

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEPARTMENT GENERAL OF POSTS AND TELECOMMUNICATIONS (DGPT)
THE SOCIALIST REPUBLIC OF VIETNAM

THE STUDY
ON
TELECOMMUNICATIONS DEVELOPMENT
IN
THE SOCIALIST REPUBLIC OF VIETNAM

FINAL REPORT
VOLUME I
TELECOMMUNICATIONS NETWORK DEVELOPMENT

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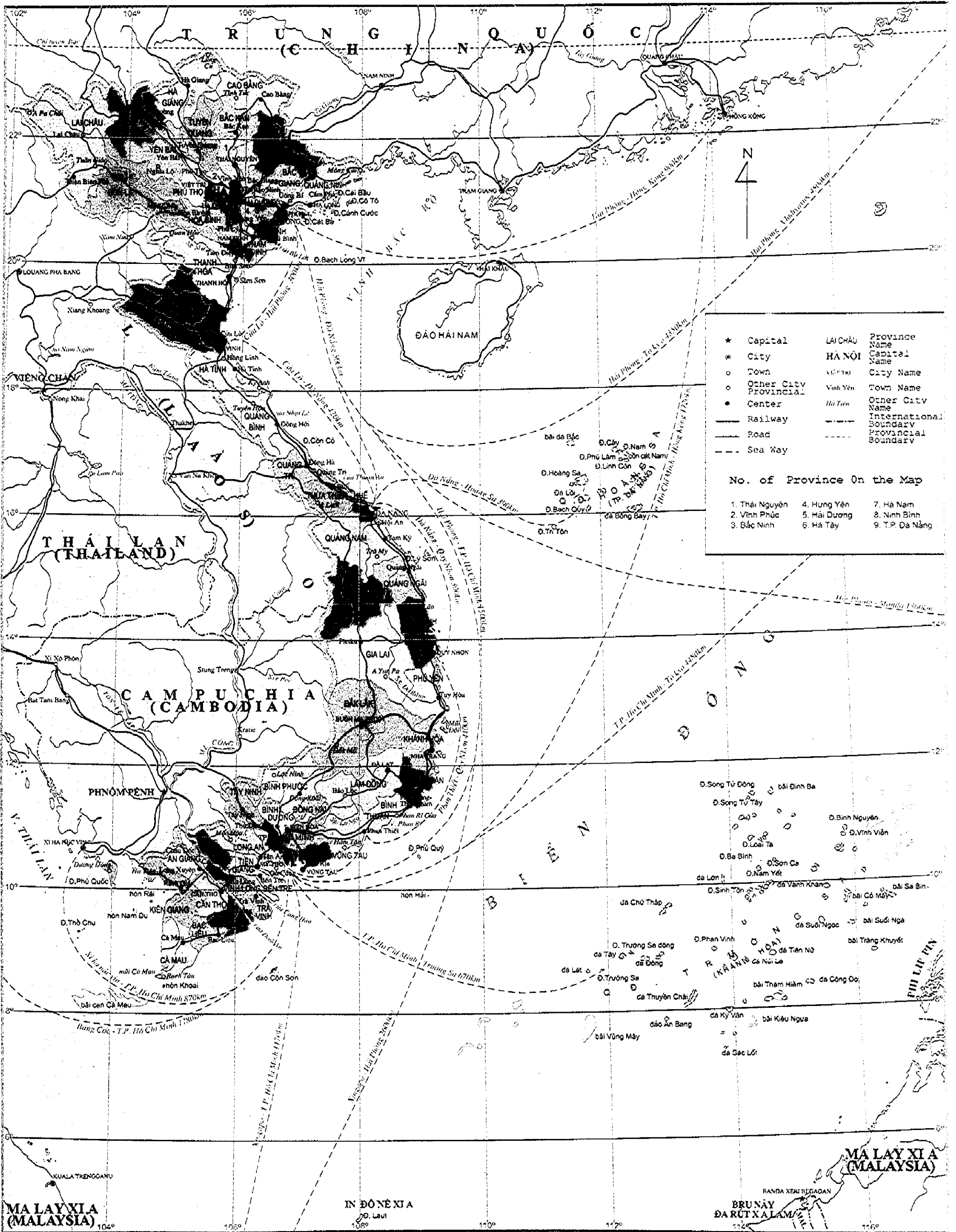
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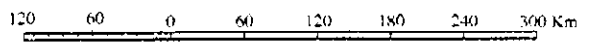


| | | |
|-------------------------|----------|------------------------|
| ★ Capital | LAI CHAU | Province Name |
| ● City | HA NOI | Capital Name |
| ○ Town | VIENTHI | City Name |
| ○ Other City Provincial | Vinh Yen | Town Name |
| ● Center | Ha Tan | Other City Name |
| — Railway | --- | International Boundary |
| — Road | --- | Provincial Boundary |
| --- Sea Way | --- | Provincial Boundary |

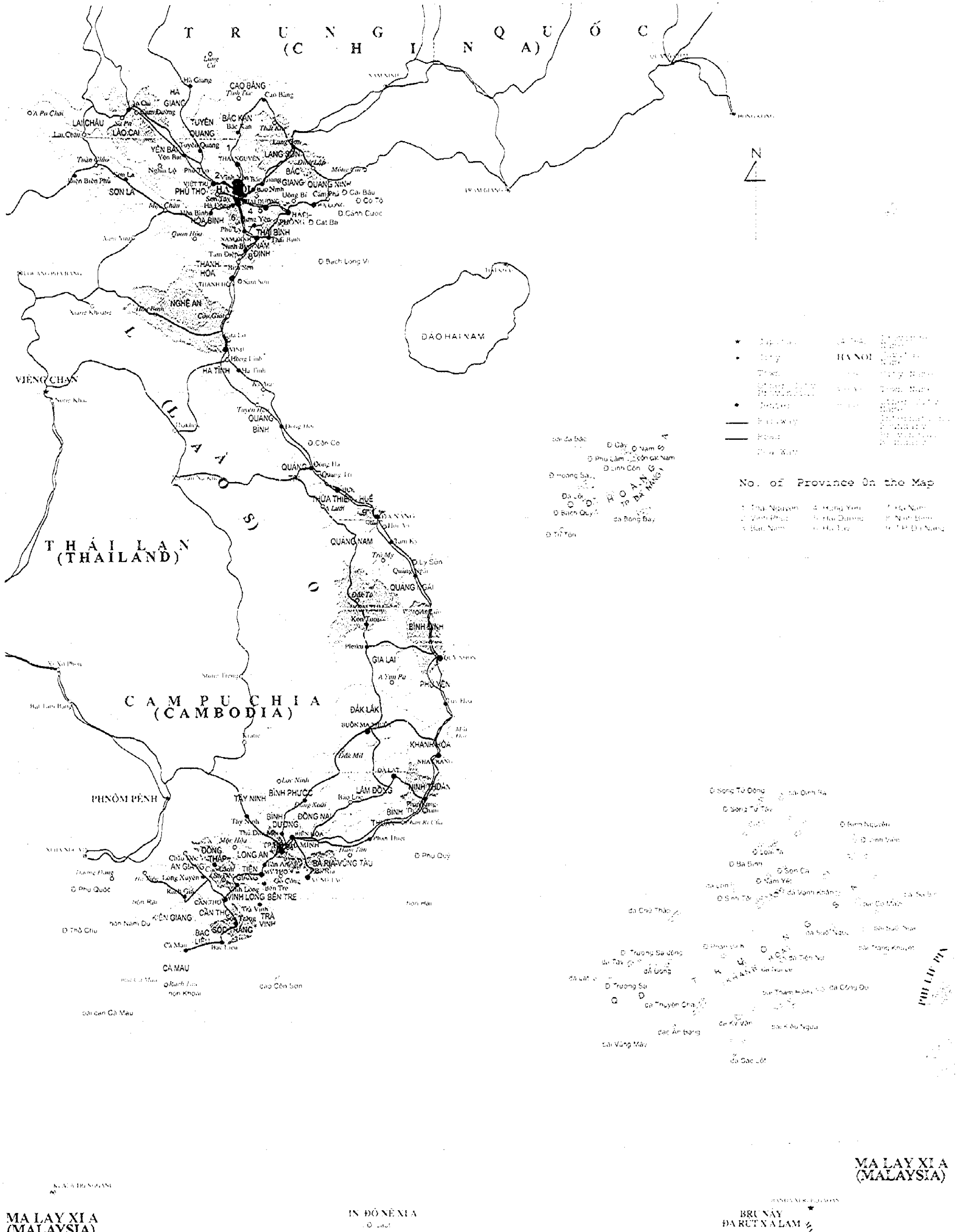
No. of Province On the Map

| | | |
|----------------|--------------|-----------------|
| 1. Thái Nguyên | 4. Hưng Yên | 7. Hà Nam |
| 2. Vĩnh Phúc | 5. Hải Dương | 8. Ninh Bình |
| 3. Bắc Ninh | 6. Hà Tây | 9. T.P. Đà Nẵng |

Scale 1:6 000 000



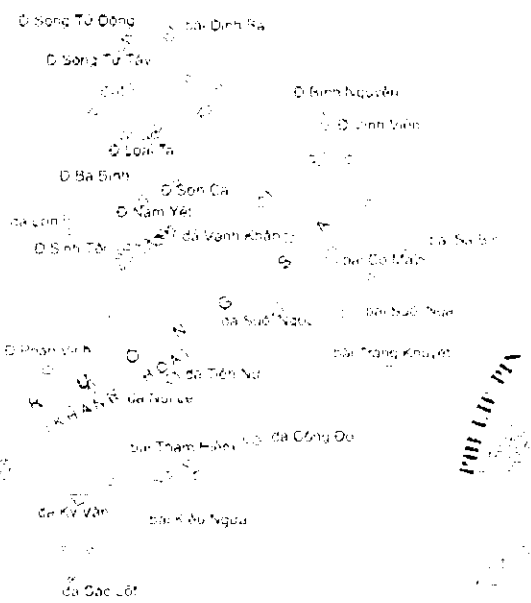
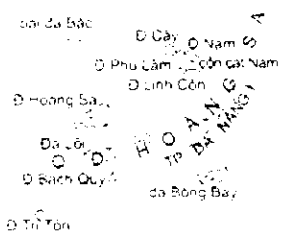
THE SOCIALIST REPUBLIC OF VIETNAM



| | | | |
|---|----------------|---|------------------|
| ★ | Department | ○ | Province Capital |
| ● | City | ○ | City |
| ○ | Town | ○ | Small Town |
| ○ | Urban District | ○ | Small Village |
| ○ | Island | ○ | Small Island |
| — | Highway | — | Small River |
| — | Road | — | Small Stream |
| — | Sea Way | — | Small Canal |

No. of Province On the Map

- | | | |
|-----------------|-------------|--------------------|
| 1. Thanh-Nghiem | 4. Hung-Yen | 7. Ha-Nam |
| 2. Vinh-Phuc | 5. Hoa-Dang | 8. Nam-Binh |
| 3. Bac-Nam | 6. Ha-Lac | 9. TP. Ho-Chi-Minh |

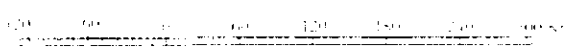


MA LAY XIA (MALAYSIA)

IN ĐÔNENIA (INDONESIA)

BRUNAY ĐARUT NALAM

Scale 1:6 000 000



PREFACE

In response to the request from the Government of the Socialist Republic of Vietnam, the Government of Japan decided to conduct a master plan study on Telecommunications Development in the Socialist Republic of Vietnam and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Shiro Tamura of NTT International Corporation to Vietnam, three times between July 1998 and June 1999. In addition, JICA set up an advisory committee headed by Mr. Takayuki Hatazoe, Deputy Director, International Cooperation Division, International Affairs Department, Ministry of Posts and Telecommunications (MPT) between July 1998 and August 1999, which examined the study from specialist and technical points of view.

The team held discussions with the officials concerned of the Government of Vietnam and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Vietnam for their close cooperation extended to the Team.

August, 1999



Kimio Fujita
President

Japan International Cooperation Agency

August 1999

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Letter of Transmittal

It is our pleasure to submit to you the study report on Telecommunications Development in the Socialist Republic of Vietnam.

This report was conducted by NTT International Corporation, under a contract to JICA, during the period of July 1998 to August 1999. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Vietnam, and formulate the most appropriate master plan up to the year 2010, covering the whole territory of Vietnam, including state management for telecommunications, network plans, operation and maintenance plan, project evaluation, and recommendations.

We wish to take this opportunity to express our deep gratitude to the officials concerned of the Japan International Cooperation Agency and other authorities concerned of the Government of Japan. We would like to express our gratitude to the officials concerned of the DGPT, VNPT and other authorities concerned of the Government of Vietnam, the JICA Vietnam Office, and the Embassy of Japan in Vietnam for their cooperation and assistance extended to the study team in connection with the execution of their duties.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



Shiro Tamura

Team Leader

Study on Telecommunications
Development in the Socialist
Republic of Vietnam

Composition of the Reports

The Final Report on Telecommunications Development Plan in the Socialist Republic of Vietnam is classified into two (2) volumes: Volume I "Telecommunications Network Development" and Volume II "Telecommunications Management".

Volume I "Telecommunications Network Development" describes main parts on the telecommunications network development, excluding a study on the state management to telecommunications out of the whole items of study that are specified in the Instruction and Guidelines as "Telecommunications Development Plan".

For the purpose of formulating the Final Report, those common and overlapping items in the Study such as current situations of Vietnam, outlook of telecommunications, setting up of target levels on the telecommunications network, selection of the priority projects, project evaluation of Master Plan, etc. are compiled in Volume I.

Therefore, Volume I involves the Telecommunications Network Development Plan and recommendations up to 2010 on the specific aspects of "Telecommunications Network Development" such as the present situations on the facilities, demand forecasting, network planning, operation and maintenance plan, and human resource development plan as well as the common items mentioned above.

In the mean time, Volume II "Telecommunications Management" covers the items and contents such as a necessary state policy in transition for a competitive market of telecommunication from monopoly markets, telecommunications industry development plan and the like, which should be handled to be independent from items of Volume I of Telecommunications Development Plan.

As a result, the Final Report of Volume II "Telecommunications Management" includes descriptions on law and regulations in Vietnam, policy of state management, telecommunications industry development, organization and management plan, spectrum management and numbering management and the related recommendations to each chapter together with targets up to the year 2010.

In this connection, each chapter of Volume II stress on the policy and management aspects in describing contents of the reports that are different from Volume I "Telecommunications Network Development, thus making it very useful for describing the each chapter much more independently and of deciphering the report more easily.

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Acronyms

A

| | |
|---------|--|
| ADM | : Add-Drop Multiplex |
| ADS | : Active Double Star |
| ADSL | : Asymmetric Digital Subscriber Line |
| AFTA | : ASEAN Free Trade Area |
| AM | : Account Management |
| AMA | : Automatic Message Accounting |
| AMPS | : Advanced Mobile Phone Service |
| AN | : Access Node |
| ANSI | : American National Standards Institute |
| AP | : Affordability Parity |
| APEC | : Asia-Pacific Economic Cooperation |
| APT | : Asia Pacific Telecommunity |
| ARPANET | : Advanced Research Program Agency Network |
| ASEAN | : Association of South-East Asian Nations Conference |
| ASTAP | : Asia-Pacific Telecommunity Standardization Program |
| ATC | : Army Telecommunications Company |
| ATM | : Asynchronous Transfer Mode |
| AUC | : Authentication Center |

B

| | |
|--------|--|
| BCC | : Business Cooperation Contract |
| B-ISDN | : Broad-band Integrated Services Digital Network |
| BOT | : Build, Operate and Transfer |
| BRI | : Basic Rate Interface |
| BSC | : Base Station Controller |
| BSMS | : Base Site Management System |
| BTS | : Base Transceiver Station |

C

| | |
|----------|---|
| CAD | : Computer Aided Design |
| CAGR | : Compounded Annual Growth Rate |
| CAP | : Carrierless Amplitude/Phase modulation |
| CAPEX | : Capital Expenditure |
| CATV | : Cable Television |
| CBO | : Congressional Budget Office |
| CBR | : Constant Bit Rate |
| CC | : Country Code |
| CCR | : Call Completion Rate |
| CDMA | : Code Division Multiple Access |
| CDR | : Call Data Recording |
| CIC | : Carrier Identification Code |
| CIF | : Cost, Insurance and Freight |
| CIETECO | : Vietnam Telecommunication Equipment Co. |
| CKEY | : Central Key Economic Region |
| CLR | : Circuit Loudness Rating |
| CMTS | : Cellular Mobile Telephone Service |
| COKYVINA | : Post and Telecommunications Equipment Import-Export Service Corporation |
| CPE | : Customer Premises Equipment |
| CPI | : Consumer Price Index |

| | |
|----------|---|
| CR | : Calling Rate |
| CRE | : Corrected Reference Equivalent |
| CSS | : Customer Service System |
| CTC | : Community Teleservice Centers |
| D | |
| DACOM | : Data Communications Corporation of Korea |
| DAMA | : Demand Assigned Multiple Access |
| D-AMPS | : Digital AMPS |
| DAN | : Da Nang Earth Station |
| DCF | : Discounted Cash Flow |
| DCN | : Data Communications Network |
| DEURAS | : Detect Unlicensed Radio Stations |
| DGPT | : Department General of Posts and Telecommunications of Socialist Republic of Vietnam |
| DLC | : Digital Loop Carrier |
| DMT | : Discrete Multi-Tone |
| DNC | : Destination Network Code |
| DOTC | : Department of Transportation and Communications |
| DP | : Distribution Point |
| DRMASS | : Digital Radio Multiple Access Subscriber System |
| E | |
| EC | : Electronic Commerce |
| EIRR | : Economic Internal Rate of Return |
| EPZ | : Export Processing Zone |
| ERMES | : European Radio Message System |
| ES | : Errored Second |
| ESR | : Errored Second Ratio |
| ETSI | : European Telecommunications Standards Institute |
| ETSIP | : Electronics and Telecommunications Standards Institute of the Philippines |
| F | |
| FCC | : Federal Communications Commission of the United States of America |
| FDI | : Foreign Direct Investment |
| FIRR | : Financial Internal Rate of Return |
| FLEX | : FLEXible paging system |
| FM | : Facilities Management |
| FOB | : Free on Board |
| FPT | : Financing and Promoting Technology |
| FR | : Frame Relay |
| FRB | : Federal Reserve Board |
| FTP | : File Transfer Protocol |
| FTTB | : Fiber-To-The-Building |
| FTTC | : Fiber-To-The-Curve |
| FTTCab | : Fiber-To-The-Cabinet |
| FTTH | : Fiber-To-The-Home |
| FTTZ | : Fiber-To-The-Zone |
| FY | : Fiscal Year |
| G | |
| GDP | : Gross Domestic Product |
| GMDSS | : Global Maritime Distress and Safety System |

GMPCS : Global Mobile Personal Communications System by Satellite
 GNP : Gross National Product
 GOJ : Government of Japan
 GOS : Grade of Service
 GOV : Government of Vietnam
 GPC : GSM, Paging and Card
 GSM : Global System for Mobile Communications
 GW : Gateway

H

HAN-1A : Standard-A earth station in Ha Noi
 HCD : Home Country Direct
 HDSL : High-bit-rate Digital Subscriber Line
 HDTV : High Definition Television
 HF : High Frequency
 HLR : Home Location Register
 HRD : Human Resource Development
 HRX : Hypothetical Reference Configuration
 HSD : High Speed Digital Transmission Service

I

IAP : Internet Access Provider
 ICP : Internet Content Provider
 IDC : Insulation Displacement Contact
 IDD : International Direct Dialing
 IJ : Internet Initiative Japan
 IMF : International Monetary Fund
 IMT-2000 : International Mobile Telecommunications 2000
 IN : Intelligent Network
 INMARSAT : the International MARitime SATellite service
 INS : Information Network System
 INTERIX : Internet Index
 IOR : Indian Ocean Region
 IP : Internet Protocol
 IPLC : International Private Leased Circuit
 IRR : Internal Rate of Return
 IRU : Indefeasible Right of User
 ISC : International Switching Center
 ISDN : Integrated Services Digital Network
 ISP : Internet Service Provider
 ISTCC : Indonesia Singapore Technical Coordination Committee
 ISUP : ISDN User Part
 IT : Information Technology
 ITC : International Telecommunications Center
 ITS : Integrated Transceiver System
 ITSP : Internet Telephony Service Provider
 ITU : International Telecommunications Union
 ITU-T : International Telecommunications Union Telecommunications Standardization Sector
 IZ : Industrial Zone

J

J/V : Joint Venture
JICA : Japan International Cooperation Agency
JTM : Jabatan Telekom Malaysia (Department of Telecommunications Malaysia)

K

KEY : Key Economic Region
KII : Korean Information Infrastructure
KT : Korean Telecom

L

LAN : Local Area Network
LDC : Less Developed Country
LE : Local Exchange
LEO : Low Earth Orbit
LES : Land Earth Station
LESO : Land Earth Station Operator
LLDC : Least among Less Developed Country
LR : Loudness Rating
LS : Lotus Station
LTM : Local Tandem Switch

M

MC : Maintenance Center
MD : Mediation Device
MDF : Main Distribution Frame
MEO : Medium Earth Orbit
MIC : Ministry of Information and Communications
MMAC : Multimedia Mobile Access Communication system
MOBIX : Mobile Index
MPI : Ministry of Planning and Investment (Vietnam)
MPT : Ministry of Posts and Telecommunications (Japan)
MRA : Mutual Recognition Arrangement on Conformity Assessment for Telecommunications Equipment
MRI : Mitsubishi Research Institute
MS : Mobile Station
MS : Multiplex Section
MSC : Mobile service Switching Center
MSDN : Multi Service Data Network
MSS : Mobile Satellite System
MSU : Main Switch Unit
MSU : Multi Subscriber Unit
MT : Mini Terminal
MTBF : Mean Time Between Failure
MTP : Message Transfer Part
MW : Microwave System

N

NCC : New Common Carrier
NDC : National Destination Code
NE : Network Element
NII : National Information Infrastructure
N-ISDN : Narrow-band Integrated Services Digital Network

| | |
|-----------|---|
| NKEY | : Northern Key Economic Region |
| NMF | : Network Management Forum |
| NMS | : Network Management System |
| NPV | : Net Present Value |
| NTC | : National Telecommunications Commission |
| NTT | : Nippon Telegraph and Telephone Corporation |
| NTTI | : NTT International Corporation |
| O | |
| OAM | : Operation, Administration and Maintenance |
| OAN | : Optical Access Network |
| ODA | : Official Development Assistance |
| ODF | : Optical Distribution Frame |
| OECD | : Organization of Economic Cooperation Development |
| OFC | : Optical Fiber Cable System |
| OLR | : Overall Loudness Rating |
| OLT | : Optical Line Termination |
| OMC | : Operation and Maintenance Center |
| ONT | : Optical Network Termination |
| ONU | : Optical Network Unit |
| OPEX | : Operating Expenditure |
| OPMC | : Outside Plant Management Center |
| OPS | : Optical Power Splitter |
| OS | : Operation System |
| OSI | : Open System Interconnection |
| OSP | : Outside Plant |
| P | |
| P & T | : Posts and Telecommunications |
| PARTNER | : Productive and Reliable Telecommunications Network for Radio Stations |
| PBX | : Private Branch Exchange |
| PC | : Personal Computer |
| PC | : Primary Center |
| PCMC | : Postal Construction Material Company |
| PCO | : Public Call Office |
| PCS | : Personal Communications Service (System) |
| PDC | : Personal Digital Cellular |
| PDCA | : Plan, Do, Check, Action |
| PDH | : Plesiochronous Digital Hierarchy |
| PDS | : Passive Double Star |
| PHS | : Personal Handyphone System |
| PIP | : Public Investment Program |
| PLMN | : Public Land Mobile Network |
| POCSAG | : Post Office Code Standardization Advisory Group |
| POI | : Point Of Interface |
| PON | : Passive Optical Network |
| POR | : Pacific Ocean Region |
| POTMASCO2 | : Posts and Telecommunications Material Supply Company 2 |
| POTS | : Plain Old Telephone Service |
| PRC | : Primary Reference Clock |
| PRI | : Primary Rate Interface |

| | |
|---------------|---|
| PSDN | : Public Service Data Network |
| PSPDN | : Public Switched Packet Data Network |
| PSTN | : Public Switched Telephone Network |
| PID | : Post and Telegraph Department |
| PTIT | : Posts and Telecommunications Institute of Technology |
| PTO | : Post and Telecommunications Organization |
| PVC | : Permanent Virtual Circuit |
| Q | |
| QA | : Q Adapter |
| QOS | : Quality Of Service |
| R | |
| RB | : Radiocommunication Bureau |
| RE | : Reference Equivalent |
| RFD | : Radio Frequency Department |
| RGDP | : Regional Gross Domestic Product |
| RLR | : Receive Loudness Rating |
| RR | : Radio Regulations |
| RSU | : Remote Subscriber Unit |
| RU | : Repeater Unit |
| S | |
| SACOM | : Telecom Material & Cable Factory |
| SAIGON POSTEL | : Saigon Posts and Telecommunications Service Corporation |
| SASE | : Stand Alone Synchronization Equipment |
| SBE | : Standard-A earth station in Song Be City |
| SBV | : The State Bank of Vietnam |
| SCF | : Standard Conversion Factor |
| SCM | : Supply Chain Management |
| SCPC | : Single Channel Per Carrier |
| SCR | : Successful Call Rate |
| SDC | : Software Development Company |
| SDH | : Synchronous Digital Hierarchy |
| SDM | : Space Division Multiplexing |
| SDSL | : Symmetric Digital Subscriber Line |
| SE | : Secondary Center |
| SEA-ME-WE3 | : South East Asia-Middle East-Western Europe Fiber Optical Submarine Cable Phase 3 |
| SES | : Severely Errored Second |
| SESR | : Severely Errored Second Ratio |
| SKEY | : Southern Key Economic Region |
| SLA | : Service Level Agreement |
| SLR | : Send Loudness Rating |
| SMDS | : Switched Megabit Data Service |
| SMW3 | : SEA-ME-WE3 |
| SN | : Subscriber Number |
| SO | : Service Order |
| SOE | : State Owned Enterprise |
| SOHO | : Small Office / Home Office |
| SONET | : Synchronous Optical NETWORK |
| SS7 | : Signaling System No.7 |

| | |
|------------|---|
| SSU | : Single Subscriber Unit |
| SSU | : Synchronization Supply Unit |
| ST | : Singapore Telecommunications Pte. Ltd. |
| STM | : Synchronous Transfer Mode |
| STP | : Signal Transfer Point |
| STP | : Switched Transit Plan |
| STS | : Site Transmission System |
| SU | : Subscriber Unit |
| SUS | : Site Utility System |
| T | |
| TAS | : Telecom Authority of Singapore |
| TCM | : Time Compression Multiplexing |
| TCU | : TDM Control Unit |
| TDM | : Tandem |
| TDMA | : Time Division Multiple Access |
| TM | : Telekom Malaysia Sdn. Bhd. |
| TMN | : Telecommunications Management Network |
| TOK | : Test OK |
| TTA | : Telecommunications Technology Association |
| TTC | : Telecommunication Technology Committee |
| T-V-H | : Thai-Vietnam-Hong Kong Fiber Optical Submarine Cable |
| U | |
| UHF | : Ultra High Frequency |
| UNDP | : United Nations Development Program |
| UR | : Unavailability Ratio |
| USD | : United States Dollar |
| V | |
| V.A.T. | : Value Added Tax |
| VBR | : Variable Bit Rate |
| VDC | : Vietnam Data Communication Company |
| VDSL | : Very high-bit-rate Digital Subscriber Line |
| VDU | : Visual Display Unit |
| VHF | : Very High Frequency |
| VIETEL | : Military Electronic and Telecommunications Company |
| VINAMARINE | : Vietnam Maritime Bureau |
| VINSAT | : Vietnam Telecommunications Satellite |
| VISHIPEL | : Vietnam Maritime Communications and Electronics Company |
| VLR | : Visitors' Location Register |
| VMS | : Vietnam Mobile Service |
| VND | : Vietnam Dong (Currency Unit) |
| VNPT | : Viet Nam Posts and Telecommunications |
| VOD | : Video On Demand |
| VoIP | : Voice-over-IP-networks |
| VPN | : Virtual Private Network |
| VSAT | : Very Small Aperture Terminals |
| VTI | : Vietnam Telecom International Company |
| VTN | : Vietnam Telecom National Company |
| W | |
| WAC | : WLL Access Controller |

| | |
|----------|---|
| W-CDMA | : Wide-band Code Division Multiple Access |
| WCS | : WLL Cell Station |
| WDM | : Wavelength Division Multiplexing |
| WLL | : Wireless Local Loop |
| WRC | : World Radiocommunication Conference |
| WS | : Work Station |
| WSU | : WLL Subscriber Unit |
| WTO | : World Trade Organization |
| WTX | : Wireless Telephone Exchange |
| WWW | : World Wide Web |
| X | |
| xDSL | : Digital Subscriber Line |

CHAPTER 1

INTRODUCTION



CHAPTER 1 INTRODUCTION

1.1 General

This Report describes a telecommunications development plan up to 2010 and a proposal or orientation to 2020 for the Study on Telecommunications Development in the Socialist Republic of Vietnam.

The Report consists of the followings:

- (1) VOLUME I :Telecommunications Network Development
- (2) VOLUME II :Telecommunications Management
- (3) VOLUME III :Supporting for Master Plan (Appendix)
- (4) FINAL REPORT SUMMARY

The Study has been carried out in accordance with the work plan and schedule of the study which were discussed and agreed upon between Department General of Posts and Telecommunications of Vietnam (DGPT) and Japan International Cooperation Agency (JICA). The study work has been done both in Vietnam and in Japan.

1.2 Background of the Study

As is well known, Vietnam introduced the "Doi Moi (Reform)" policy for the first time in 1986 for the purpose of recovering and normalizing the economy quickly. The main features of the policy consist in establishing a market economy and invitation of foreign capital and technology to Vietnam.

The Vietnamese Government has worked out the development plan towards 2010 and 2020 in accordance with the main objectives of the policy by promoting the industrialization and modernization process in Vietnam. By the year 2020, Vietnam will become an industrialized country.

Since the introduction of the "Doi Moi" policy, Vietnam has made an effort to remarkably increase the growth in social and economic activities with a higher development rate of Gross Domestic Product (GDP) / Gross National Product (GNP). For this purpose, the Vietnam government has been putting much more emphasis in the national development policy on the construction of an adequate, efficient and reliable infrastructure.

In accordance with this, the Vietnamese Government has put a higher priority on

telecommunications development, because the telecommunications play an important role in providing diversified and copious services to comply with all demands of socio-economic development of the country.

So far as the telephone service is concerned, the number of the telephone subscriber lines accounts for 1,398,000 lines as of the end of 1997; the increase ratio between 1990 and 1997 is almost 12 times over eight (8) years from 122,000 lines in 1990 to 1,532,055 lines (including 134,050 mobile phones) in 1997. Telephone density has increased from 0.2 to 2.01 telephones per 100 inhabitants (1.83 as for fixed phone, 0.18 as for mobile phone). This penetration rate, however, is rather low as compared with even the average rate in Asia/Pacific of which the ratio is about 6.2.

Under these circumstances, the Vietnam Government has set up a development target to aim at increasing the density to 4 telephone lines per 100 inhabitants by the year 2000. To achieve the target, it is very important to take into account the following confronting problems: (1) insufficient penetration to rural areas of telephone services, (2) some difficulty in getting access to the remote areas, (3) the difficulty of securing necessary funds for expansion programs, (4) the recent Asian economic crisis, and (5) as yet insufficient human resource development.

In order to cope with the above-mentioned problems, a long-term telecommunications development plan (Master Plan) based on a viable strategy is essential. This Plan covers telecommunications development up to the year 2010 and will proceed line with the General Development Plan for socio-economic development plan of the country and the latest directions in policy, management and telecommunications circumstances. This telecommunications master plan also involves a planning framework of reliable telecommunications network structuring, technology development, telecommunications industry development, and human resource development suitable for the 21st Century.

1.3 Objectives of the Study

The objectives of the Study are:

- (1) to formulate a master plan for the development of telecommunications in Vietnam up to the year 2010
- (2) to pursue the technology transfer (including methodology, know-how for formulating the master plan) to the counterparts of Vietnam in the course of the Study.

1.4 Scope of the Study

In order to achieve the objectives mentioned above, the Study shall cover the following items:

- (1) **Basic Study**
 - (a) Collection of existing data and information
 - (b) Field survey

- (2) **Analysis and Evaluation**
 - (a) Analysis and evaluation of social and economic development
 - (b) Trends of the introduction of new technologies, new telecommunications services (ISDN, Internet etc.) and telecommunications environments
 - (c) Forecast method – Demand and traffic forecasts
 - (d) Planning framework (target year, planning area, service level)

- (3) **Formulation of the Master Plan**

For the Telecommunications Network Development

 - (a) Organization and institutional plan
 - (b) Telecommunications network plan
 - (c) Telecommunications facilities plan
 - (d) Operation and maintenance plan
 - (e) Human resource development plan
 - (f) Cost estimation and financial plan
 - (g) Project evaluation
 - (h) Phased implementation plan (year 2000, year 2005, year 2010)
 - (i) List of investment projects
 - (j) Recommendations and measures for implementation of master plan
 - (k) Orientation for the development of the Vietnamese Telecommunications to the year 2020

For the Telecommunications Management

 - (a) State management to telecommunications
 - (b) Telecommunications industry development
 - (c) Organization and institution
 - (d) Spectrum management
 - (e) Numbering management

1.5 Organization of the Study Team

The Study has been carried out by the Study Team dispatched by JICA in close cooperation with counterparts of DGPT and VNPT.

For the smooth implementation of the study, a joint organization for the Study has been established in Vietnamese side as well as in Japanese side at the beginning of the First Work in Vietnam for the Study. The organizational composition is shown in Figure 1.5-1.

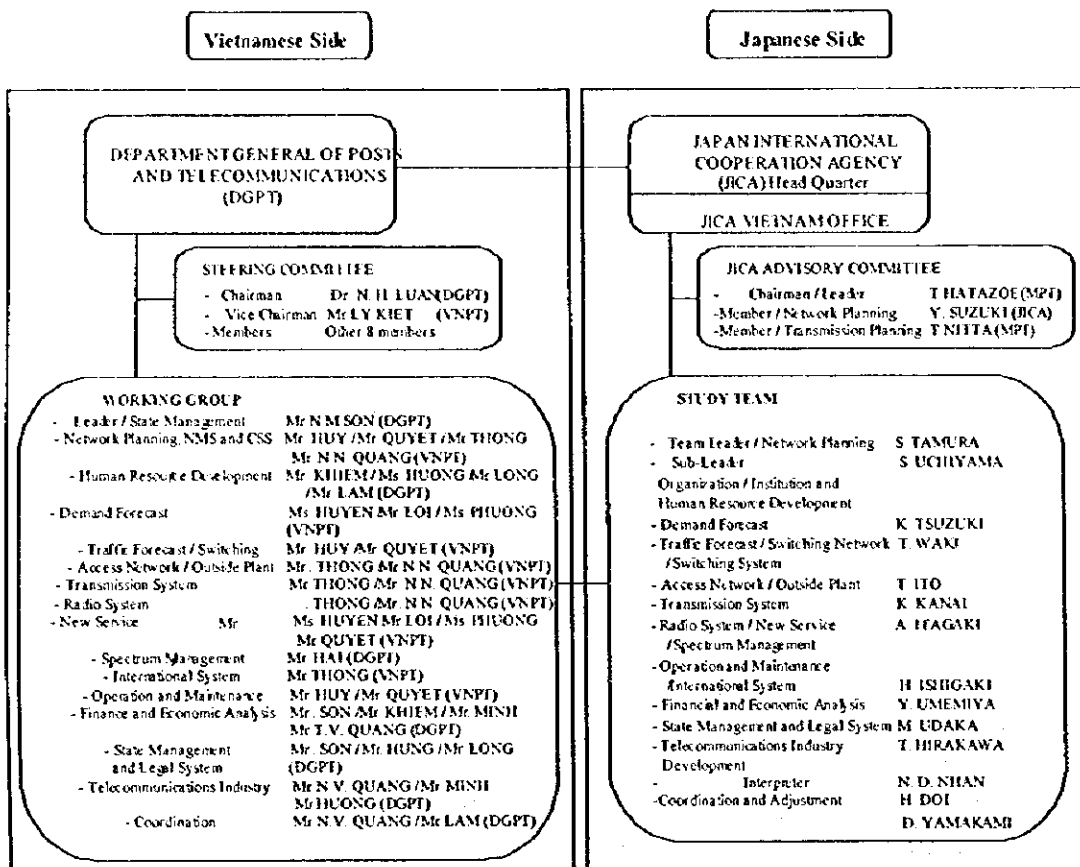


Figure 1.5-1 Formation of the Study

(1) JICA Study Team

The name and duty of the Study Team members are shown in Table 1.5-1.

Table 1.5-1 JICA Study Team

| Name | Duty in Charge |
|-----------------------|--|
| Mr. Shiro TAMURA | Team Leader / Network Planning |
| Mr. Suzuo UCHIYAMA | Sub-Leader / Organization / Institution and Human Resource Development |
| Mr. Kazuyuki TSUZUKI | Demand Forecast |
| Mr. Toshihiro WAKI | Traffic Forecast / Switching Network / Switching System |
| Mr. Tsuneo ITO | Access network / Outside Plant |
| Mr. Kuniomi KANAI | Transmission System |
| Mr. Akira ITAGAKI | Radio System / New Services |
| Mr. Hideaki ISHIGAKI | Operation and Maintenance / International System |
| Mr. Yasushi UMEMIYA | Financial and Economic Analysis |
| Mr. Mamoru UDAKA | Management and Legal System |
| Mr. Teruhide HIRAKAWA | Telecommunications Industry Development |
| Mr. Nguyen Duc NHAN | Interpreter |
| Mr. Hisaaki DOI | Coordination and Adjustment |
| Mr. Dai YAMAKAMI | Coordination and Adjustment |

(2) JICA Advisory Committee

The JICA Advisory Committee provides the Study Team with advice for implementing the Study. The member of the committee is shown in Table 1.5-2.

Table 1.5-2 JICA Advisory Committee

| Name | Duty in Charge | Affiliated to |
|----------------------|--------------------------------------|--|
| Mr. Takayuki HATAZOE | Chairman (Leader) | Deputy Director, International Cooperation Division, International Affairs Department, Ministry of Posts and Telecommunications (MPT) |
| Mr. Yasuo SUZUKI | Member (Network Planning) | Development Specialist in Telecommunication, Japan International Cooperation Agency (JICA) |
| Mr. Takao NITTA | Member (Transmission Planning) | Deputy Director, Land Mobile Communications Division, Radio Department, Ministry of Posts and Telecommunications (MPT) |

(3) Counterpart Team (Working Group)

The DGPT acts as the counterpart agency to the Study Team and assigned counterparts who are responsible for each duty of the Study as shown in Table 1.5-3.

Table 1.5-3 Counterpart Team (Working Group)

| Duty in Charge | Name | Affiliated to |
|--------------------------------------|--|----------------------|
| Chairman (Leader) | Mr. Nguyen Minh SON | DGPT |
| Network Planning | Mr. Vu Gia HUY Mr. Do Manh QUYET Mr. Trinh THONG | VNPT |
| NMS and CSS | Mr. Nguyen Ngoc QUANG | VNPT |
| Human Resource Development | Mr. Pham Hong KHIEM Ms. Tran Cam HUONG Mr. Nguyen Xuan LAM | DGPT |
| Demand Forecast | Ms. Nguyen Minh HUYEN Mr. Du Duc LOI Ms. Le Xuan PHUONG | VNPT |
| Traffic Forecast / Switching | Mr. Vu Gia HUY Mr. Do Manh QUYET | VNPT |
| Access Network / Outside Plant | Mr. Nguyen Ngoc QUANG | VNPT |
| Transmission System | Mr. Trinh THONG Mr. Nguyen Ngoc QUANG | VNPT |
| Radio System | Mr. Trinh THONG Mr. Nguyen Ngoc QUANG | VNPT |
| New Service / Spectrum Management | Ms. Nguyen Minh HUYEN Mr. Pham Thanh HAI | VNPT DGPT |
| State Management | Mr. Thieu Minh Long | DGPT |
| Telecommunications Industry | Mr. Nguyen Van Quang | DGPT |
| International Telecommunications | Mr. Trinh THONG | VNPT |
| Operation and Maintenance | Mr. Vu Gia HUY Mr. Do Manh QUYET | VNPT |
| Finance and Economic Analysis | Ms. Nguyen Hong Van Mr. Truong Vinh QUANG Mr. Nguyen Cong MINH | DGPT VNPT VNPT |

1.6 Progress of the Study

1.6.1 General

The main purpose of this Study work consists in the preparation of the Final Report that should include the overall progress results in the following stages:

- First Work in Vietnam : from 16th July 1998 to 24th October 1998
- First Work in Japan : from 26th October 1998 to 6th December 1998
- Second Work in Vietnam : from 7th December 1998 to 13th February 1999
- Second Work in Japan : from 15th February 1999 to 28th March
- Third Work in Vietnam : from 14th June 1999 to 24th June 1999
- Third Work in Japan : from 13th August 1999 to 27th August of 1999.

The overall progress in study works is illustrated in Figure 1.6.1-1.

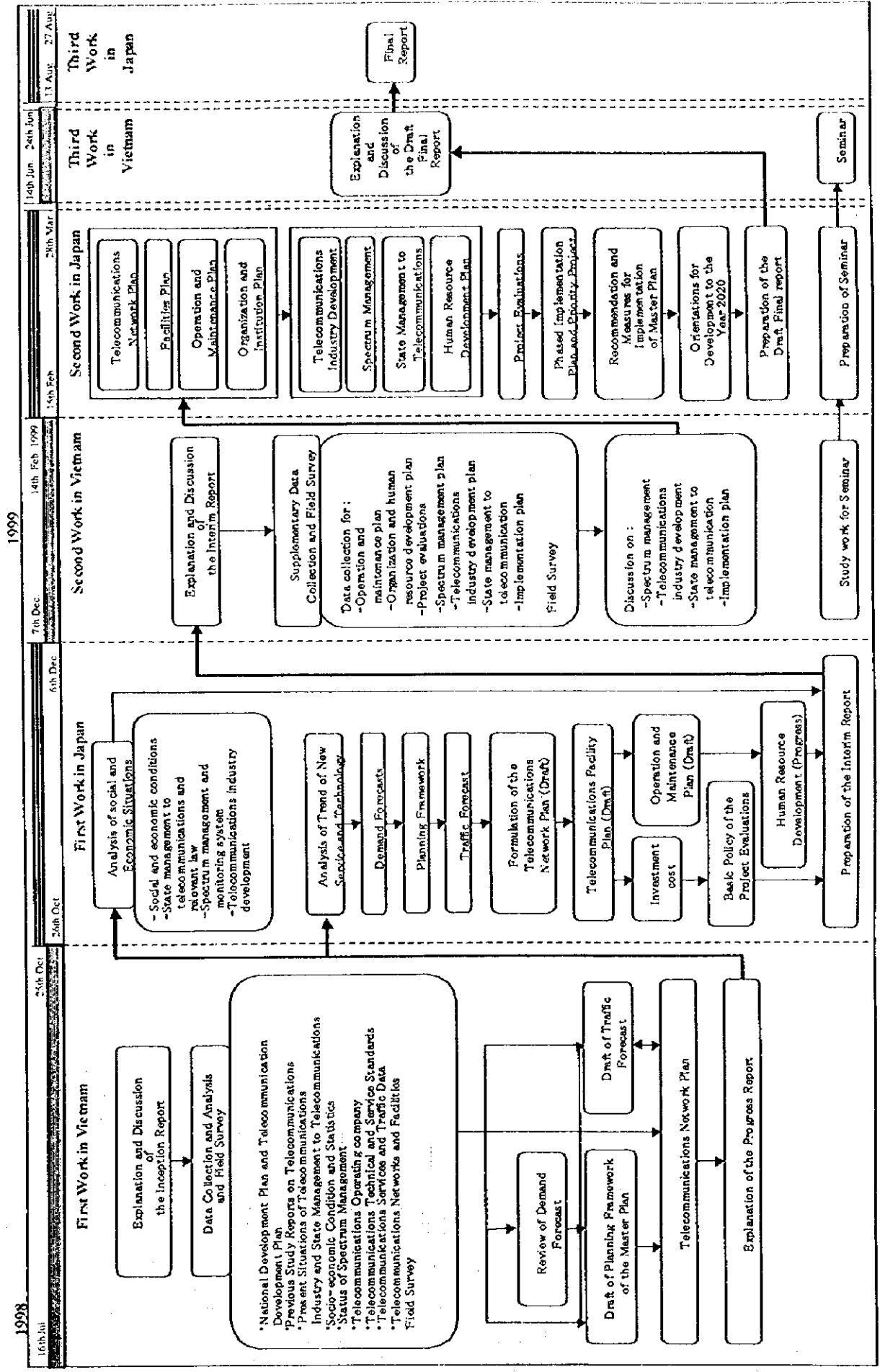


Figure 1.6.1-1 Overall Progress Results of the Study Work

1.6.2 Major Items of the Report

The major items of the Report are as follows:

Volume I : Telecommunications Network Development

- (1) Introduction-Background and Objectives of the Study
- (2) Socio-Economic Overview
- (3) Outlook of Telecommunications sector
- (4) Fundamental Technical Plan
- (5) Current Status of Telecommunications Facilities
- (6) International Telecommunications
- (7) Demand Forecast
- (8) Traffic Forecast
- (9) Formation of Development Indicators (Development Frame Work and Strategy)
- (10) Telecommunications Network Plans
- (11) Facilities Plan
- (12) Operation and Maintenance Plan
- (13) Human Resource Development Plan
- (14) Project Evaluation
- (15) Priority Project
- (16) Recommendation for Network Development

Volume II : Telecommunications Management

- (1) State Management for Telecommunications
- Regulations and Policies toward Competitive Telecommunications Market -
- (2) Telecommunications Industry Development
- (3) Institution and Organization Plan
- (4) Spectrum Management
- (5) Numbering Management

CHAPTER 2

SOCIO-ECONOMIC OVERVIEW



CHAPTER 2 SOCIO-ECONOMIC OVERVIEW

2.1 Socio-Economic Situation

In 1995, Socialist Republic of Vietnam has joined ASEAN as a member country. Vietnam is located at the center of ASEAN geographically. The S-shaped country faces the East China Sea with 3,260Km-long coastal line, and has the border with People's Republic of China to the North and Laos and Cambodia to the West. Meteorological conditions of the country are varied from tropical weather in the South to the subtropical one, which provides the variety of agricultural products. The country, however, is quite mountainous with the area of 75% out of the total area.

The total area of the country is 332,000 square Km with total population of 76.9 million (as of the end of 1998), which is the second largest among ASEAN countries next to Republic of Indonesia. The country is also rich with natural resources such as iron ore, lead, tin, coal, rare metals and others.

Thus, the country has quite potentiality of economic growth in ASEAN. The War for independence from France and, successively, the American War forced the country to be under the wartime economy for nearly 50 years. After the unification in 1975, the country has sought for reconstruction of the war-damaged economy and economic growth under the socialistic economic system. In 1991, the Union of Soviet Socialist Republics had fallen down, and the country has been obliged to open its economy to neighboring countries and to the Western world in stead of USSR and the Easter world. The "Doi Moi" (Reform) policy has been adopted since 1986. Under the policy, the country has decided to establish the market economy under socialism.

Currently, the country is in the midst of the economic reform process to the market economy under the Fifth Five-Year National Development Plan from 1996 to 2000. The period of the Fifth Plan is considered as the preparation period for the take-off of the economy and catching up with other ASEAN countries. The economy of the country has changing rapidly, and has showed remarkable performance for the last 7 years. The economic slump of the Asian economies, due to large depreciation of their currencies in the international money market in 1997, hits the Vietnam economy in 1998. Hence, the country also has to face the economic slow-down until a future recovery of the Asian economy, which may be achieved in a few years by regional and world economic cooperation.

As a background information for demand forecast, trend of Vietnam's GDP, including GDP per capita, regional GDP per capita, and industrial composition of GDP were analyzed as follows. After that, growth potential of the economy and negative impact from the East Asian Crisis were also analyzed.

(1) Economic Performance in terms of GDP

Vietnam economy since 1991 has performed well as shown in Table 2.1-1. From 1991 to 1997, the growth rates of real GDP (Gross Domestic Products) were higher than 8.5% except 1991 and 1993. As a result, GDP per capita increased from USD122 in 1991 to USD329 in 1997 by more than doubled.

In terms of GDP implicit deflator, inflation rate was more than 70% in 1991 but 6.2% in 1996 and 5.1% in 1997, which showed the end of hyperinflation.

Table 2.1-1 GDP, Population, and GDP per Capita

(Unit: Billion VND)

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--------------------------------|--------|---------|---------|---------|---------|---------|---------|
| GDP by 1989 fixed price ① | 31,286 | 33,991 | 36,736 | 39,982 | 186,499 | 203,919 | 221,872 |
| Growth rate (%) | 6.0 | 8.6 | 8.1 | 8.8 | 9.5 | 9.3 | 8.8 |
| GDP by Current price ① | 76,707 | 110,535 | 136,571 | 170,258 | 222,840 | 258,609 | 295,696 |
| Growth rate (%) | 83.3 | 44.1 | 23.6 | 24.7 | 30.9 | 16.1 | 14.3 |
| Population ('000) ① | 67,774 | 69,105 | 71,026 | 72,510 | 73,959 | 75,355 | 76,710 |
| Ave. Exchange Rate (VND/USD) ② | 9,390 | 11,181 | 10,647 | 10,960 | 11,032 | 11,038 | 11,724 |
| GDP per capita ('000 VND) | 1,132 | 1,600 | 1,923 | 2,348 | 3,013 | 3,430 | 3,855 |
| (USD) | 122 | 143 | 181 | 214 | 273 | 311 | 329 |

Notes: 1) In 1995, 1996 & 1997, annual average exchange rate (VND/USD) is the average of the mid-value of Vietnam Bank for International Trade at the end of each month.

2) Figures of 1997 are estimates.

3) Figures of 1995 to 1997 are in terms of the fixed price of the base year 1994.

Reference: ① Statistical Yearbook 1994, 1995, 1996, and 1997, General Statistical Office

② Viet Nam / Economic Report on Industrialization and Industrial Policy, Oct. 17, 1995, World Bank

GDP per capita of some Asian countries is shown in the Table 2.1-2 and the Figure 2.1-1. GDP per capita of Vietnam was less than a half of China and less than one eighth of Thailand in 1997.

From another point of view, it can be also said that the Vietnam's level of GDP per capita is still the same as Korea, Taiwan, Indonesia, Thailand, Malaysia, and the Philippines twenty (20) to thirty (30) years ago. China has reached the same level seven (7) years ago.

Table 2.1-2 Historical Comparison of GDP per Capita in Asia (1965-1997)

(Unit: USD)

| | Vietnam | China | Korea | Taiwan | Indonesia | Thailand | Malaysia | Philippines |
|------|---------|-------|--------|--------|-----------|----------|----------|-------------|
| 1965 | - | - | 106 | 223 | - | 131 | 292 | 189 |
| 1970 | - | - | 272 | 386 | 77 | 195 | 382 | 195 |
| 1975 | - | - | 599 | 962 | 225 | 355 | 784 | 376 |
| 1980 | - | 302 | 1,643 | 2,325 | 491 | 693 | 1,787 | 675 |
| 1985 | - | 291 | 2,311 | 3,223 | 531 | 754 | 1,992 | 562 |
| 1990 | 97 | 342 | 5,917 | 7,870 | 590 | 1,528 | 2,409 | 714 |
| 1995 | 258 | 584 | 10,037 | 12,214 | 1,039 | 2,830 | 4,221 | 1,055 |
| 1996 | 297 | 670 | 10,548 | 12,683 | 1,140 | 3,018 | 4,690 | 1,162 |
| 1997 | 307 | 733 | 9,511 | 13,070 | 1,055 | 2,535 | 4,545 | 1,132 |

Source: "Asian Economy 1998", Economic Planning Agency, Japan

"Socio-economic Statistical Data of 61 Provinces and Cities", General Statistical Office (Oct., 1998) for the data of Vietnam for the years of 1995 through 1997

(a) GDP per capita and telephone subscribers

As is mentioned in detail in the Chapter 7, it is well known that GDP per capita in a specific country has a strong correlation with the main line subscribers per 100 inhabitants.

Vietnam is said to have the second fastest growing telecommunications sector in the world by the International Telecommunications Union. In 1986, Vietnam had just nine international telephone lines with its GDP per capita of USD 138, the figure of the international telephone lines has soared to more than 60,000. Telephone penetration among the country's 77 million people in the period has gone from almost zero to almost 1.85 per 100 residents with its GDP per capita of USD 324 in 1997.

Table 2.1-3 Main Lines per 100 Inhabitants in Vietnam (1993-1997)

| Year | Population ('000) | Main lines | Penetration |
|------|-------------------|------------|-------------|
| 1993 | 69,939 | 254,506 | 0.36% |
| 1994 | 71,501 | 442,658 | 0.62% |
| 1995 | 72,918 | 734,355 | 1.01% |
| 1996 | 74,310 | 1,110,115 | 1.49% |
| 1997 | 75,665 | 1,398,005 | 1.85% |

Source: DGPT, "Socio-economic Statistical Data of 61 Provinces and Cities", General Statistical Office (Oct., 1998) for the population data of Vietnam for the years of 1995 through 1997

The following Table 2.1-4 and Table 2.1-5 show the number of main lines and waiters per 100 inhabitants in Asia. Comparing with the level of GDP per capita in the region, it can be said that the level of penetration in Vietnam is shifting in rather high level.

Table 2.1-4 Main Lines per 100 Inhabitants in Asia

| | Korea | Taiwan | Indonesia | Thailand | Malaysia | Philippines |
|------|-------|--------|-----------|----------|----------|-------------|
| 1990 | 30.97 | 30.96 | 0.59 | 2.40 | 8.97 | 1.00 |
| 1991 | 33.67 | 33.34 | 0.72 | 2.77 | 10.03 | 1.04 |
| 1992 | 35.68 | 35.75 | 0.90 | 3.13 | 11.26 | 1.04 |
| 1993 | 37.81 | 38.13 | 1.00 | 3.81 | 12.66 | 1.33 |
| 1994 | 39.60 | 40.25 | 1.30 | 4.68 | 14.69 | 1.68 |
| 1995 | 41.47 | 43.07 | 1.69 | 5.86 | 16.56 | 2.09 |

Source: ITU Yearbook

Table 2.1-5 Waiters for Main Line per 100 Inhabitants in Asia

| | Korea | Taiwan | Indonesia | Thailand | Malaysia | Philippines |
|------|-------|--------|-----------|----------|----------|-------------|
| 1990 | 0.00 | 0.10 | 0.22 | 1.80 | 0.35 | 0.93 |
| 1991 | | 0.02 | 0.17 | 2.31 | 0.77 | 1.14 |
| 1992 | | | 0.12 | 2.79 | 0.91 | 1.24 |
| 1993 | | | 0.06 | 3.20 | 0.75 | 1.14 |
| 1994 | | | | 2.72 | 0.63 | 1.28 |
| 1995 | | | | 1.82 | 0.70 | 1.33 |

Source: ITU Yearbook

(b) Regional GDP per capita

Regarding regional GDP per capita in Vietnam, the South region shows the highest regional GDP per capita of USD700 while the Central region has the lowest of USD200. Within the country, the income difference between these two regions is relatively large since the South region is 3.5 times higher than the Central region.

From another point of view, the Regional GDP (RGDP) appear in Table 2.1-7. RGDP in every province had been improving until the year 1996. However, in 1997, RGDP of some 20 % of provinces decreased their RGDP against the previous year.

This can be considered the effects of drought damage and export competitiveness in the region.

Table 2.1-6 Regional GDP per Capita in Vietnam

| | | |
|----------------|---|--------|
| National | : | USD240 |
| South Region | : | USD700 |
| North Region | : | USD449 |
| Central Region | : | USD200 |

Source: SAIGON TIMES, Sep. 28 - Oct. 4, 1996

Table 2.1-7 RGDP at Current Price

| | | (Unit: Thou. USD) | | | | |
|------------------------|-----------------|-------------------|------------------|------------------|------------------|------------------|
| | | 1993 | 1994 | 1995 | 1996 | 1997 |
| (From 1996) | (Before 1995) | | | | | |
| NORTH EAST | | | | | | |
| 1 Ha Giang | Ha Giang | 32,074 | 51,131 | 49,810 | 55,370 | 52,645 |
| 2 Tuyen Quang | Tuyen Quang | 52,166 | 68,416 | 90,034 | 107,444 | 104,660 |
| 3 Cao Bang | Cao Bang | 45,161 | 57,738 | 59,023 | 75,070 | 81,099 |
| 4 Lang Son | Lang Son | 77,880 | 112,036 | 120,091 | 142,079 | 147,307 |
| 5 Lao Cai | Lao Cai | 43,871 | 49,050 | 70,944 | 91,067 | 89,599 |
| 6 Yen Bai | Yen Bai | 58,065 | 80,995 | 81,639 | 98,883 | 111,221 |
| 7 Bac Can | Bac Thai | 136,682 | 164,615 | 188,937 | 212,683 | 218,672 |
| 8 Thai Nguyen | | | | | | |
| 9 Quang Ninh | Quang Ninh | 189,309 | 221,810 | 260,172 | 299,119 | 318,593 |
| 10 Phu Tho | Vinh Phu | 236,682 | 312,036 | 342,956 | 388,325 | 425,321 |
| 11 Vinh Phuc | | | | | | |
| 12 Bac Giang | Ha Bac | 239,263 | 325,520 | 361,455 | 393,572 | 407,265 |
| 13 Bac Ninh | | | | | | |
| | <i>Total</i> | 1,111,152 | 1,443,348 | 1,625,061 | 1,863,613 | 1,956,383 |
| WEST EAST | | | | | | |
| 14 Lai Chau | Lai Chau | 54,101 | 71,131 | 73,498 | 82,660 | 87,438 |
| 15 Son La | Son La | 50,968 | 71,584 | 86,354 | 106,836 | 106,141 |
| 16 Hoa Binh | Hoa Binh | 70,876 | 94,842 | 96,849 | 102,696 | 107,766 |
| | <i>Total</i> | 175,945 | 237,557 | 256,701 | 292,192 | 301,345 |
| RED RIVER DELTA | | | | | | |
| 17 HA NOI* | HA NOI* | 782,212 | 1,017,376 | 1,317,433 | 1,569,887 | 1,727,858 |
| 18 HAI PHONG* | HAI PHONG* | 356,590 | 428,778 | 557,760 | 620,844 | 639,364 |
| 19 Ha Tay | Ha Tay | 230,783 | 272,127 | 357,857 | 421,807 | 409,954 |
| 20 Hai Duong | Hai Hung | 350,691 | 392,851 | 506,224 | 623,214 | 641,687 |
| 21 Hung Yen | | | | | | |
| 22 Thai Binh | Thai Binh | 221,106 | 253,303 | 365,843 | 415,506 | 418,727 |
| 23 Ha Nam | Nam Ha | 350,230 | 343,167 | 464,528 | 499,128 | 508,709 |
| 24 Nam Dinh | | | | | | |
| 25 Ninh Binh | Ninh Binh | 86,083 | 100,633 | 125,179 | 127,072 | 136,373 |
| | <i>Total</i> | 2,377,696 | 2,808,235 | 3,694,825 | 4,277,458 | 4,482,671 |
| NORTH CENTRAL | | | | | | |
| 26 Thanh Hoa | Thanh Hoa | 399,355 | 511,674 | 578,840 | 623,477 | 660,245 |
| 27 Nghe An | Nghe An | 316,498 | 411,584 | 462,256 | 510,704 | 511,398 |
| 28 Ha Tinh | Ha Tinh | 119,816 | 140,452 | 204,174 | 226,264 | 222,578 |
| 29 Quang Binh | Quang Binh | 70,046 | 92,036 | 111,069 | 134,017 | 128,919 |
| 30 Quang Tri | Quang Tri | 49,124 | 66,787 | 80,321 | 90,622 | 103,809 |
| 31 Thua Thien- Hue | Thua Thien- Hue | 135,945 | 176,652 | 180,641 | 214,589 | 226,577 |
| | <i>Total</i> | 1,090,783 | 1,399,186 | 1,617,302 | 1,799,673 | 1,853,527 |

SOUTH CENTRAL COAST

| | | | | | | |
|---------------|--------------------|----------------|------------------|------------------|------------------|------------------|
| 32 DA NANG* | Quang Nam- Da Nang | 261,935 | 328,869 | 438,260 | 486,055 | 520,077 |
| 33 Quang Nam | | | | | | |
| 34 Quang Ngai | Quang Ngai | 93,548 | 121,991 | 166,694 | 196,441 | 203,679 |
| 35 Binh Dinh | Binh Dinh | 171,889 | 209,321 | 240,982 | 283,468 | 288,318 |
| 36 Phu Yen | Phu Yen | 68,848 | 120,181 | 117,783 | 132,111 | 137,403 |
| 37 Khanh Hoa | Khanh Hoa | 182,949 | 234,661 | 286,631 | 330,068 | 346,826 |
| 38 Ninh Thuan | Ninh Thuan | 70,507 | 89,231 | 94,459 | 109,569 | 112,778 |
| 39 Binh Thuan | Binh Thuan | 92,719 | 118,733 | 150,711 | 170,576 | 181,998 |
| Total | | 942,396 | 1,222,986 | 1,495,521 | 1,708,289 | 1,791,079 |

CENTRAL HIGHLANDS

| | | | | | | |
|--------------|----------|----------------|----------------|----------------|----------------|----------------|
| 40 Gia Lai | Gia Lai | 76,129 | 92,851 | 119,564 | 142,369 | 170,282 |
| 41 Kon Tum | Kon Tum | 28,571 | 33,484 | 36,990 | 44,212 | 48,356 |
| 42 Dac Lac | Dac Lac | 155,392 | 197,647 | 321,676 | 385,393 | 355,820 |
| 43 Lam Dong | Lam Dong | 103,226 | 128,869 | 151,829 | 170,086 | 171,728 |
| Total | | 363,318 | 452,851 | 630,059 | 742,061 | 746,186 |

SOUTH EAST

| | | | | | | |
|---------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 44 HO CHI MINH* | HO CHI MINH* | 2,412,535 | 2,982,624 | 3,526,322 | 4,300,045 | 4,685,721 |
| 45 Binh Duong | SongBe | 165,899 | 209,774 | 284,105 | 389,324 | 434,502 |
| 46 Binh Phuoc | | | | | | |
| 47 Tay Ninh | Tay Ninh | 112,995 | 141,629 | 195,824 | 233,536 | 251,866 |
| 48 Dong Nai | Dong Nai | 402,673 | 479,276 | 614,449 | 758,084 | 811,688 |
| 49 Ba Ria- Vung Tau | Ba Ria- Vung Tau | 875,207 | 1,055,747 | 1,043,841 | 1,322,106 | 1,406,397 |
| Total | | 3,969,309 | 4,869,050 | 5,664,541 | 7,003,096 | 7,590,174 |

MEKONG RIVER DELTA

| | | | | | | |
|---------------|------------|------------------|------------------|------------------|------------------|------------------|
| 50 Long An | Long An | 179,078 | 220,995 | 300,505 | 344,875 | 334,266 |
| 51 Dong Thap | Dong Thap | 240,000 | 257,014 | 305,384 | 322,923 | 354,739 |
| 52 An Giang | An Giang | 351,705 | 389,683 | 504,089 | 579,610 | 606,520 |
| 53 Tien Giang | Tien Giang | 305,714 | 324,887 | 404,950 | 452,547 | 470,861 |
| 54 Ben Tre | Ben Tre | 169,401 | 199,457 | 288,530 | 361,353 | 373,238 |
| 55 Vinh Long | Vinh Long | 177,880 | 193,484 | 244,807 | 274,026 | 280,796 |
| 56 Tra Vinh | Tra Vinh | 123,134 | 161,448 | 200,712 | 263,677 | 272,925 |
| 57 Can Tho | Can Tho | 311,429 | 375,113 | 461,121 | 533,409 | 559,890 |
| 58 Soc Trang | Soc Trang | 143,318 | 192,579 | 259,854 | 286,264 | 307,778 |
| 59 Kien Giang | Kien Giang | 258,249 | 293,032 | 403,578 | 490,967 | 475,609 |
| 60 Bac Lieu | Minh Hai | 295,945 | 367,692 | 475,504 | 481,271 | 501,459 |
| 61 Ca Mau | | | | | | |
| Total | | 2,555,853 | 2,975,385 | 3,849,034 | 4,390,921 | 4,538,082 |

| | | | | | |
|------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| GRAND TOTAL/ AVERAGE | 12,586,452 | 15,408,597 | 18,833,043 | 22,077,304 | 23,259,447 |
| <i>Growth Rate (%)</i> | | 22.4% | 22.2% | 17.2% | 5.4% |
| <i>Exchange Rate (source: JRI)</i> | 10,850 | 11,050 | 11,006 | 11,015 | 11,752 |

Source: 1993-1994: Post and Telecommunications Statistical Yearbook 1986-1995

1995-1997: "Socio-Economic Statistical Data of 61 Provinces and Cities", General Statistical Office (Oct., 1998)

(c) Industrial composition of GDP

Regarding the industrial composition of production, the GDP share of goods production has slightly decreased from 1991 to 1997 while the share of service

production has increased. Within the goods production, manufacturing and construction industries increase their shares but the primary sector of agriculture, fishery and forestry lowers its share.

Within the tertiary sector, the commercial sector has the largest GDP share and the highest growth rate. The second largest share is given to Government while the increase in the share is only by 1%. The communication sector increases its share from 2.5% in 1991 to 4% in 1997. This shows a important role of telecommunications sector to improve national GDP.

Table 2.1-8 Industrial Composition of Production

| | (Unit: Billion VND) | | | | | | |
|----------------------|---------------------|----------|----------|----------|----------|----------|----------|
| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
| GOODS | 19,492 | 21,374 | 22,958 | 24,800 | 108,378 | 118,539 | 129,420 |
| (share) | (62.3%) | (62.9%) | (62.5%) | (62.0%) | (58.1%) | (58.1%) | (58.3%) |
| Agri & Fish & Fores. | 12,264 | 13,132 | 13,634 | 14,168 | 51,284 | 53,539 | 55,923 |
| (share) | (39.2%) | (38.6%) | (37.2%) | (35.4%) | (27.5%) | (26.3%) | (25.2%) |
| Industry | 6,042 | 6,925 | 7,766 | 8,771 | 42,504 | 48,442 | 54,914 |
| (share) | (19.3%) | (20.4%) | (21.1%) | (21.9%) | (22.8%) | (23.8%) | (24.8%) |
| Construction | 1,186 | 1,317 | 1,558 | 1,860 | 14,590 | 16,558 | 18,579 |
| (share) | (3.8%) | (3.9%) | (4.2%) | (4.7%) | (7.8%) | (8.0%) | (8.3%) |
| SERVICES | 11,794 | 12,617 | 13,777 | 15,182 | 78,121 | 85,380 | 92,452 |
| (share) | (37.7%) | (37.1%) | (37.5%) | (38.0%) | (41.9%) | (41.9%) | (41.7%) |
| Communication | 792 | 842 | 897 | 960 | 7,599 | 8,158 | 8,892 |
| (share) | (2.5%) | (2.5%) | (2.4%) | (2.4%) | (4.1%) | (4.0%) | (4.0%) |
| Commerce | 3,654 | 3,877 | 4,109 | 4,478 | 32,545 | 36,080 | 39,387 |
| (share) | (11.7%) | (11.4%) | (11.2%) | (11.2%) | (19.5%) | (17.7%) | (17.8%) |
| Finance | 448 | 496 | 578 | 710 | 3,940 | 4,388 | 4,739 |
| (share) | (1.4%) | (1.5%) | (1.6%) | (1.8%) | (2.1%) | (2.2%) | (2.1%) |
| Government | 2,841 | 3,040 | 3,322 | 3,760 | 19,799 | 21,392 | 22,523 |
| (share) | (9.1%) | (8.9%) | (9.0%) | (9.4%) | (10.6%) | (10.5%) | (10.2%) |
| Others | 4,059 | 4,362 | 4,871 | 5,274 | 14,238 | 15,362 | 16,911 |
| (share) | (13.0%) | (12.8%) | (13.3%) | (13.2%) | (7.6%) | (7.5%) | (7.6%) |
| GDP | 31,286 | 33,991 | 36,735 | 39,982 | 186,499 | 203,919 | 221,872 |
| (share) | (100.0%) | (100.0%) | (100.0%) | (100.0%) | (100.0%) | (100.0%) | (100.0%) |

Note: 1) 1997: estimate

2) 1991 to 1994: 1989 fixed price, 1995 to 1997: 1994 fixed price

Source: Statistical Yearbook 1993, 1994, 1995, 1996 and 1997, General Statistical Office

(2) Growth Potentials of the Economy

The growth potentials of the Vietnam's economy were analyzed from the view point of population size, quality of labour force, and natural resources as follows.

The number of population is 75.67 million, 22% out of which live in the Mekong River Delta area and 19% out of which live in the Red River Delta area. The 80%

of total population are in the rural area while 20% of it are in the urban area.

Population size is large enough to provide an advantage to conform a large domestic market, which may enable the economy to enjoy the economy of scale.

Besides the size of population, the country provides a good education service, so that the literacy rate is very high. It is well accepted that a quality of labor force in Vietnam is very high. This is quite essential for the economy to develop.

Table 2.1-9 Population by Region and by Province

| | | (Unit: '000) | | | | |
|------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | 1993 | 1994 | 1995 | 1996 | 1997 |
| (From 1996) | (Before 1995) | | | | | |
| NORTH EAST | | | | | | |
| 1 Ha Giang | Ha Giang | 520 | 535 | 546 | 555 | 564 |
| 2 Tuyen Quang | Tuyen Quang | 629 | 645 | 658 | 669 | 680 |
| 3 Cao Bang | Cao Bang | 626 | 638 | 549 | 558 | 566 |
| 4 Lang Son | Lang Son | 672 | 690 | 703 | 716 | 729 |
| 5 Lao Cai | Lao Cai | 535 | 552 | 566 | 575 | 587 |
| 6 Yen Bai | Yen Bai | 638 | 652 | 664 | 675 | 687 |
| 7 Bac Can | Bac Thai | 1,145 | 1,168 | 307 | 312 | 317 |
| 8 Thai Nguyen | | | | 972 | 981 | 996 |
| 9 Quang Ninh | Quang Ninh | 890 | 900 | 915 | 925 | 938 |
| 10 Phu Tho | Vinh Phu | 2,203 | 2,249 | 1,242 | 1,264 | 1,284 |
| 11 Vinh Phuc | | | | 1,050 | 1,067 | 1,085 |
| 12 Bac Giang | Ha Bac | 2,263 | 2,308 | 1,428 | 1,452 | 1,475 |
| 13 Bac Ninh | | | | 909 | 925 | 940 |
| <i>Total</i> | | <i>10,120</i> | <i>10,336</i> | <i>10,509</i> | <i>10,673</i> | <i>10,847</i> |
| WEST EAST | | | | | | |
| 14 Lai Chau | Lai Chau | 501 | 521 | 535 | 546 | 556 |
| 15 Son La | Son La | 776 | 802 | 818 | 833 | 847 |
| 16 Hoa Binh | Hoa Binh | 713 | 729 | 744 | 757 | 770 |
| <i>Total</i> | | <i>1,990</i> | <i>2,052</i> | <i>2,097</i> | <i>2,136</i> | <i>2,173</i> |
| RED RIVER DELTA | | | | | | |
| 17 HA NOI* | HA NOI* | 2,155 | 2,194 | 2,230 | 2,285 | 2,357 |
| 18 HAI PHONG* | HAI PHONG* | 1,584 | 1,615 | 1,643 | 1,668 | 1,693 |
| 19 Ha Tay | Ha Tay | 2,218 | 2,257 | 2,294 | 2,331 | 2,367 |
| 20 Hai Duong | Hai Hung | 2,658 | 2,709 | 1,674 | 1,694 | 1,717 |
| 21 Hung Yen | | | | 1,070 | 1,084 | 1,098 |
| 22 Thai Binh | Thai Binh | 1,768 | 1,789 | 1,810 | 1,831 | 1,853 |
| 23 Ha Nam | Nam Ha | 2,586 | 2,640 | 802 | 814 | 825 |
| 24 Nam Dinh | | | | 1,880 | 1,907 | 1,934 |
| 25 Ninh Binh | Ninh Binh | 840 | 861 | 877 | 892 | 906 |
| <i>Total</i> | | <i>13,809</i> | <i>14,065</i> | <i>14,279</i> | <i>14,505</i> | <i>14,748</i> |
| NORTH CENTRAL | | | | | | |
| 26 Thanh Hoa | Thanh Hoa | 3,312 | 3,382 | 3,439 | 3,497 | 3,553 |
| 27 Nghe An | Nghe An | 2,681 | 2,743 | 2,787 | 2,830 | 2,874 |

| | | | | | | |
|----------------------------|--------------------|---------------|---------------|---------------|---------------|---------------|
| 28 Ha Tinh | Ha Tinh | 1,294 | 1,309 | 1,327 | 1,343 | 1,359 |
| 29 Quang Binh | Quang Binh | 737 | 762 | 778 | 793 | 806 |
| 30 Quang Tri | Quang Tri | 521 | 535 | 544 | 553 | 562 |
| 31 Thua Thien- Hue | Thua Thien- Hue | 973 | 995 | 1,013 | 1,027 | 1,042 |
| <i>Total</i> | | <i>9,517</i> | <i>9,727</i> | <i>9,888</i> | <i>10,042</i> | <i>10,196</i> |
| SOUTH CENTRAL COAST | | | | | | |
| 32 DA NANG* | Quang Nam- Da Nang | 1,912 | 1,953 | 647 | 656 | 667 |
| 33 Quang Nam | | | | 1,337 | 1,357 | 1,379 |
| 34 Quang Ngai | Quang Ngai | 1,150 | 1,179 | 1,197 | 1,215 | 1,234 |
| 35 Binh Dinh | Binh Dinh | 1,373 | 1,407 | 1,432 | 1,455 | 1,478 |
| 36 Phu Yen | Phu Yen | 709 | 731 | 746 | 758 | 770 |
| 37 Khanh Hoa | Khanh Hoa | 924 | 947 | 965 | 979 | 994 |
| 38 Ninh Thuan | Ninh Thuan | 449 | 495 | 468 | 476 | 483 |
| 39 Binh Thuan | Binh Thuan | 859 | 882 | 903 | 925 | 943 |
| <i>Total</i> | | <i>7,375</i> | <i>7,594</i> | <i>7,695</i> | <i>7,821</i> | <i>7,948</i> |
| CENTRAL HIGHLANDS | | | | | | |
| 40 Gia Lai | Gia Lai | 738 | 763 | 786 | 815 | 844 |
| 41 Kon Tum | Kon Tum | 250 | 256 | 262 | 265 | 269 |
| 42 Dac Lac | Dac Lac | 1,173 | 1,211 | 1,255 | 1,302 | 1,347 |
| 43 Lam Dong | Lam Dong | 743 | 769 | 798 | 828 | 854 |
| <i>Total</i> | | <i>2,904</i> | <i>2,999</i> | <i>3,102</i> | <i>3,210</i> | <i>3,315</i> |
| SOUTH EAST | | | | | | |
| 44 HO CHI MINH* | HO CHI MINH* | 4,322 | 4,392 | 4,635 | 4,843 | 4,990 |
| 45 Binh Duong | SongBe | 1,082 | 1,114 | 618 | 632 | 650 |
| 46 Binh Phuoc | | | | 522 | 535 | 549 |
| 47 Tay Ninh | Tay Ninh | 869 | 888 | 905 | 918 | 932 |
| 48 Dong Nai | Dong Nai | 1,763 | 1,813 | 1,861 | 1,913 | 1,975 |
| 49 Ba Ria- Vung Tau | Ba Ria- Vung Tau | 657 | 671 | 688 | 706 | 724 |
| <i>Total</i> | | <i>8,693</i> | <i>8,878</i> | <i>9,229</i> | <i>9,548</i> | <i>9,820</i> |
| MEKONG RIVER DELTA | | | | | | |
| 50 Long An | Long An | 1,225 | 1,252 | 1,270 | 1,285 | 1,300 |
| 51 Dong Thap | Dong Thap | 1,463 | 1,491 | 1,516 | 1,537 | 1,559 |
| 52 An Giang | An Giang | 1,934 | 1,971 | 1,998 | 2,027 | 2,056 |
| 53 Tien Giang | Tien Giang | 1,622 | 1,656 | 1,680 | 1,703 | 1,726 |
| 54 Ben Tre | Ben Tre | 1,309 | 1,330 | 1,351 | 1,373 | 1,394 |
| 55 Vinh Long | Vinh Long | 1,041 | 1,062 | 1,081 | 1,095 | 1,110 |
| 56 Tra Vinh | Tra Vinh | 939 | 958 | 977 | 990 | 1,003 |
| 57 Can Tho | Can Tho | 1,781 | 1,817 | 1,846 | 1,876 | 1,905 |
| 58 Soc Trang | Soc Trang | 1,173 | 1,197 | 1,216 | 1,236 | 1,255 |
| 59 Kien Giang | Kien Giang | 1,327 | 1,360 | 1,390 | 1,421 | 1,447 |
| 60 Bac Lieu | Minh Hai | 1,719 | 1,757 | 754 | 772 | 784 |
| 61 Ca Mau | | | | 1,041 | 1,064 | 1,082 |
| <i>Total</i> | | <i>15,532</i> | <i>15,851</i> | <i>16,119</i> | <i>16,377</i> | <i>16,619</i> |
| GRAND TOTAL | | 69,939 | 71,501 | 72,918 | 74,310 | 75,665 |
| <i>Average Growth Rate</i> | | | 2.23% | 1.98% | 1.91% | 1.82% |

Source: 1993-1994: Post and Telecommunications Statistical Yearbook 1986-1995
1995-1997: "Socio-Economic Statistical Data of 61 Provinces and Cities", General Statistical Office
(Oct. 1998)

Table 2.1-10 Population by Urban and Rural

| | 1993 | 1994 | 1995 | 1996 | 1997 |
|---------|--------|--------|--------|--------|--------|
| Urban | 13,663 | 14,139 | 14,575 | 15,085 | 15,725 |
| (share) | 20% | 20% | 20% | 20% | 21% |
| Rural | 56,318 | 57,326 | 58,342 | 59,225 | 59,939 |
| (share) | 80% | 80% | 80% | 80% | 79% |
| Total | 69,981 | 71,465 | 72,917 | 74,310 | 75,664 |

Source: General Statistical Office, "Statistical Yearbook 1997", p.9

Besides such a high quality of human resources, the country is very rich in natural resources, especially, minerals and petroleum. As shown in Table 2.1-7, coal, iron ore, tin, aluminum, lead, and other rare metals have a large reserve. Table 2.1-8 shows the export of crude oil, which will earn some foreign currencies. Furthermore, in stead of exporting crude oil, the economy will be able to produce petrochemical products for the domestic market as well as the export in near future.

Table 2.1-11 Reserves of Minerals

| Items | Unit | Identified Reserves | Estimated Reserves |
|----------|--------------|---------------------|--------------------|
| Tin | Thousand ton | 80 | 300 |
| Tungsten | Thousand ton | 80 | 200 |
| Gold | Ton | 25 | 2,000 |
| Iron Ore | Million ton | 1,300 | 1,000 |
| Chrome | Thousand ton | 3,700 | 30,000 |
| Aluminum | Million ton | 390 | 3,500 |
| Titan | Thousand ton | 13,000 | - |
| Nickel | Thousand ton | 152 | 500 |
| Lead | Thousand ton | 760 | 2,000 |
| Copper | Thousand ton | 795 | 1,000 |

Source: Tran Hoang Kim, Vietnam's Economy - The Period 1945-1995 and the Prospective by the Year 2020

Table 2.1-12 International Trade Balance of Petroleum

| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|------------------------------|-------|-------|-------|-------|-------|-------|
| Oil Trade Balance (Mil. USD) | 13 | 34 | 96 | 141 | 160 | 167 |
| Export of Crude Oil | 200 | 390 | 581 | 756 | 844 | 866 |
| Import of Petrol. Product | 187 | 356 | 485 | 615 | 684 | 699 |
| Oil Trade Balance (1000ton) | ▲ 748 | ▲ 244 | 1,345 | 2,324 | 2,153 | 2,429 |
| Export of Crude Oil | 1,514 | 2,617 | 3,917 | 5,466 | 6,153 | 6,942 |
| Import of Petrol. Product | 2,262 | 2,861 | 2,572 | 3,142 | 4,000 | 4,513 |

Source: IMF STAFF COUNTRY REPORT NO.95/93, SEP. 1995: VIETNAM-STATISTICAL TABLES (IMF)

(3) Impact of East Asian Crisis

As is mentioned before, Vietnam economy performed well from 1991 to 1997. On the other hand, growth rate of GDP had been in declining tendency for over the

past three years, from 1995 to 1997 and it is forecasted that this tendency would continue to 2000.

Low economic growth rate was due to many different reasons, of which the most important were a decline in investments in all economic sectors, a decrease of the world's prices of Vietnam's exported goods, and impacts of the financial crisis in Asia.

Vietnam has been hit by the impact of the East Asian crisis, which will clearly have a severe impact on its economy in 1998 and beyond. As a result of the regional financial crisis, Vietnam has lost competitiveness within the region, and export growth and foreign direct investment flows are running at half their level of a year ago, and foreign exchange reserves are under significant pressure.

The slowdown in export growth was due mainly to the collapse of regional markets, which account for two-thirds of Vietnam's total exports. In addition, large devaluation in Thailand, Indonesia, and South Korea have also made it difficult for the price-sensitive non-traditional exports of Vietnam (such as garments, footwear and marine products) to compete in these and third country markets. Furthermore, the recent drought has also had a significant impact on agricultural output and electricity supply, adding to the challenges facing policy makers in Vietnam.

Table 2.1-13 Key Economic Indicators for 1998 Forecasted by the World Bank

| Economic Indicators | 1998 (forecast) |
|---|-----------------|
| Real GDP Growth Rate (%) | 4 - 6 |
| Inflation Rate (% per annum) | 10 - 11 |
| Export Growth Rate (%) | 8 - 9 |
| Import Growth Rate (%) | 4 - 5 |
| Current Account Deficit / GDP | -6 - -7 |
| Current Account Deficit (Billions of USD) | -1.6 - 2.0 |
| Foreign Direct Investment (Billions of USD) | 1.6 - 1.8 |

Source: "The World Bank's Country Assistance Strategy for Vietnam 1999 - 2002"

As a result, the GDP growth rate is forecasted to fall sharply in 1998. Macroeconomic stability is threatened and inflationary pressures are building up in the economy - the annual in April, 1998 was 6.7 %, the highest in two years.

(4) Exchange rate

In general, the official exchange rate announced by the State Bank of Vietnam (SBV) was stable at level of VND 11,175/USD in 1997.

After the SBV issued new regulation to widen market exchange rate amplitude to $\pm 10\%$ around the official exchange rate in consistent with a strong intervention of the SBV in buying USD. In practice, this situation was due to a hiding pressure caused by financial and currency crisis in South East Asia that has started in Thailand since July 1997 and spread to other countries in the region and Asia as a whole. In a desperate situation, the market exchange rate went up at weak level about VND 14,000/USD in the middle of December 1997. After that it tended to rise and it stood at level of VND 13,350/USD in July 1998.

Table 2.1-14 Exchange Rates of VND against US Dollar and Japanese Yen

| | Dec. 31, 95 ① | Dec. 31, 96 ② | Jun. 25, 97 ③ | Sep. 4, 97 ④ | Changes ① - ② | Changes ② - ③ | Changes ③ - ④ |
|---------|------------------|------------------|------------------|-----------------|------------------|------------------|------------------|
| VND/USD | 10,980 | 11,055 | 11,668 | 11,700 | -6.56% | -5.83% | -0.27% |
| VND/JPY | 105.58 | 95.30 | 102.35 | 97.25 | +7.89% | -2.04% | +4.98% |

Note: +(-) for Changes presents appreciation (devaluation) of VND.

Source: Central Institute for Economic Management, Department of Economic Management Science

At present, financial market has not been completed in Vietnam. However, on the other hand, the delay of liberalization of financial market keeps the sustainability of Vietnamese Dong.

2.2 Socio-Economic Development Plans

It is essential for the government to keep consistency between the telecommunications development plans and national socio-economic development plans, especially, in terms of macro-economic target or forecast. However, the national socio-economic development plans between 2001 and 2010 are not available at this moment. The public investment program for the years between 1996 and 2000 was analyzed to grasp the situation of socio-economic development in Vietnam.

(1) Public investment program 1996 – 2000

The Prime Minister approved Public investment program (PIP) for the years 1996 – 2000 (Decision No. 2920/QHQT) on June 18, 1996 as an investment program of the Government, and it includes central and local projects that are either to be financed from domestic budgetary sources or by credits from the State Budget, including Official Development Assistance (ODA) from bilateral and multilateral channels in the form of grant aid and concessive loans.

(2) Growth targets for the period 1996 - 2000

The 5-year plan was prepared within a framework that assumes GDP growth will accelerate to 9-10% per annum. The targeted GDP growth would result in GDP per capita doubling over the decade 1991 – 2000.

Table. 2.2-1 Basic Growth Scenario (%)

| | |
|-------------|---------|
| GDP | 9 – 10 |
| Agriculture | 4.5 – 5 |
| Industry | 14 – 15 |
| Services | 12 – 13 |

Source: "PUBLIC INVESTMENT PROGRAM 1996 – 2000"

Population by the year 2000 is projected to be 82 Million, with a growth rate of 1.8% per annum. It is estimated that the population growth rate falling to 1.4% per annum by the year 2010.

To improve the living conditions of the broad mass of the people, development of the rural economy will have a high priority. Almost 80% of the population live in rural areas, so that the modernization of agriculture and the development of the rural economy are of critical importance.

In the period 1996 – 2000, industrial growth will be concentrated in the focal economic zones: Ha Noi, Hai Phong, Quang Ninh in the north, Ho Chi Minh City, Dong Nai, Vung Tau in the south and Quang Nam, Da Nang, Quang Ngai in the central part of the country.

(3) Investment for telecommunications

In terms of development objectives of the telecommunications sector, telecommunication service coverage should rise from just 1.045 line per 100 people (end of 1995) to 5 – 6 lines in the year 2000, and 25 lines in 2010. By the year 2000, it is planned to provide all villages in the country with telephone lines, including those villages located in remote areas and trying to provide every family with each telephone, reaching the average level in the region.

Investment requirement for the period 1996 – 2000 is about USD 2.39 Billion (VND 26.8 Trillion). It is proposed that about 3.4 % of the total investment for telecommunications, VND 900 Billion, would be contributed from the State budget. In other words, 0.93 % of the State investment would be allocated for

telecommunications. The State budget would mainly support projects in mountainous and remote areas, the army and security network as well as to check frequencies.

Main resources for telecommunications investment will be loans and Business Cooperation Contracts (BCC) and mobilization of other resources. Foreign investment resources in the form of borrowing, aid, BCC will account for about 65 – 70%.

Table 2.2-2 Telecommunications Investment Structure for Period 1996 – 2000

| | Total | | State Investment | | SOE Investment | FDI |
|--------------------|------------|-----------|------------------|-----------|----------------|------------|
| | (Tri. VND) | (share %) | (Tri. VND) | (share %) | (Tri. VND) | (Tri. VND) |
| Telecommunications | 26.80 | 5.83% | 0.90 | 0.93% | 13.00 | 12.90 |

Note: SOE: State Owned Enterprise
FDI: Foreign Direct Investment

Source: "PUBLIC INVESTMENT PROGRAM 1996 - 2000", p.20

2.3 Outline of Related Telecommunications Development Plans to National Economic Development Plan

2.3.1 Economic Development Plan and Telecommunications Development Plan

A country's telecommunication development plan must be worked out carefully so as to be compatible with the government's targets for economic development, such as its political objectives, the projected rate of economic growth, and the amount of public investment available for each segment.

On the other hand, the principles of the telecommunications development plan of the DGPT should be reflected in the telecommunication infrastructure development principles applied in the government's economic development plan. This is because telecommunications infrastructure is a key component of the social infrastructure.

The following principles are often considered in forming a country's economic development plan:

- (1) Correcting the imbalance among economic segments
- (2) Promoting structural transition of industries

(3) Promoting public welfare

The following items are generally listed as the objectives of economic development plans:

- (1) Providing full employment and stable prices
- (2) Providing a secure, fulfilling life for people
- (3) Coordination and contribution of telecommunication to achieve economic development
- (4) Providing economic security and developing infrastructure
- (5) Reconstructing finances, and responding to new financial conditions

Telecommunications development is closely related to each of the above objectives (1) to (5). In particular, since telecommunications infrastructure will function as the major social assets in the provision of a secure and fulfilling life in (2), its contribution and related policies such as the amount of construction investment must be specified in the economic development plan. Objectives such as increasing teledensity, upgrading networks, and improving transmission quality and reliability must be included in the principles of a telecommunications development plans, accompanied by definite growth targets stated in terms of figures for telephones, data-communications, and mobile-communications facilities.

In addition, measures to provide better services in rural areas and to maintain telecommunications service in the event of a disaster should be included.

The estimates of costs for constructions and implementations must be calculated to evaluate the balance between such costs and total public investments and the overall social asset framework.

Telecommunications development must be given a high priority in the land development plan from the viewpoints of extension of industrial infrastructures, efficient land use, and environmental protection. The same applies to regional development plans, which usually reflect both the principles of the national land development plan and specific conditions of each district. In order to plan regional telecommunications development, careful consideration must be given to the regional development plans in order to devise the most suitable telecommunications development plans for each district.

2.3.2 Impact of Telecommunications Development to National Economy

(1) Role of Telecommunications

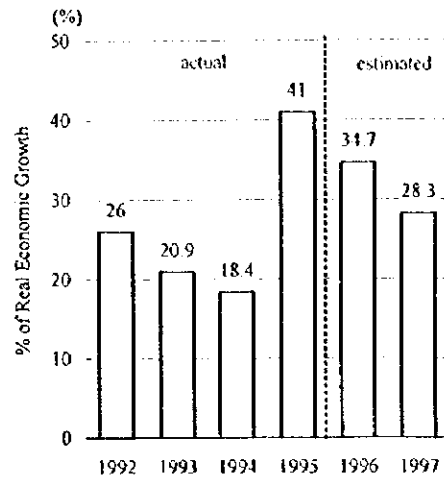
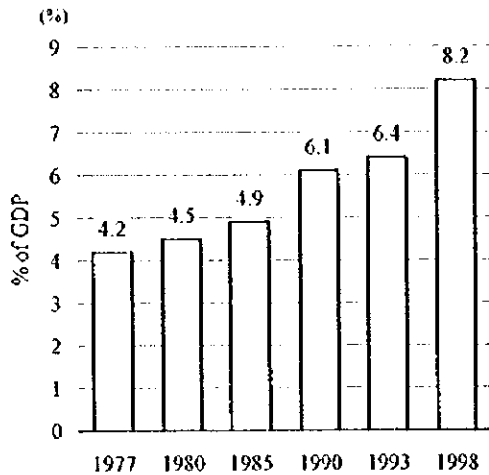
Past research on the role of telecommunications for economic growth has found that there has been a strong correlation between telecommunications development and the performance of national economy. International comparisons have also proved that the correlation between telecommunications and economic growth is generally stronger in low-income countries than high-income countries. This suggests the importance of the role of telecommunications for a country's economy to take off. It has also been pointed out that government expenditure in telecommunications results in long- and medium-term impacts on the overall economy without suffering from the effects of inflation.

(2) Effects of Information Technology on Economy

To address the rapid development of digital information technology, the US Department of Commerce released a report, "The Emerging Digital Economy," on April 15, 1998, on the role of telecommunications in economic growth. The report pointed out the following five points as the effects of digital information technology for the U.S. economy.

- (a) Information Technology (IT) sector's share of the economic growth rapidly increased from 4.9 % in 1985 to 8.2 in 1998. (Figure 2.3.2-1)
- (b) In recent years, IT industries have been responsible for more than one-quarter of real economic growth. (Figure 2.3.2-2)
- (c) Without contribution of the IT sector, overall inflation, at 2.0 %, would have been 3.1 % in 1997. (Figure 2.3.2-3)
- (d) In the 1960s, business spending on IT equipment represented only 3 % of total business equipment investment. In 1996, IT's share rose to 45 %.
- (e) IT industries supports high-paying jobs. In 1996, 7.4 million people worked in IT industries and IT-related occupations across the economy. They earned close to USD46,000 per year, compared to an average of USD28,000 for the private sector.

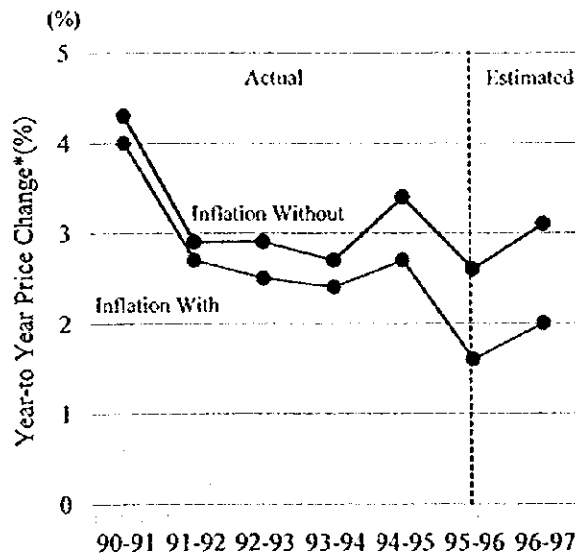
As seen in the data on OECD countries in the 1980s shown in the Figure 2.3.2-4, the higher the intensity of information technology, which is defined as the share that IT investment holds in total investment grows, the higher the annual growth rate of employment increases.



Note: Estimates based on Bureau of Economic Analysis and Census data
 Source: U.S. Department of Commerce Economics and Statistics Administration

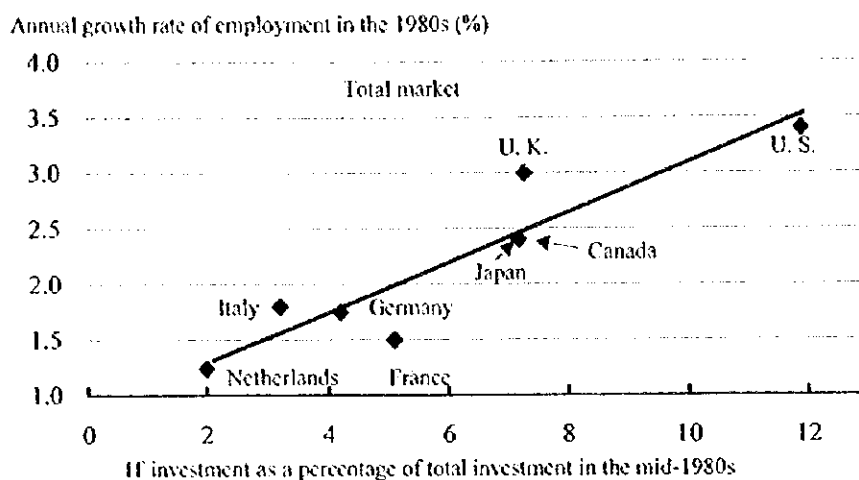
Figure 2.3.2-1 IT's Share of GDP

Figure 2.3.2-2 IT's Contribution to Real Economic Growth



Note: Estimates based on Bureau of Economic Analysis and Census data
 * As measured by the Gross Domestic Income Implicit Price Deflator
 Source: U.S. Department of Commerce Economics and Statistics Administration

Figure 2.3.2-3 IT Industries' Impact to Keep Inflation Down



Source: OECD Secretariat calculations from OECD ANBERD and ISDN databases.

Figure 2.3.2-4 Information Technology Intensity and Employment Growth

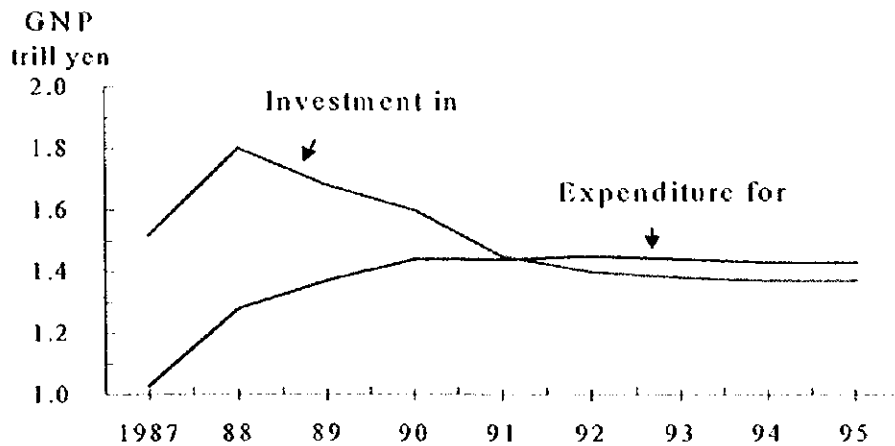
(3) **Pervasive Effects of Investment in Information and Communications Industry**

As mentioned above, the development of the information and communications industries can be resulted in a strong impact on the economic growth of Vietnam in the future. In discussing the effects of investment in the information and communications industries on the national economy, the following analysis on the economy of Japan in fiscal 1997 can provide useful information for the impact of information and telecommunications development in Vietnam .

Increases in the GNP of Japan were calculated when an additional one trillion yen was spent on (1) information and communications services and (2) investment in information and communications facilities. The analysis shows that the additional one trillion yen spent on information and communications services increased the GNP for the relevant fiscal year by a little over one trillion yen (short-term multiplier 1.03), while investment in information and communications facilities was also increased in that year by 1.53 trillion yen (short-term multiplier 1.53). Figure 2.3.3-1 indicates that the medium-term multiplier of the expenditure for information and communications services gradually increased to 1.45 in fiscal 1991. The pervasive effects of investment in information and communication facilities are larger on a short-term basis, though the multipliers in the two cases are almost the same when viewed on a medium-term basis.

Although the multipliers for investment in information and communications

facilities depends on economic and industrial structures or differs at stages of development, a unit of increase in investment in VNPT will follow a process similar to the above analysis to trigger production several times as large as the amount invested in the information and telecommunications industries, telephone and telegraph facilities manufacturing industries, and other domestic industries, while new employment opportunities will also result.



Source: MPT, Japan (1997)

Figure 2.3.3-1 Effects on GNP Growth

2.3.3 Telecommunications Buying Power

In this section, correlation of affordability of telephone services and household revenues are explained. Available data suggest that the threshold level be between one and two % of household's income for those with telephone service. Figure 2.3.3-1 shows that in countries with a high level of penetration of household telephones, the proportion of the expenditures spent on telephone charges against the total household's expenditure is generally less than 2 %.

Supposed that the average size of households consists of 4 family members, in countries with teledensity of 5 to 10 %, the portion of telephone expenditures against total household expenditure is generally less than 4 %. In the countries with teledensity of less than 5 %, from 2 to 8 % of household expenditure tends to be spent on telephone services.

In developing countries with low income, telecommunications policy makers naturally tend to think that a similar proportion of household expenditure should set the threshold for

affordability in their countries. Unfortunately, telephone services are not commodities like foods, where the costs of production are directly related to the wealth of the domestic economy. The physical components of a telephone network, which accounts for more than half the cost of a telephone network cost roughly the same in Angola as they do in Germany. Countries with high levels of telephone penetration tend to be wealthy so, while the relative share of telephone service expenditures appears low, the absolute amount is significant (See Figure 2.3.3-1 right chart). If the same relative measure of affordability is used to establish telephone tariffs in lower income countries, this would result in insufficient revenue being generated to recoup network operating and expansion costs.

An alternative approach is to start by establishing the average operating costs for a telephone network. From this point of view, an average tariff for telephone services can be derived on the basis of costs. This *absolute* measurement should help policy makers determine how many households in their country could theoretically afford individual telephone services. For those families for whom an average tariff is beyond their ability to pay, additional policies might be employed, such as financial assistance or directing network development towards shared access (e.g., public payphones).

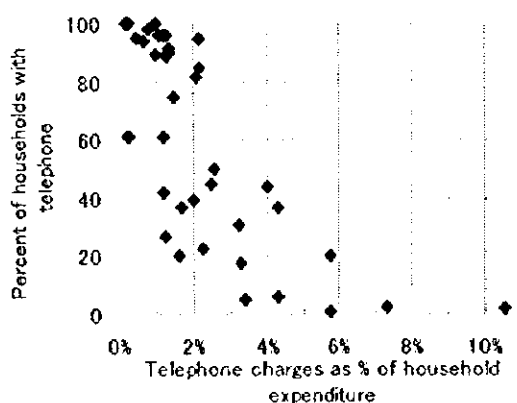
However, another question is what is *average cost*. By looking at a sample of operators from different regions around the world, it is possible to estimate the typical range of operating costs. In 1995, the annual average operating cost per telephone line fell in a range of USD 200-750. The median value was USD 300 while the lowest value, which could be considered as best practice, was USD 200. Residential subscription tariffs (including local calls) tend to recoup about 40 % of operating costs (based on an analysis of the source of revenue for telephone operators) and are typically about half of business tariffs. This would put the annual charge in a range of USD 64-122 (See Table 2.3.3-1.)

As well as considering operating costs for the network as a whole, it is also necessary to consider connection charges to cover a portion of the cost of installing a new telephone line. The average value of connection fees charged by a group of operators is USD 270, the median value is USD 50 and the lowest value USD 20. This amount is divided by 7, the average depreciation time for capital equipment, which results in an annual figure in the range of USD 3-40.

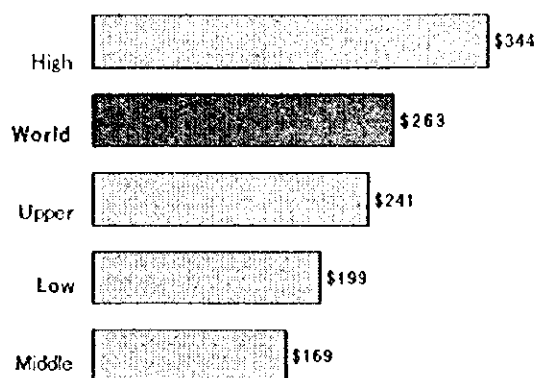
In order to generate sufficient revenue to recoup operating costs and fund network development, low income countries must expect families to spend a greater proportion of

household expenditure on telephone services than in high income countries. If the affordability threshold for basic household telephone service, including a pro rata share of line installation, is set at five % of income, the average household income required for a telephone service would be USD 2,060. For an efficient network with lower operating costs, the figure would fall to USD 1,340 (Table 2.3.3-1). A figure of five % is realistic. South Africa, for instance, has recently set residential tariffs on the basis of household expenditure at this level.

Relative telephone charges, 1995



Telephone charges for one year
By country income grouping, US\$, 1995



Note: The annual telephone charges data are basket based on one tenth of the installation charge, annual subscription in the largest local network, 700 local calls and 130 long-distance calls. Taxes are included.
Source: ITU World Telecommunication Indicators Database, Siemens.

Figure 2.3.3-1 Relative Affordability and Telephone Access

Table 2.3.3-1 Average Residential Tariffs 1995

| | Average | Median | Best practice |
|---|---------|--------|---------------|
| Annual operating cost per line | 380 | 300 | 200 |
| Annual subscription ¹ | 122 | 96 | 64 |
| Annual connection fee ² | 39 | 7 | 3 |
| Total annual charge for telephone service | 160 | 103 | 67 |
| Annual household income required to afford service ³ | 3,200 | 2,060 | 1,340 |

Note: Annual operating cost per line is based on a sample of ten operators from different regions and country income levels around the world. "Best practice" refers to the operator with the lowest operating cost. Costs have been adjusted to reflect the portion of revenues the operators receive from fixed-link telephone service.

¹ Calculated as 40 % of operating costs discounted by 20 % (covered by higher business subscription charge). Includes free local calls

² Actual installation charges divided by seven.

³ Assuming telephone charges represent 5 % of income. Figures are rounded to the nearest USD 10.00.

Source: ITU

2.3.4 National Information Infrastructure Plan

Vietnam is still in the period of industrialization and its informationalization of economy and society is just in the beginning stage, while the wave of Information Technology is rushing into Vietnam and the world countries including APEC members are actively pursuing their own versions of National Information Infrastructure (NII) that will enhance their national competitiveness. In such worldwide waves, it will be required for the coming Vietnam's information society to work over his own plan of Vietnam's National Information Infrastructure. NII is known symbolically as Information Superhighway.

Generally, the development of individual country's NII and its future direction shall be closely related with the unique culture, history, language, level of economic growth and way of life.

NII is increasingly the focus of global concern and national policy aimed at taking advantages of information technology applications. The importance of the information technology as a basic infrastructure is recognized improving the fields of welfare, education, medicine, economy and so on. In the emerging future information society, a well-established national information network plays a crucial role in enhancing economic efficiency and creating national wealth.

In addition to the contribution above, the NII will work as a driving force of the Vietnam's information and communication industry which covers the categories of communication networks, hardware such as computers and multimedia terminals, contents, software and services.

Information Infrastructure

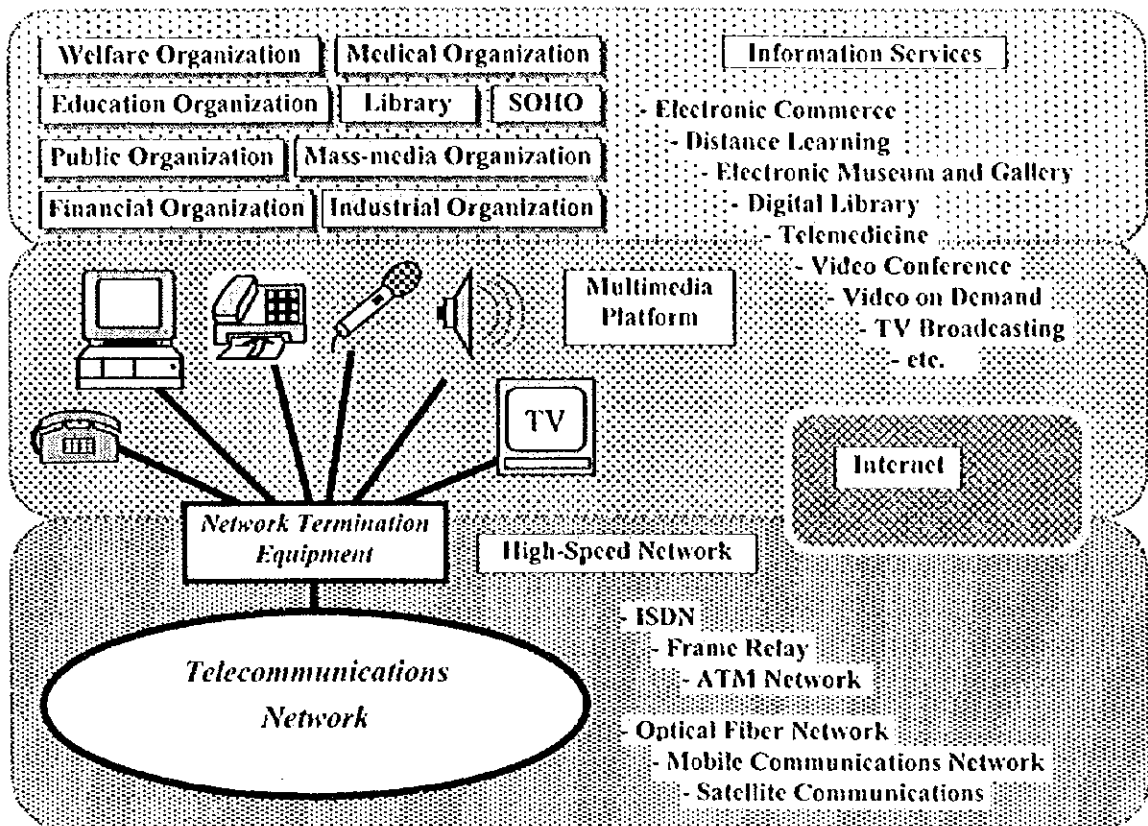


Figure 2.3.4-1 National Information Infrastructure

(1) NII Promotion Organization

In Vietnam, it is still not clear enough to determine how, when, and by whom the NII will be planed and implemented. In order to establish and promote Vietnam's NII, the government shall start to organize a task force in cooperation with the private sectors.

The following three fields will be planed and directed by the task force.

- Information Service Development
- Telecommunications Network Development
- Human Resource Development

The task force shall be formed to work systematically and effectively with five working groups as listed in the Table 2.3.4-1.

Table 2.3.4-1 NII Task Force

| No. | Working Groups | Main Task Descriptions |
|-----|--------------------------------------|---|
| 1 | NII Planning | <ul style="list-style-type: none"> - To formulate Vietnam's NII policies - Planning action steps and trial projects - To study the liberalization and privatization aspects on telecommunications - To establish the telecommunications regulatory regime |
| 2 | Network Construction | <ul style="list-style-type: none"> - Network construction and maintenance - To announce of equipment procurement - Allotment of radio frequency spectrum |
| 3 | Application Technology and Promotion | <ul style="list-style-type: none"> - To promote application services - To make technical research and development - To introduce new technologies |
| 4 | Human Resource | <ul style="list-style-type: none"> - To develop human resources - To improve Information Literacy in Vietnam |
| 5 | Administration and General Affairs | <ul style="list-style-type: none"> - Administrative supports - To coordinate and negotiate NII related affairs - Relationship to Asia-Pacific countries - To draw out NII promoting strategy - To draw out NII whole framework |

(2) **Information Services Development**

Generally, the following information services and multimedia applications can be envisaged in the future information society.

- Education and Training services including Distance Learning
- Electronic Commerce and Exchange of Industrial Information
- Digital Library
- Electronic Museum and Gallery
- Healthcare Applications/Telemedicine
- Intelligent Card/Smart Card
- Video Conference
- VOD
- HDTV etc.

Numbers of the pilot/demonstration systems have been and being carried out in many countries. As a late comer on NII development, Vietnam can avoid detour in the technology, while the individual country shall perform his own service trial with his NII initiative, because no two nations are the same in terms of their interests, capabilities and nature. It means that the pilot project will take a different shape depending on a number of aspects, such as the type of application, the level of interest, and the individual country's ability of Information Technology use and production. The trial shall guide how a particular application service is to be

designed, constructed and maintained in balance with the level of existing services available, other than the economical and social profits.

Considering Vietnam's current educational and medical circumstances, the Distance Learning and Telemedicine trials, optionally adding Video Conferencing trials shall be run. These IT implementations are expected until year 2000. (Cf. Section 9.5.9 of Part I)

(a) Distance Learning (Remote Education)

The multimedia communication function brings diversity of education/training mode into the remote areas. It creates an active and vivid learning environment, gives students incentives to learn, provides plentiful learning materials/information and makes lifelong study possible.

The service program in Vietnam will form two shapes; one is to provide educational information to the rural schools by using Internet (IP) multimedia functions, and the other is to link universities and research institutions with high-speed network which enables to exchange voice, text and video/image information.

(b) Telemedicine

Telemedicine service will be useful in Vietnam, as well. One mode is to provide medical consultations to doctors and other medical staffs from specialists far away, utilizing real-time telephone, E-mail, file/image data transfer and optionally Video Conference system. The other one is to provide diagnostic medical services for patients in a village without a doctor, associating with establishing Community Teleservice Centers (CTC).

(3) Telecommunications Network Development

The information services and applications are provided on the advanced high-speed networks that consist of both fixed and mobile networks, and both wired and wireless networks. It is very important to take an overall system approach to telecommunications infrastructure design, and to deploy digitized telecommunications links and system whenever possible.

Considering current telecommunications network situations in Vietnam, two aspects on the network development are proposed, i.e. providing universal services

and establishing high-speed digital networks.

(a) Universal Services

For the purpose of the balanced development of the Vietnam's entire nation, it is important to provide universal services in telecommunications to both urban and rural areas, in other words, to accelerate the network construction in rural areas.

It will promote the growth of the regional economy and help to improve the living environment of all citizens.

In line with the universal service (Cf. Section 9.2 of Part I), the currently faced subjects are as follows ;

- Network expansion in rural province basis
- To expand the network to all of the communes in Vietnam

(b) High Speed Network Development

In order to realize an information society, the telecommunications network should be ultimately a total digital network, which connects individual digitized networks on a seamless basis, without allowing its users to be conscious of the characteristics of the networks.

Vietnam's high-speed digital network providing the broadband/multimedia services will evolve from a simple network of dedicated line into more efficient options of ISDN, Frame Relay and ATM utilization, coming into line with the transmission and the access network improvement.

Figure 2.3.4-2 shows the time target of the introduction and development of Vietnam's network digitization technologies.

| Network Digitization Technologies | | Time Target of Development | | |
|-----------------------------------|-----------------------------|----------------------------|-------------|-------------|
| | | to 2000 | 2001 - 2010 | beyond 2011 |
| Access Network | FTTB/FTTCab | → | | |
| | FTTC | ☆ | → | |
| | FTTH | ☆ | → | |
| | xDSL | ☆ | → | |
| Transmission | SDH-Inter Province | → 100% | | |
| | SDH-Intra Province | → | | |
| | WDM-80G for Backbone | | ☆ | → |
| | Submarine Route | | ☆ | → |
| Switching and Network Service | N-ISDN (BRI) | ☆ | → | |
| | N-ISDN (PRI) | | ☆ | → |
| | Frame Relay | ☆ | → | |
| | ATM - B-ISDN | | ☆ | → |
| Mobile Communications | Digital Cellular (GSM/CDMA) | → | | |
| | IMT-2000 | | ☆ | → |

Figure 2.3.4-2 High-speed and Total Network Digitization

Vietnam's future information and communications demand will become high mainly in Hanoi, Da Nang and Ho Chi Minh City and the satellite cities of them. The generated multimedia data traffic including voice, text, image and so on will be concentrating in the backbone network linking such 3 large cities. Therefore, the backbone network shall be considered to possess a high-speed and sufficient capacity and capable service nodes as well. In addition to the backbone network development, high-speed digital access networks, e.g. optical access networks, are required to meet the future information and communications demand.

The above mentioned high-speed and total digital network shall be introduced initially into the planned new commercial/industrial cities such as Hanoi High-Tech Park, Dung Quat Industrial Estate, Saigon South and so on. The network infrastructure in these areas shall be able to provide high-speed and broadband services. Table 2.3.4-2 shows the proposed network infrastructure to be constructed in such areas.

Table 2.3.4-2 Network Infrastructure for Commercial/Industrialized City

| Network Infrastructure | Description |
|------------------------|---|
| Access Network | Optical Network FTTB/FTTH : Industrial/Commercial zone FTTCab/FTTC : Residential zone |
| | Metallie Cable Network - Complement for FTTCab/FTTC - Temporary access network |
| | TDMA/WLL Supplemental Use |
| Service Node | POTS/N-ISDN MSU or RSU |
| | Non-telephone Dedicated Line/Frame Relay, optionally ATM |
| Transmission | SDH-Optical Fiber Capacity of STM-4 to STM-16 |
| Mobile System | Digital Cellular GSM/CDMA : Covered developing area |
| Information Services | Internet Setting Internet Access Point |
| | Telemedicine Trial : Hospital in the area |
| | Distance Learning Trial : Research Institution/University/Schools in the area |
| | Video Conference Optional trial |
| | Electronic Commerce To be studied as a future plan |

(4) Human Resource Development

Elevation of the information literacy for entire population and, in particular, developments of human resources to support the development of the advanced information society are important points in order to improve Vietnam's NH.

(a) Human Resource Development

NH development requires qualified personnel with understanding and wide vision on information infrastructure.

It shall cover every field, i.e. technology, finance, management and policy and regulations (see Table 2.3.4-3).

Table 2.3.4-3 Fields of NII Human Resource Development

| | Fields | Description |
|---|------------------------|--|
| 1 | Technology | <p>The construction and development of NII require telecommunications and information technology in particular in engineering and computer and inevitably need experts i.e. engineers and computer technician both in the hardware and software area.</p> <p>Vietnam faces the problem of the lack of engineers and computer technicians both in quantity and quality.</p> <p>Vietnam should start to develop the personnel's skill in technology by means of transfer of technology in the form of research and development in telecommunications industry, fellowship grants, training and study tours in developed economies or joint development projects.</p> |
| 2 | Management | <p>Management is one of the most important factors apart from technology to achieve the project for development of NII. It is the first priority to train the managers with wider vision.</p> <p>Developed economies may offer assistance to support and encourage managers in developing economies.</p> |
| 3 | Policy and Regulations | <p>Policy and Regulations come directly from executive directors and managers. The executive directors and managers should learn and follow closely liberalization policy and regulations for fairness and transparency and to apply them in their own economy to get ready to future impacts.</p> |

(b) Improving Information Literacy

Information Literacy can be defined as the person's ability to operate the relevant equipment in a narrow sense, while in a broader sense, it implies to analyze data and to select and process information on one's own initiative. Concretely, it includes the abilities to use a personal computer, to use networks such as the Internet and so on.

In order to establish the information society to be aimed in the NII, it is essential to improve such Information Literacy.

The following measures to improve Information Literacy are suggested for Vietnam's NII;

- Firstly, mandatory to enhance the computer literacy for civil servants in Vietnam.
- Secondly, it is important for children to be educated in information literacy at school, especially on the computer operating and Internet accessing.
- Thirdly, to familiarize public people with the computer and Internet accessing widely by installing appropriate equipment in places such as post offices and public libraries.

(5) NII Conceptions in Asian Countries

Table 2.3.4-4 shows NII conceptions in Asian countries. It brings useful information for making a program of Vietnam's NII development.

Table 2.3.4-4 NII Conceptions in Asian Countries

| Country | Pilot Project and Description | |
|------------------|----------------------------------|--|
| Singapore | Singapore One | <ul style="list-style-type: none"> <Phase I : 1996-2000> - To provide Distance Learning, Digital Library and High-speed Internet services - Virtual Government Kiosks <Phase II : 1999-2004> - To promote FTTH |
| Indonesia | Nusantara-21 | <ul style="list-style-type: none"> - Archipelagic Super Lane linking 27 provinces with 155Mbps - Multimedia Cities including Ring Java and Multimedia City Jakarta (Optical SDH rings linking major cities) - Distance Learning, Telemedicine, Digital Library, Electronic Museum, Government Informatization |
| Malaysia | Multimedia Super Corridor | <ul style="list-style-type: none"> - ATM network with 5 to 10Gbps links in Kuala Lumpur metropolitan area - To establish Cyber Law - Government Informatization, Distance Learning, Telemedicine, Smart Card, and so on |
| Papua New Guinea | | <ul style="list-style-type: none"> - Network provisioning to inaccessible and disadvantaged remote areas - Network digitization (Packet switching service, Internet and ISDN) - Regulation on the telecommunications |
| Thailand | IT-2000 | <ul style="list-style-type: none"> - Software Park : to enhance domestic software industry - Glnet : backbone networks with 155 to 620Mbps links for 76 provinces and 2Mbps links for the 680 outskirts - Thai Social-Scientific, Academic and Research Network : |
| Korea | Korea Information Infrastructure | <ul style="list-style-type: none"> <Phase II : 1998-2002> - Government Network ATM network with 2.5 to tens Gbps links between 5 major cities and 2.5Gbps between major cities and 7 large cities - Government Informatization, VOD, Video Conferencing, Distance Learning, Telemedicine and so on - FTTB and FTTC for commercial and high-demand areas <Phase III : 2003-2010> - Public Network ATM network with 100Gbps optical transmission system - HDTV, PCS and so on - FTTH |