD).

5.1.6 Policy for Reducing Expenditures

For the purpose of reduction for expenditures, reduction of staffs, restraint or suspension of new employment, encouragement of retirement or reallocation of staffs to other blocks as related business are considered to be urgent policies. To reduce costs of supplies, reduction of cost for repairs by rationalization aiming at maintenance free and saving cost of fuels are also needed.

5.1.7 Management Diversification

(1) Theoretical Background of Management Diversification

1) Fundamental Way of Thinking

Transportation service by railway is not completed only by railway itself but by total service including transfer to bus, various kinds of service, shopping, drinking and accommodation in stations and terminals. Furthermore, the development and sales of residential land and buildings alongside railway lines, construction of facilities for sports, recreation and cultural activities, and construction and rental service of buildings in stations and terminals will lead to promotion of use of its own company's railway and expansion of management scale. Therefore, the management diversification of railway corporation has an inevitability to increase "Value Added of Railway".

2) Organizational Structure of Management Diversification

There are two cases for organizational structure of management diversification categorized into "Internal Diversification" and "Diversification by Connection with Outside". The former is carried out by divisionalized organization or establishment of subsidiaries of which total funds are financed by the government. The latter is conducted by alliance, affiliation, grouping, subsidization by merging and merger by absorption with the same or different kinds of business.

The organizational structure of management diversification of THE VNR has both characteristics of two kinds of cases mentioned above. The VNR is striving to promote the latter case, diversification with outside, in the form of joint venture.

3) Synergy Effect

Synergy effect is a determinant for management diversification. According to H. Igor Ansoff, who wrote a book titled, "The New Corporate Strategy", 1988, synergy effect is classified into four kinds of effects as follows;

a. Sales synergy:

Common distribution route, common sales control organization, common utilization of warehouses and etc.

b. Production synergy:

Intensified use of facilities and personnel, dispersion of indirect costs, merits based on common learning curve.

c. Investment synergy:

Common utilization of plants, common warehouse of raw materials, residual effects of research and development for similar commodities, common machines and tools.

d. Management synergy:

Common character of countermeasures to tactical managerial problems.

The view point of synergy effect will be effective and important for the management diversification for the VNR.

(2) Incentives of Management Diversification

Generally the incentives of management diversification is classified into four groups as follows;

i. Removal of Instability or Uncertainty of Business Management

ii. Security of Profitability

iii. Expansion of Business and Organizational Scale

iv. Giving Company Vitality by Organizational Activation

Applying these incentives to transport business, the following incentives are expected for transport business.

i. Change of Type of Service and Expansion of Business Chance

The modern transport corporation has a nature to form network as an integrated system including transport of goods and passengers with information and has grown up to the industry producing added value not only in its main business but also in surrounding business.

ii. Promotion of Potentiality for Diversification

There are several business sectors related with transport corporation and transport corporation has become to conduct more easily management diversification than other kinds of business. Transport corporation has potential possibility to develop the related business from both aspects of hardware and software by facilitating with "network" as railway lines and "nodes" as cores

iii. Sufficient Utilization of Managerial Resources

Human, physical, financial, informational or technological resources can be listed up as managerial resources. Particularly, informational or technological resources has recently been considered to be the most important tool for marketing strategy.

(3) Present Situation of the VNR

The VNR considers that its holding many kinds of fields of business and conducting the integrated management will promote formulating strong economic groups and play the important economic role of the country. The proportion of revenue accruing from these related businesses in total revenues has increased like 5.0% in 1990, 6.0% in 1991, 6.9% in 1992 11.20% in 1993, and 8.5% in 1994. The ratio of 8.5% in 1994 is more than twice of that of the six companies of JR to be mentioned later.

Transport Division intends to continue related businesses as one policy to escape from management deficits in future as follows;

1) The buildings of stations especially in cities will be reformed to commercial and service center. Stores, restaurants and other facilities (telephone, facsimile, courtesy car services and

etc.) will be offered to customers by utilizing land and space by the VNR itself or by making lease them

2) The related service in trains to passengers will be improved: usage of telephone and facsimile connected with communication network through the country. The tourist business will be strengthened and the reservation for hotels abroad, air tickets and railway tickets will be realized.

3) By activating the factories owned by the VNR, cooperative businesses and joint ventures for production of goods for railway passengers such as lunch, or production of marketable goods and goods for export will be promoted.

4) By activating the land of which right for management is trusted by the Government, the VNR will construct hotels, commercial centers and apartment houses for foreigners by the VNR itself or by joint ventures.

(4) Experience of Foreign Countries

1) Japan

During years of the Japan National Railway (JNR), related businesses were classified into those having JNR equity investment based on the JNR Law and other ancillary businesses. The former included consignment businesses (ticket sales by agents, passenger car maintenance, and data processing services); transport related business (seaside railroads, bus terminal facilities, and warehouses and terminals for distribution); and asset-utilizing businesses (recreation facilities, advertising, and land development and utilization). The latter category consisted primarily of businesses conducted inside stations and passenger cars and the leasing of land and space under elevated railroads. The scope of these businesses gradually expanded in response to managerial environmental changes. Before restructuring, JNR had to obtain approval or permission from the Minister of Transport concerning the investment or leasing of important assets for related businesses. Also, they were subject to restrictions imposed by JNR's own internal regulations and other rules.

When the privatization process was carried out, related businesses were also divided and subsequently taken over by the six new passenger railways companies and the freight railway. Legal restrictions were considerably reduced. Some requirements remain, such as approval by the Minister of Transport for the transfer or collateralization of important assets, as due requirements to pay consideration to local medium-sized and small enterprises. Consequently, the number of subsidiaries of the six passengers railway companies climbed from about 90

before restructuring to more than 170 over the past several years. Each company is also striving to expand its related businesses. In comparison with large private railway companies, however, the proportion of revenue accruing from these businesses in total revenues is still low (in Fiscal Year 1990, 3% on average for the six passenger railway, versus 40% for the largest 15 private railways). Thus the promotion of these businesses, and the fostering of their subsidiaries, remains an important managerial theme. This proportion of six companies in FY 1994 was 3.7% showing a slight increase.

2) Canada

The Canadian National (CN) which is a sate owned railway company, was changed its managerial form to a stock company pursuing profits is a big conglomerate composed of freight transport and groups of related businesses. As for the related businesses, the real estate company is operating and manages the real estate of CN, the resources development company is developing oil and well of natural gas in Canada at the West. Furthermore, CN has many other related businesses such as Canac International Corporation (consulting and technology transfer service), AMF Techno Transport Corp. (production, reform and rehabilitation of rolling stocks) and CN Tower Corp. (observation platform, restaurant businesses and communication businesses). These related businesses are contributing to increase of revenue of CN.

(5) Future Directions of the VNR

The related business by management diversification should be considered as sources of revenue which support revenue from railway transportation as main business. It is required to make the best of use human resources (staffs as transportation specialist), physical resources (networks of transportation and telecommunication, station facilities and so on) and financial resources (capital funds).

In short-term period, the VNR should have a stress on the following businesses. Advancing into new business by positive usage of stations which have attracting power of passenger, stations are expected to induce passenger demands by synergy effects. Such new business includes information center, amusement center, hotels in front of stations and so on. Furthermore, the VNR is needed to participate into general tourism service business integrating constructing railways and hotels, coordinating trips by railway, bus and ferry , hotel reservation and so on.

5.1.8 Policy to Cope with Abolishment of Non-Profitable Lines

(1) Present Situation

Three unprofitable lines are listed up as the lines to be abolished by the VNR as follows; (i) Kep - Bai Chay (Ha Long) Line, (ii) Dong Anh - Thai Nguyen Line, (iii) Cau Giat - Nghia Dan Line. Vinh - Cua Lo Line has already been abolished. Final decision to abolish the non-profitable lines depends on the Government (The Ministry of Transportation and Telecommunication) judgment after transference of infrastructure of the VNR to the Government ownership. But the VNR is still responsible for operation and control of non-profitable lines and will continue to have managerial burden.

(2) Criteria for Abolition

1) Experience of Japan

Before privatization, JR (called "JNR " before) was established the criterion in 1981 to abolish the unprofitable local lines by assignment as the specified local lines on the basis of traffic density. The traffic density as a criterion was less "than 2,000 passengers per day and per km". 38 lines of 83 lines were remained as railways which were managed by the third sectors of 31 companies and by 2 private companies, and other 45 lines were converted to bus companies.

2) Criteria for VNR

There are very few lines to be abolished in the VNR. The decision for abolishment must be very prudently carried out according to the following criteria;

(i) Traffic Density

The minimum level of traffic density like 500 passenger/day/km. as a criterion must be set up like the experience of JR mentioned above.

(ii) Role in Transport Network

The importance of the line must be studied from the view point of the role and function of the line in total transport network including railway.

(iii) Existence of Alternative Mode

If other alternative modes like bus or private car, the railway line may be abolished.

(iv) Necessities to Local Residents

Even if other alternative modes are operated, the railway line is very convenient for daily lives of local residents, the line should not be abolished.

(v) Contribution to Regional Economy

If the line is indispensable for the economic development and it is prospective to contribute to regional economy in the shape of growth of GRDP, increase of population, the inducement of traffic demand for tourism and etc., the line must be remained.

The local lines are important factors for improvement of local welfare. Because there are many residents who are the poor, young and old, physically handicapped without any other means for transport except railway who can not afford to buy private cars, bicycles and other modes. It is indispensable to offer the railway transport service to these "the transport weak". They have rights to move by transport means. The local lines should not be easily abolished.

Then, the abolishment problems should be studied not from narrow view point of profitability of transport side but from wider view point of social welfare in the region. In other words, the management of railway are needed to be conducted in the form of total management of the region or "compound management". In this context, "public-private partnership" method which is introduced by Europe and America is very suggestive to the management of local lines of the VNR.

5.1.9 Management Information System (MIS)

(1) Restructuring of Management Organization, Institute and Regulation

Toward structure of strategic management information system, the following systems and regulations(standards) of the VNR are needed to be studied and restructured.

1) Financial and Accounting System and Regulations (Standards)
2) Fare System and Regulations (Standards)
3) Job System and Regulations (Standards)
4) Salary System and Regulations (Standards)
5) Management System and Regulations (Standards)

(2) Establishment of Management Information System

For the purpose of computer processing of management information, the new working manuals are prepared for accounting works, salary calculation, materials management, repairs management, consignors' ledger, seat reservation and so on.

The basic facilitation for information strategic management will be carried out by the following tactics;

1) Overall office automation by rationalization of manual works in the middle stage

2) Establishment of sales strategy by preparing system to cope with diversification of sales network

3) Establishment of system to support managerial strategies by setting up data base, making information for control on staffs, materials, repairs and so on and for supporting them.

5.1.10 Fostering Capable Staffs and Development of Capability

The VNR exists in a severe managerial environment. To cope with the environment, the development of capability of human resources of the VNR is the most important and urgent tasks. First of all, by training and educating the executives of the VNR, it is necessary for them to understand enough the character of market economy, to display their leadership, to establish the directions of the VNR as a public corporation and to master thoroughly modern management methodology with regard to financial control and operation. Furthermore, it is needed to strengthen the section of staff control because the strategy for staff control is closely related to restructuring of future VNR. Besides, the facilities and materials for education of existing schools are poor and the plan of a new school under construction must be reviewed because of shortage of budget. Therefore, the construction of new school or training center is urgent tasks to be tackled.